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FOREWORD



TRAN THANH HAI
Rector
PhD, Professor of Geology

We are pleased to welcome you to the 7th International Conference on Economic Management in Mineral Activities and Topical Issues on Sustainable Development (EMMA+), hosted at the Hanoi University of Mining and Geology on October 23, 2024. The Conference continues to foster dialogue among scientists, researchers, experts, and students dedicated to advancing the field of economic management in mineral activities and sustainable development.

The 7th EMMA+ is particularly special as it coincides with the 25th Anniversary of the Faculty of Economics and Business Administration. This milestone reflects our commitment to excellent education and research, and we are excited to celebrate this journey with all of you.

This year, the Conference received 70 submissions from Australia, Russia, Romania, China, Indonesia, Thailand, and Vietnam. After a rigorous peer-review process, we are proud to include 51 papers in this proceedings volume, alongside ten qualified articles selected for publication in the Journal of Indonesian Economy and Business and Gadjah Mada International Journal of Business. These works represent the latest advancements, insights, and innovative research in the field.

We would like to extend our heartfelt gratitude to all participants whose contributions and insights enrich our discussions and knowledge base. A special thanks goes to our diligent reviewers, whose expertise and commitment ensure the quality of the papers selected for publication. We would like to acknowledge the significant support from the University of Applied Sciences Georg Agricola Bochum, Germany, and colleagues at the Faculty of Economics and Business Administration. Your dedicated assistance has been crucial to the successful organization of the Conference and the preparation of the proceedings. We also appreciated the financial support from our sponsors, which has greatly facilitated our efforts.

We wish the 7th EMMA+ a great success and all participants an enjoyable and fruitful scientific gathering in Hanoi. We look forward to seeing you again at the 8th EMMA+ in 2026 at the same location.

On behalf of the Organizing Committee

Prof. Tran Thanh Hai, PhD

GREEN GROWTH

THE DETERMINANTS OF GREEN BONDS ISSUANCE: EVIDENCE FROM ASEAN-5

Nanda Bayu Saputra[a*], R. Agus Sartono[a]

[a]Universitas Gadjah Mada, Yogyakarta, 55281, Indonesia

**Corresponding author: nandabayu02@mail.ugm.ac.id*

Abstract:

Introduction/Main Objectives: *This research investigates the determinants influencing companies' decisions to issue green or conventional bonds in ASEAN-5 countries from 2018 to 2022.*

Background Problems: *The climate warming issue is escalating and gaining worldwide recognition. Many countries are responding by setting ambitious targets to achieve carbon neutrality in alignment with the Paris Agreement. This trend has created opportunities to develop green financial instruments supporting environmentally friendly projects.*

Novelty*: Previous research has primarily concentrated on developed countries, resulting in a gap in studies regarding the reasons behind green bond issuance in developing countries. This research offers an initial discussion focused primarily on the context of the ASEAN-5 region.*

Research Methods: *This research utilized a binary choice model (Logistic regression) on a sample of 118 corporations from five different countries to assess the direct impact of various factors on the likelihood of these companies issuing green bonds.*

Finding/Results: *The findings of this study reveal that higher coupon bonds and larger bond issuance sizes negatively impact the likelihood of green bond issuance, whereas longer tenors and larger firm sizes positively influence the probability of green bond issuance.*

Conclusion: *Green bond issuance is a complex decision-making process. Understanding its drivers is crucial for achieving Net Zero Emissions, underscoring the need for regulators to implement strategic policy responses.*

Keywords: *Green Bonds, Issuance, Determinant, ASEAN-5, Logistic Regression.*

1. INTRODUCTION

Climate change and global warming are worsening in the 21st century (Abbass et al., 2022). This is evidenced by the annual increase in global surface temperatures caused by greenhouse gas emissions from various countries' economic activities. In the United States, the majority of greenhouse gas emissions stem from fossil fuel combustion for energy use (EIA, 2023). Similarly, in the Asia-Pacific region, the power and heat generation sectors are the most significant contributors to greenhouse gas emissions (Statista, 2024).

The deteriorating climate change issue has become a global consensus (Lin & Su, 2022). Through the COP21 climate change conference, the United Nations introduced the Paris Agreement on December 12, 2015. This agreement outlines concrete steps to tackle climate change and its negative impacts, including limiting global temperature rise to 1.5 degrees Celsius, periodically

evaluating long-term goals collectively, and providing financial support to developing countries for climate change mitigation (United Nations, 2023). Consequently, many countries aim to achieve Net Zero Emissions (NZE) by 2050 (IESR, 2023). NZE refers to the balance between greenhouse gas emissions produced and those removed from the atmosphere (Climate Council, 2023).

The urgency of achieving NZE by 2050 has opened opportunities for green financial instruments dedicated to supporting environmentally sustainable and low-carbon initiatives (Jin et al., 2020). One such instrument is green bonds. According to POJK 60/POJK.04/2017, green bonds or environmentally oriented debt securities are "debt securities whose proceeds are used to finance or refinance environmentally oriented business activities." This distinction sets green bonds apart from conventional bonds, offering a standardized instrument to combat the climate crisis through funding activities that benefit the environment.

Globally, the guidelines and standards for green bond usage refer to the International Capital Market Association's (ICMA, 2021) Green Bond Principles and the Climate Bond Initiative's (CBI, 2024) Climate Bond Standards. Regionally, the ASEAN Green Bond Standards by the ASEAN Capital Markets Forum guide green bond issuance in Southeast Asia, along with other standards relevant to each region.

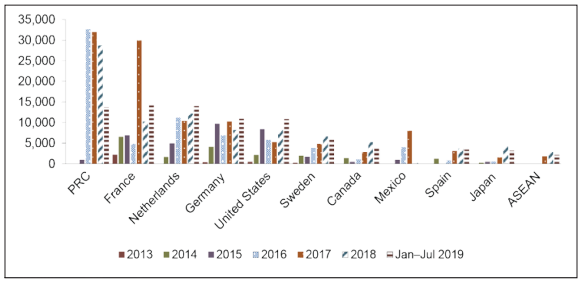


Fig1. Green Bond Issuance (ADBI, 2020).

The first green bond was issued in 2007 by the European Investment Bank (EIB) through the Climate Awareness Bond. Despite the rapid growth of the green bond market, it represented only about 3% to 3.5% of total bond issuance in 2020, indicating a need for faster growth to meet the Paris Agreement targets (European Parliament, 2022). Countries in Southeast Asia, particularly, have shown commitment to realizing carbon neutrality by integrating green bonds. However, green bond issuance in ASEAN remains relatively low compared to China and other countries (Fig1).

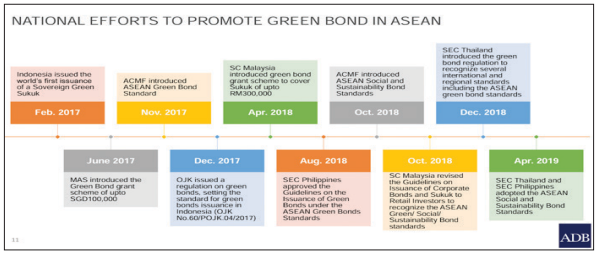


Fig2. Green Bond Promotion in ASEAN (ADB, 2019).

This research focuses explicitly on the ASEAN-5, the five founding countries of the Association of Southeast Asian Nations: Indonesia, Malaysia, the Philippines, Thailand, and Singapore. These countries are the ASEAN region's primary promoters of green bonds (Fig2). They have set NZE targets for 2050, yet their green bond issuance is relatively lower than other countries, creating a gap. Therefore, investigating the factors that influence a company's decision to issue green bonds is intriguing.

This research aims to assist governments in formulating effective green bond promotion policies by understanding corporate issuance behavior, providing managerial decision-making insights for other companies, and filling the literature gap on the determinants of green bonds versus conventional bond issuance, particularly in the ASEAN-5 context. This research uses corporate bond issuance data, both green and conventional, in the five countries (ASEAN-5) from 2018 to 2022, excluding the financial and government sectors.

To gain a deeper understanding of the motivations driving green bond issuance, we investigate a range of factors that may influence these decisions, along with the mechanisms that underpin them. Our analysis identifies eight potential determinants spanning three key dimensions: the characteristics of the issued bonds, issuer-specific traits, and broader macroeconomic conditions. By employing a logistic binary choice model, we evaluate the direct effects of each identified factor on the likelihood of green bond issuance.

Our overall results firstly reflect that the companies with higher bond coupon rates and larger bond issuance sizes decrease the probability of firms issuing green bonds. On the other hand, a longer tenor and larger issuer size are linked to an increased likelihood of green bond issuance. Therefore, these findings offer specific implications for policymakers to encourage the growth of green bonds and provide some managerial recommendations.

The paper is structured as follows: Section 2 presents the literature review and the hypotheses to be studied. Section 3 describes the research framework, data set, and methodology. Section 4 describes and discusses the empirical results from regression. Section 5 contains the research conclusions. Lastly, Section 6 includes imitations and future lines of research.

2. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

2.1. Literature Review

2.1.1. Green Bonds

Green bonds are bond instruments whose proceeds are exclusively used to finance or refinance in part or whole from green projects that have met the requirements and are in line with the four components of the Green Bond Principles (ICMA, 2021). Based on the Green Bond Principles issued by the International Capital Market Association (2021), the four components consist of (1) use of proceeds, (2) project evaluation and selection process, (3) fund management, and (4) reporting.

Like conventional bonds, green bonds are fixed-income financial instruments to raise capital from investors through the debt capital market. Bond issuance involves acquiring fixed capital from investors over a certain period, with repayment of the capital (principal) at maturity and payment of agreed interest (coupons) throughout the journey. The fundamental difference between green bonds and conventional bonds lies in granting a "green label" placed by the issuer or other entity. In this context, bonds are given "green"

status, indicating a commitment to use funds from green bonds, namely the principal, in a transparent manner. Unlike regular bonds that finance the issuer's working capital, green bonds must be explicitly used to finance or refinance green projects or assets (Maltais & Nykvist, 2020).

The ASEAN Capital Markets Forum (ACMF) in the ASEAN Green Bond Standards (2018) released green project categories including but not limited to renewable energy projects, energy efficiency, pollution prevention and control, sustainable management of biological natural resources and land use, terrestrial and aquatic biodiversity conservation, clean transportation, sustainable water and waste management, climate change adaptation, products/technologies/production processes that are in accordance with the circular economy, and green buildings that meet standards.

2.1.2. Capital Structure Theory

A critical aspect of a company's decision is the capital structure decision. The capital used by the company to run operations and develop the business can come from equity and debt from third parties. Titman et al. (2018) explained that the capital structure is a combination of equity and debt used by the company. The main objective of capital structure management is to realize an optimal capital structure that maximizes the company's value. According to Titman et al. (2018), the optimal capital structure is a combination of funding sources in the capital structure that can increase value. Scott (1976) added that the company's capital structure that reaches its maximum point indicates optimal performance, and its financial leverage can reduce the weighted average cost of capital (WACC).

2.1.3. Trade-Off Theory

According to Hanafi (2016), some things prevent companies from using as much debt as possible. This is because the higher the debt, the higher the potential for bankruptcy. Brigham and Houston (2017) explain that the trade-off theory suggests companies balance the tax advantages of debt financing against the risks associated with potential bankruptcy. Thus, the capital structure theory by Modigliani and Miller (1963) is considered less relevant because it does not consider the assumption of the company's bankruptcy costs.

In the context of issuing green bonds, companies will consider the higher interest costs. If the additional costs exceed the benefits received by the company, conventional bonds will be more attractive. Conversely, if the benefits obtained exceed the costs, the company may issue green bonds to get a lower cost of capital with greenium while improving its reputation (Carmichael & Rapp, 2022).

2.1.4. Signaling and Asymmetric Information Theory

There is a relationship between asymmetric information theory and signaling. Modigliani and Miller (1958) assume that managers and investors have the same information about the company's prospects (symmetric information). However, there is a gap in the information they received about the company's prospects (asymmetric information). Managers have better information than investors. Hanafi (2016) stated that investors who feel they have less information will try to interpret the behavior of managers. The existence of asymmetric information can potentially cause market failure (Sartono, 2001).

In the context of this research, investors often lack adequate information to assess a

company's commitment to the environment. Therefore, investors need to distinguish companies committed to the environment from those that are not. Companies can signal their commitment to the environment by issuing green bonds.

2.2. Hypothesis Development

Green bonds are specifically crafted to reduce issuance costs and appeal to companies with a strong environmental focus (Gianfrante & Peri, 2019). Regarding the average coupon rate, green bonds have lower issuance yields when compared to conventional bonds (Fatica et al., 2021). Therefore, the cost advantage of green bonds has succeeded in attracting the attention of corporate issuers (Lin & Su, 2022). Green bond coupons are expected to negatively correlate significantly with a company's decision to issue green bonds (Lin & Su, 2022). Companies tend to issue green bonds due to their desire for lower coupon payment obligations, opting to issue conventional bonds for larger debt requirements. This aligns with Barua and Chiesa (2019) observation that lower coupon rates frequently incentivize companies to pursue green bond issuance. Therefore, we propose the following hypothesis:

H1: The COUPON influences the probability of listed companies in the ASEAN-5 countries to issue green bonds.

While green bonds offer numerous advantages, they also present challenges. The strict requirements related to the allocation of financing proceeds, especially when facing broader financing needs, can be a significant hurdle. This underscores the need for further research and innovation in the field of green finance (Cao et al., 2021). According to Lin and Su (2022), the bond size is expected to have a significant negative correlation with the company's decision to issue green bonds. Green bonds are often chosen when the company has relatively tiny funding needs. This is logical, given that green bonds involve more stringent verification processes compared to traditional debt financing methods. (Cao et al., 2021). Therefore, we propose the following hypothesis:

H2: The LnSIZE influences the probability of listed companies in the ASEAN-5 countries to issue green bonds.

Tenor, the period until the bond matures, is a crucial factor in financial planning. Conventional bonds become more appealing when the bond tenor is extended since they demand a higher issuance size and can considerably impact financing costs. This highlights the importance of careful financial planning and the need for a thorough understanding of the implications of tenor on financing costs (Lin & Su, 2022). According to Cicchiello et al. (2022), the tenor is the average bond maturity expected to negatively correlate with a company's decision to issue green bonds. Companies typically issue green bonds to fulfill lowered loan demand while capitalizing on the improved reputation associated with green activities. Green bonds are not a key source of funding. According to related studies, conventional bonds are preferable since longer bond maturities need larger issue sizes and have an impact on funding costs (Lin & Su, 2022). In addition, longer tenors will increase interest rate risk, which can impact the company's borrowing costs. If interest rates rise significantly in the future, companies will have to pay more for interest on their bonds. Therefore, we propose the following hypothesis:

H3: The TENOR influences the probability of listed companies in the ASEAN-5 countries to issue green bonds.

The current ratio measures a company's ability to pay its short-term liabilities with its current assets. A company's liquidity is reflected in the size of its current assets or assets that are easily converted into cash, including cash, securities, receivables, and inventory (Sartono, 2001). According to Cicchiello et al. (2022), the level of solvency can positively impact the comfort of a company's funding. Since they have less asymmetric information, companies with a greater level of solvency (higher current ratio) would be more inclined to issue conventional bonds. In addition, the flexibility of conventional bonds that do not impose restrictions on the use of funds may also be more attractive to companies with lower current ratios when compared to green bonds (Lin & Su, 2022). According to Cicchiello et al. (2022), the current ratio is a proxy for short-term solvency that negatively correlates with the company's decision to issue green bonds.

H4: The CURRENT influences the probability of listed companies in the ASEAN-5 countries to issue green bonds.

Company size is a scale that reflects the size of a company. The proxy used in this research is the company's total assets transformed into the logarithm of nature. Using total assets as a proxy provides an overview of the total resources owned by the company (Dang et al., 2018). Lin and Su (2022) state that larger companies face lower information costs. Larger companies usually have a good reputation, more access to credit ratings, and more transparent financial statements, so they can quickly obtain funding through conventional methods such as conventional bonds. On the other hand, smaller companies often do not have these advantages, making it quite challenging to obtain funding through conventional bonds.

As a result, small companies are increasingly turning to alternative funding sources, such as green bonds. A survey by the Asian Development Bank (2022) underscores this trend, revealing that green bond issuers are predominantly smaller companies. Specifically, 40% of issuers have a market capitalization of less than 500 million US dollars, 26% fall between 500 million and 2 billion US dollars, and only 3% have a market capitalization of 50 billion US dollars.

H5: The LnFSIZE influences the probability of listed companies in the ASEAN-5 countries to issue green bonds.

3. RESEARCH DESIGN

3.1. Research Framework

This research will employ a binary response model, specifically a logit model. According to Seo (2016), logistic regression analysis is used to explore the correlation between response probabilities in binary or ordinal form and explanatory variables. Generally, this method fits a linear logistic regression model using the maximum likelihood approach, as explained by Hosmer and Lemeshow in 1989. This quantitative research involves using numerical data collected to answer a specific question (Sekaran & Bougie, 2016). This research will use secondary data, with one dummy dependent variable and five independent

variables. These variables will be examined through hypothesis testing based on five hypotheses previously discussed.

The research aims to test the causality between the dummy variable "GREEN" (valued at 1 if the company issues green bonds and 0 if it issues conventional bonds) and three independent variables related to characteristics of bonds ("COUPON," "LnSIZE," "TENOR") and two independent variables related to characteristics of the issuer ("CURRENT," "LnFSIZE"). Additionally, there are three country-level control variables ("GROWTH," "INFLATION," and "INTEREST").

3.2. Data Collection and Preview

This research will focus on private companies listed in ASEAN-5 countries, excluding the financial and government sectors. Companies will be selected based on the completeness of their financial reports published during the 2018-2022 period. The sample will be chosen using the data pooling method with purposive random sampling, specifically judgment sampling, which involves selecting samples based on specific criteria. The criteria for this research are:

Table 1. Sample Selection Process

Number	Selection Criteria	Observations
1	Private companies listed in ASEAN- 5 issuing bonds from January 1, 2018, to December 31, 2022	380,776
2	Companies that issue green and conventional bonds with the "Plain Vanilla Fixed Coupon" coupon type	3,416
3	Companies other than the financial, banking and government sectors	2,055
4	Companies that have complete financial report data required for research	541
Final Observations		541

This research uses panel data. According to Gujarati and Porter (2009), Panel data integrates both cross-sectional and time series data. This indicates that panel data has several observations with the same unit over time. Thus, panel data has advantages; first, it allows researchers to control specific characteristics that individuals, companies, or others do not observe. Second, the data also allows researchers to research lags in the behavior or outcomes of a policy (Wooldridge, 2016). The panel data used in this research is unbalanced panel data, which means that the number of observations for each company is different.

The research data was collected through various sources. Data on private companies listed in ASEAN-5 that issued conventional and green bonds during 2018-2022 came from Thompson Reuters Refinitiv Eikon DataStream. Then, it was supplemented with company characteristics data from Osiris, annual and financial reports from the company's official website, and macroeconomic data obtained from the World Bank and CEIC data.

Table 2. Variable Definitions and Summary Statistics

Variable	Definition
Dependent Variable	
GREEN	The dummy variable is set to one if a firm issues a green bond, and zero otherwise (i.e., if the bond is identified as a "green bond" in the Thomson Reuters Refinitiv database).
Independent Variables	
COUPON	Percentage of annual coupon interest rate per year.
LnSIZE	The natural logarithm of the value of the bonds issued.
TENOR	The maturity period of the bond in years
CURRENT	The company's current ratio one year before the bond issuance
LnFSIZE	Firm size, measured by the natural logarithm of total assets
Control Variables	
GROWTH	Annual gross domestic product growth rates of five ASEAN countries.
INFLATION	The inflation rate of the five ASEAN countries, measured by the gross domestic product deflator
INTEREST	The interest rate of the 10-year government bond yield of five ASEAN countries

According to Lin and Su (2022) and Altunbaş et al. (2010), the firm characteristic variable (CURRENT) is used with a lag at time t-1 from the year of bond issuance. This approach is important because the decision to issue bonds is related to the company's financial accounts from the previous year. Additionally, this method can help prevent endogeneity issues.

3.3. Methodology

3.3.1. Logit Regression

Logit regression or logistic regression is a statistical model used to model the probability of a binary outcome variable based on one or more explanatory variables. The response probability in the logit model is a logit function evaluated on the linear function of the explanatory variable (Wooldridge, 2018). Unlike linear regression, logit regression aims to predict the probability for categorical binary classifications, such as "yes" or "no" and "success" or "failure." In this case, the logit model analysis aims to see whether the independent variables can predict the probability of the dependent variable.

Binary response models such as logit are nonlinear, so they use the Maximum Likelihood Estimation (MLE) method to find the best model parameters by maximizing the possibility of observing the existing data. We use the logit regression model using GREEN as a dummy variable to distinguish the kind of issuance as the dependent variable, as indicated by Eq. (1).

$$\text{Ln}\left(\frac{p}{1-p}\right) \text{GREEN}_{i,t} = \beta_0 + \beta_1 \text{COUPON}_{i,t} + \beta_2 \text{LnSIZE}_{i,t} + \beta_3 \text{TENOR}_{i,t} + \beta_4 \text{CURRENT}_{i,t} + \beta_5 \text{LnFSIZE}_{i,t} + \beta_6 \text{GROWTH}_{i,t} + \beta_7 \text{INFLATION}_{i,t} + \beta_8 \text{INTEREST}_{i,t} \quad (1)$$

The issuance choice is primarily based on the previous year's accounts, which helps avoid potential endogeneity issues.

Table 3 presents the descriptive summary of all the variables used in this research. The dependent variable, GREEN, has an average value of 0.3419593 based on 541 observations. The independent variable, COUPON, represents the annual coupon interest rate of the issued bonds, with an average of 0.562616 or 56%. The bond with the lowest coupon rate is issued by Central Pattana PCL (Thailand), offering 10.1% for conventional bonds, while PT Global Mediacom Tbk (Indonesia) has the highest rate at 12%. The independent variable, LnSIZE, is the natural logarithm of the bond issue size in USD, averaging 16.75076. The smallest issuance size belongs to PT Global Mediacom Tbk (Indonesia), while the largest, with a value of 20.86303, is by PT Indofood CBP Sukses Makmur Tbk (Indonesia), both for conventional bonds.

The TENOR variable represents the time to maturity of the bonds, with an average of 7.066543 years. The shortest tenor, at two years, is shared by bonds issued by Wha Utilities and Power PCL (Thailand), True Corporation PCL (Thailand), Ayala Land Inc (Philippines), PT Oki Pulp & Paper Mills (Indonesia), and PT Intiland Development Tbk (Indonesia). At 31 years, the longest tenor is for bonds issued by PT Indofood CBP Sukses Makmur Tbk (Indonesia).

The CURRENT variable reflects the current ratio one year before bond issuance, averaging 1.820426. PT Duta Angggada Realty Tbk (Indonesia) has the lowest current ratio at 0.14, while PT Pelabuhan Indonesia (Persero) has the highest at 25.31094. LnFSIZE variable is the natural logarithm of total assets, indicating the size of the bond-issuing company. The average company size is 18.15038, with the smallest being PT Sinar Mas Agro Resources and Technology Tbk (Indonesia) at 0.264043 and the largest being PT Bumi Serpong Damai Tbk (Indonesia) at 31.8054.

This research also includes three country-level control variables: GROWTH, INFLATION, and INTEREST. The GROWTH variable measures the GDP growth of the five ASEAN countries (Indonesia, Malaysia, Philippines, Thailand, and Singapore) from 2018 to 2022, with an average of 2.470356. The Philippines experienced the lowest GDP growth in 2020, at -9.518295, while Singapore had the highest in 2021, at 8.882354.

The INFLATION variable represents the inflation rate of the five ASEAN countries over five years, as measured by the GDP deflator, averaging 4.398243.

Table 3. Descriptive Statistics

Variable	N	Mean	S.D	Min	Max
GREEN	541	0.3419593	0.4748051	0	1
COUPON	541	0.562616	0.2589992	0.101	1.2
LnSIZE	541	16.75076	1.734579	8.066208	20.86303
TENOR	541	7.066543	4.215405	2	31
CURRENT	541	1.661195	1.820426	0.14	25.31094
LnFSIZE	541	18.15038	2.913327	0.264043	31.8054
GROWTH	541	2.470356	4.169633	-9.518295	8.882354
INFLATION	541	4.398243	3.763805	-2.696455	9.567844
INTEREST	541	48.59827	24.4786	12.18	92.47

Singapore had the lowest inflation in 2020, at -2.696455, and Thailand had the highest in 2022, at 9.567844. The INTEREST variable refers to the 10-year government bond yield rate of these countries, averaging 48.59827. Singapore had the lowest rate, at 12.18 in 2020, and Indonesia had the highest, at 92.47 in 2018.

3.3.2. Hosmer-Lemeshow Goodness of Fit Test

Determination testing in the logit model aims to test how well the model fits the observed data. The test used in the determination test (goodness of fit) uses the Hosmer-Lemeshow test. Provisions regarding the Hosmer-Lemeshow test: (1) the probability statistic value (Prob> chi2) <0.05 (95% confidence level), meaning that there is a significant difference between the observation value and the model, (2) the probability statistic value (Prob> chi2)> 0.05 (95% confidence level), meaning that there is no significant difference between the observation value and the model. Thus, a model that has a high H-L test value (> 0.05) is good because it fits the observed data.

4. RESULTS AND DISCUSSION

4.1. Logit Regression Results

This section presents the main regression results derived from the Logit model, both for the full sample data (ASEAN-5) and for each country. Finally, we will conduct the Hosmer-Lemeshow test.

The results of the nonlinear logit regression in Table 4 cannot be interpreted directly except for the direction of the relationship (positive or negative). Therefore, the interpretation method in this research does not use coefficients or odd ratios but uses the average marginal effect (AME) as in Table 5.

The influence of variables in this research is tested simultaneously using the Likelihood Ratio (LR) test. Based on Table 4, it is known that the Value (Prob > chi2) is 0.0000 or less than 0.05 (95% confidence level). This indicates that there is an influence of at least one independent variable on the dependent variable.

Table 4. Logit Regression Results for Full Sample

Independent Variables	Dependent Variable = 1 if a firm issues green bonds (GREEN)			
	Coeff.	Robust Std. Error.	z	p-value
COUPON	-4.753672***	1.546268	-3.07	0.002
LnSIZE	-0.8624765***	0.139142	-6.20	0.000
TENOR	0.2786519***	0.043299	6.44	0.000
CURRENT	-0.242258**	0.114642	-2.11	0.035
LnFSIZE	0.1410751*	0.0855208	1.65	0.099
GROWTH	0.2097365***	0.0422496	4.96	0.000
INFLATION	-0.2139704***	0.053166	-3.87	0.000

Independent Variables	Dependent Variable = 1 if a firm issues green bonds (GREEN)			
	Coeff.	Robust Std. Error.	z	p-value
INTEREST	-0.0577247***	0.0196788	-2.93	0.003
Constant	14.4484***	2.30047	6.28	0.000
Num of Obs.	541			
Log pseudolikelihood	-175.14641			
Wald chi2 (8)	132.93			
Prob > chi2	0.0000			
Pseudo R2	0.4960			

Note: In Equation (1), the dependent variable is GREEN; * Significant on 10%; ** Significant on 5%; *** Significant on 1%.

In the context of this research, the average marginal effect informs that each additional predictor variable of one unit is associated with an increase or decrease in the probability of a company issuing green bonds of the result dy/dx multiplied by 100 percentage points (Taberner, 2021).

Table 5. Average Marginal Effects for Full Sample

Independent Variables	Dependent Variable = 1 if a firm issues green bonds (GREEN)			
	dy/dx	Delta-method Std. Err.	z	p-value
COUPON	-0.4856376***	0.1421867	-3.42	0.001
LnSIZE	-0.088111***	0.0083349	-10.57	0.000
TENOR	0.0284672***	0.0030439	9.35	0.000
CURRENT	-0.0247492	0.0166832	-1.48	0.138
LnFSIZE	0.0144123*	0.0082143	1.75	0.079
GROWTH	0.0214268***	0.0041102	5.21	0.000
INFLATION	-0.0218593***	0.0047577	-4.59	0.000
INTEREST	-0.0058972***	0.001737	-3.40	0.001
Num of Obs.	541			

*Note: In Equation (1), the dependent variable is GREEN; * Significant on 10%; ** Significant on 5%; *** Significant on 1%.*

The first bond characteristic variable, COUPON, which is the percentage of the annual coupon interest rate of the bond, has a regression result of -0.4856376 with a negative relationship direction and is statistically significant at the 1% level, ceteris paribus. This indicates that for every 1 unit increase in the bond coupon, the company's probability of issuing green bonds will decrease by 48.5 percentage points. The second independent variable, LnSIZE, the natural logarithm of the value of the bonds issued, has a result of -0.088111 with a negative relationship direction and is statistically significant at the 1% level, ceteris paribus. This indicates that for every 1 unit increase in the bond size, the company's probability of issuing green bonds decreases by 88 percentage points. The third independent variable, TENOR (bond

maturity period), has a regression value of 0.0284672 with a positive relationship direction and is statistically significant at the 1% level, ceteris paribus. This indicates that for every one-year increase in the bond maturity period, the company's probability of issuing green bonds will increase by 2.8 percentage points. The fourth independent variable, CURRENT (the company's current ratio one year before the bond issuance), has a regression value of -0.247492 with a negative relationship direction and is proven insignificant. The last independent variable, LnFSIZE (logarithm of total assets in kind) or company size, has a regression value of 0.0144123 with a positive relationship direction and is statistically significant at the 10% level, ceteris paribus. This indicates that for every 1 unit increase in company size, the company's probability of issuing green bonds increases by 1.4 percentage points.

This research uses three country-level control variables: GROWTH, INFLATION, and INTEREST. The GROWTH variable has a regression value of 0.0214268 with a positive relationship direction and is statistically significant at the 1% level, ceteris paribus. This indicates that for every 1 unit increase in the company's country GDP growth, the probability of the company issuing green bonds increases by 2.1 percentage points. The INFLATION variable has a regression result of -0.0218593 with a negative relationship direction and is statistically significant at the 1% level, ceteris paribus. This indicates that for every 1 unit increase in inflation in the country where the company operates, the probability of issuing green bonds by the company decreases by 2.1 percentage points. Finally, the INTEREST control variable has a regression result of -0.0058972 with a negative relationship direction and is statistically significant at the 1% level, ceteris paribus. This indicates that for every 1 unit increase in the government's 10-year interest rate in the country, the probability of the company issuing green bonds decreases by 0.5 percentage points.

Table 6. Composition of Research Sample Data

Country	Green Bond (GREEN =1)	Conventional Bond (GREEN = 0)
Indonesia	0	149
Malaysia	133	60
Filipina	4	49
Thailand	41	84
Singapore	7	14
Total	**185**	**356**

Based on the composition between the number of dummy variables with values 1 and 0 in the research sample, logit regression analysis in each country can be carried out in Malaysia (Table 7), Philippines (Table 8), and Thailand (Table 9), except for Indonesia due to the absence of green bond issuance by companies in sectors other than financial and government during 2018-2022 and Singapore with relatively little bond issuance data so that analysis cannot be carried out with many variables (five independent variables and three control variables). However, the logit model used in the analysis per country excludes the independent variable of the size of the issuing company (LnFSIZE) due to the issue of perfect separation that can occur when the independent variable perfectly predicts the dependent variable, thus causing a convergence problem in the logit regression. The issue of perfect separation does not arise when the analysis is carried out with ASEAN-5 data due to the higher level of variability in the predictor variables.

Table 7. Logit Regression (Malaysia)

Independent Variables	Dependent Variable = 1 if a firm issues green bonds (GREEN)			
	Coeff	Robust Std. Error.	z	p-value
COUPON	1.962634	7.151375	0.27	0.784
LnSIZE	-1.100442	0.3089086	-3.56	0.000
TENOR	0.6048646	0.1368768	4.42	0.000
CURRENT	-1.371557	0.6275562	-2.19	0.029
GROWTH	0.7080171	0.2545482	2.78	0.005
INFLATION	-0.7745742	0.2090824	-3.70	0.000
INTEREST	-0.3460979	0.1682716	-2.06	0.040
Constant	29.88379	6.768695	4.42	0.000
Num of Obs.	193			
Log pseudolikelihood	-42.217676			
Wald chi2 (8)	36.23			
Prob > chi2	0.0000			
Pseudo R2	0,4960			

*Note: In Equation (1), the dependent variable is GREEN; * Significant on 10%;*

*** Significant on 5%; *** Significant on 1%.*

Table 8. Logit Regression (Philippines)

Independent Variables	Dependent Variable = 1 if a firm issues green bonds (GREEN)			
	Coeff.	Robust Std.Error	z	p-value
COUPON	4.436502	5.665863	0.78	0.434
LnSIZE	-0.0425183	0.2328537	-0.18	0.855
TENOR	-0.8527382	0.6132154	-1.39	0.164
CURRENT	-0.6159349	0.3894392	-1.58	0.114
GROWTH	0.0366177	0.1076836	0.34	0.734
INFLATION	-0.4436055	0.5312129	-0.84	0.404
INTEREST	-0.270626	0.0654602	-0.41	0.679
Constant	3.782212	6.627681	0.57	0.568
Num of Obs.	53			
Log pseudolikelihood	-11.862905			
Wald chi2 (8)	4.16			
Prob > chi2	0.7611			
Pseudo R2	0.1635			

*Note: In Equation (1), the dependent variable is GREEN; * Significant on 10%;*

*** Significant on 5%; *** Significant on 1%.*

Table 9. Logit Regression (Thailand)

Independent Variables	Dependent Variable = 1 if a firm issues green bonds (GREEN)			
	Coeff.	Robust Std. Error	z	p-value
COUPON	-5.996437	1.748451	-3.43	0.001
LnSIZE	-0.3574055	0.297349	-1.20	0.229
TENOR	0.2293827	0.0683644	3.36	0.001
CURRENT	0.2349334	0.2069906	1.13	0.256
GROWTH	-0.006504	0.1139343	-0.06	0.954
INFLATION	-0.0524295	0.1153463	-0.45	0.649
INTEREST	0.0287785	0.0465421	0.62	0.536
Constant	5.187502	5.735843	0.90	0.366
Num of Obs.	122			
Log pseudolikelihood	-66.582586			
Wald chi2 (8)	28.61			
Prob > chi2	0.0002			
Pseudo R2	0.1201			

*Note: In Equation (1), the dependent variable is GREEN; * Significant on 10%; ** Significant on 5%; *** Significant on 1%.*

Table 10. Hosmer-Lemeshow Test

Number of Observations	541
Number of Groups	10
Hosmer-Lemeshow chi2(8)	7,80
Prob > chi2	0,4533

The Goodness of Fit test (Table 10) for the logit model in this research used the Hosmer-Lemeshow test. Based on the table above, it is known that the value of Prob > chi2 (0.4533) is greater than alpha 0.05. These results indicate no significant difference between the observed values and the model. Therefore, the logit model in this research is considered good because it fits the observed data.

Regarding bond characteristic variables, COUPON, and LnSIZE significantly negatively affect the GREEN dummy variable. It reveals that the higher the green bond coupon, the lower the company's probability of issuing green bonds. In other words, the findings explain that low bond coupons often encourage companies to issue green bonds (Barua & Chiesa, 2019). Green bonds are designed to minimize issuance costs and are used as a funding source for eco-friendly initiatives (Giafrante & Peri, 2019). Compared to conventional bonds, the average coupon rate on green bonds is lower (Fatica et al., 2021). However, several costs could potentially arise, given the limited flexibility of use. For example, the cost of green certification for third parties is due to possible policy uncertainty (Lin & Su, 2022). These findings are consistent with studies conducted in Europe (Cicchiello et al, 2022) and China (Lin & Su, 2022). The negative relationship between LnSIZE and GREEN indicates that green bonds are preferred when a company's funding needs are relatively small. This is supported by the fact that green bonds involve more certification procedures conducted by third parties to validate information about the

environmental benefits of a green bond project and avoid companies' greenwashing practices (Baity, 2023). This results in inefficiencies when issuing large amounts of debt through green bonds. These findings are consistent with research conducted in China (Lin & Su, 2022). Research by Zhou and Cui (2019) also revealed that green bonds are not the primary financing option for companies but rather are seen as a prestige tool aimed solely at enhancing a company's environmentally friendly reputation.

On the other hand, the third bond characteristic variable, TENOR, has a significant positive effect on GREEN. This research's findings imply that bonds with longer maturities are suitable for supporting the financing of environmentally friendly projects in ASEAN-5, considering that the green projects being funded are long-term.

For issuer characteristic variables, The LnFSIZE is the only variable that significantly influences the choice between issuing green or conventional bonds. Based on the coefficient sign, larger companies are more inclined to issue green bonds compared to their smaller companies. It's supported by the argument that larger companies have a greater capacity to manage risk and possess sufficient resources to participate in funding environmentally friendly projects through green bonds. According to the theories of asymmetric information and signaling, issuing green bonds is also a step to reduce the information asymmetry between investors and companies regarding their involvement in environmentally friendly projects. Therefore, issuing green bonds can serve as a credible signal to investors that the company is committed to environmental sustainability by participating in green projects.

CURRENT has been found to have no significant impact on the dependent variable GREEN. Companies with relatively low current ratios might choose to issue green bonds if they have credible green projects and receive government support to mitigate financial risks. In the context of ASEAN-5, the intensity of green projects and government support have not yet shown significant influence, resulting in no significant relationship between the CURRENT variable and GREEN. On the other hand, the current ratio measures a company's ability to meet its short-term obligations, while bonds, in general, and green bonds, in this case, are long-term. Thus, there may be a mismatch between the current ratio and the issuance of green bonds.

5. CONCLUSION

Understanding the determinants of green bond issuance is urgent to achieve the Net Zero Emission target in 2050. Research conducted in the context of ASEAN-5 is essential because the level of green bond issuance is still quite low compared to other countries. The variables of the characteristics of the bonds issued, the characteristics of the bond issuer, and external factors - such as the macroeconomic conditions of a country - have been shown to have a significant influence. Thus, a company's decision to issue green bonds is a complex decision-making process. The findings in this research reveal that higher bond coupon rates and larger bond issuance sizes have been shown to significantly negatively affect the probability of a company's decision in ASEAN-5 to issue green bonds. On the other hand, the longer the bond tenor and the larger the size of the issuing company have a significant positive effect. This research also reveals that the issuer's current ratio has been shown to have no significant effect on the probability of a company issuing green bonds.

The findings of this research have implications for both government policy-making and corporate management. The determinants that significantly influence a company's decision to issue green bonds include all three factors: bond characteristics, issuer characteristics, and macroeconomic external factors. This suggests that the design of green bond mechanisms and targeted promotional policies play a crucial role in increasing the popularity of green bonds and achieving the targets set by the Paris Agreement.

As a result, governments can start crafting strategic policies to boost green bond issuance, such as tax incentive policies that reduce the tax burden for investors receiving coupon payments from green bonds. This could increase demand for green bonds, encouraging companies to issue them. From a corporate perspective, the findings on green bonds can provide valuable insights before engaging in sustainable investments, helping companies reduce long-term funding costs. Based on these research findings, companies are advised to issue green bonds rather than conventional bonds if the projects being funded have a long tenure.

6. LIMITATIONS AND FUTURE RESEARCH

This research faces four limitations. Firstly, the limited time range is due to the scarcity of data on companies issuing green bonds in the ASEAN-5 region, as green bonds are relatively new in this area. Secondly, the research only employs a nonlinear logit regression model, thus providing results from a single model. Thirdly, this research only examines the determinants of green bond issuance for the ASEAN-5 region and does not focus on individual countries. This limitation is due to the limited number of green bond issuance data in each country, making partial analysis impractical. Fourthly, this research does not include independent variables related to corporate governance in the model, even though some studies in developed countries have incorporated them.

Therefore, future research can make four improvements. First, extend the research period to more than five years as time progresses to increase the number of observations. Second, the research model should be combined with other nonlinear regression models, such as the Probit model, to explore potential differences in results. Third, conduct a more in-depth study on the future determinants of green bond issuance, focusing on each ASEAN-5 country to obtain more specific findings. This improvement becomes possible as the data on companies issuing green bonds in ASEAN-5 increases yearly. Finally, independent variables related to corporate governance—such as the percentage of women on the board of directors—should be added to understand better these variables' role in influencing a company's decision to issue green bonds.

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USING THE ANALYTIC HIERARCHY PROCESS TO SELECT ELECTRICITY GENERATION SOURCE FOR OFF-GRID HOUSEHOLDS IN LAI CHAU

Pham Canh Huy[a], Nguyen Linh Dan[a]

[a]School of Economics and Management of Hanoi University of Science and Technology

Abstract: *Ensuring energy security by meeting the electricity demands necessary for socio-economic development and nationwide access is essential. Vietnam has made substantial investments in power supply and electrification, but many households in mountainous and remote regions still lack access to the national grid. This study examines various alternatives, including renewable energy sources, to provide electricity to these underserved areas, using Lai Chau province as a case study. The alternatives are evaluated based on expert judgment using the analytical hierarchy process (AHP), a powerful tool for decision-making that integrates both quantitative and qualitative data. It considers four main criteria: (1) financial factors, (2) technical aspects, (3) social and environmental impacts, and (4) reliability and safety. The findings indicate that solar energy is the most viable option due to its abundance, cost-effectiveness, and environmental benefits. This study supports the electrification of remote households, contributing to the effective execution of national energy development strategies, especially when Vietnam aims at net zero emission in 2050.*

Keywords: *AHP, electrification, remote areas, renewable energy.*

1. INTRODUCTION

The National Assembly of Vietnam passed the first Electricity Law in December 2004. As part of the law, many activities of the Electricity for Rural, Mountainous, and Island Areas program have been actively implemented to improve the livelihoods of the households and the socio-economic development of the locals in remote areas. According to Electricity Vietnam (EVN), by the end of 2020, as a whole, 19 provinces and cities are fully electrified; up to 99.25% of Vietnamese rural households have access to electricity. Most of the remainder (0.75%) are located in far-flung, remote, and impoverished areas and islands. The goal of nationwide electrification still faces many difficulties and challenges because of the following: scattered population, huge investment rate, not financially viable, problematic land acquisition and site clearance.

The 2007 National Energy Development Strategy to 2020, with a vision to 2050, and then the 2015 Development Strategy of Renewable Energy to 2030 with a vision to 2050 have enabled many renewable energy projects throughout the country. Experts commonly agree that distributed, independent renewable energy sources are among the feasible energy supply solutions for off-grid remote areas, which can help enhance the national electrification rate.

With the advantage of more than 3,200 km of coastline and average annual wind

speed in Bien Dong (the East Sea) of above 6 m/s at an altitude of 65 m, wind energy development in Vietnam has enormous potential, especially in the central coast, Central Highlands and on the islands. The potential of solar power is also significant as Vietnam is a tropical country with long sunshine duration yearly and high-energy radiation intensity in the Central and Southern regions. The sunshine hours per year in the north-western provinces (such as Lai Chau and Son La) are around 1,897 to 2,102. Those of other northern areas and provinces of north-central coast from Thanh Hoa to Quang Binh are around 1,400-1,700 and from Hue to the south are about 1,900-2,700 hours per year. Regions with 1,800 sunshine hours or more per year are considered to have potential for photovoltaic power development. Apart from wind and solar, Vietnam has a huge potential for biomass and waste as the economy is still thriving on agriculture.

Lai Chau is a province with complex, diverse, and divided terrain, with both alpine and deep valleys. With an average slope of 260 – 350, over 60% of Lai Chau's area is at an altitude of more than 1,000 m and is separated by the northwest-southeast mountain range. Electricity supply in remote and far-flung areas has faced many difficulties. According to the provincial Power Development Plan for 2016-2025, 133 villages (8,840 households) in Lai Chau are not yet connected to the power grid, accounting for 88.6% (90.3% of total households).

By national records, sunshine duration in Lai Chau province is around 1,750 to 1,800 hours per year, which is considered a potential in photovoltaic power. The average daily radiation peaks in February, March, April, May, and November, reaching over 2.5kWh/m². Lai Chau has a certain potential for wind power, although not as high as the prospective Ninh Thuan, Binh Thuan, Central Highlands. As researched by Wind Global Atlas, measuring wind speed at an altitude of 100m, the adjacent areas with Lao Cai province in Phong Tu, Than Uyen, Tam Duong districts and Lai Chau city have the most significant wind potential. Some potential is also found in Sin Ho and Phong Tho districts, and partly in northern Muong Te district, which borders China. Wind Global Atlas' statistics also show that the wind speed in the province ranges from about 3m/s to nearly 8m/s, but the average wind speed in more than half of the area is about 3.8m/s. The energy density for 10% of the province's highest wind potential area reaches 327W/m2. Regarding bio-energy, no proven data on the potential in the local area is available. However, as a mountainous province that relies mainly on agriculture, Lai Chau also has sufficient feedstock to develop this energy type.

Despite excessive government effort towards full electrification, many households in Vietnam and Lai Chau province, in particular, are still left inaccessible to the national grid. They are mainly in the less developed, isolated and sparsely populated mountainous areas, which makes power transmission and distribution extremely difficult and costly. Therefore, utilizing renewable energy to generate electricity for those remote communities could be a viable alternative.

2. LITERATURE REVIEW

Methods for evaluating power supply plans and projects, such as economic and financial analysis, or socio-economic analysis have been widely used. Still, these methods assess the criteria separately without a combined holistic assessment. The analytical hierarchy process (AHP),

developed by Saaty in 1980, is a common multi-criteria decision-making tool. A lot of research has applied this method to support decision-making.

Ozgur Demirtas (2013) used the AHP method to assess the most suitable renewable energy price for meeting energy needs. The results show that wind energy is the most appropriate renewable energy option.

Seong Kon Lee, Gento Mogi, K.S. Hui (2013) used a combination of AHP and Data Envelopment Analysis (DEA) to determine the allocation of R&D costs to energy sources to improve South Korea's national energy security and to promote "low-carbon, green growth." In this study, five criteria were taken for evaluation: economic impact, commercial potential, in-house capacity, technical development capabilities, and development costs.

Robles Algarín et al. (2017) applied the analytical hierarchy process to support decision-making in energy planning by using renewable energy for Colombia's Caribbean countryside. The survey of experts identified five criteria, twenty sub-criteria and four alternatives. The AHP calculation shows that solar development is the best solution.

Merve Cengiz Toklu1 and Harun Taşkin (2018) investigated the fuzzy AHP and fuzzy TOPSIS combination methods in renewable energy source selection. In the research, alternative energy sources were evaluated based on four main criteria: (1) Technological, (2) Economic, (3) Environmental, and (4) Socio-political. Wind energy has been concluded as the most suitable option for Turkey.

Rattiya Chanchawee, Parnuwat Usapein (2018) ranked various types of renewable energy for national electricity planning in Thailand using the AHP method. Options of renewable resources were referred to from the Alternative Energy Development Plan (AEDP 2015). As a result, solar energy had the highest ratings, followed by biomass, small hydropower, biogas from wastewater, wind energy, biogas from energy plants and waste.

In Vietnam, analytical hierarchy process methods have also been used in various research. Pham Hoang Phi (2017) applied AHP to assess the selection of urban trees in Hanoi city. Based on reviewing the current status of Hanoi street greenery, interviewing greenery experts, managers, and workers planting and caring for trees, the study has developed a set of 15 criteria. By the AHP method, the study identifies the five most suitable species for the streets of Hanoi.

Nguyen The Quan (2015) applied the analytical hierarchy process (AHP) to choose the technology for the construction plan. Nguyen Thi Duc Nguyen, Le Phuoc Dinh, Le Hoang Lan (2015) used it to select carton suppliers in supply chain management for PVM company. The final results suggest that BH should be chosen as a carton supplier for export purposes.

To achieve energy security, power supply projects should consider not only economic aspects but also many other criteria, such as society and the environment. A literature review shows that no study using the AHP method for selecting energy for electricity generation in far-flung and remote areas in Vietnam has been conducted. Therefore, our paper will conduct this analysis to review the appropriate form of electricity for off-grid households. The case study site is in Lai Chau province.

3. METHOD, DATA, AND ANALYSIS

3.1. Introduction to AHP method

The analytical hierarchy process (AHP), developed by Thomas L. Saaty, is a multi-criteria decision-making technique. When decision-makers have to choose from a number of alternatives with multiple criteria, it can be quite difficult for decision-makers to determine each relative priority and/or assess the importance of each option. The AHP helps define a set of criteria and sub-criteria arranged in a hierarchy, make pairwise comparisons and find the weights of criteria or decision alternatives. The higher the weight is, the more important the corresponding criterion would be. Then it assigns a score to each option according to the decision maker's pairwise comparisons of the options based on that criterion. Finally, criterion weights and evaluation scores are combined to rank the alternatives.

3.2. Steps of the AHP method

The steps are as follows:

Step 1: To determine the evaluation criteria

Step 2: To determine the scale of relative importance for criteria and alternatives.

The original AHP by Thomas L. Saaty uses a one-to-nine scale. However, to simplify the review process, the study uses a scale of five, as shown in Table 1 below.

Table 1. Pairwise comparison scale

Definition	Intensity of importance
Equal importance	1
Moderate importance of one over another	2
Essential or strong importance	3
Very strong importance	4
Extreme importance	5

Step 3: Pairwise comparison process

A comparison table (Table 2) will help perform a comparison of criteria. Experts are asked to assign relative weight to each cell, where n is the number of criteria compared.

Table 2. Pairwise comparison matrix

	C_1	C_2	...	C_n
C_1	1	a_{12}	...	a_{1n}
C_2	$a_{21} = 1/a_{12}$	1	...	a_{2n}
...	...	...	1	...
C_n	$a_{n1} = 1/a_{1n}$	$a_{n2} = 1/a_{2n}$	...	1

Step 4: Matrix normalization and weight calculation

After the pair comparison matrix is developed, the geometric mean calculation normalizes and finds a relative weight for each value (Table 3).

Table 3. Normalized pairwise comparison matrix

	C_1	C_2	...	C_n	Weights
C_1	$a_{11} = \frac{1}{\sum_{i=1}^{n} a_{i1}}$	$a_{12} = \frac{a_{12}}{\sum_{i=1}^{n} a_{i2}}$	...	$a_{1n} = \frac{a_{1n}}{\sum_{i=1}^{n} a_{in}}$	$w_1 = \frac{\sum_{j=1}^{n} a_{1j}}{n}$

	C_1	C_2	...	C_n	Weights
C_2	$a_{21} = \frac{a_{21}}{\sum_{i=1}^{n} a_{i1}}$	$a_{22} = \frac{1}{\sum_{i=1}^{n} a_{i2}}$	...	$a_{2n} = \frac{a_{2n}}{\sum_{i=1}^{n} a_{in}}$	$w_2 = \frac{\sum_{j=1}^{n} a_{2j}}{n}$
...	...	...	...	...	...
C_n	$a_{n1} = \frac{a_{n1}}{\sum_{i=1}^{n} a_{i1}}$	$a_{n2} = \frac{a_{n2}}{\sum_{i=1}^{n} a_{i2}}$	...	$a_{nn} = \frac{1}{\sum_{i=1}^{n} a_{in}}$	$w_n = \frac{\sum_{j=1}^{n} a_{nj}}{n}$

Step 5: Check for consistency

Comparing pairs in AHP matrix easily leads to a lack of consistency between responses from investigative questions (Anderson et al., 1998; Saaty, 2000). To evaluate consistency, Saaty proposed a system, called a CR (consistency ratio). A reasonable CR is one that is equal to or less than 0.1. When the consistency is greater than 0.1, the pairwise comparison matrix needs to be re-evaluated to reduce the level of inconsistency.

Estimate the consistent ratio is done by following these steps:

(1) Multiply pairwise comparison matrix by relative priorities. Sum values across rows to calculate weighted sum vectors.

$$\begin{bmatrix} 1 & a_{12} & \dots & a_{1n} \\ a_{21} & 1 & \dots & a_{2n} \\ \dots & \dots & 1 & \dots \\ a_{n1} & a_{n2} & \dots & 1 \end{bmatrix} \times \begin{bmatrix} \omega_1 \\ \omega_2 \\ \dots \\ \omega_n \end{bmatrix} = \begin{bmatrix} aw_1 = \sum_{j=1}^{n} a_{1j} w_j \\ aw_2 = \sum_{j=1}^{n} a_{2j} w_j \\ \dots \\ aw_n = \sum_{j=1}^{n} a_{1j} w_j \end{bmatrix}$$

Weighted sum vector

(2) Divide weighted sum vector elements by associated priority value. The average of these values is determined as:

$$\lambda_{\max} = \frac{\sum_{j=1}^{n} \left(aw_j / \omega_j \right)}{n} \quad (1)$$

(3) Determine the consistent index (Saaty, 1990), as:

$$CI = \frac{(\lambda_{\max} - n)}{n-1} \quad (2)$$

(4) The consistent ratio (CR) is calculated as:

$$CR = \frac{CI}{RI} \quad (3)$$

where RI is a random index. The n-size matrix determines the RI as in Table 4.

Table 4. Random indicators

n	1	2	3	4	5	6	7	8	9	10
RI	0.00	0.00	0.52	0.89	1.11	1.25	1.35	1.40	1.45	1.49

Source: Robles Algrin et al. (2017)

Step 6: Score the options

This step calculates the priority vector according to each criterion for each option. The calculation method is similar to evaluating criteria, including building a pairwise comparison matrix, a synthesis, and a consistent ratio estimation. Combined with the weight of each criterion, we calculate the score and rank the options.

4. RESULT AND DISCUSSION

Power grid is considered as an energy source option in supplying electricity to off-

grid remote areas. Based on the renewable energy potential of Lai Chau province, three types of alternatives are selected: solar power, wind power, and biomass energy. In total, the study evaluates and compares four options.

4.1. Determine the evaluation criteria

While choosing the type of renewable energy for electricity generation in Bangladesh, Kabir and Shihan (2003) set the power unit cost, social impacts, technical/ technology, location, and environment as five evaluation criteria. Each main criterion includes a set of sub-criteria to improve the accuracy of the assessment. For example, the sub-criteria of "technical/ technology" are equipment design and complexity, plant design, equipment and parts availability, plant safety, maintainability, and training requirements. The study conducted by Robles Algarin et al. (2017) uses the analytic hierarchy process (AHP) to prioritize a set of criteria, sub-criteria, and alternatives as a support for decision-making in the process of energy planning with renewable energy for rural areas in the Caribbean region of Colombia. The main criteria and sub-criteria are: (1) Technical: efficiency, maturity of technology, spare parts availability, infrastructure, reliability; (2) Economic: investment costs, operation and maintenance costs, payback period, service life; (3) Social: acceptability of local residents, local job creation, energy for rural health and education, installation on indigenous lands; (4) Environmental: gas emissions, requirement of land and water resources, visual impact, hazardous waste; (5) risk: natural phenomena, armed conflict, investment risk, and technological obsolescence.

Our study uses the criteria suggested in the previous research combined with expert consultation. We had several interviews and in-depth discussions with two groups of experts to decide what to include in the criteria set to best describe the characteristics and demand of the local industry. The consultation process was conducted with leaders of the Center for Renewable Energy of the Institute of Energy through face-to-face meetings and with technical managers of Lai Chau Power Company through online meetings. The Institute of Energy is the leading national research institution for Vietnam's energy strategies, while Lai Chau Power Company is the regional power supply unit that is in charge of electricity distribution and business for the whole province. As a result, the proposed energy sources are shown in the hierarchy below (Figure 1):

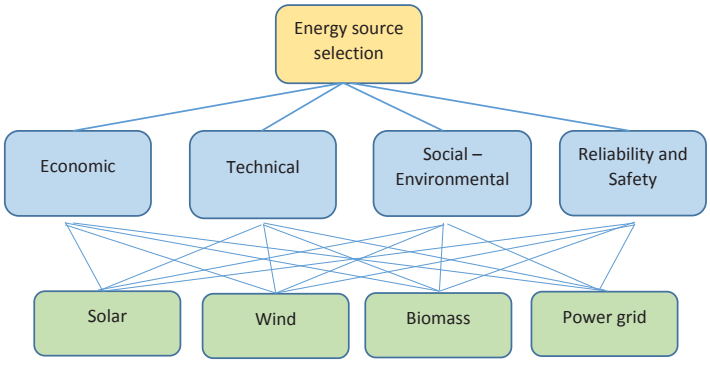


Fig 1. AHP hierarchy to select the energy source

Four main criteria and the corresponding sub-criteria are listed in Table 5.

Table 5. Main and sub-criteria

No.	Main criteria	Sub-criteria	Description
1	Economic Criteria (C1)	Overall Economic Efficiency (C11)	Efficiency for the whole economy, not the electricity sector or consumers alone.
2	Technical Criteria (C2)	Easy to install, connect (C21)	
		Easy to operate (C22)	Availability of materials, spare parts for maintenance, repair and operation
		Broad applicability (C23)	
3	Social – Environmental Criteria (C3)	Environmentally Friendly (C31)	Less impact on the environment and the natural landscape, low emissions.
		Reducing dependence on fossil fuels (C32)	
		Noise and visual pollution (C33)	
4	Reliability and Safety Criteria (T4)	Stability of Supply (C41)	
		User's safety (C42)	The level of safety during usage
		Self-sufficiency (C43)	The degree of independence in energy supply

4.2 Results and implications

After consultation with experts of two independent units from the Institute of Energy (EXG1) and EVN-NPC Lai Chau Power Company (EXG2), the results are as follows:

Calculation of priority vectors (weight) of criteria

Resulted from the above pairwise comparison matrix and the consistency test of the criteria evaluation process, CR is less than 0.1. When CR exceeds 0.1, the data are not consistent, and the decision-maker's judgments must be reviewed. As it is not, the study can proceed to subsequent steps as presented in section three, to obtain the priority vector (weight) of the main criteria as below.

Table 6. Priority vector (weight) of the main criteria_EXG1

	EXG1				
Main criteria	**Economic**	**Technical**	**Social - Environmental**	**Reliability and safety**	**Priority vector**
Economic	1.00	2.00	4.00	3.00	**0.48**
Technical	0.50	1.00	2.00	1.00	**0.22**
Social - Environmental	0.25	0.50	1.00	0.50	**0.11**
Reliability and Safety	0.33	1.00	2.00	1.00	**0.20**

□ max = 4,021; CI = 0.007; CR = 0.008

Table 7. Priority vector (weight) of the main criteria_EXG2

EXG2					
Main criteria	Economic	Technical	Social - Environmental	Reliability and safety	Priority vector
Economic	1.00	3.00	3.00	3.00	**0.48**
Technical	0.33	1.00	2.00	1.00	**0.20**
Social - Environmental	0.33	0.50	1.00	2.00	**0.17**
Reliability and Safety	0.33	1.00	0.50	1.00	**0.14**

Going through the same process, we obtain the priority vector of the sub-criteria of each energy source, as in Table 8 and Table 9.

Table 8. Priority vector of the sub-criteria_EXG1

	Priority vector by each sub-criterion_EXG1									
Energy type	Overall Economic Efficiency (C11)	Connection, Installation (C21)	Operation (C22)	Broad applicability (C23)	Environmentally Friendly (C31)	Reduce dependence on FF (C32)	Noise and Visual Pollution (C33)	Stability of Supply (C41)	User's Safety (C42)	Self-sufficiency (C43)
	CR = 0.029	CR = 0.014	CR = 0.078	CR = 0.030	CR = 0.039	CR = 0.000	CR = 0.052	CR = 0.029	CR = 0.000	CR = 0.013
Sun	0.36	0.51	0.31	0.41	0.23	0.29	0.41	0.10	0.25	0.48
Wind	0.32	0.14	0.15	0.13	0.39	0.29	0.13	0.18	0.25	0.20
Biomass	0.19	0.09	0.11	0.09	0.23	0.29	0.16	0.29	0.25	0.11
Power grid	0.13	0.26	0.44	0.38	0.14	0.14	0.30	0.43	0.25	0.22

Table 9. Priority vector of the sub-criteria_EXG2

	Priority vector by each sub-criterion_EXG2									
Energy type	Overall Economic Efficiency (C11)	Connection, Installation (C21)	Operation (C22)	Broad applicability (C23)	Environmentally Friendly (C31)	Reduce dependence on FF (C32)	Noise and Visual Pollution (C33)	Stability of Supply (C41)	User's Safety (C42)	Self-sufficiency (C43)
	CR = 0.007	CR = 0.066	CR = 0.092	CR = 0.076	CR = 0.076	CR = 0.066	CR = 0.013	CR = 0.092	CR = 0.013	CR = 0.039
Sun	0.42	0.42	0.42	0.40	0.37	0.35	0.36	0.30	0.36	0.45
Wind	0.23	0.30	0.13	0.28	0.21	0.35	0.16	0.19	0.15	0.22
Biomass	0.23	0.14	0.18	0.18	0.32	0.17	0.15	0.13	0.33	0.14
Power grid	0.12	0.15	0.27	0.14	0.11	0.12	0.33	0.38	0.16	0.19

Score and rank energy source for power supply

Based on the weight of each criterion and priority vector of each energy source, the score and ranking for each alternative are as follows:

Table 10. Scores and rankings of energy sources for power generation_EXG1

	Priority vector by each main criterion				Priority vector	Rank
	Economic	Technical	Social - Environmental	Reliability and safety		
Weight	0.48	0.22	0.11	0.20		
Sun	0.36	0.41	0.31	0.28	**0.35**	**1**
Wind	0.32	0.14	0.27	0.21	0.26	2
Biomass	0.19	0.09	0.23	0.21	0.18	4
Power grid	0.13	0.36	0.19	0.30	0.22	3

Table 11. Scores and rankings of energy sources for power generation_EXG2

	Priority vector by each main criterion				Priority vector	Rank
	Economic	Technical	Social - Environmental	Reliability and safety		
Weight	0.48	0.20	0.17	0.14		
Sun	0.42	0.41	0.36	0.37	**0.40**	**1**
Wind	0.23	0.24	0.24	0.19	0.22	2
Biomass	0.23	0.17	0.21	0.20	0.21	3
Power grid	0.12	0.19	0.19	0.25	0.17	4

According to the expert judgement from the Institute of Energy, solar energy is the most suitable form for local electricity supply, with a priority value of 0.35. The following are wind power (0.26), power grid (0.22) and finally biomass energy (0.18).

According to Lai Chau Power Company's expert group, solar energy is also the most preferred form of energy with a score of as high as 0.40, followed by wind power (0.22), biomass (0.21) and grid power (0.17).

Both groups of experts choose solar energy as the most appropriate energy source for electricity production in off-grid remote areas in Lai Chau province.

5. CONCLUSION AND SUGGESTION

When deciding on any energy source for electricity supply in remote areas, many factors, not only economic aspects, should be taken into consideration, such as socio-political and environmental impacts. Multi-criteria analysis is a useful tool to assist this kind of decision-making process.

The study took Lai Chau province as a case study and consulted relevant experts to develop the set of evaluation criteria.

Based on the criteria set and the pairwise comparison matrix obtained through the survey, the study applied the AHP method to score and rank each type of energy per criterion. The results showed that solar energy is the most appropriate type of power supply for off-grid far-flung and remote households in Lai Chau province.

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CURRENT STATUS OF LEGAL REGULATIONS ON THE DEVELOPMENT OF THE CARBON MARKET IN VIETNAM AND SOME RECOMMENDATIONS

Le Minh Thong[a,*], Nguyen Thanh Thuy[a]

[a]Hanoi University of Mining and Geology, Vietnam

**Corresponding author: leminhthong@humg.edu.vn*

Abstract: *Climate change causes significant harm and long-term consequences. Vietnam is considered one of the most severely affected countries by climate change. Recognizing the serious impact, the Vietnamese government has taken important early steps, such as participating in the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol. It has made strong commitments to the international community to prevent climate change at the United Nations forums on Climate Change (COP). Additionally, Vietnam has implemented related policies to reduce greenhouse gas emissions and prevent climate change, building a carbon market in Vietnam step by step. However, while implementing these related policies, Vietnam has encountered many obstacles. Therefore, analyzing and assessing the current status of legal regulations to provide recommendations for the future is necessary.*

Keywords*: Carbon market, Climate Change, Greenhouse gas emissions, Vietnam.*

1. THE NECESSITY OF DEVELOPING A CARBON MARKET IN VIETNAM

Climate change is considered one of the biggest challenges to human development and survival in the 21st century. According to assessments by the Intergovernmental Panel on Climate Change (IPCC), the main cause of global climate change is the excessive emission of greenhouse gases from human socio-economic activities. To address and limit global temperature rise, the United Nations Framework Convention on Climate Change (UNFCCC) was signed by 155 countries at the United Nations Conference on Environment and Development in Rio de Janeiro in 1992. The goal is to stabilize greenhouse gas concentrations in the atmosphere at levels that prevent dangerous human interference with the climate system. Since then, reducing greenhouse gas emissions has been a main topic of negotiation at the Conference of the Parties to the UNFCCC (COP).

A historic international framework was adopted at COP21 in 2015 at Paris (the Paris Agreement). The main goal of the Paris Agreement is to limit global warming to below 2°C compared to the pre-industrial period and to continue efforts to keep the temperature rise at 1.5°C. Therefore, each country must develop its route to meet this global goal by submitting its Nationally Determined Contributions (NDC). These NDC are evaluated every five years, and countries are encouraged to enhance the quality of these reports over time and through low-emission development strategies.

Recognizing the importance of reducing global greenhouse gas emissions and their impact on the nation's socio-economic development, Vietnam has supported the UNFCCC and actively participated in related legal agreements to mitigate climate change.

Specifically, Vietnam signed the Climate Convention in 1992 and ratified it in 1994; signed the Kyoto Protocol in 1998 and ratified it in 2002; and established the National Steering Committee for implementing the Climate Convention and Kyoto Protocol. Vietnam was one of the countries that signed the agreement at COP21. By COP26, Vietnam committed to reducing methane emissions by 30% by 2030 and achieving carbon neutrality, and phasing out coal by 2050 (Viet Nam, 2022)8,15]]},"issued":{"date-parts":[["2022"]]}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"} . Vietnam has developed many mechanisms and policies to reduce emissions and prevent climate change to fulfill these commitments, including establishing a carbon emission market.

2. ELEMENTS IN THE CARBON MARKET

2.1. Goods on the Market

In the carbon market, two types of goods are traded:

Greenhouse Gas Emission Quotas: These are the maximum amount of greenhouse gases that an emission unit is allowed to emit into the environment within a certain period. The Ministry of Natural Resources and Environment allocates these quotas to facilities listed as requiring greenhouse gas emission inventory.

Carbon Credits: A carbon credit represents the right to emit one ton of carbon dioxide (CO_2) or an equivalent amount of another greenhouse gas (CO2eq). One ton of CO2eq is considered one carbon credit, the trading unit in the carbon or carbon credit market. According to the Environmental Protection Law 2020, carbon credits are tradable certificates representing the right to emit one ton of CO2 or its equivalent. These credits, certified by the Ministry of Natural Resources and Environment, are traded on the carbon credit exchange and are created from domestic and international credit-generating programs or projects.

Carbon credits or quotas are a type of license allowing the holder to emit a specified amount of CO2 or other greenhouse gases (CH4, NO2). Each business or production facility has a set quota for greenhouse gas emissions. If their emissions exceed the allowed limit, they must purchase additional carbon credits to avoid violating environmental protection regulations. Conversely, if actual emissions are lower than the limit, the facility can sell unused carbon credits to others.

The carbon market is where transactions involving buying and selling carbon credits occur between companies, entities, organizations, or countries. It is a mechanism that creates resources to promote greenhouse gas emission reduction and transition to a carbon-neutral economy.

2.2. Market Participants

According to Clause 1, Article 5 and Article 16 of Decree 06/2022/ND-CP, the entities participating in the carbon market are as follows:

- Facilities listed in the categories of sectors and facilities emitting greenhouse gases that are required to conduct greenhouse gas inventories, as stipulated by the Prime Minister.

- Organizations participating in implementing mechanisms for exchanging and offsetting carbon credits domestically and internationally per the laws and international agreements to which the Socialist Republic of Vietnam is a party.

- Other organizations and individuals related to activities involving investing and trading greenhouse gas emission quotas and carbon credits in the carbon market.

2.3. Organization of the Market

The centralized carbon market organizes carbon trading based on legal regulations and countries' commitments in international conventions, agreements, and programs to achieve greenhouse gas reduction goals. When participating in this market, organizations must comply with the goals committed under mandatory national, regional, or international carbon reduction regulations to reduce CO2 emissions. The centralized carbon market operates under two types of mechanisms.

First, the "Cap and Trade" mechanism is the most common centralized market type. The process works as follows:

• Cap Process: The government establishes a greenhouse gas emission quota system for production units with emissions, where each unit can emit a certain amount of CO2 or equivalent. Through this process, countries can limit the total amount of CO2 emitted into the environment.

• Trade Process: Production units emitting more than the allowable quota may be subject to high taxes or required to purchase additional quotas. Units that do not use up their emission quotas can accumulate them as carbon credits and sell or exchange quotas through the carbon market. In these markets, regional, national, and international government organizations issue the maximum carbon emission limits for businesses and domestic industries. Each allowable emission (or emission permit) typically allows the emission of one ton of pollutants like CO2. These permits are then traded on the secondary market, with prices determined by supply and demand. For example, a company that exceeds its allocated emissions may seek to purchase additional emission credits from a company with actual emissions below the limit.

Second, the baseline-and-credit system, where the baseline emission level, i.e., the target level set by the regulatory authority, is determined based on historical data and environmental objectives. This baseline is established based on units that have complied in the past, and permits are issued to units that have reduced emissions below that level. Units emitting more than the baseline are not necessarily penalized but will not receive carbon permits. Countries like China and Australia have utilized baseline-and-credit systems for emission reduction fund initiatives.

2.4. Market Monitoring and Management

Developing the carbon market and managing carbon credit exchanges and offset mechanisms are crucial solutions for achieving greenhouse gas emission reduction goals at a reasonable cost, promoting the development and application of low-emission technologies, enhancing business competitiveness, and increasing income for people participating in greenhouse gas reduction projects.

Carbon credit management involves developing and implementing regulations on creating and exchanging carbon credits, whether voluntarily or to offset greenhouse gas emission quotas. This forms the basis for developing the domestic carbon market and participating globally. The exchange, trading, and reduction of greenhouse gas emissions must ensure the national greenhouse gas emission reduction goals and balance the interests of the state, the people, businesses, and participating partners.

3. Current Status of Legal Bases for Building the Carbon Market in Vietnam

On November 21, 2012, the Prime Minister promulgated Decision No. 1775/QD-TTg approving the Project for the Management of Greenhouse Gas Emissions and the Management of Carbon Credit Trading Activities on the World Market,

which included implementing "Nationally Appropriate Mitigation Actions" (NAMAs) and set the requirement that NAMAs be implemented in a measurable, reportable, and verifiable manner (MRV) (Decision No. 1775/QD-TTg, 2012) (Decision No. 896/QD-TTg, 2022). The main legal bases that have been promulgated in Vietnam to concretize the carbon emissions market gradually include:

Resolution 24-NQ/TW, dated June 3, 2013, of the 11th Central Executive Committee, affirmed that climate change is a global issue and a severe challenge for all of humanity in the 21st century. Proactively responding to climate change, enhancing resource management, and protecting the environment are particularly important issues that have significant impact and interplay, jointly determining the country's sustainable development. These are the foundation and prerequisites for formulating strategies and policies for socio-economic development, ensuring national defense, security, and social welfare. This resolution emphasized the need to investigate, inventory, and develop route and implementation plans for greenhouse gas emission reductions appropriate for each sector, field, and locality. It also promoted activities to reduce greenhouse gas emissions suited to the country's conditions, based on financial and technological support from other countries and international organizations; it also aimed to develop the domestic carbon credit market and participate in the global carbon market. The target set was to reduce greenhouse gas emissions per unit of GDP by 8-10% by 2020 compared to 2010 (Resolution 24-NQ/TW, 2013).

The Government's Action Program to implement Resolution No. 24-NQ/TW, the National Strategy on Climate Change, the National Strategy on Green Growth, and Resolution No. 93/NQ-CP approving the Paris Agreement on Climate Change highlighted the establishment of a carbon market aimed at developing a comprehensive emission trading mechanism based on market mechanisms. (Resolution No. 93/NQ-CP, 2016)

The Plan to Implement the Paris Agreement (Decision 2053/QD-TTg dated October 28, 2016) outlined greenhouse gas emission reduction tasks to implement the Paris Climate Agreement, divided into two phases: 2016-2020 and 2021-2030. These tasks outlined related to emissions reduction in key sectors such as energy, transportation, and agriculture include an important initiative: "Establishing and developing a domestic carbon market and other cooperative mechanisms for reducing greenhouse gas emissions under Article 6 of the Paris Agreement. This will be piloted in sectors with potential" (Decision 2053/QD-TTg, 2016).

The Environmental Protection Law No. 72/2020/QH14: For the first time, it introduced provisions on the organization and development of a domestic carbon credit market (Article 139), which includes the organization and development of a domestic carbon market as part of the greenhouse gas emissions reduction efforts. The law also stipulates that "The domestic carbon market consists of activities related to the exchange of greenhouse gas emission quotas and carbon credits obtained from the exchange and offsetting mechanisms of carbon credits, both domestic and international, under legal regulations and international treaties to which Vietnam is a party." The National Assembly has tasked the Ministry of Finance, in collaboration with the Ministry of Natural Resources and Environment and other relevant ministries and agencies, with establishing the domestic carbon market (No. 72/2020/QH14, 2014).

The most recent is Decree No. 06/2022/ND-CP: This decree provides detailed regulations on reducing greenhouse gas emissions, protecting the ozone layer, and establishing and developing the carbon credit market under Article 139 of the Environmental Protection Law 2020, which states: "The exchange of greenhouse gas emission quotas and carbon credits shall be conducted on the carbon credit exchange and the domestic carbon market" (Decree No. 06/2022/ND-CP, 2022). The decree outlines the development roadmap and timeline for the domestic carbon market. The roadmap is expected to be divided into three phases:

- Phase 2023-2024: Establishing the initial legal framework to develop the proposal.

- Phase 2025-2027: Pilot trading period on the carbon market.

- By 2028: Official operation of the carbon market and connection with carbon credit exchanges in the region and the world.

Accordingly, on January 18, 2022, the Government issued Decision No. 01/2022/QD-TTg, which stipulates the list of sectors and facilities required to inventory greenhouse gases, including 1,912 facilities that will participate in the domestic carbon credit market.

With the documents that have been issued, it can be seen that the carbon market is gradually taking shape, enhancing compatibility with international carbon credit pricing mechanisms, creating opportunities for linkage with global and regional carbon credit markets, and improving the competitiveness of Vietnamese products in international markets. The carbon credit market that Vietnam aims to build is compulsory. Enterprises will be regulated on greenhouse gas emissions. If they exceed the quota, they may purchase additional carbon credits on the mandatory market or a small portion from the voluntary market for offsetting. This mechanism also creates resources to promote developing and applying low-emission technologies, moving towards a carbon-neutral economy, and encouraging enterprises to invest in technology transformation to reduce carbon emissions in production processes. (Luu Quoc Dat et al, 2024).

4. Recommendations for the Development of the Carbon Market

Building and Completing the Legal Framework:

The government needs to develop and issue regulations on state management of carbon credits, including regulations on auctions, transfers, loans, repayments, and the revocation of quotas. A legal framework for organizing and operating carbon credit trading platforms should also be established. A financial management mechanism for the carbon credit market's activities should also be developed. Regulations on the procedures and techniques for measuring, reporting, and verifying greenhouse gas emission reductions must be issued.

The ministries, including the Ministry of Industry and Trade, Ministry of Transport, Ministry of Construction, Ministry of Agriculture and Rural Development, and the Ministry of Natural Resources and Environment, should urgently issue sectoral greenhouse gas emission reduction plans by Government Decree No. 06/2022/ND-CP and organize implementation to ensure that the commitments under the Nationally Determined Contributions (NDC).

Relevant ministries and local authorities need to coordinate with related agencies to advise competent authorities on organizing negotiations, signing, and implementing agreements or contracts with international partners on carbon credit transfers and

greenhouse gas emission reduction results in their management fields, ensuring the achievement of emission reduction targets according to the NDC. They also need t assess the readiness of certain sectors to participate in the carbon market.

Organizing the Market Operation:

Ministries must quickly establish goods in the carbon market by allocating quotas and carbon credits to relevant entities. The Ministry of Natural Resources and Environment should urgently research and establish a national carbon credit registration system, manage programs, projects, and activities to reduce greenhouse gas emissions, and create carbon credits for piloting and developing the domestic carbon market and international exchange. Furthermore, the organizational structure, human resources, technical infrastructure, and management, inspection, and monitoring mechanisms for the market must be improved.

Raising Awareness and Enhancing Capacity:

To raise awareness about issues related to the carbon emissions market, the Ministry of Information and Communications should collaborate with relevant ministries to direct news agencies, radio, and television stations at the central and local levels to develop and implement media programs on national greenhouse gas emission reduction goals, Nationally Determined Contributions (NDC), carbon credit creation methods, voluntary carbon market participation, and the organization and development of a compliant carbon market. Additionally, the government should have policies to support enterprises in developing information systems related to disseminating information about the carbon emissions market.

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ENERGY TRANSITION IN VIETNAM: THE LESSONS LEARNT FROM INTERNATIONAL EXPERIENCES

Nguyen Thi Huong[a*], Nguyen Duc Thang[a]

[a]Hanoi University of Mining and Geology, Hanoi, Vietnam

Abstract: *As fossil fuel resources become depleted and environmental pollution issues arise from their utilization, transitioning to renewable energy is imperative for national sustainable development. Vietnam set an ambitious target: achieving net-zero emissions by 2050 through various strategies, including a commitment to cease the use of coal-fired power by 2050 (Vietnam's-Commitments-at-COP26, 2021). To achieve this goal, Vietnam will face numerous challenges during the transition, including energy security concerns, high costs, and impacts on the livelihoods of workers in the coal sector, especially as coal still accounts for over 33% of electricity generation capacity and more than 50% of power output (Kirin-Capital, 2024). If these challenges are not addressed, the transition process may stall, failing to meet commitments made at the COP26 conference or impacting energy security. This paper analyzes the experiences of countries that have significantly progressed in transitioning away from coal-fired energy, such as the UK, Germany, and China. It proposes policies that could apply to Vietnam. Recommendations are made to promote technological innovation, improve clean energy development models, and enhance community and business engagement toward a sustainable transition model.*

Keywords: *Energy transition, energy transition lessons, energy transition experiences.*

1. INTRODUCTION

In Resolution 55-NQ/TW dated February 11, 2020, the Political Bureau outlined the strategic orientation for the national energy development up to 2030 and vision to 2045, emphasizing to "exploit, use thoroughly and efficiently renewable energies, new energies, and clean energies; and to exploit and use fossil energy sources domestically in a rational manner" (Resolution-No-55/NQ-TW, 2020).

At COP26, Vietnam was among the nations that made strong commitments to achieving net-zero emissions by 2050, ceasing new coal-fired power construction from 2030 and gradually phasing out coal power from 2040; announcing initiatives on forests and land use; participating in the Global Adaptation Coalition; and reducing methane emissions by 30% by 2030 compared to 2020 levels. (Vietnam's-Commitments-at-COP26, 2021).

Power Plan VIII also states: "Orientation to 2050: No longer use coal for power generation, completely switch fuel to biomass and ammonia..." (Decision-No-500/QĐ-TTg, 2023).

Meanwhile, as of the end of 2023, the total capacity of coal-fired thermal power was 26,757 MW, accounting for 33.2% of the total power capacity, while coal-fired power constituted 46.1% of total electricity output [2]. In 2024, coal-fired thermal power is expected to contribute over 55% of the electricity consumption due to lower water inflow to hydroelectric reservoirs compared to previous years (Vietnam Electricity, 2024).

The transition away from coal-fired energy is an inevitable trend in Vietnam

due to its international commitments and because such a transition brings numerous benefits, such as climate change mitigation, minimizing environmental and health risks, enhancing national energy security, and improving the country's trade balance. However, the transition to non-coal energy has many challenges. Vietnam will face several hurdles during the process, including energy security issues, high costs, and impacts on workers' livelihoods in the coal sector and thermal power plants.

This report explores the experiences of countries transitioning away from coal-fired energy and enhancing renewable energy, such as the UK, the US, Germany, and China, which have made significant progress in this field, to consider proposals that could be applied to Vietnam.

2. GLOBAL ENERGY TRANSITION EXPERIENCES

Vietnam should learn from the experiences of countries that have previously undergone significant transitions in energy usage to implement its energy transition goals effectively.

The European Union, as a continent leading the energy shift, provides a valuable case study in energy transition experiences. Notably, Germany and the UK, selected for this study, transitioned from a fossil fuel-based power system, where coal power once had a substantial share in their electricity production. These countries have made concerted efforts to transition to renewable energy-based power systems. Another country included in this study is China, a global leader in renewable energy research and investment. Despite its continued use of coal power, China shares similar natural conditions and potential for renewable energy development with Vietnam.

2.1. Germany

2.1.1. Current State of Electricity Production in Germany

From 2000 to 2022, coal power consistently contributed significantly to Germany's total electricity output, although its share has declined. The proportion of coal-fired electricity decreased from 65% in 1999 to about 30% by 2022, with a point where it only constituted 25% of the nation's total electricity production. Alongside coal, nuclear power decreased from over 30% in 2000 to 10% in 2022. Conversely, electricity from renewable energy sources has significantly increased, rising from nearly 5% in 1999 to about 55% by 2022.

The German government has committed to phasing out coal-fired power plants by 2038.

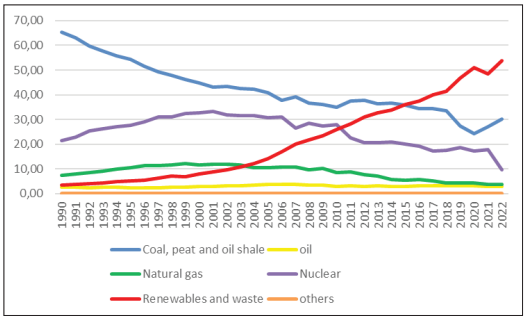


Fig 1. Proportion of Electricity Sources in Germany from 1990-2022

Source IEA

2.1.2. Germany's Experience in Energy Transition

Germany's approach to reducing coal emissions has been cautious and comprehensive, particularly during the discussion about coal reduction conducted after Germany shut down its last three

nuclear reactors in April 2023. The insights from the debate, policy formulation, and Germany's approach to reducing coal-fired power can be valuable lessons for other countries, including Vietnam.

- Establishment of the Coal Commission with a comprehensive approach to a just energy transition:

From 2015 to 2018, Germany conducted extensive research on various policy options with different approaches aimed at gradually reducing and eventually ceasing the operation of coal-fired power plants (Agora, 2019).

To facilitate this process, the German government established the Commission on Growth, Structural Change, and Employment (commonly known as the Coal Commission), which included representatives from the energy industry, trade, environmental sectors, coal industry regions, unions, etc., to research, discuss, and develop a roadmap for reducing coal-fired electricity generation. The purpose of the Commission was to create a coal reduction roadmap and promote a just transition, ensuring minimal negative impacts on the economy and society by considering the overall reduction of coal-fired power in the context of energy security, electricity pricing, economic development in coal mining regions, new employment opportunities, as well as social cohesion and environmental concerns. The Federal Ministry of Economics and Energy oversaw the Commission.

The final report of the Commission estimated the total cost necessary to completely stop coal-fired power plants in Germany by 2038 at approximately 69 - 93 billion EUR, including several critical elements (World resource institute, 2021): (1) direct and indirect support for workers (including retraining, early retirement support, and job loss compensation) with an estimated total cost of 5 - 7 billion EUR, (2) involvement of trade unions, employers, and the government in conducting collective labor agreements, as well as signing additional contents in employment contracts regarding compensation for job loss and workers' rights, (3) price compensation to limit electricity price increases, with an estimated budget of 16 - 32 billion EUR from 2023 to 2038 to ensure that the costs of ceasing coal-fired power generation are not passed on to electricity prices and consumers, (4) dialogue between local governments and communities regarding plans related to coal mines, (5) compensation for the owners of coal-fired power plants, estimated at 5 - 10 billion EUR for early plant closure.

- Enactment of related laws on coal reduction:

In 2020, Germany enacted two laws related to reducing coal-fired power: the Coal Reduction and Cessation Act and the Coal Regions Support Act.

The 2020 Coal Reduction and Cessation Act established a gradual reduction roadmap for coal-fired power plants, decreasing capacity to approximately 30 GW by 2022 (15 GW each for lignite and hard coal) and 17 GW by 2030.

The Act introduced a bidding policy to cease coal-fired power plants, where hard-coal plants would participate in voluntary bidding until 2027, and from 2031, coal plants must shut down gradually according to the law. The bidding policy was designed to ensure that plants closing earlier would receive more compensation, with a bidding cap of 165 EUR/kW in 2020 for the first round of bidding in September 2020, decreasing to 89 EUR/kW by 2027.

The Coal Reduction and Cessation Act set specific targets for the capacity of coal-fired

power plants (decreasing) for 2022, 2030, and 2038. In its coal reduction roadmap, Germany also specified the cessation of lignite power plants in the western regions first, followed by those in the eastern areas (due to the weaker economy of the eastern regions and their greater vulnerability due to the cessation of coal-fired power).

The German government also reached agreements with investors in lignite power plants to specify closure dates and compensate them with a total of 4.35 billion EUR.

The Coal Regions Support Act introduced regulations for financial support to change the economic structure in regions and states affected by the cessation of coal use.

The support law introduced financial support up to 40 billion EUR to support economic restructuring in regions affected by the cessation of coal-fired power, including compensation for job loss and support for sustainable economic development. The Federal Government will provide 26 billion EUR in support for the affected regions by developing infrastructure and establishing new research facilities. Additionally, 14 billion EUR is directly invested in coal mines and other affected states.

There is also 1.1 billion EUR in specific support for less developed regions of coal-fired power plants using hard coal in Germany.

As per regulation, some coal-fired power plants will close entirely, while others will switch to reserve capacity mode, which must be maintained to be ready to operate again. In emergencies requiring power generation, reserve plants must generate electricity onto the grid within ten days. Furthermore, plants identified as crucial for voltage stability on the power grid (and approved by the federal regulatory authority) will have their own plans. (Dũng, 2023)

- Electricity pricing policy

Germany pioneered the Feed-in Tariff (FiT) rates for each kWh of electricity fed onto the grid. FiTs for small rooftop systems commissioned in October 2018 could be as high as 11.84 cents-EUR/kWh and are guaranteed to the operator for the next 20 years.

The FiT mechanism in Germany was applied in 2000 and regulated under the Renewable Energy Act (EEG). In 2014, the EEG Act in Germany adjusted the fixed purchase price from renewable energy sources downwards; simultaneously, it began phasing out fixed-price purchases from solar power and moving to auction-based purchases. In 2016, the EEG Act was further adjusted by eliminating subsidy policies and moving to a government purchasing electricity through auction formats.

2.2. United Kingdom

2.2.1. Current State of Electricity Production in the UK

Since the 1960s, the UK has developed oil and natural gas. Thus, the share of electricity generated from gas and oil has been relatively high. At one point, the proportion of electricity generated from oil and gas exceeded 65% of the total electricity generation. In 2022, the UK's share of electricity from oil and gas was still around 65%. Coal power in the UK decreased from over 30% in 1990 to about 10% in 2012; by 2020, the proportion of coal power was nearly zero. Renewable energy in the UK has gradually increased in share throughout this period. By 2022, the total electricity from renewable sources in the UK was about 20%.

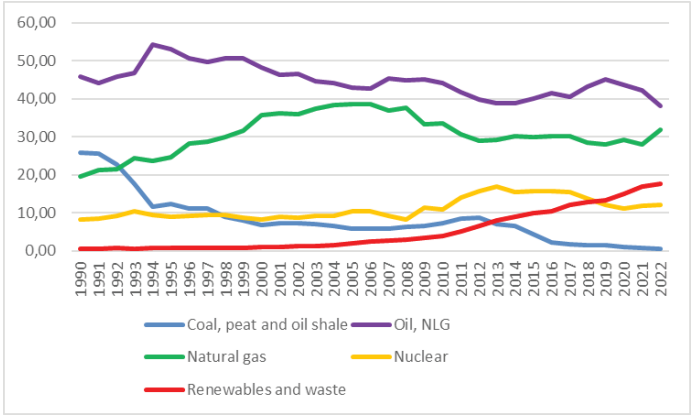


Fig 2. Proportion of Electricity Sources in the UK from 1990-2022

Source: IEA

The most noteworthy lesson for Vietnam from the UK is the effective elimination of coal power.

2.2.2. UK's Experience in Energy Transition (National Agency for Science and Technology Information, 2022)

In 2015, the UK committed to eliminating coal power from the national grid by 2025. On April 21, 2017, the United Kingdom experienced its first coal-free day since the start of the Industrial Revolution.

By May 2019, the National Grid of the United Kingdom confirmed that it had gone 168 hours, equivalent to a week, without using coal-fired energy.

Unlike Germany, where solutions primarily came from government-enacted laws to reduce coal power, the UK utilized market mechanisms to decrease coal usage.

- Renewable Energy Obligation

The UK introduced the Utilities Act 2000, which was enacted in 2000. This act introduced the Renewables Obligation (RO) system, which requires electricity producers to source a certain percentage of their electricity from renewable energies. RO came into effect in April 2002, mandating that UK electricity suppliers contribute a mandatory renewable energy ratio within their total commercial electricity output. In 2015, this ratio was 15.4%. Companies that achieved the required renewable energy ratio were issued a Renewables Obligation Certificate (ROC). If they failed to meet the requirement, they had to pay a buy-out fee of £34.3 per MWh shortfall for 2007-2008. This money went into the buy-out fund managed by Ofgem, and annually, a portion of the fund supports units achieving ROC certification.

Initially, ROCs were granted for each MWh of renewable electricity generated, regardless of the technology used. However, projects utilizing advanced technologies such as biomass or anaerobic digestion received more support than waste gas projects.

Establishing the RO market and the buy-out fund made renewable energy production more financially attractive. Renewable energy producers profit from selling regular energy, receive support from the buy-out fund and sell excess ROCs above their quota.

- Tax incentives policies

In the UK, all electricity production is subject to a climate change levy, except for electricity generated from renewable sources, which is exempt from this tax (about EUR 6.3/MWh). As part of its policy to transition to new

energy sources and reduce the use of fossil fuels, the UK government has focused on implementing tax credits or tax exemptions for fuels produced by renewable sources to encourage renewable energy development, increase public investment income, and cut labor costs.

- Pricing policies

The UK has developed a FiT-CfD (Feed-in Tariff with Contract for Difference) framework, where low-carbon power plants sign different contracts with the CfD Counterparty backed by the government, which acts as an intermediary between power generators and suppliers.

Under the CfD contract, renewable energy generators receive the excess amount over the strike price compared to the reference price calculated by the average wholesale electricity price, or they get compensated for the difference if the reference price exceeds the strike price. This system allows power generators to hedge against local price volatility.

- Other policies

In April 2006, the UK government announced an action plan to develop renewable energy, notably a 5-year funding plan for biomass heating systems and combined heat and power biomass systems. In the same year, the UK government approved a program to assist with the installation costs of renewable energy supply stations such as hydrogen, electric, biofuel, natural gas/biomass stations... The deployment of biomass fuel projects in the UK was also supported by the Department of Energy and Climate Change and the National Lottery's New Opportunities Fund, which provided GBP 66 million in funding.

2.3. China

2.3.1. Current State of Electricity Production in China

The structure of electricity production in China is depicted in Figure 3. Coal-fired power still plays a major role in China's electricity mix, accounting for nearly 70%. Despite being a global leader in renewable energy investment, with 546 million USD invested in 2022, China's share of renewable energy remains relatively low, just over 13%. However, from now until 2050, China has set directions to reduce the share of coal power to below 25% and increase the share of electricity from environmentally friendly sources, including wind, solar, and biomass power, as shown in Fig 4. This strategy is similar to Vietnam's future direction. Thus, China's policies are highly relevant to Vietnam, a country with conditions nearly identical to those of China.

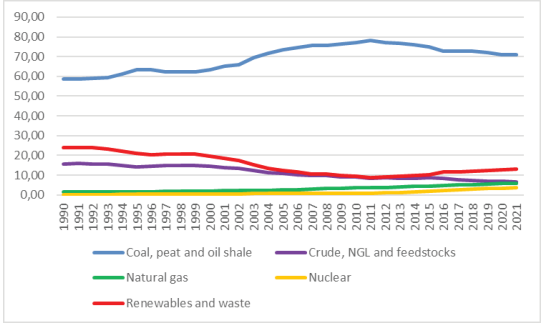


Fig3. Electricity Sources in China from 1990-2022

Source: IEA

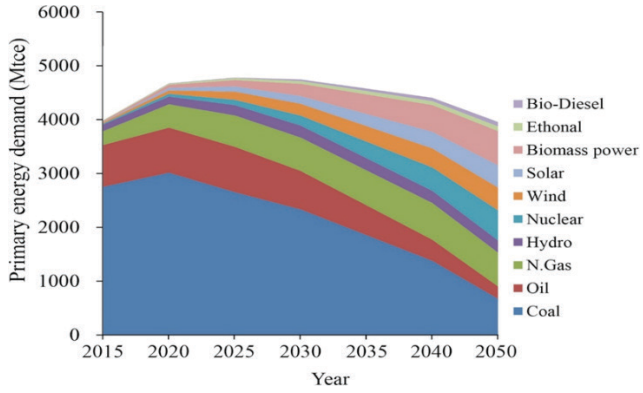


Fig 4. China's Energy Transition Scenario by 2050 (Xiang, 2022)

2.3.2. China's Experience in Renewable Energy Transition (National Agency for Science and Technology Information, 2022)

- Investment in Infrastructure for Renewable Energy

In China, the government has given significant attention to the investment in infrastructure to develop renewable energy. They have heavily invested in the power transmission network to avoid congestion and potential damage to individual power grids in cases of large fluctuations in power supply.

- Tax Incentives

Tax incentives in China for the renewable energy sector include:

Corporate Income Tax (CIT) Policies: Certain enterprises within the renewable energy sector are eligible for CIT incentives, including up to a 50% reduction in corporate income tax.

+ Value-Added Tax (VAT) Policies: The Chinese government has implemented various tax incentives, including a 50% VAT refund for businesses selling wind-generated electricity, a 100% VAT refund for the sale of biodiesel produced from vegetable oil, VAT exemption for the sale of self-produced goods including recycled water, standard-compliant powdered rubber made from old tires, retreaded tires, and some building materials made from 30% or more waste, as well as VAT exemption for wastewater treatment, waste disposal, and sludge treatment services.

Besides incentives related to corporate income tax and VAT, China has also taxed and eliminated subsidies for fossil fuel sources (coal, oil, gas), as exemplified by Shanxi province's implementation of a coal tax.

- Electricity Pricing Policy

In China, the Feed-in Tariff (FiT) for renewable energy is a significant financial policy and has significantly contributed to the miraculous development of renewable energy in China. Specifically, the FiT requires the purchase of renewable energy at a fixed price. FiT is calculated based on factors such as the avoided cost in conventional power production, the cost of renewable energy plus a reasonable profit, and the average retail price. Thus, the renewable energy subsidy policy (FiT) is regularly adjusted.

- Credit policy

China established the Renewable Energy Development Fund to support the following activities: research, development of standards, implementation of pilot projects on the application of REIT; application of loan programs with preferential interest rates when investing in renewable energy projects or scientific and technological research in the field of renewable energy through funds dedicated to renewable energy development.

3. LESSONS FOR VIETNAM IN ENERGY TRANSITION

The author analyzes the current state and direction of Vietnam's energy transition until 2050 to draw lessons for achieving net-zero emissions as committed at COP 26.

3.1. Current State of Electricity Production in Vietnam

From the 1990s to 2010, Vietnam focused on exploiting hydroelectric power. During these 20 years, Vietnam only added five medium and large thermal power plants into commercial operation. As a result, the output from coal-fired power during this period only accounted for 10-16% of the total national electricity output.

However, from 2010 to the present, according to the adjusted National Power Development Plan for the period 2011-2020 with an outlook to 2030 (Power Development Plan VII adjusted) (Decision-No-1208/QĐ-TTg, 2011), by 2020, the total capacity of coal-fired power plants was about 26,000 MW (accounting for 42.7% of the total system capacity), producing about 131 billion kWh (accounting for 49.3% of electricity production).

Table 1. Statistics of Electricity Production by Source for 2021-2023

TT	Power output, MW			Proportion (%)		
	2021	2022	2023	2021	2022	2023
Hydro Power	21.836	22.544	22.872	28,50	28,98	28,39
Coal Power	24.671	25.312	26.757	32,20	32,53	33,22
Gas Power	7.125	7.160	7.160	9,30	9,20	8,89
Renewable Energy	20.670	20.670	21.664	26,98	26,57	26,89
Other Sources	2.318	2.114	2.102	3,03	2,72	2,61
Total Capacity	76.620	77.800	80.555	100	100	100

Source: (Kirin-Capital, 2024)

By the end of 2023, the total capacity of the power system reached about 80,555 MW, an increase of more than 2,800 MW compared to 2022. Coal power accounted for the largest share at over 33.2% in 2023, a rise of 0.7% compared to 2022. Electricity from hydro and renewable sources also accounted for a significant proportion in 2023, at 28.4% and 26.9%, respectively, but the increase in proportion was relatively small.

3.2. Vietnam's Energy Transition Direction by 2050

According to Power Development Plan VIII, there is a significant change in the power capacity structure. Specifically, the capacity from coal power decreases from more than 33% in 2023 to 20% in 2030, and to 0% by 2050.

Table 1. Statistics of Power Plant Capacity by Source for the Period 2030-2050

No.	Capacity (MW)			Proportion (%)		
	2030	2050 (kịch bản thấp)	2050 (kịch bản cao)	2030	2050 (kịch bản thấp)	2050 (kịch bản cao)
Hydropower	32.046	66.666	81.566	21,29	13,91	13,96
Coal Power	30.127	0	0	20,02	0,00	0,00
Gas Power +NGL	37.330	35.830	44.830	24,81	7,48	7,67
Wind Power	27.880	130.050	168.550	18,53	27,14	28,84
Solar Power	12.836	168.594	189.294	8,53	35,18	32,39
Biomass Power + Cogeneration	4.970	36.147	42.947	3,30	7,54	7,35
Other Power Sources	5.300	41.942	57.242	3,52	8,75	9,79
Total Capacity	150.489	479.229	584.429	100	100	100

Source: (Decision-No-500/QĐ-TTg, 2023)

The capacity of electricity from renewable energy sources significantly increases from more than 26% in 2023 to 28.5% in 2030 and over 60% by 2050 in both scenarios. Up to 2030, wind and gas power are prioritized for development, while solar power growth slows down, decreasing in proportion from more than 20% to 9% by 2030. However, from the 2030-2050 period, solar power will be prioritized for aggressive development, with its proportion increasing from nearly 9% in 2030 to over 35% by 2050. Wind power continues to be encouraged for development during the 2030-2050, but gas power decreases proportionally.

Although hydropower decreases in proportion during the 2030-2050 period, the electricity output from hydroelectric power still nearly doubles in 2050 compared to 2030.

Thus, Vietnam's electricity production structure is trending towards a substantial reduction in coal-fired power by 2050, while other fossil fuels, such as oil and gas, are still encouraged to be used along with other energy sources.

3.3. Vietnam's Policies on Energy Transition

In terms of policy and legal framework, since 2007, Vietnam has first adopted the national energy development strategy envisioning up to 2050 through Decision No. 1855/QD-TTg dated December 27, 2007, by the Prime Minister (Decision-No-1855/QĐ-TTg, 27/12/2007).

Based on this, various decrees and plans have been issued:

In 2011, the Government approved a 10-year development plan from 2011 to 2020 in the initial Power Development Plan VII under

Decision 1208/QD-TTg dated July 21, 2011, which, for the first time, identified the role and proportion of renewable energy sources (Decision-No-1208/QĐ-TTg, 2011).

In 2014, to strengthen the legal framework for the development of energy sources, the National Assembly amended the Electricity Law No. 28/2004/QH11 (2004), which was amended by Law No. 24/2012/QH13 at Article 29, laying the foundation for the development of renewable energy projects; a new Environmental Protection Law No. 55/2014/QH13 was enacted, which clearly defined the scope of application for renewable energy and emphasized government incentives for the exploitation and use of green and renewable energy.

To promote the objectives set out in Power Development Plan VII, in 2015, the Government announced Decision No. 2068/QD-TTg on Vietnam's first Renewable Energy Development Strategy, aiming for renewable energy to account for about 32% of total primary energy consumption and electricity production by 2030, and up to 44% by 2050 (Decision-No-2068/QĐ-TTg, 2015).

In 2016, the Government amended Power Development Plan VII to continue increasing these targets, raising the proportion of renewable energy to 10% according to Decision No. 428/QD-TTg on the National Power Development Plan for the period 2011 - 2020, with a vision to 2030 (Decision-No-428/QĐ-TTg, 2016).

Prime Minister's decisions on renewable energy development include:

- Decision No. 11/2017/QD-TTg dated April 11, 2017, and 13/2020/QD-TTg dated April 6, 2020, to encourage solar power development.

- Decision No. 37/2011/QD-TTg dated June 29, 2011, and Decision No. 39/2018/QD-TTg dated September 10, 2018, to promote wind power development.

- Decision No. 24/2014/QD-TTg dated March 24, 2014, and Decision No. 08/2020/QD-TTg dated March 5, 2020, amending and supplementing some provisions of Decision No. 24/2014/QD-TTg on biomass power.

- The most recent is Decision 500/QD-TTg dated May 15, 2023, by the Prime Minister approving the National Power Development Plan for the period 2021 - 2030, with a vision to 2050 (referred to as Power Development Plan VIII), continuing to adjust the policy frameworks related to renewable energy.

It is evident that, despite having a strategic framework since 2007 and multiple policy adjustments through decisions by the Prime Minister from 2014, 2015, 2016 to the most recent in 2023, policies and laws for renewable energy investment have not been specified in a single law but are scattered across various legal documents.

To meet the primary conditions of a project, renewable energy project developers must comply with several basic conditions:

- Comply with the power development planning;

- Meet the complex process of electricity purchasing and power purchase agreements, including grid connection, control system monitoring and data collection, and metering; approve environmental impact assessments; fire prevention and fighting plans; power operation licenses and power generation permits.

- In addition to meeting these requirements, renewable energy projects must comply with laws on investment, electricity, construction, environment, taxes, etc., not to mention the policy mechanisms of each locality.

3.4. Lessons for Vietnam

Given the current state, the direction of energy transition as previously outlined, and the government's energy transition policies, Vietnam has made significant efforts to transition towards low-emission energy. Recently, Vietnam has been recognized as one of the countries with rapid development and numerous incentives for renewable energy projects.

As of June 23, 2023, 70 of 85 renewable energy projects with a total capacity of 3,851.86 MW have submitted documents to the Vietnam Electricity Power Trading Company (EVNEPTC) to negotiate electricity prices and power purchase agreements. Furthermore, 11 wind and solar projects/ parts of projects with a total capacity of 545.72 MW have completed the Commercial Operation Date (COD) procedures and officially commenced commercial electricity generation. However, Vietnam needs to implement many more projects to achieve the goals set out in the Power Development Plan VIII.

From the actual activities of energy transition in countries like Germany, the UK, and China, we can observe the following: Germany has consistently implemented legislative measures carefully adjusted from the initial stages of developing systems to encourage renewable energy, adjusting feed-in tariffs (FiTs) and their decreasing rates according to the type of renewable energy, capacity range, and year of activation. Conversely, the UK has maximized market functions to encourage renewable energy efficiently. Meanwhile, China has introduced numerous tax incentives, credits, and pricing like the UK, focusing on infrastructure development.

Vietnam also has coal mines that need to be closed, just like Germany, and it needs to encourage investment in renewable energy. Therefore, we can draw the following lessons for energy transition:

3.4.1. Policy Framework

As analyzed, Vietnam's policies on energy transition are numerous but not focused, with various overlapping regulatory documents. Therefore, Vietnam needs a national master plan for renewable energy development, a clear and stable legal and policy framework, and sufficient incentives to attract investors. Policies are the main driver of growth, and a comprehensive legal system ensures the stability and security of investments in renewable energy.

To create a market for various technologies, encouraging policies, such as targets, quotas, mandatory obligations, standards, rules, and efficient tasks, and attractive policies, including pricing policies, public procurement, tradable certificates, and regulations on renewable energy, should be established.

3.4.2. Infrastructure

Renewable energy has the characteristic of rapid, uncontrollable changes in generation capacity, which will cause significant fluctuations in the power system whenever these sources generate intermittently and unstably.

Therefore, to develop these energy sources, investment in infrastructure and power systems is necessary. Expanding public investment in energy-efficient use will ensure the power system operates safely without voltage or frequency drops.

Investment in electrical storage systems for flexible use is also critical.

3.4.3. Investment Policy

To transition from coal power by 2050, many renewable energy plants must be developed to replace coal power, ensuring energy security and economic growth. Therefore, many policies are needed to encourage investment in the renewable energy sector. Some suggestions for policies to enhance investment activities in renewable energy include:

- Implementing budgetary measures, cooperating with energy service companies, or using public-private partnerships (PPP) where risks are shared with the private sector.

- Establishing mega energy service companies to effectively pool and fund energy efficiency projects in the public sector.

- Supporting cost for activities: Research, establish standards, implement pilot projects applying renewable energy.

Dedicated funds for renewable energy development should be used to apply loan programs with preferential interest rates for investment in renewable energy projects or scientific research and technology (R&D) in the renewable energy sector.

3.4.4. Pricing Policy

According to Decision 2068/QD-TTg, Vietnam had a supporting FiT policy (Decision-No-2068/QĐ-TTg, 2015), but this policy is no longer suitable because the uniform FiT applied nationwide leads to development concentration in areas with high economic potential (high solar radiation, considerable average wind speed), resulting in some regions experiencing grid overload or investments in low-demand areas requiring long-distance transmission. To remedy this, a regional and appropriate support pricing policy is needed.

3.4.5. Solutions related to closing coal power plants

As Vietnam has committed to not using coal power by 2050, numerous coal power plants will gradually close until 2050. To facilitate this process, Vietnam should implement the following solutions:

- Developing a roadmap for reducing emissions from coal power and form a joint committee with representatives from all parties involved in the transition and plant closure (including representatives from the coal industry, coal mining localities, unions, and environmental and energy sectors) to ensure studies and evaluations consider the interests of all stakeholders, especially the rights of workers and local socio-economic development benefits.

- Identifying key coal power plants that directly affect the stability of the power system and plants that need to maintain a reserve mode.

- Building a detailed roadmap with specific evaluations of the necessary budget costs to choose appropriate policy options for each development stage, including fuel transition scenarios and cessation of coal power plant operations linked to the impact on the coal industry.

- Adjusting electricity prices to reasonable levels to generate revenue to support the closure of coal power plants.

- Cataloging and planning for retraining or compensating workers who lose their jobs during the energy transition process.

4. CONCLUSION

Transitioning to low-carbon energy and phasing out coal power is an inevitable trend that Vietnam must embrace due to its international commitments and substantial benefits such as environmental damage reduction, decreased health risks to the community, enhanced national energy security, and improved trade balance. Vietnam has already been transitioning from coal to increasing the use of renewable energy sources. Analyzing the experiences of countries currently undergoing energy transitions, such as the UK, Germany, and China, where significant progress has been made in this field, is crucial to formulating appropriate policies for Vietnam. The lessons drawn from the analysis of these countries' experiences, combined with Vietnam's current reality and energy transition direction, include lessons on policy frameworks, infrastructure, investment policies, pricing strategies, and solutions related to the closure of thermal power plants.

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GREEN FINANCE AND ENVIRONMENTAL PROTECTION AT VINACOMIN - SOME RECOMMENDATIONS

Luu Thi Thu Ha[a*], Pham Minh Hai[a], Le Thi Thu Hong[a]

[a]Hanoi University of Mining and Geology, Hanoi, Vietnam

**Corresponding author: luuthithuha@humg.edu.vn*

Abstract: *Green finance is understood as policies to encourage and provide financial support to industries and sectors to reduce greenhouse gas emissions and environmental pollution towards green production. In the production and business process, in many fields such as mining, electricity production, industrial explosives, etc., especially coal mining and processing in Quang Ninh, which is a production field that affects the environment, Vietnam National Coal-Mineral Industries Corporation Holding Limited (Vinacomin) always pays attention to environmental work, linking production with environmental protection, sustainable development towards a green economy, friendly to the environment. In recent years, Vinacomin has synchronously implemented many solutions to protect the environment as well as minimize environmental impacts in the production and business process. In particular, Vinacomin allocates thousands of billions of VND each year for environmental protection, especially in the Quang Ninh mining area. The article includes the following contents: (i) introduction of green finance associated with environmental protection to green Vinacomin's production and business; (ii) achievements, shortcomings, and limitations in Vinacomin's environmental protection work and funding sources for this activity; (iii) recommendations on green finance policies for Vinacomin to actively contribute to improving the environment and contributing to the development of localities, especially Quang Ninh province, in an increasingly "Green" direction.*

Keywords: *green finance, environmental protection, Vinacomin.*

1. GREEN FINANCE AND THE TREND OF GREENING VINACOMIN'S PRODUCTION AND BUSINESS

Green finance is a term associated with the recent development of the trend of greening the world economy. According to the United Nations Environment Program, green finance involves diversifying financial products and services financial institutions provide to promote sustainable development in a country (UNEP, 2016).

According to the G20 Green Finance Study Group, green finance is defined as the financing of investments that bring environmental benefits in the broader context of environmental sustainability. These environmental benefits include reducing air, water, and soil pollution, reducing greenhouse gas (GHG) emissions, improving energy efficiency while using natural resources and mitigating and adapting to climate change and its co-benefits (G20 Green Finance Synthesis Report, 2016).

According to Chowdhury et al. (2013), green finance is financial support aimed at green growth through meaningful reductions in greenhouse gas emissions and environmental pollution. Volz (2018) argues that the financial system for green economic development includes the following main pillars: green financial products, green financial institutions, and green financial markets. This is also the basis and

recommended financial framework for countries to develop strategies and propose solutions to mobilize financial resources for green economic development goals.

Aiming at green production and sustainable development, Vinacomin has identified two principled action mottos for development: (i) Production development must be associated with environmental protection, and (ii) Production development must be in harmony with the environment, locality, and community. These principles are specified by Vinacomin in the Resolutions of Party Committees at all levels, such as directing the development of the Resolution of the Party Committee of the Group on strengthening leadership in implementing environmental protection work in Vinacomin for the period 2021-2025, with a vision to 2030; directing the development of long-term environmental plans; directing the development of a set of internal environmental criteria for Vinacomin; developing environmental regulations to replace previously issued environmental regulations; Issuing many documents directing the implementation of environmental work at member units for implementation throughout the Group.

In recent times, Vinacomin has implemented many specific programs and action plans, such as developing plans to implement environmental protection work into long-term environmental protection projects so that units can proactively practically implement environmental protection work in accordance with and promptly with the production development plan of the entire Group in the periods 2016-2020; 2021-2025. Vinacomin has regularly managed and trained environmental protection contents for all levels in the Group's production organization to implement them effectively. At the same time, it has coordinated with state and local management agencies on environmental work to inspect and monitor the results of environmental protection work at units to promptly correct and handle situations arising in production, contributing to raising awareness and quality of environmental protection work.

With great efforts, Vinacomin has solved the environmental pollution left by the past and prevented new pollution from arising; the quality of the landscape environment in the areas where this corporation's production and business activities are enormously improved, creating favorable conditions for sustainable development strategy, contributing positively to the development of localities, especially Quang Ninh province in an increasingly "Green" direction. Vinacomin and Quang Ninh province have agreed to supplement policies and solutions for developing the coal industry in association with socio-economic development in the area and protecting the environment of Ha Long Bay, ensuring the dual goal: Increasing coal industry output in harmony with urban development, tourism and other economic sectors in the area. To achieve this goal, Vinacomin has proposed a policy to build coal mines in the following directions: Green mines, clean mines, modern mines, mines with few people, and safe mines. Up to now, Vinacomin spends about 1,300 billion VND each year on environmental protection, over 1,000 billion VND in Quang Ninh alone. From this funding source, many environmental projects and works have been invested and implemented to effectively serve environmental protection in the Group's production and business process.

2. RESULTS OF IMPLEMENTING ENVIRONMENTAL PROTECTION SOLUTIONS OF VINACOMIN

** Collection and treatment of waste*

To protect the environment during the production and business process until 2023, Vinacomin has invested in building and

maintaining the stable operation of 45 mine wastewater treatment stations; the quality after treatment is guaranteed according to regulations, and the treatment output reaches over 150 million m3 of wastewater, effectively managing and operating over 39 wastewater treatment stations (industrial mines and 80 concentrated mine wastewater treatment stations; has completed the investment in building a project wastewater treatment station under -150 in Mao Khe. Large-capacity sludge filtration and pressing systems are invested at coal preparation plants, using circulating water without discharging into the environment. The Group builds and maintains the operation of an industrial hazardous waste treatment plant in Quang Ninh, annually treating over 3,500 tons of dangerous waste, of which over 50% of the products after treatment are reused for production.

** Environmental restoration*

Regarding environmental restoration, in 2023, Vinacomin planted trees to restore the environment on over 235 hectares (Quang Ninh's area is 220 hectares). By the end of 2023, over 2,000 hectares of trees were planted (Quang Ninh's area is over 1,800 hectares). Some areas typically that have completed environmental restoration include the waste dumps: Nam Deo Nai, Nam Lo Phong, Chinh Bac Nui Beo, part of Dong Cao Son waste dump, and Nam Khe Tam - Dong Khe Sim waste dump, etc. In addition, the Group has implemented a plan to plant trees at high density to quickly green the mine waste dumps, shortening the greening time from 5-6 years ago to 2-3 years now, contributing to limiting soil and rock erosion, reducing dust emissions, and quickly improving the general landscape environment, especially in Ha Long city. From 2016 to the present, Vinacomin has implemented more than ten projects to build dams to prevent landslides, about 20 projects to improve and restore the environment, and nearly 40 projects to improve and dredge drainage systems and settling ponds.

** Dust control work*

By the end of 2023, Vinacomin has invested in and strengthened the dust-blocking net system in concentrated coal areas; maintained regular watering to suppress dust, operated over 118 high-pressure misting equipment, 167 specialized road watering vehicles, dust suppression in the mine, conveyor heads, fixed misting systems, etc.; strengthened dust control work in the dry season, especially focusing on waste dumps, roads near residential areas, coal warehouse areas, ports.

** Environmental landscape improvement work*

The implementation of environmental landscape improvement work at four concentrated warehouses and ports (KM6, Lang Khanh, Ben Can, Dien Cong) and six mine production sites is being accelerated for other production sites, new mines built according to green - clean - beautiful criteria (Nui Beo, Ha Lam, Thanh Cong, Giap Khau, etc.); Specialized coal transportation routes have been renovated to ensure drainage, trees have been planted on both sides to prevent dust and noise and improve the landscape environment.

** Environmental pollution control work*

Vinacomin has coordinated with Quang Ninh province to invest in and install over 50 automatic environmental monitoring systems for continuous coal mine wastewater, transmitting data directly to the Department of Natural Resources

and Environment by the provisions of the law on wastewater treatment. In addition, this corporation continues to conduct concentrated environmental monitoring for residential areas at risk of being affected outside the management boundary to control and detect pollution risks, promptly direct the implementation of preventive solutions as well as conduct periodic environmental monitoring at member units in accordance with the approved environmental impact assessment report.

** Climate change response work*

In the past, Vinacomin has built many dams and dikes to block soil and rock at the foot of the waste dump. Currently, coal mine waste dumps have had enough dikes and dams according to the plan, preventing soil and rock from being washed away, ensuring safety for production and residents, building nearly thirty settling ponds at the headwaters of drainage streams, regularly dredging the drainage system of rivers and streams to minimize soil and rock filling, and preventing flooding.

According to the overall resettlement project of Quang Ninh province, Vinacomin is relocating hundreds of households in dozens of areas at risk of landslides and dangerous flooding due to the impact of Vinacomin's mining areas to ensure the safety of residents during the rainy and stormy season.

** Technological innovation contributes to environmental protection*

Vinacomin focuses on investing in innovative coal mining technology in the direction of mechanization and hydraulics in underground mining (hydraulic support columns, hydraulic support systems, crushers, etc.), synchronous investment in large-capacity equipment in open-pit mining (excavators with a bucket capacity of 12m3, trucks with a load capacity of over 100 tons, etc.) has reduced the consumption of coal support wood from 45-50 m3/1000 tons to 7-8 m3/1000 tons of coal, reducing coal loss and reducing emissions. Screening plants focus on investing in large-capacity sludge filtration equipment to increase the coal recovery rate, use circulating water, and reduce environmental emissions. At the same time, invest in soft-start systems for electrical equipment to save electricity.

3. ASSESSMENT OF THE IMPLEMENTATION OF VINACOMIN' ENVIRONMENTAL PROTECTION ACTIVITES

3.1. Achievements

One of Vinacomin's strategic goals is moving towards a sustainable „green" economy. Thus, to realize this growth model from 2016 to 2023, the coal industry has spent 4,800 billion VND on environmental protection, handling dust and noise pollution, and innovating mining technology in an environmentally friendly direction.

In addition, Vinacomin has strived to complete more than a dozen large projects and hundreds of medium and small projects, such as wastewater treatment works, hazardous waste, landfill rehabilitation, dredging rivers and streams, building embankments and dams, building new roads to avoid people's lives, relocating seaports, coal processing plants, etc. The Group has developed a long-term plan and roadmap for 5 to 10 years for the treatment, management, and reuse of mine wastewater, landfill rehabilitation, dust treatment, improving environmental management capacity, etc. At the same time, it has built an industry-wide environmental database to serve data

storage and lookup. Units in the Group have strictly complied with and closely controlled the implementation of procedures and technical standards for safety and environment in coal exploration, exploitation, transportation, processing, and use.

Vinacomin has cooperated with foreign organizations in environmental protection: such as applying German wastewater treatment technology at Vang Danh Wastewater Treatment Plant; Korean technology at Trang Khe Wastewater Treatment Plant; selecting suitable local plant varieties (Germany); researching greening of waste dumps on hard ground (Korea); improving the quality of waste dump soil (Japan); using environmentally friendly Neoweb technology to enhance the quality of mine roads (Israel); The Group's advisory agencies and member units have proactively and effectively implemented environmental protection work in production and business activities; The work of educating the sense of responsibility in environmental protection activities to all officers, employees and workers of the Group has been improved one step further through very practical and specific activities from the agency's headquarters - production sites to daily life activities with very specific regulations of the „Bright-Green-Clean" Environmental criteria set applied in Vinacomin. Thereby, gradually forming a lifestyle and culture of environmental protection for Vinacomin's staff, creating a foundation for effectively implementing Green Economy development in Vinacomin in the coming time.

3.2. Some shortcomings and limitations

- Some waste disposal areas visible from national and provincial highways (Dong Cao Son, Dong Khe Sim, Bang Nau) are still dumping waste, so trees still need to be planted to cover the green area, thus affecting the general environmental landscape. Planting new trees is considered to cover the green area without considering the goal of developing the forest economy. According to the plan, some waste disposal sites have not cleared the land to build enough dams to prevent soil and rock.

- Dust control works during the transportation, processing, and consumption of coal; transportation and dumping of soil and rock is sometimes not thorough in some places, still affecting the environment and residents. Some mine wastewater treatment plants have not invested in expansion and capacity increase in time, the implementation progress is slow, surface water has not been well controlled, and when there is heavy rain, the regulating tank sometimes overflows and flows into the environment.

- Some areas need to be implemented faster to implement environmental improvement and restoration, and each part must be completed when conditions permit. The potential of recycling waste rock and soil into common construction materials for the construction and production of mines has not been fully exploited.

3.3 Causes of the shortcomings and limitations

- The system of policies and laws still has many shortcomings, lacks synchronization, overlaps, and many regulations on new environmental issues.

- Investment and regular expenditures from the state and local budgets are still limited and do not meet environmental protection requirements.

- Climate change is increasingly occurring in an extreme direction, creating great pressure on environmental protection projects and solutions.

- The Quang Ninh coal area concentrates many intertwined units, including units not part of Vinacomin, so solving environmental issues is complex and requires time.

- Financial resources for enterprises' environmental protection work are increasingly limited. Previously, Vinacomin's environmental protection budget was taken from the Centralized Environmental Fund, but until now, Vinacomin has no longer been allowed to set aside a Centralized Environmental Fund. The budget for environmental protection work is included in the production and business costs of the units in the Group. In the context of increasing production costs due to increasingly deep coal mining activities, while the volume of environmental protection work is large, the solution requires arranging appropriate financial resources, so the units encounter many difficulties. Due to limited capital, some investment projects have not been allocated enough for the works, so environmental protection solutions have to be supplemented or implemented later, causing a loss of synchronization, efficiency, and timeliness in environmental protection. Vinacomin's total environmental protection budget by industry in 2015-2023 is shown in Table 1 and Table 2.

In previous years, Vinacomin maintained and developed the environmental fund and widely applied economic tools to protect the environment. However, since 2020, the centralized environmental protection fund has no longer been maintained for many reasons, so environmental protection work has encountered many difficulties. Investment costs for environmental work are included in project investment costs and production maintenance costs, which also puts pressure on the costs of member units. In addition, investment, construction, and land procedures are complicated; site clearance is difficult, so the investment time for environmental protection works is prolonged. Due to limited financial resources, some investment projects have not been fully arranged, and environmental protection solutions must be supplemented or implemented later, causing a loss of synchronization and timely effectiveness in ecological protection.

Table 1. Total environmental protection budget of Vinacomin in 2015 - 2023

Unit: Million VND

(Source: Excerpt from Annual Report of Vinacomin and its units)

	2015	2016	2017	2018	2019	2020	2021	2022	2023
Coal	1,077,805	1,148,530	1,166,798	858,879	831,473	756,667	1,076,000	1,013,431	911,510
Minerals	3,255	7,658	8,972	9,574	9,898	15,444	27,799	34,749	35,444
Electric	3,179	7,285	11,167	10,160	10,072	21,753	23,928	29,910	30,209
Industrial Explosives	8,303	6,143	6,388	9,916	9,139	10,773	32,273	33,128	24,496
Total	1,092,542	1,169,616	1,193,325	888,529	860,582	804,637	1,160,000	1,111,218	1,001,659

Table 2. Plan and arrange capital sources to implement environmental protection works in Quang Ninh in 2021-2024

Unit: Million VND

Num.	Target	2021	2022	2023	2024
I	Uong Bi region	57,728.86	58,907	74,772	24,569
1	Mao Khe Coal Company – Vinacomin	12,602.8	12,860	16,147	13,500
2	Nam Mau Coal Company – Vinacomin	23,079	23,550	26,362	0
3	Uong Bi Coal Company – Vinacomin	3,990.56	4,072	0	0
4	Vang Danh Coal Company – Vinacomin	5,956.44	6,078	19,238	4,165
5	Da Bac Logistics Company – Vinacomin	12,100.06	12,347	13,025	6,904
II	Hon Gai region	65,487.52	66,824	71,854	32,153
1	Hon Gai Coal Company – Vinacomin	19,335.4	19,730	32,756	5,560
2	Ha Lam Coal Joint Stock Company – Vinacomin	7,604.8	7,760	8,200	0
3	Ha Tu Coal Joint Stock Company - Vinacomin	14,790.16	15,092	9,548	1,983
4	Quang Ninh Coal Processing Company	3,318.28	3,386	0	0
5	Nui Beo Coal Joint Stock Company – Vinacomin	0	0	10,100	12,735
6	Hon Gai Coal Preparation Company – Vinacomin	20,438.88	20,856	11,250	11,875
III	Cam Pha region	226,096	230,711	327,367	252,338
1	Environmental Company Vinacomin	89,180	91,000	143,200	136,152
2	Coc Sau Coal Joint Stock Company – Vinacomin	15,121	15,430	10,000	11,500
3	Deo Nai Coal Joint Stock Company – Vinacomin	29,939	30,550	56,456	42,011
4	Cao Son Coal Joint Stock Company – Vinacomin	25,253	25,769	20,426	30,266
5	Mong Duong Coal Joint Stock Company – Vinacomin	3,844	3,923	16,754	19,723
6	Ha Long Coal Company – Vinacomin	20,090	20,500	28,407	0
7	Thong Nhat Coal Company – Vinacomin	5,880	6,000	6,000	0
8	Quang Hanh Coal Company – Vinacomin	2,017	2,059	0	0
9	Cam Pha Port and Logistics Company - Vinacomin	22,500	22,960	21,786	0
10	Khe Cham Coal Company – Vinacomin	12,269	12,520	24,338	12,686

4. SOME PROPOSED SOLUTIONS

- *First,* improve the provisions of environmental protection laws in the direction of reducing administrative procedures, strengthening compliance monitoring in practice. Develop mechanisms and policies, especially financial policies for environmental protection (continuing to set up environmental funds from production costs...) to create conditions for enterprises to proactively carry out environmental protection work, encourage enterprises to invest in waste treatment and recycling.

- *Second*, prioritize financial resources, maintain environmental costs of 0.5% - 1.0% of revenue to carry out urgent, focused or shared environmental protection work and regular environmental costs of 0.3% - 0.5%

of production costs (excluding wastewater and waste treatment costs) used at units to proactively source funds for environmental protection work. Research on socialization in the collection and treatment of waste generated in production to diversify capital sources, shorten investment time, and reduce dependence on commercial loans.

- *Thirdly*, integrate solutions, works, and capital sources for environmental protection and climate change response into planning, investment projects, and long-term plans; develop projects and plans for long-term environmental protection and climate change response for each region and each unit as a guideline for implementation to ensure environmental protection and climate change response requirements. New projects choose modern technical technologies that have little impact on the environment, and complete the installation and construction of all environmental protection items before putting the project into official operation.

- *Fourthly*, promote investment in mine wastewater treatment systems to ensure environmental standards; complete the installation of automatic environmental monitoring systems for wastewater and emissions in the Quang Ninh area. Collect, strictly manage and thoroughly treat all types of waste generated in production, especially hazardous waste; recycle and reuse waste to the maximum extent for production and supply to the needs of other economic sectors; increase the capacity of wastewater treatment plants, strengthen supervision and inspection, innovate technology to reduce costs and reuse mine wastewater, gradually forming a circular economy, transforming from brown to green.

- *Fifth*, continue to promote rapid tree planting to cover waste dumps and mines that have ended operations, prioritizing the neat dumping of waste in each area to soon restore the environment and improve the general landscape of Quang Ninh. Plant trees to restore the environment of coal mines after they end in the direction of planting useful trees combined with the development of residential areas, eco-tourism services, providing clean water and environmentally friendly economic sectors. Resolutely carry out environmental sanitation work, improve the landscape of production sites according to the motto "Bringing parks into mines and factories" to improve the working environment and renovate the general landscape.

- *Sixth*, continue to research, innovate, and improve coal and mineral mining and processing technology in a modern direction, using less energy, raw materials, and low emissions; develop new factories that ensure environmental criteria and respond to climate change, in harmony with local development.

- *Seventh*, strengthen scientific research and international cooperation in the field of environmental protection and climate change response to apply new technologies, improve efficiency, and reduce environmental protection costs; resolutely implement the Group's circular economy policy, especially the reuse of waste, including recycling mine wastewater into domestic water for people and industry.

5. CONCLUSION

As a pillar economic group of the country in terms of energy, environmental protection is considered by Vinacomin as one of the key and regular tasks. Therefore, in the past time, the Group has devoted significant

financial resources to environmental protection. However, there is a great need for stronger financial policies for the Coal - Mineral industry in the coming time so that Vinacomin can develop production and business in the direction of green economy, circular economy, environmentally friendly, adaptable to climate change, in harmony with the environment, community and society.

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GREEN ECONOMIC DEVELOPMENT IN VIETNAM: CURRENT SITUATION AND SUGGESTED SOLUTIONS

Nguyen Thi Thuy Huong[a*]

[a]*Academy of Finance, Hanoi, Vietnam*

Abstract: *A green economy is a sustainable, growing economy that brings win-win results for society, promoting environmental protection at the same time and accelerating economic growth. Developing a green economy has become an inevitable trend for countries to achieve economic goals while maintaining environmental and ecological sustainability. In recent years, Vietnam has taken many specific actions to realize the goal of green growth and developing a green economy, initially bringing many practical results. However, reality has also been changing, posing many challenges that must be resolved. The article analyzes the current situation of developing a green economy to protect the environment sustainably in Vietnam, thereby offering solutions to develop a green economy in Vietnam today.*

Keywords: *Green economy, sustainable environment, reality, solution.*

1. INTRODUCTION

In recent years, policymakers have recognized the concept of a green economy as a sustainable, growing economy that brings win-win results for society. It promotes environmental protection while boosting rapid economic growth. The green economy is mainly associated with economic and sustainable development policies, contributing to potential harmony between environmental preservation and economic growth, promoting innovation, and increasing productivity. The green economy is based on the trend of breaking the potential trade-off between short-term economic benefits and an environmentally sustainable future.

In recent years, the development of the economy has caused great harm to the environment, such as polluted air, polluted water resources, land degradation, deforestation, biodiversity loss, and increasing greenhouse gas emissions like CO2, SO2, CH4, etc. Therefore, developing a green economy is important for economic growth while maintaining environmental and ecological sustainability. The 13th National Party Congress affirmed the importance of promoting the development of a green economy and a circular economy associated with ensuring environmentally sustainable development. This study focuses on clarifying the theory of green economy and the current situation of green economy for environmentally sustainable development in Vietnam, thereby proposing some solutions to promote green economic development in Vietnam in the near future.2.1. Some arising issues

2. SOME THEORETICAL ISSUES ABOUT GREEN ECONOMY AND ENVIRONMENTAL SUSTAINABILITY

2.1. Green economics, green economy

The green economy has been of interest to researchers around the world since quite early, such as Dorling (2007); Luo, Z. (2012); Egorova et al. (2015); Maria et al. (2015); Georgeson & Maslin (2019); Sulich, A. (2020); Mikhno et al. (2021). In Vietnam, most current research focuses on many theoretical issues on green economy, economic development

in various fields, namely agriculture, industry, energy, etc.; experience in green economic development in the world and lessons for Vietnam such as greening the economy, applying biotechnology, responsible business models of economic sectors, etc., which are discussed by many researchers such as Kim Ngoc, Nguyen Thi Kim Thu (2015); Do Phu Hai (2018); Nguyen The Chinh (2019); Le Nguyen (2022); Doan Thi Cam Thu (2022).

Countries around the world have undergone a transition from "brown growth" to "green growth." This transition improves the quality of human life and minimizes the impacts of climate change. Brown growth describes an economic development process that relies heavily on fossil fuels and does not consider the negative side effects that economic production and consumption have on the environment. In contrast, green growth is considered a transition to a cleaner economy, more efficient energy consumption, and more proper management of natural resources (World Bank, 2013). Hallegatte et al. (2012) believe that green growth is about making the growth process resource-efficient, creating a cleaner and more flexible environment without necessarily slowing it down. According to Matthews, R. (2022), a brown economy is an economy that depends mainly on fossil fuels, increasing the risk of environmental destruction and not taking into account social issues, environmental pollution, and resource depletion. In contrast, a green economy is defined as an economy that aims to minimize the impacts of environmental degradation and ecological scarcity and whose purpose is sustainable development without damaging the environment. A green economy is often described in opposition to using fossil fuels and non-renewable resources.

The green economy can also be understood as a dynamic economic transition to promote low carbon, improve resource efficiency, and enhance people's benefits by using technology and creating jobs while minimizing long-term environmental degradation (Frone & Simona, 2015). The European Union believes that a green economy is an innovative economy with sustainable and equitable growth (European Commission, 2010). The green economy is defined as creating a better quality of life for all people within the Earth's ecological limits (Green Economy Alliance, 2012).

In 2011, in the report towards a green economy: Pathways to sustainable development and poverty eradication, UNEP defined a green economy as an economy that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcity. It's a model that - while improving well-being - also guarantees a significant reduction in environmental risks and resource scarcity. A green economy can be considered a low-carbon, resource-efficient, and socially inclusive economy. The core meaning of the green economy is economic growth coupled with environmental protection (UNEP, 2011).

The World Bank (WB, 2012) defines a green economy as economic development that ensures efficient use of natural resources, reduces pollution and environmental impacts, and enhances resilience to environmental changes, promotes the role of the government in managing the environment and resources in natural disasters prevention and control. According to the United Nations Economic and Social Commission for Asia and the Pacific, the green economy is an approach to achieving economic growth with the goal of economic development while ensuring environmentally sustainable development.

The green economy focuses on qualitative innovation of growth models through promoting eco-efficiency. The

green economy is considered a model with higher-quality development, in-depth development, and green growth aims at integrating environmental protection and reducing carbon emissions in production and business, which serves as a driving force for comprehensive development. From the above definitions, it can be generalized that a green economy is an economy that uses energy economically and efficiently, has low emissions, minimizes environmental risks, improves quality of life, and balances society.

2.2. Environmentally sustainable development

The UN's World Commission on Environment and Development defines "sustainable development" as —development that meets the needs of the present without compromising the ability of future generations to meet their own needs (World Commission on Environment and Development, 1987). The United Nations Conference on Environment and Development (UNCED), also known as the 'Earth Summit,' held in Rio de Janeiro, Brazil, in 1992, declared that "Sustainable development" is a development process that requires a close, reasonable and harmonious combination of three aspects of the development, namely economic growth, social development, and environmental protection. Thus, sustainable development is a development that ensures economic growth based on the rational use of natural resources and protection of the natural environment to meet the needs of the next generation without affecting the conditions and ability to satisfy the needs and living environment of future generations.

Environmentally sustainable development is rationalizing natural resources, maintaining a stable resource base, and avoiding overexploitation of renewable resource systems. Environmentally sustainable development needs to maintain biodiversity, stabilize the atmosphere and other ecological activities, and reduce environmental pollution, including urban and industrial pollution. It is necessary to properly manage solid and hazardous waste and be capable of preventing and minimizing the negative impacts of climate and natural disasters.

A green economy towards environmentally sustainable development is a high-quality development model that focuses on innovating the quality of the in-depth growth model and integrating environmental protection and economic growth goals. The green economy is the efficient use of energy and natural resources, low emissions, reduced environmental risks, and improved social equality. Environmental protection, sustainable management and use of natural resources, and response to climate change are considered key issues of a green economy.

2.3. The roles of green economy

Firstly, a green economy minimizes the impacts of climate change. Based on calculations, only about 1.25% of global GDP needs to be invested in improving energy efficiency across sectors and developing renewable energy, including second-generation biofuels. According to studies, worldwide energy consumption can decrease by 36% by 2030, and annual CO2 emissions will decrease from 30.6 billion tons in 2010 to 20 billion tons in 2050[1]. In addition, thanks to Green Agriculture, the green economic scenario is estimated to reduce greenhouse gas concentrations to 450 ppm by 2050, a reasonable and sufficient level to reduce global warming by up to 2 degrees Celsius. According to UNESCO, green investment in forestry and agriculture will help reverse

1 Ministry of Planning and Investment (2021). National Strategy on Green Growth for the period 2021 - 2030, vision to 2050.

forestland decline, regenerating about 4.5 billion hectares of this important resource over the next 40 years. Investing in green agriculture will help improve productivity, produce more food, reduce land use for agriculture and livestock by 6%, and improve agricultural land quality by 25% by 2050.

Secondly, a green economy encourages more efficient use of renewable and new energy to protect the environment. The green economic model recognizes the value and role of investment in natural capital, creating jobs and being a pillar for poverty reduction. Therefore, instead of using fossil fuels, the green economy uses renewable energy and low-carbon technology, encouraging more efficient use of resources and energy. Because natural resources are increasingly depleted, biodiversity is decreasing, and environmental pollution is increasing, renewable energy will help reduce greenhouse gas emissions and the risk of fossil fuel price fluctuations. Furthermore, renewable energy is an energy source with almost endless reserves, long-term use, potential, and environmental friendliness - such as wind, solar radiation, tides, biogas, wood, biomass, block (straw, rice husk, leaves, etc.)

The United Nations Environmental Program emphasizes the use of renewable energy (solar energy, wind energy, geothermal energy, biogas, etc.); the design and building of greenhouses using clean energy, efficient use of water, and consumption of green products and environmentally friendly materials; friendly transport environment with growing use of biofuels, increasing use of bicycles and public vehicles powered by steam engine and electricity, etc. in the green economy. Therefore, using renewable energy is also one of the new driving forces of the green economic trend, which is environmental protection towards sustainable environmental development.

Thirdly, the green economy helps reduce carbon emissions, opens up sustainable urban living, and protects the environment. Today's urban areas are home to more than 50% of the population, consuming 50% - 60% of energy and emitting 75% of total greenhouse gas emissions. Rapid urbanization increases pressure on clean water supply, drainage, public health, poor infrastructure, environmental degradation, and high public health care costs. Urbanization and urban sprawl will continue to drive energy demand growth in cities. Therefore, behavioral changes in urban energy systems are necessary, which is the strategy to achieve the long-term sustainability of global energy use, including carbon emission reductions.

3. CURRENT SITUATION OF GREEN ECONOMIC DEVELOPMENT IN VIETNAM

3.1. Achievements

Recent UK and European Union announcements have committed to bringing greenhouse gas emissions to net zero by 2050. China targets to achieve net zero by 2060, while India aims for 2070. A Green New Deal promotes large-scale clean energy investments to stimulate continued growth. However, national and international efforts are moving towards a green economy, which is like a panacea for the urgent challenges of climate change and economics.

In recent years, climate change in Vietnam has continuously set new records in temperature, rainfall, sea level, frequency, and impact of superstorms, floods, tropical depressions, etc. Vietnam is one of the countries most heavily affected by climate change and rising sea levels. This is considered the direct cause of changes in

the environment and the Earth's ecosystem and is a risk of negative impact on the socio-economic development of all countries in the world, not only in Vietnam. The World Bank estimates that this changing climate will reduce Vietnam's GDP by 3.5% by 2050[2]. Under the Sustainable Development Goals by 2030, Vietnam will become an industrialized and modernity-oriented country, including many internationally competitive and in-depth industries participating in global value chains that are increasingly putting pressure on the environment and natural resources. Therefore, green economic development is an inevitable trend, ensuring the goals of economic modernization, environmentally sustainable development, and the ability to respond to climate change. Vietnam needs to conduct research and properly assess the impacts of climate change, reduce environmental degradation, and improve resilience and adaptation to climate change, which is an essential and urgent goal that needs to be resolved soon to ensure green development in the future.

In the context of the COVID-19 epidemic, many countries promote economic recovery and economic growth in the direction of green growth or green recovery. Transitioning to a green economy and green growth is not only an inevitable choice but also an opportunity for Vietnam to become a pioneer in the region, catching up with the world's development trends, which are seen as follows:

- Firstly, green economic development policy improves environmental protection. Vietnam is one of the few countries heavily affected by climate change and suffers many negative impacts from natural disasters and epidemics. According to research, over the past 20 years in Vietnam, natural disasters have caused more than 13,000 deaths and caused economic losses worth over 6.4 billion USD (Tuan Ngoc, 2022). According to climate change scenarios, by the end of the 21st century, sea levels could rise by 1 meter, directly affecting the lives and livelihoods of about 20% of the population, and losses could reach 10% GDP/year (Ministry of Natural Resources and Environment, 2016).

Realizing the impacts of climate change on people's lives, over the past few years, Vietnam has had many green economic development policies such as orientations and goals of greening the economy specified in Decision 1393/QD-TTg of the Prime Minister, dated September 25, 2012, approving the National strategy on green growth for the period 2011 - 2020 with a vision to 2050; Decision 2612/QD-TTg, dated December 30, 2013, of the Prime Minister approving the Strategy for using clean technologies by 2020, with a vision to 2030; Decision 1658/QD-TTg, dated October 01, 2021 of the Prime Minister approving the National strategy on green growth for the period 2021 - 2030, with a vision to 2050. The Prime Minister also approved a national action program on sustainable development of production and consumption for 2021 - 2030 for sustainable and environmentally friendly exploitation and use of resources and stable job creation, thereby promoting sustainable lifestyles and improving quality of life.

The 12th Party Congress affirmed the policy of building a green, circular, and environmentally friendly economy: "Ensure rapid and sustainable development based on macroeconomic stability, growth model renewal and improvement of productivity, quality, efficiency and competitiveness of the economy. Proactively and effectively respond to climate change; manage, exploit, and use

2 World Bank (2013). From brown to green growth: The economic benefits of climate action, https://www.worldbank.org

natural resources rationally, economically, effectively, and sustainably; Implement the protection of the environment with people's health as the top priority; Resolutely eliminate projects that are likely to cause environmental pollution, ensure the environmental quality, and protect and conserve the ecosystems and the biological diversity; build a green, circular, environmentally friendly economy" (Communist Party of Vietnam, 2021).

- Secondly, the economic production model should be transformed, moving from a "brown" to a "green" growth model and integrating environmental protection goals. The world's development trend is transforming economic structure and innovating growth models from "brown" to "green," from intensive exploitation of natural resources to development based on ecosystems, digital economy, circular economy, and low carbon emission. Compared to the world's average level, Vietnam's production technology is mostly old, with large energy consumption and poor waste treatment, leading to low productivity, generating a large amount of polluting waste and increased costs and greenhouse gas emissions. Therefore, the green production model is becoming one of the models that many businesses aim at, meeting new requirements and being in line with the general development trend of the world. At the same time, this model also helps enhance businesses' position and competitiveness in domestic and foreign markets.

In the agricultural sector in Vietnam, green farms have been formed with the objectives of scientific production planning and strict production processes; production development is associated with creating a sustainable ecological environment and biodiversity. In addition, many local farmers have joined agricultural cooperatives to produce organically, without using chemical fertilizers or pesticides, providing clean products to consumers and enterprises applying the continuous, clean, closed-loop production model according to standards in which the lowest one is VietGAP.

In the industrial sector, enterprises limit the use of old and outdated technology and promote research and application of science and high technology in production. According to data from the General Statistics Office for 2011 - 2015, the proportion of high-tech products in the total value of industrial production reached an average of 18.37% (UNDP, 2015). In 2016 - 2020, the figure increased from 63.9 in 2016 to nearly 80% in 2020 (Nguyen Tuan Phong, 2021). Besides, the industrial production sector also had positive changes. The proportion of industrial enterprises applying cleaner production technology increased from 11% to 32% in the period 2011-2015; industries that consume large amounts of energy tended to decrease, especially the steel industry (decreased by 8.09%), cement (decreased by 6.33%), textile fibers (decreased by 7.32%) (Lan Anh, Thu Phuong, 2019).

People and investors gradually change their shopping habits to "green" consumption channels in the service sector and prioritize health protection and renewable energy. Many clean food companies have opened to meet people's need to buy clean products, such as Sea Wolf, Uncle Tom, Home Food, Hano Farm, etc. Restaurants, eateries, supermarkets, etc., switched to using "green" products such as packaging and utensils made from environmentally friendly materials instead of nylon or disposable plastic. For example, milk tea shops use bamboo and stainless-steel straws instead of plastic straws; supermarkets use banana leaves to wrap vegetables and food instead of plastic bags, an example of using environmentally friendly packaging, etc.

Those examples prove that Vietnamese consumers are increasingly concerned about "green" and "clean" issues, so they are willing to pay more for brands with "green" and "clean" commitments. Specifically, up to 80% of consumers are concerned about the long-term harmful effects of artificial ingredients, and 79% are willing to pay more to buy products that do not contain unwanted ingredients (Ministry of Industry and Trade, 2017).

- Thirdly, using energy economically and effectively encourages more efficient use of renewable energy to reduce emissions and protect the environment. Vietnam is one of the countries most affected by climate change. Extreme weather events are occurring more and more frequently and erratically (prolonged heat waves, droughts, storms and floods, saltwater intrusion, sea level rise in coastal areas, etc.), and their associated causes are related to global warming and greenhouse gas emissions. It is estimated that the total amount of greenhouse gas emissions comes from fields, namely energy, and agriculture, in which CO2 emissions in 2020 were 466 million tons. In 2030, it will increase to 760.5 million tons (Ministry of Planning and Investment, 2021). In addition, Vietnam is currently facing the negative impacts of climate change. Large quantities of greenhouse gases cause serious environmental consequences, especially in large cities, if emission reduction measures do not alleviate these impacts.

Vietnam has promoted the development of renewable and clean energy to reduce emissions. Biomass energy projects include the Phu Quoc bioelectric power plant, the biomass thermal power plant in Binh Phuoc, and the rice husk-fueled thermal power plant in Can Tho. Vietnam Electricity Corporation has built 113 solar and wind power projects, with a total capacity of wind and solar power sources of nearly 23,000 MW, of which solar power capacity is about 11,200 MW and wind power is about 11,800 MW. That brings Vietnam into the top 10 countries with the largest installed solar power capacity globally by 2020. With great potential for ambitious solar and green energy goals, by 2050, Vietnam will have many opportunities to become a global leader in renewable energy.[3]

In the fields of agriculture, forestry, and construction, there has also been significant progress in the process of implementing green growth. Many programs have been put into practice, bringing efficiency in production and business, such as Good Agricultural Practices (VietGAP) for key agricultural products (vegetables, tea, rice, coffee), water-saving irrigation process for rice and dry plants, biogas program in the livestock industry, promotion of energy saving and energy efficiency in fisheries; action plan to reduce greenhouse gas emissions and emissions in cement production; implementation of integrated solid waste management; urban development plan or action plan to reduce CO2 emissions in civil aviation activities.

3.2. Limitations in the process of developing a green economy in Vietnam

- The lifestyle and consumption of a part of the people is still wasteful, destructive to resources, and not friendly and in harmony with nature. Awareness and understanding of green growth and building a green economy toward sustainable development require extensive research and dissemination of knowledge throughout the political system, businesses, industries, professions, and communities.

3 Ministry of Planning and Investment (2021). National Strategy on Green Growth for the period 2021 - 2030, vision to 2050.

Labor quality is not high, science and technology levels are limited, and the economic growth model is still mainly extensive and dependent on foreign direct investment.

- Labor restructuring in the market is still slow, not keeping up with economic restructuring: In 2022, the number of employed workers aged 15 and over was 53.61, including 17.0 million working in the industry and construction sector (accounting for 33.6%); 19.7 million people (accounting for 38.9) working in the service sector; 13.9 million people (accounting for 27.5) working in the agro-aquatic-forestry sector. Meanwhile, in the economic structure in 2022, the agro-aquatic-forestry sector accounted for 11.88%; industry and construction accounted for 38.26%; the service sector accounted for 41.33%; taxes and subsidies on products accounted for 8.53%.

The legal and policy systems are not synchronized and do not match the trends of globalization and green growth.

- Low efficiency of resource use, waste of natural resources, in which biological resources are seriously degraded, and land resources are used ineffectively.

- Outdated production technology, consuming a lot of energy; brown economic sectors account for a large proportion of the economy. Compared to the world's average level, Vietnam's production technology is mostly old, with large energy consumption and poor waste treatment, leading to low productivity, generating a large amount of polluting waste and increased costs and greenhouse gas emissions.

- Clean energy production industries such as nuclear, wind, solar, biomass, and geothermal have not yet developed.

- In industry, solving environmental problems, environmental services, and industrial recycling is still weak.

4. SUGGESTED SOLUTIONS FOR GREEN ECONOMIC DEVELOPMENT IN VIETNAM UNTIL 2030

Firstly, Propaganda will raise awareness about developing a sustainable green economy to protect the environment, the political system, businesses, and communities. Therefore, it is necessary to build and implement information and propaganda projects to raise awareness of the entire political system, businesses, and communities about implementing green growth and contributing to building our country with sustainable development. Extensive propaganda to attract people to participate more and have a deeper transition into a green economy and growth chain, raising awareness about environmental protection and resource protection in production and consumption.

Secondly, Complete the appropriate legal corridor for green economic development, such as financial measures, national policy reform, international cooperation through trade, aid and market development, etc. Build a legal system, legal corridor, and regulations to promote, encourage, and support the development of organizations, individuals, and businesses oriented towards green development, green business, and environmental protection. Apply green economic tools and consistently use the national standard system and green classification criteria for production and consumption activities.

Thirdly, Increase investment in science and technology development, especially promoting research and research

cooperation with international partners in fields and industries serving green economic development such as using renewable energy, resource-saving, and resource-efficient technologies, seeking technological solutions, supporting conditions for technology transfer and promoting the implementation of these technologies in all industries and fields to achieve the goal of economic growth, and ensure national emission reduction goals at the same time;

Fourthly, strengthen international cooperation on technology transfer, response to climate change, environmental protection, and natural resources; at the same time, learn from the experience of successful transition and development of green economies of pioneering countries to draw lessons, thereby proposing an action program appropriate to Vietnam's economic characteristics and specific development conditions.

5. CONCLUSION

Developing a sustainable green economy is a global trend and a goal towards environmentally sustainable development; a green economy meets both economic growth and environmental protection goals. A green economy plays an important role in protecting the environment sustainably and minimizing the impacts of climate change, reducing energy consumption, increasing the efficiency of clean energy use, and reducing carbon emissions to ensure urban residents' health. Therefore, Vietnam has achieved positive results in the green economy development strategy, but certain difficulties still need to be changed and resolved.

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INDUSTRIAL DEVELOPMENT POLICIES TOWARDS GREEN GROWTH: INTERNATIONAL EXPERIENCES AND LESSONS LEARNED FOR VIETNAM

Nguyen Quy Binh[a*],

[a]Tran Phat Education Company, Hanoi, Vietnam

**Corresponding author: Nguyenquybinh1980@gmail.com*

Abstract: *For many countries worldwide, industrial development towards green growth is considered a comprehensive solution that not only solves environmental problems, reduces waste, and maximizes resources but also boosts economic growth and promotes competition. Green industry development presents benefits on not only economic but also on social and environmental fronts. The article studies the experiences of three countries, namely Germany, Denmark, and South Korea, with four central policies, including green credit policy in industrial development, resource tax policy in industrial development, state budget spending policies in industrial development, and policies on green financial market development; Thereby, valuable experiences can be drawn and applied to Vietnam.*

Keywords: *Industrial development policy; Green industry; Green growth.*

1. INDUSTRIAL DEVELOPMENT POLICIES TOWARDS GREEN GROWTH OF SOME COUNTRIES IN THE WORLD

1.1. Green credit policy in industrial development towards green growth

1.1.1. Germany:

Germany has the German Reconstruction Bank- KfW providing loans and financial support for green industrial development projects, including renewable energy, energy efficiency and environmental protection: "KfW- Warteg"- Loan program for small and medium-sized enterprises investing in energy efficiency, renewable energy and environmental protection; "KfW-Erneuerbare Energien"- Providing financial support for renewable energy projects such as wind power, solar power, biomass, etc.; "KfW-Kommunal"- Providing loans for local government projects related to environmental protection, climate change adaptation and sustainable development; "KfW Advisory Services"- Supporting enterprises and regional authorities in developing and implementing green industrial development projects. In addition, KfW actively participates in international initiatives on green finance, for example KfW cooperated with the European Bank for Reconstruction and Development (EBRD) to finance green industrial development projects on a large scale; KfW became a member of the International Solar Alliance (ISA) and actively participated in efforts to promote investment in clean energy, etc.

The "Kredit für Innovation" (KfI) program provided loans to small and medium-sized enterprises (SMEs) investing in green technology research and development for the

industry. Kfl offered loans of up to two million euros for each research and development project with competitive loan interest rates and flexible payment terms. In particular, enterprises could receive additional support through grants or subsidies.

1.1.2. Denmark:

The Green Investment Fund (GIF) provides investment capital for green industrial projects, including renewable energy and energy efficiency. The Danish government established it to promote sustainable development.

GIF offered many different types of investments, including (1) equity, directly investing in companies that develop and operate green industry projects; (2) green bonds, issuing bonds to mobilize capital for green industrial projects; (3) green loans, providing loans to enterprises and organizations implementing green industry projects; (4) venture capital fund, supporting startups to develop new green technologies for industry. GIF collaborates with private and public partners to implement green industry projects. The Fund also actively participates in international initiatives to promote investment in sustainable industry solutions.

"Klimastøtte" program provided financial support to small and medium-sized industrial enterprises to transition to environmentally friendly production activities. The program aimed to promote sustainable development and reduce greenhouse gas emissions. The Klimastøtte program provided grants and technical support to SMEs in the following areas: (1) minimizing energy consumption, improving the energy efficiency in industrial production processes; (2) transitioning to renewable energy, installing solar power, wind power or other renewable energy systems; (3) minimizing greenhouse gas emissions in industrial production, improving production processes to reduce emissions of CO_2 and other greenhouse gases; (4) managing industrial waste, implementing recycle and reuse programs, reducing waste and improving industrial waste treatment processes; (5) using environmentally friendly materials, replacing traditional materials with recycled, reused or sustainably sourced materials.

The Klimastøtte program is a valuable resource for Danish SMEs transitioning to environmentally friendly industrial production activities. By providing financial and technical support, the program helped SMEs reduce their environmental impact, saving money, and promoting sustainable development.

In addition to the Klimastøtte Program, the Danish government offered many other financial support programs for enterprises looking to invest in green industry solutions.

1.1.3. South Korea:

Korea is a pioneer country in applying green credit policies to promote sustainable industrial development. The Korean government has implemented many programs and initiatives to encourage industrial enterprises to use environmentally friendly production methods and invest in green technologies.

Green Policy Fund is the governmental fund to support investment on promoting

green growth and sustainable development, founded in 2009. The Green Policy Fund provided loans, credit guarantees, and direct investments to qualified industrial enterprises and green industrial projects.

The main goals of the Green Policy Fund included (1) promoting renewable energy development: the fund invests in renewable energy projects such as wind power, solar power, and geothermal energy to minimize dependence on fossil fuel; (2) improving energy efficiency: the fund supports projects to improve energy efficiency in industrial parks; (3) minimizing environmental pollution: the fund invests in projects to minimize air pollution, water pollution and soil pollution from industrial production activities; (4) responding to climate change: the fund supports industrial projects that help Korea adapt to the impacts of climate change and minimize greenhouse gas emissions.

The Green Policy Fund invested in many different types of projects, including (1) infrastructure projects (the construction of renewable power plants, green transportation systems, and industrial wastewater treatment facilities); (2) technology projects (industries with new environmentally friendly technologies, such as electric vehicles, batteries, and smart energy systems); (3) enterprise projects (industrial enterprises in developing environmentally friendly products and services).

The "Green Credit Initiative" (GCI) program was launched in 2010 to encourage commercial banks to provide preferential loans to industrial enterprises applying green technologies and environmentally friendly production practices.

The Korean government provided subsidies and tax incentives to commercial banks participating in the program. Commercial banks used these subsidies and incentives to offer preferential loans to industrial enterprises applying green technologies and environmentally friendly production practices. These loans typically had lower interest rates and longer payment terms than conventional loans.

The GCI program has successfully promoted green industrial development in Korea. Since its executive implementation, the number of industrial enterprises adopting green technology and environmentally friendly production practices has increased significantly. This has contributed to minimizing the environmental impact of industrial activities and promoting sustainable development.

"Green Bond Market Initiative" (GBMI) was launched in 2012 to promote the development of the green bond market in Korea. The Bank of Korea (BOK) and the Korean Ministry of Finance cooperated to support the issuance and investment in green bonds, contributing to mobilizing capital for green industrial projects.

GBMI operates through several measures, including providing financial support. The Korean Government provided subsidies and guarantees to green bond issuers. The Korean government has issued some regulations and standards to support the development of the green bond market and develop a legal framework. To raise

public awareness, the government launched campaigns about the benefits of green bonds for investors and industrial enterprises. Korea also collaborated with other countries to share experiences and develop international standards for green bonds.

1.2. Resource tax policy in industrial development towards green growth

1.2.1. Germany:

The Kyoto Commitment and the international community's goals of limiting global warming to below 2°C above pre-industrial levels should be implemented to reduce greenhouse gas emissions and respond to climate change. The German Government set a target of cutting greenhouse gas emissions by 55% by 2030 and 70% by 2040, and they expected to reach an 80-95% net emission reduction target by 2050 through developing renewable energy and promoting energy efficiency.

At the same time, a series of policy tools were deployed to ensure the achievement of climate goals. The Climate Action Program issued by the Government on December 3, 2014, included 100 solutions to ensure the completion of the goal of reducing greenhouse gases and issuing annual climate action reports. Climate policies have created opportunities for domestic enterprises to invest in renewable energy. The efficient use of energy helped industrial enterprises increase their competitiveness and reduce their dependence on energy imports.

The ecological tax policy was issued in 1999 to limit oil and electricity consumption and encourage renewable energy development. After a period of implementation, the eco-tax has helped reduce fuel consumption and emission levels, promote renewable energy development, and create more economic jobs.

Energy tax reform policy was helpful for the energy system transition, which could be considered a typical field in implementing the green economic model, contributing to promoting environmental and economic development in Germany. Like many countries, Germany changed the energy system transition strategy into the "Green Energy Economy". With a strategic vision and long-term steps, Germany has become the first country in the world to build a "Green energy" economic strategy. German Renewable Energy Sources Act (EEG), adopted in September 2000, set out a common policy framework for renewable energy in Germany up to 2050. Preferential price policies for renewable energy and energy tax reform are applied to promote energy-efficient technologies.

Regarding environmental tax policy, the German government levies taxes on industrial products and activities that pollute the environment, such as coal, natural gas, gasoline, and CO_2 emissions from factories. Higher taxes are applied to more polluting products and activities to encourage using renewable energy and cleaner technologies and minimize the negative environmental impact of industrial activities.

The German government gradually eliminated subsidies for industries consuming fossil fuels, encouraging the transition to renewable energy. The aim is to reduce dependence on fossil fuels, promote

cleaner energy consumption, and reduce greenhouse gas emissions.

1.2.2. Denmark:

Denmark applied a high carbon tax on CO2 emissions from industrial production activities. This tax was essential in encouraging renewable energy consumption and reducing greenhouse gas emissions. For example, in 2023, Denmark's carbon tax was 750 DKK (about 100 USD) per ton of CO2 emitted.

1.2.3. Korea:

The Korean Government levies carbon tax on fossil fuels such as coal, natural gas, and oil. Tax rates are adjusted over time to gradually increase the cost of fossil fuels, encouraging renewable energy consumption and energy conservation. The revenue from the carbon tax is allocated to finance green industrial development programs, such as research and development of renewable energy technology, and support to investment in clean energy industry projects.

Korea participated in the Greenhouse gas emissions trading system (ETS), which allowed industrial enterprises to buy and sell greenhouse gas emission permits. The ETS aims to minimize South Korea's greenhouse gas emissions by setting emission limits and allowing industrial enterprises to trade emission permits.

1.3. State budget spending policy in industrial development towards green growth

1.3.1. Germany:

The state directly invested capital in research and development projects in renewable energy technology, such as solar, wind, and electric vehicles. It also supported the construction of green energy infrastructure and provided finance programs encouraging energy efficiency and conservation in industrial enterprises.

Subsidies and tax incentives are also supportive measures for developing green growth. The State provided subsidies to industrial enterprises investing in renewable energy technology and other green industrial solutions and reduced taxes for industrial enterprises producing and consuming environmentally friendly products. It offered value-added tax (VAT) exemption for some renewable energy products and electric vehicles.

Regarding loans and credit guarantees, the State provides preferential loans for industrial enterprises investing in green industry projects and credit guarantees to private loans for renewable energy and energy efficiency projects.

In terms of public procurement, the State prioritizes the procurement of environmentally friendly products and services for government activities, sets high environmental standards for public procurement contracts, and supports local industrial enterprises in developing green products and services that meet government needs.

On training and education programs, the State invests in training programs to develop human resources for the green industry, raises public awareness of the importance of renewable energy and sustainable development, and supports universities and

research facilities in developing educational programs related to the green industry.

1.3.2. In Denmark:

The government provides research and development (R&D) funding for renewable energy technologies, energy efficiency, and other environmental solutions. The government prioritizes purchasing green products and services and invests in infrastructure supporting the green industry, such as smart grids and electric vehicle charging stations.

Other business support can be seen in government loans and grants to green industry enterprises to help them invest in new technologies and expand their business operations. The government also provides consulting and support services to help them overcome barriers and seize opportunities. Market development for green industry products and services is also supported.

1.3.3. In Korea:

State budgets should be spent to support the main industries, such as automobile manufacturing, electronics, shipbuilding, and ship construction, through offering preferential loans, tax discounts, or other incentive policies.

Investing in technical and social infrastructure, such as railway systems, seaports, hospitals, and schools, will create favorable conditions for industrial development and enhance the economy's competitiveness.

Promote research and technology development by investing in research projects, product development, and supporting businesses in conducting innovative research. At the same time, the government supports the training of high-quality human resources and fosters collaboration between businesses and universities in training, research, and technological development for the advancement of green industry.

1.4. Policy to develop the green capital market in industrial development towards green growth

1.4.1. In Germany:

The green bond market in Germany is expanding thanks to the introduction of specific and strict management and development policies. During the development of green bonds, two market standards (in European countries) have emerged to help this market operate: the Green Bond Principles (GBPs) of the Capital Markets Association (ICMA) and the Climate Bond Standard (CBS) issued by the Climate Bonds Initiative (CBI).

The Green Bond Principles (GBPs), initially established in 2014 by a consortium of investment banks, have been developed and monitored by an independent secretariat hosted by the International Capital Market Association (ICMA). The guidelines were updated in 2018 and June 2021 and became the global green bond standards. The Next Generation EU green bonds are also aligned with the GBPs. However, although the standard defines a clear process for project selection and allocation of funds, it still lacks clear definitions of green economy activities.

The Climate Bond Standard developed by the Climate Bonds Initiative (CBI) has evolved with stricter requirements on green bonds. In addition to the basic requirements

of the ICMA standards, the CBI standards also provide a taxonomy with screening criteria to define green economy activities and require green bonds to be certified by approved external reviewers. In 2020, about a quarter of green bonds worldwide were issued under CBI standards.

1.4.2. In Denmark:

Denmark has become a leader in promoting green bonds. The government and financial institutions have vigorously promoted the development of this market by providing incentives and financial support for green industry projects and enterprises. The Danish Government has improved the legal framework to support the development of the green bond market, including establishing standards and regulations to ensure transparency and consistency in green bond issuance and management.

1.4.3. In Korea:

Korea aims to develop a comprehensive green economy instead of focusing on developing green bonds to mobilize capital. Accordingly, Korea developed 07 models relating to 07 different areas of life that significantly affect environmental issues. In particular, Korea's green growth strategy for green industrial development includes two components: greening existing industries and promoting new green industries that provide ecological goods and services.

Currently, the Korean Government, with scarce budget resources, always sets priorities in areas of promoting a green economy. The financial tools Korea uses are green commercial loans and policies, green policy guarantees, green policy funds, and green policy insurance. In addition, the Government also calls for direct investment from industrial enterprises or large investors because they can withstand risks better and accept capital recovery in the long term.

2. LESSONS LEARNED FOR VIETNAM

2.1. Lessons on green credit policy in industrial development towards green growth

Completing the green finance policy framework for green industrial development: Based on the existing legal framework, the Vietnamese government needs to issue specific documents clearly defining standards in green finance, green industrial projects, and principles for green financial management to serve as a basis for inspection and supervision by authorities. Research and develop an index to evaluate sustainable development companies to attract investor interest in green finance.

Completing the bases for providing green credit: Currently, in Vietnam, regulations on green banking and green credit are directional, not mandatory, and only encourage credit institutions to practice green credit. The mechanism of capital mobilization for green credit still has limitations. Preferential capital access for green credit from international financial institutions still faces many challenges. Therefore, for the banking sector's mechanisms and policies to be truly effective in expanding and unlocking credit for green sectors, it is necessary to promptly issue a 'Green Classification List' as a basis for

credit institutions to assess, evaluate, and monitor when providing green credit.

2.2. Lessons on resource tax policy in industrial development towards green growth

Research the reform of the resource tax system and review environmental taxes aimed at developing a green economy, adjusted through economic instruments, financial mechanisms, and taxation to encourage the conservation and efficient use of resources, especially rare resources, protect the environment, and maintain and develop natural ecosystems.

Improving the carbon tax policy: Vietnam is in the process of developing and refining its carbon tax policy to meet the goal of reducing greenhouse gas emissions. Some legal documents have been issued, but there are still many limitations that need to be addressed to ensure the effectiveness and fairness of the policy. Therefore, in the near future, the Government needs to: First, research and propose a carbon tax rate appropriate to Vietnam's actual conditions, ensuring it both creates a positive impact on reducing greenhouse gas emissions and maintains the competitiveness of the economy; Second, expand the scope of carbon tax coverage to include all major emission sources, such as emissions from factories, vehicles, and agricultural activities; Third, apply more effective carbon tax calculation methods, such as an emissions trading system or direct taxation based on emission levels; Fourth, implement appropriate support policies for businesses, especially small and medium-sized enterprises, to adapt to the carbon tax policy; Fifth, enhance communication efforts to raise public and business awareness of the carbon tax policy.

2.3. Lessons on state budget spending policies in industrial development towards green growth

The Government needs to invest more resources in energy development, limit fossil energy consumption, switch to green energy and renewable energy, practice energy-saving policies, and contribute to reducing environmental pollution in industrial production. To realize the goal of industrial development towards green growth, the Government needs to focus on three main factors: environment, carbon emission reduction, and renewable energy development.

Budget spending for research and development activities related to green industrial development toward green growth should be increased. Investing in research and development activities is very important and brings practical results. The state budget can be allocated to directly invest in research institutes and universities to conduct green technology research and development. At the same time, the State can also order research centers or external research enterprises to carry out green technology research and applications. Investment and science and technology order should be carried out on the principle of "no efficiency, no investment". In this way, scientific research, especially research related to green technology, will be practical and highly applicable and contribute

to the sustainable development of the national economy.

The Government should prioritize spending in green technology industry sectors and carry out green public procurement to promote the green goods and services market. Green public procurement should focus on products that benefit the community, such as efficient energy consumption, waste, and emissions minimization, response to climate change, etc. When considering bids, state agencies that are investors and bidding parties need to consider not only price and purchasing efficiency but also environmental issues, prioritizing contractors using green, environmentally friendly technology.

2.4. Lessons on policies to develop green capital markets in industrial development towards green growth

The Government needs to issue a joint circular with the cooperation of many departments and branches to synthesize instructions and regulations related to green bonds. At the same time, the State reviews, supplements, and completes the legal basis, as well as the policy framework and market management mechanism for green bonds. The basic legal framework on green bonds in Vietnam is not yet complete and unified; therefore, reviewing the law is necessary to adjust shortcomings and resolve redundant and overlapping content. In particular, it is necessary to develop consolidated documents to complete legal regulations on green bonds. The development and promulgation of consolidated documents as proposed are very important; this will create a solid and consistent legal basis to make it easier for entities to access, monitor, study, and implement effectively and consistently the legal requirements set forth on green bonds.

Infrastructure and market intermediary institutions must be developed to promote green bonds. In addition, the market must be promoted to demonstrate modernity, transparency, and compliance with international practices on green bonds.

The intermediary role of banks in issuing and managing green bonds should be strengthened thanks to favorable conditions such as high credit ratings and a professional management system. Currently, most green projects implemented in developing countries are small-scale and do not meet the minimum scale requirements of large banks and financial institutions worldwide; therefore, pooling small-scale projects and using banks as mobilization intermediaries would help green projects achieve more favorable financing terms.

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GREEN BUSINESS DEVELOPMENT: INTERNATIONAL EXPERIENCES AND IMPLICATIONS FOR VIETNAM

Phan Trong Phuc[a,*]

[a]*Trung Vuong University, Hanoi, Vietnam*

**Corresponding author: phucpt.edu@gmail.com*

Abstract: *The green transition process is progressing strongly worldwide and is considered a common global path. The green transition is a trend and an essential journey for businesses to achieve green growth and sustainable development while enhancing their competitiveness in the market. A company is considered successful in its operations not only based on financial figures but also by aligning its long-term growth with the sustainable benefits of the community, society, and the environment, aiming for the goal of Net Zero in its sustainable business journey. In this article, the author has researched and compiled international experiences and provided lessons for developing businesses in a green direction in Vietnam.*

Keywords: *Net Zero, Green Business, Green Transition of Businesses, Green Transformation of Businesses, Green Business Development.*

1. GREEN BUSINESS DEVELOPMENT

Many countries around the world aim for the green transition to address existing issues related to environmental pollution and climate change. This is a crucial issue for businesses wanting to participate in the global supply chain.

Business development, as commonly defined, involves increasing the number and quality of businesses, enhancing operational efficiency, ensuring a reasonable structure that aligns with the local economic structure, and contributing to the overall socio-economic development of the area.

In other words, business development is moving from lower to higher stages, from simple to complex, and from less complete to more complete forms. This process occurs gradually and in leaps, leading to new entities replacing the old ones. It follows a spiral trajectory where each cycle repeats the initial entity but at a higher level.

According to UNEP (2011), green development (or transition) for the entire national economy involves building a low-emission economy that uses natural resources efficiently and conserves biodiversity. From a business perspective, green transition means production and business activities that minimize and aim to eliminate environmental pollution.

In essence, developing businesses in a green direction means applying environmentally friendly principles and practices in all areas of a business's operations, including:

*Products***:** Designing environmentally friendly products that are easy to recycle and decompose.

*Production***:** Using resources efficiently: minimize the use of materials, water, and energy; reuse and recycle materials when possible; use environmentally friendly materials, meaning materials with sustainable origins and minimal environmental impact;

utilize renewable energy sources such as solar and wind energy; minimize waste by reducing the amount of waste generated, handling waste safely and in an environmentally friendly manner; reduce carbon dioxide and other greenhouse gas emissions.

Supply chain: Collaborating with environmentally responsible suppliers.

Management: Implement environmental management policies and raise awareness among staff and the community about environmental protection.

Critical characteristics of green-oriented businesses:

Aiming for long-term benefits: Businesses should focus not only on immediate benefits but, more importantly, on sustainable benefits in the future.

Resource conservation: Efficient use of natural resources such as water, energy, and raw materials.

Pollution reduction: Adopting environmentally friendly technologies and production processes, limiting greenhouse gas emissions and harmful waste.

Enhancing social responsibility involves engaging in community activities, supporting local development, and ensuring safe working conditions for employees.

Developing green-oriented businesses aims to harmonize economic profits, social responsibility, and environmental protection, ensuring efficient resource use while minimizing negative environmental impacts and improving community living standards. Therefore, green-oriented business development is inevitable in the context of increasingly severe climate change and environmental pollution. This model brings many benefits to businesses, including (i) Cost savings from reduced resource and energy use; (ii) Risk reduction by complying with environmental regulations and minimizing environmental impact; (iii) Increased profits due to growing demand for green products and services, with increased revenue and cost savings, reducing risks; (iv) Enhanced brand image by attracting potential customers through high customer evaluations of corporate reputation and social responsibility; (v) Increased competitive advantage due to reputation, brand image, and alignment with global development trends.

Developing green-oriented businesses intersect with "Business Development" and "Green Development." "Green-oriented business development" can be defined as a qualitative improvement process of businesses associated with the efficient use of energy and natural resources, minimizing negative environmental impacts, and moving towards developing environmentally friendly products. This aims to help businesses save costs, expand markets, and enhance their image and brand. Green-oriented business development is a business model that aims to harmonize economic profits, social responsibility, and environmental protection.

2. EXPERIENCE IN DEVELOPING GREEN-ORIENTED BUSINESSES

Experience in implementing government policies to manage and support the green development of businesses in various countries

Some Asian countries have been affected by excessive economic development, which has harmed the environment. Therefore, these countries have implemented policies to adjust their economies towards resource conservation, increased green and clean energy development, and reduced environmental emissions. Examples include China, South Korea, and Japan.

China's Experience in Developing Green-Oriented Businesses

China's rapid growth has propelled it to a high upper-middle-income status. However, the environment in China has significantly deteriorated during this process. Chart 1 shows China's PM2.5 particulate matter index increased faster than economic growth from 1990 to 2016. Chart 1 also shows that China reached 56 μg/m³ of PM2.5 particulate matter with a GDP per capita of $7,000 in 2016. In contrast, the World Health Organization's safe limit for PM2.5 is ten μg/m³ or lower. This pollution level is about 40% higher than the global average for the same income level.

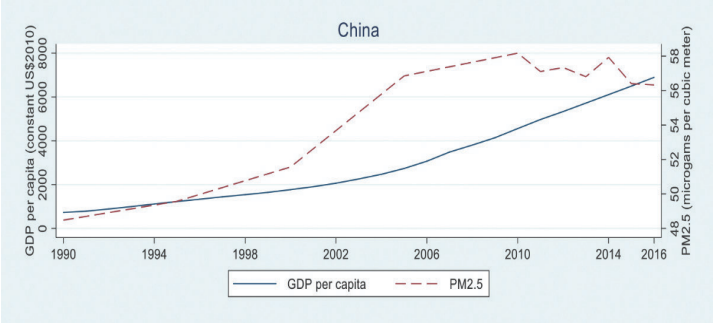


Chart 1. China's GDP Index and PM 2.5 Particulate Matter from 1990 to 2016

Source: Dang and Serajuddin (2020)

Upon closer examination of Chart 1, it is evident that China's air pollution levels peaked in 2010 and stabilized or gradually decreased. This improvement could be attributed to the proactive measures taken by the Chinese government. Aiming to build a circular economy, the Chinese government has introduced several policies, including the Circular Economy Promotion Law, the Clean Production Promotion Law, the Energy Conservation Law, technical guidelines, criteria for environmentally friendly products, restructuring of key industries with an emphasis on research and development (R&D), and tax incentives. As a result of these initiatives, the production, distribution, and consumption of environmentally friendly products in China have rapidly increased in recent years.

China has also reviewed and certified environmentally friendly products, with over half of these products including textiles, beverages, paper goods, microwaves, and more. In the $586 billion economic stimulus package, China has prioritized investment in technological innovation, economic restructuring, and renewable energy development to move towards green development and improve energy efficiency gradually.

In a study by Han Jing et al. (2020), it was reported that China has restructured key industries (such as steel, automotive, and cement) to create jobs, enhance competitiveness, and modernize these sectors to adopt green technology, particularly those causing significant pollution. Additionally, China has used various tools to stimulate industrial greening and promote the green transition, including local clustering, encouraging more private

sector involvement, green financing, public procurement, and standardization.

On the other hand, China has introduced tax incentives to attract the private sector and improve market conditions for private companies involved in energy conservation and environmental protection. As of 2023, public-private partnerships (PPPs) are being utilized to address pollution and low-carbon green technology. More than 500 environmental NGOs and funds are also contributing to greater sustainability in China's industry through projects such as raising awareness about green product consumption.

South Korea's Experience in Developing Green-Oriented Businesses

South Korea is one of the first Asian countries to focus on green development and considers it a central model for national growth. The South Korean government has issued the National Green Growth Strategy with a vision for 2050. A key component of this strategy is the development of green technology, greening industries, and increasing spending on research and development while recognizing the significant role businesses play in achieving green growth



Fig1. South Korea's Green Growth Strategy and Policy Directions

Source: Văn phòng điều phối chính sách Chính phủ, 2010

South Korea's green growth plans can be broadly categorized into comprehensive and sectoral plans. Comprehensive plans involve cross-cutting tasks for central and local governments and ministries. The National Green Growth Strategy and the 5-Year Plan are crucial plans that guide other comprehensive green growth plans at both the central and regional levels. Ministries must incorporate green growth into their relevant plans (sectoral plans), classified into core plans, related plans, and supplementary plans.

Core plans, such as the National Energy Basic Plan, the Comprehensive Basic Plan for Climate Change Response, and the Basic Plan for Sustainable Development, are closely related to the national green growth strategy. These plans typically have a long implementation period (20 years) and are reviewed by the PCGG before being approved by the Cabinet.

Related plans are those developed within the national legal framework and directly related to the national green growth agenda, including the National Territorial Comprehensive Plan and the Basic Plan for National Science and Technology.

Supplementary plans are management plans created by ministries' initiatives, such as the New and Renewable Energy Development Plan by the Ministry of Knowledge Economy (now the Ministry of Trade, Industry and Energy, MOTIE).

Additionally, South Korea introduced the Green Purchasing Law in 2005. Programs such as eco-labeling, ecological supply chain management, and eco-design have helped prevent resource waste and environmental pollution by promoting the purchase of environmentally friendly products. Over five years, the number of certified green products increased more than tenfold, and the scale of green product production grew more than twentyfold by 2022.

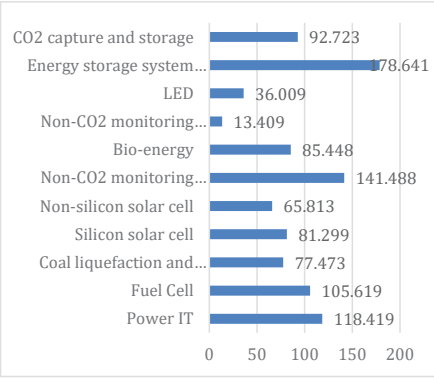


Chart 2. Investment in Green Technology by Sector in 2013 (Unit: Million Won)

Source: GTC-K, 2013

Technological advancements have been particularly notable in secondary batteries and LED lighting. For example, the lithium-ion battery market, which Japanese companies have dominated for over 20 years since Sony first commercialized the technology in 1991, saw South Korea take over the largest global market share, reaching 36% by 2013. Leading South Korean manufacturers, such as LG Chem and Samsung SDI, have become key players in this market and have recently secured contracts with global automotive manufacturers for electric vehicle production. Recognizing that lithium-ion batteries are central to the latest electric vehicle developments, South Korea stands to benefit from the explosive growth in demand.

In the case of LEDs, often described as one of the most exciting technological advancements in the lighting industry due to their high energy efficiency and durability, South Korea entered the field later than technology leaders Japan and Germany. Government investment in research and development has narrowed the country's technological competitiveness to 85% of the level of leading global countries. Technological progress has also been supported by the government's expansion of ESCO projects and incentives for energy-efficient building construction, contributing to a significant domestic LED market. The export volume of the LED lighting industry increased from 1.4 trillion won in 2009 to 5.6 trillion won in 2012.

Due to a lack of natural resources, South Korea heavily depends on imported energy sources to meet about 95% of its energy needs from fossil fuels, given its energy-intensive industries. This reliance has maintained South Korea's status as one of the world's largest energy importers, including liquefied natural gas (LNG). South Korea has seen significant renewable energy (NRE) growth in recent years, largely due to

favorable government policies and increasing environmental concerns. As of 2022, the installed renewable energy capacity in South Korea was 27.24 GW, a notable increase from 24.36 GW in 2020, signaling rapid adoption of renewable energy in the country.

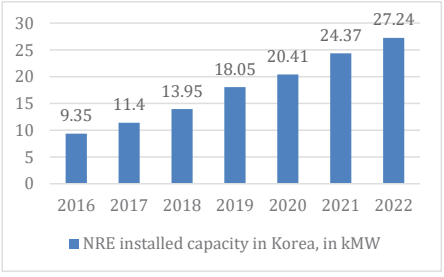


Chart 3. Growth of the Domestic NRE Industry in South Korea

Source: IRENA Renewable Energy Statistics

In February 2021, the South Korean government planned to invest approximately $43.2 billion in an 8.2 GW offshore wind project by 2030 to meet its renewable energy targets. Once completed, this project is expected to rank among the most significant offshore development projects globally. Businesses have committed $42.4 billion to support the project, with the remaining $802 million provided by the government.

In December 2022, GE Renewable Energy and Hyundai Electric announced a strategic partnership as the next step in their joint efforts to serve the South Korean offshore wind market. Under the agreement, Hyundai Electric will act as the manufacturing partner, facilitating the localization of the assembly process for Haliade-X offshore wind turbines and generators.

Japan's Experience in Developing Green-Oriented Businesses

Facing environmental pollution issues since the 1970s, Japan experienced dangerously high levels of particulate matter (PM2.5) around its major cities, leading to pollution-related diseases such as Minamata disease from mercury poisoning and Yokkaichi asthma. Japan has focused on addressing pollution through various measures, including the enactment of the Basic Environmental Pollution Control Law, which allows local governments to impose stricter pollution control standards than national requirements; encouraging businesses to adopt environmentally friendly technologies and methods; modernizing inefficient factories; investing in environmental control technologies; and enhancing public awareness and education.

For instance, in Kitakyushu City, chemicals and other production materials, including plastics, pollute the bay, leading to severe water pollution. To address this issue, the city collaborated with private companies to reduce soot and other harmful emissions through investments in renewable technology. Wind farms have been established along the coast to harness strong winds, and hydrogen energy is being used to replace gasoline and diesel for transportation and electricity generation, presenting a potential future alternative to fossil fuels.

Experience in Green Development of Some Global Companies

Green Development Experience of H&M

H&M is a multinational fashion company based in Sweden. Since 2010, H&M has been promoting using recycled materials in the fashion industry. The company aims that by 2030, all materials will be recycled or sourced sustainably. Regarding sustainable

cotton, H&M ranked third in the Sustainable Cotton Ranking in 2020. Each year, H&M has gradually increased the proportion of its supply of organic cotton, recycled cotton, and Better Cotton Initiative (BCI) cotton. By 2030, all materials used in H&M products are expected to be certified as sustainable, organic, or recycled.

Green Development Experience of GAP Inc

GAP Inc is a multinational company engaged in retail clothing and accessories, as well as personal care products for men, women, and children, with brands such as Old Navy, Gap, Banana Republic, Athleta, Intermix, Janie, and Jack, headquartered in the United States. By focusing on eight core areas—water, climate, waste, materials, product sustainability, employees, communities, and supply chains—and applying a product lifecycle perspective, GAP Inc addresses environmental issues by reducing the impact of its direct operations and supply chain through several approaches:

(i) Improving production at factories and laundries, aiming to reduce more than 10 billion liters of water used in production by 2022.

(ii) Setting a goal to reduce greenhouse gas emissions in its operations and supply chain by 2030 and committing to achieving carbon neutrality across its entire value chain by 2050.

(iii) Commit to converting 80% of waste from landfills for its operations in the U.S. by the end of 2020 and to eliminate single-use plastics by 2030.

(iv) Enhancing product sustainability starts with designing and developing attractive products, have minimal environmental impact, and build customer trust. GAP Inc has leveraged partnerships with organizations such as the Sustainable Apparel Coalition (SAC) and the Hong Kong Textile Resource Institute, committing to using 100% sustainable cotton by 2025.

Green Development Experience of Levi Strauss & Co

Levi Strauss & Co is an American clothing company. Like GAP Inc, Levi Strauss & Co has maximized water efficiency, reducing 13 billion liters of water in the production process by 2020. The company's Wellthread products achieve sustainability throughout every link in the supply chain.

Regarding production, the company has committed to reducing greenhouse gas emissions by 90% across all owned and operated facilities and by 40% throughout the entire supply chain by 2025.

In terms of usage and reuse, the company enhances product design with a focus on circularity, using 100% recyclable materials and providing optimal garment care solutions.

Green Development Experience of Unilever

Unilever is a leading multinational corporation from the UK and the Netherlands specializing in the production and marketing of personal care, household, and food products. Through various initiatives, Unilever has pioneered and established a green production model, beginning with the sorting and collection of plastic waste. This crucial step helps to collect and reintegrate

plastic into the economy, significantly reducing carbon emissions from plastic production.

Currently, Unilever has reduced the use of virgin plastic by 55%, 62% of its product packaging is recyclable, and 100% of its rigid plastic packaging contains recycled plastic. Furthermore, the company plans to eliminate fossil fuels from the formulations of its cleaning and laundry products. Approximately 96% of Unilever's household care products contain biodegradable ingredients.

Green Development Experience of Toyota Motor Corporation

Toyota is one of the largest automobile manufacturers in the world, and it is a globally recognized brand. In its production activities, the company has made substantial efforts to minimize environmental impacts through research, application, and investment in eco-friendly technologies at its factories, standardizing production processes. Additionally, Toyota actively supports dealers and suppliers in implementing and standardizing a closed-loop "green cycle" from component manufacturing to assembly (including wastewater and solid waste management), sales, and customer service. The company also provides technical and financial support to dealers to expand the adoption of environmental management systems according to ISO 14001 standards.

Since 2023, Toyota has launched the Multi-pathway Project, which aims to reduce carbon emissions through alternative energy solutions and electric vehicle options tailored to customers' mobility needs without relying on infrastructure development or financial capacity. Hybrid and biofuel solutions are timely and suitable for conditions in developing markets such as Vietnam, contributing to immediate reductions in CO2 emissions.

To become a "green company," Toyota has undertaken numerous environmental protection activities to achieve its goal. These include properly storing, recovering, and processing discarded hybrid batteries, using solar energy systems, and building playgrounds for children using recycled tires. Toyota Motor Vietnam has also collaborated with the Ministry of Natural Resources and Environment on the "One Billion Trees" program to promote a greener Vietnam; developed an automated wastewater quality monitoring system with data integration into environmental authorities; and supported suppliers in obtaining ISO 14001 certification within a year of cooperation to uphold a "green supply chain" ethos. Currently, 100% of Toyota dealers engage in CO2 emission reduction activities, such as replacing fluorescent lights with LEDs and installing energy-saving reminder labels on switches…

3. LESSONS LEARNED FROM GREEN BUSINESS DEVELOPMENT

To promote green business development, it is essential not only for companies to have awareness and efforts but also for government involvement in creating supportive mechanisms, incentives, and necessary regulations. Based on the study of green growth strategies implemented by various countries and the practices of both domestic and international companies, the author presents several lessons for both management agencies and businesses as follows:

For the Government and State Management Authorities

First, the policy and legal system must be improved.

Develop and refine environmental protection and green business development policies and laws to ensure consistency, coherence, and effectiveness. Establish criteria for screening, selecting, and evaluating investment projects that use advanced and environmentally friendly technologies. The government should implement clear, stringent, and transparent regulations and procedures related to business and investment. It should diversify incentive policies to encourage businesses to invest in advanced, clean technologies that consume less energy and resources, have low emissions, and are environmentally friendly.

Introduce tax incentives and financial support, providing information and advisory services to businesses pursuing green development. The government must enhance tax policy tools related to resources and the environment to encourage and incentivize businesses to use resources and energy efficiently and sustainably. Adjusting environmental taxes and fees is crucial for steering business activities towards greener practices and more efficient resource use. Additionally, it facilitates access to information about environmental policies and sustainable development. State management agencies should improve the effectiveness of disseminating policies and regulations to ensure businesses, especially small enterprises, can easily access information.

Support training high-quality human resources through research institutions, universities, and policies to attract high-quality talent from abroad. Additionally, it emphasizes establishing connections between businesses and scientific and technological organizations through programs such as technology fairs and scientific knowledge dissemination.

The government should enforce regulatory measures, closely monitor and control businesses' waste discharge, and establish a supportive mechanism that aligns with business rights and effectiveness. Furthermore, increasing business participation in developing, refining, and enforcing environmental laws is also a crucial step. Experience shows that strengthening consultations with businesses and the public during the legislative process improves the quality of legal regulations.

Secondly, Developing Green Technology

Support businesses in the transfer and application of green technology in production. Encourage the use of environmentally friendly technologies and products that consume less energy in production and consumption through tax incentives, fee reductions, and public spending. The government should prioritize spending in green technology sectors, procure green technologies to help boost the market for green goods and services, and focus on products that benefit the community, use energy efficiently, reduce waste and emissions, and address climate change. Additionally, when considering criteria such as price and efficiency in procurement, government agencies, as investors, should consider environmental issues, giving preference to contractors

who use green and environmentally friendly technologies.

Increase budget allocation for research and development (R&D) activities related to the green industry. Moreover, investment in and commissioning scientific and technological research should follow the principle of "no efficiency, no investment." This ensures that scientific research, particularly those related to highly applicable green technologies, is substantial and contributes to the sustainable development of the national economy. Additionally, the government needs to monitor the implementation of policies to create a level playing field for businesses to access funding and disseminate information about new technologies globally.

Local authorities should identify regional advantages and potential to guide green business development, creating breakthrough and sustainable growth for the region. Proactively integrate green business development tasks and solutions into long-term local sustainable development plans, programs, and projects. Develop implementation roadmaps and allocate human resources and annual budgets to support local businesses. Innovate methods for monitoring and evaluating the situation, identifying difficulties and obstacles businesses face, and proposing solutions to relevant authorities to address these issues promptly. Enhance the effectiveness of government management in business development, particularly by simplifying administrative procedures to facilitate easier access to support and incentives for businesses.

Thirdly, Supporting Businesses in Adopting International Standards for Sustainable Green Development

Organize workshops and training sessions to raise awareness and share experiences among businesses regarding the adoption of international standards for sustainable development, including the ISO 14001 Environmental Management System, the LEED Green Building Rating System, GBC2000, and BREEAM. Assist businesses in implementing these international standards.

Monitor and evaluate the implementation of international sustainable development standards by businesses. Along with supporting businesses, encourage the adoption of these standards. Promote the involvement of non-governmental organizations and investment funds in supporting businesses to adhere to international green standards.

Fourthly, Raising Consumer Awareness

Encourage consumers to use green products by applying policies that offer incentives for green product usage and increasing information about the benefits of these products. Implement awareness and education programs about the importance of environmental protection and green products. Improve green consumption awareness through capacity-building activities, enhancing understanding, and creating more convenient marketing channels to increase the number of consumers purchasing green products.

Fifthly, Promoting International Cooperation

Enhance international cooperation in green business development by participating in international environmental protection and sustainable development agreements. On the other hand, engage in experience sharing and technology exchange between countries. At the same time, it increases opportunities to learn from leading countries and inherit technology in new areas, such as new energy, environmental infrastructure, and smart cities, supported by technology investment and human resources.

For Businesses

First, Prioritizing Commitment to Green Development

Business leaders must commit to and demonstrate determination to develop their businesses greenly. Develop a green growth strategy with specific goals, solutions, and implementation roadmaps. Integrate green development factors into all business activities, from production to management.

Second, Implementing Measures to Reduce Environmental Impact

Businesses must promote innovation and apply advanced technologies in production, especially pioneering core technologies. Actively innovate business thinking, improve management capacity, productivity, quality, and competitiveness of products and services; standardize production to meet the green requirements and criteria of international markets; enhance business linkages and cooperation to develop production and value chains, increasing the added value of products and services; innovate business models linked to green development goals: clean, green, efficient production, effective energy use, environmental protection, aiming to spread green activities throughout the production chain and community.

Thirdly, Raising Awareness of Sustainable Green Development

Businesses need to define and enhance awareness of green growth. This is a necessary, periodic, continuous improvement task that enhances the company's competitiveness. Alongside production processes, businesses should intensify improvement activities to increase productivity while reducing environmental impact. Green development should become a company culture, with significant contributions from employees. Businesses must empower and raise employees' awareness, encourage continuous improvement in work efficiency, and simultaneously incentivize efforts to improve ecological environments and avoid adverse environmental impacts.

Fourthly, Encouraging Customers to Use Green Products

Developing businesses in a green direction and demonstrating social and environmental responsibility requires the support of all stakeholders, from consumers to the entire system. The trend toward greening production and consumption needs society's contribution, with business improvements playing a central role. Alongside these improvements, promoting activities and showcasing what businesses have achieved to relevant parties will be crucial in fulfilling the company's commitment to the community. It is necessary to organize programs to encourage the use of green

products and apply incentive policies for customers who choose green products.

4. CONCLUSION

From the experience of green development in various countries and businesses worldwide, it is evident that green business development is an inevitable trend. When businesses effectively use energy resources and natural resources, minimize negative environmental impacts, and work towards developing environmentally friendly products, they can save costs, expand markets, and enhance their image and brand. Achieving this requires the joint efforts of the government, state management agencies, and businesses to meet new demands, align with global development trends, and simultaneously enhance the position, competitiveness, and sustainability of businesses in both domestic and international markets.

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GREEN INDUSTRY DEVELOPMENT EXPERIENCE OF SOME EAST ASIAN COUNTRIES AND LESSONS FOR VIETNAM

Tuan Dang Hoang[a*]

[a]*Department of Transport of Long An Province, Long An Province, Vietnam*

**Corresponding author: danghoangtuan1978@gmail.com*

Abstract: *The green industry aims to create products/services using environmentally friendly processes and technologies, from raw material exploitation and production to the use and recycling stages. To develop a green industry, Vietnam increasingly emphasizes activities to reduce emissions, save energy and resources, and minimize environmental impacts during the production process. The Party and State have issued many regulations, laws, and institutions to orient economic development towards sustainability, environmental protection, adaptation to climate change, improving investment quality and efficiency, and focusing on attracting high-quality projects. However, the development of the green industry in Vietnam is only at the starting point. This paper examines the experiences of some countries in the world and will provide lessons to help Vietnam plan institutions and implement policies for green industrial development.*

Keywords: *Green industry, green industry development.*

1. INTRODUCTION

The green industry is becoming the driving force for economic growth in many countries around the world. It is an industry that produces and operates in a way that minimizes negative impacts on the environment and natural resources. The objective of the green industry is to create products and services by using environmentally friendly processes and technologies encompassing all stages, from raw material exploitation to production, usage, and recycling. Vietnam has made many efforts to develop a green industry characterized by reduced emissions, saving energy and resources, and minimizing environmental impacts throughout production. The government has introduced various regulations, laws, and institutions to promote sustainable economic development, environmental protection, climate change adaptation, and enhanced investment quality and efficiency, focusing on attracting high-quality projects. Despite these efforts, the development of the green industry in Vietnam is still at an early stage. This study aims to investigate the experiences of some countries in green industry development, extracting lessons to help Vietnam create effective institutional frameworks and implement policies to foster green industrial development.

2. CURRENT STATUS OF GREEN INDUSTRY DEVELOPMENT IN VIETNAM

In recent years, the Government, ministries, branches, and localities have enacted many legal documents, programs, action plans, and executive guidance documents on green economic development,

sustainable growth, and environmental protection. After the COVID-19 pandemic, many countries are promoting economic growth recovery towards "green recovery". For Vietnam, shifting to a green economy is not only an inevitable choice but also an opportunity to become a pioneer country in the region, catching up with the world's development trends.

Recognizing the potential development, impact, and positive contribution of renewable energy, the government issued many policy documents to improve the investment environment in this field. Since 2011, national programs and goals for economical and effective energy management have been implemented. Currently, the proportion of renewable energy in operation accounts for nearly 27% of the total installed capacity of the entire system. To implement the Net-Zero commitment at the 26th Conference of the Parties to the United Nations Framework Convention on Climate Change (COP 26), Vietnam is firmly determined to develop this type of energy by 2030 and 2050. Power Plan VIII, approved in May 2023, is expected to increase the capacity of solar power sources by 4,100 MW by 2030, reaching 168,594 - 189,294 MW, producing 252.1 - 291.5 billion kWh by 2050. It is expected to develop 21,880 MW of onshore wind power, 6,000 MW of offshore wind power by 2030, and 70,000 - 91,500 MW by 2050.

Encouraging green and sustainable consumption has become the Party and State's consistent viewpoint and policy. It is a fundamental aspect of development goals in Vietnam, deployed in many localities nationwide, initially achieved good results, attracting many people to participate. In particular, green consumption is included in Vietnam's Green Growth Strategy for 2011 - 2020 and vision for 2050. The green consumption trend in Vietnam has been growing strongly in recent years. Consumers are increasingly interested in smart, sustainable consumption and environmentally friendly products and services, from production to consumption and product use. Today's consumption requires intelligence about product quality and a deep understanding of each product's social and humanistic aspects. Especially in the context of the COVID-19 pandemic, people and investors are gradually shifting their shopping habits through "green" consumption channels and prioritizing health protection.

By the end of the second quarter of 2023, Vietnam had nearly 300 green buildings evaluated and certified by the Lotus Green Building Criteria System (VGBC), Edge Green Building Certification System (IFC-WB), US Green Building Council (LEED), and Green Mark (Singapore), with a total construction floor area of about 7 million m2 and ranked 28th in the world in the number of green buildings certified by LEED. According to statistics, the transportation sector is the third largest greenhouse gas emission producer, following the energy and agriculture sectors, with about 18.4% of the total annual emissions. If in 2020, the amount of CO2 emissions from transportation was about 47,680 thousand tons, the forecasted figure will reach 89,119 thousand tons by 2030.

Besides positive results, the recent implementation of the green industrial policy in Vietnam also revealed some limitations. Although Vietnam has achieved a fairly high, continuous, and stable growth rate in the Southeast Asia region, with an average growth rate of 6.1% during 2011 – 2023, this growth also caused increased CO2 emissions. According to experts' forecasts,

Vietnam's CO2 emissions will reach nearly 471 million tons by 2030. Each year, Vietnam generates about 1.83 million tons of plastic waste; the daily household solid waste is about 61,000 tons. According to the World Bank, water pollution could cost Vietnam up to 3.5% of its gross domestic product (GDP) by 2035. Vietnam is also one of the countries vulnerable to climate change, with losses of up to 11% of its GDP by 2030. Along with that, awareness of the green economy in Vietnam remains nascent, with many problems still unclear, requiring further research and widespread dissemination of knowledge across society, from governments at all levels to businesses and the public. According to the Ministry of Planning and Investment's assessment, only seven ministries, branches, and 34/63 provinces and cities had issued plans to implement the Green Growth Strategy by the end of 2018. Resources for implementing plans and programs for green economic and sustainable development are unclear. Many projects that ministries, branches, and localities have been implementing related to green economic development are based on financial and technical support from international organizations.

In addition, attracting investment capital into green projects faces many barriers because the level of attractiveness to investors is not high.

3. GREEN INDUSTRY DEVELOPMENT EXPERIENCE OF SOME EAST ASIAN COUNTRIES

3.1. Korean experience

After years of colonialism and war, the Korean government pursued an export-oriented industrialization strategy, leading to unprecedented economic growth. However, although the Korean economy quickly recovered from the 1997 Asian financial crisis, the average GDP growth rate has fallen sharply to 3-4% annually since the mid-2000s. The slowdown in growth is not just a temporary phenomenon but an inevitable consequence of several structural economic problems. In response to the economic slowdown, the Korean low-carbon green growth model has identified "green industry" as a new growth engine for the country and seeks to move away from growth that relies heavily on increasing the number of production factors. Specifically, the Korean green industry strategy includes two components: (1) Greening existing industries and (2) Creating new green industries that provide environmental goods and services.

The government has selected 17 industries with the highest potential for creating new markets and positive spillover effects to promote structural reform. On the other hand, greening the value chain requires the development of green small and medium-sized enterprises, the promotion of resource circulation in industrial processes, the establishment of green industrial clusters, the incubation of high-tech industries, and the development of innovative public-private partnerships. The first component - greening industries - aims to improve environmental efficiency or reduce pollution in all production stages, including design, procurement, manufacturing, packaging, and distribution. This can be achieved through various measures, including (1) Increasing production efficiency through optimal use of resources, (2) Enforcing waste management and reduction practices, and (3) Phasing out hazardous substances and avoiding pollution during production and consumption.

Recognizing the urgent need to develop green industries, the Government has grouped its strategies into "green innovation" and "green restructuring". Green innovation reduces environmental impacts by increasing energy efficiency, reducing waste or greenhouse gas emissions, and/or reducing the consumption of non-renewable raw materials (OECD, 2013). The Government ensures that green innovation occurs balanced across all key industries and that innovation strategies are tailored to different industries according to their specific structural and market conditions.

Greening industries create many opportunities for economic growth. The first component of Korea's green industry agenda is "greening existing industries," which brings environmental impacts, such as reducing air pollution and greenhouse gas emissions by improving resource and energy efficiency, and economic impacts, such as reducing energy costs and dependence on foreign energy. The second component, "creating new green industries", is expected to promote economic growth by accelerating the development of green markets through green technology.

The Ministry of Trade, Industry and Energy (MOTIE), formerly the Ministry of Knowledge Economy (MKE), has been at the forefront of promoting green industry growth, which is the driving force of the Korean economy. When formulating the country's low-carbon green growth vision in 2008, the Ministry acknowledged that Korea was still in the process of achieving full high-income status and, therefore, needed to balance sustainable economic growth and sustainable consumption. Based on the premise that environmental protection can only be achieved through strong economic growth, MOTIE has developed a strategy to ensure a certain degree of flexibility in industry greening.

The Green Growth Industry Development Plan for Knowledge and Innovation, published by MKE in December 2008, serves as a blueprint for implementing the "green transformation" of the industry. Specifically, the "green transformation" realization plans set out three goals: (1) Green innovation of core industries (Green Innovation); (2) industrial restructuring for low-carbon development (Green Restructuring); and (3) green transformation of the value chain (Green Value Chain).

The Korean government has established institutions and implemented various policies to promote green growth at the national level. The draft law on low-carbon development and green growth was finalized in February 2009. At the fourth meeting of the Presidential Committee on Green Growth in July 2009, a five-year plan was adopted, consisting of three strategies and ten decrees. The scope of this five-year plan is broader than the environmental policies enacted in developed countries, focusing mainly on energy and climate change. In November 2009, the 6th Presidential Committee on Green Growth proposed to reduce greenhouse gas emissions by 30% compared to the business-as-usual level without policy intervention by 2020. This is quite an ambitious target for a developing country determined to reduce emissions by 15-30% over the same period. The government's decision specifically considers the country's voluntary emissions target. (UNDP&GGGI, 2015).

In addition, the Korean government also enacted the Green Growth Law. President

Lee Myung-bak officially approved the Green Growth, Low Carbon Emission Law on January 13, 2010, which came into effect on April 14, 2010, consisting of 7 chapters and 64 articles. This comprehensive law addresses a wide range of issues on energy, climate change, and sustainable development. Article 1 of the Green Growth Law, the goal of this law is to (1) create a balance between economic development and environmental protection by establishing a foundation for low-carbon development and green growth; (2) promote economic growth through the implementation of green industry and development of green technology as the driving force of growth; (3) contribute to improving the quality of life; and (4) make Korea a developed and responsible country in the international community through the realization of a low-carbon society. By 2011, the Korean government had focused on improving these systems by enacting laws to limit greenhouse gas emissions and developing energy management to shift the socioeconomic structure toward low-carbon emissions.

In December 2020, the Korean government adopted the "Carbon Neutral Strategy," a five-chapter strategy that outlines the path toward a green and sustainable society. The strategy outlines five key elements that have guided Korea's policymaking, social transformation, and technological innovation for the green transition, including expanding the use of clean energy and hydrogen across all sectors, significantly improving energy efficiency, commercializing decarbonization and other future technologies, scaling up the circular economy to improve industrial sustainability, and strengthening carbon sinks. In September 2021, the National Assembly of Korea passed the Framework Act on Carbon-Neutral Green Growth to Respond to the Climate Crisis (Act No. 18469, 2021). In addition to the carbon neutrality target by 2050, the Act also stipulates that Korea's Nationally Determined Contribution (NDC) aims to reduce emissions by 40% compared to 2018 levels by 2030. The Act will take effect in March 2022, making Korea the 14th country in the world to legislate on carbon targets. The Act consists of 11 chapters and 83 articles, including important and decisive provisions, such as National Master Plan for Carbon-Neutral Green Growth (Chapter 3); Regulations on the Establishment of the Carbon-Neutral Green Growth Committee, Promoting Carbon-Neutral Green Growth by 2050 (Chapter 4); GHG Mitigation Policy (Chapter 5); Measures to Adapt to the Climate Crisis (Chapter 6); Establishment and Operation of the Climate Response Fund (Chapter 10). The framework law includes various policy options to help achieve carbon neutrality and has set emission reduction targets. In October 2021, South Korea developed and published two scenarios for upgrading its carbon neutrality roadmap by 2050. According to the Carbon Neutral Green Growth Committee, both scenarios aim for net zero emissions by 2050 but have different proposals in areas such as power supply, transportation, hydrogen, and carbon capture, utilization, and storage (CCUS). The first scenario aims to phase out all fossil fuel-fired power generation and liquefied natural gas (LNG) to achieve zero emissions in the power supply sector. The second scenario also aims to phase out coal-fired power generation but will keep LNG as a flexible power source despite its associated emissions. Both scenarios also

include proposals to expand the use of renewable energy sources and improve the energy efficiency of buildings. In particular, South Korea has raised its GHG reduction target from 26.3% to 40% by 2030 compared to 2018, aiming to become carbon neutral by 2050. Accordingly, from 2021 to 2030, the Korean government aims to reduce GHG emissions in the electricity supply sector by 44.4%, from 269.6 million tons in 2018 to 149.9 million tons in 2030. In the industrial sector, the country targets reducing GHG emissions from 260.5 million tons in 2018 to 222.6 million tons in 2030.

3.2. Japanese experience

Since 2003, the Japanese Government has issued the "Biomass Energy Strategy" and built smart, green, and ecological urban models. 208 and 300 cities achieved this title in 2009 and 2010, respectively. Next, in 2008, the government issued the "Action Plan for a Low Carbon Society", which focuses on the production of renewable energy, such as solar energy, the development of non-gasoline vehicles, the design of a new generation of electric vehicles, and the promotion of a lifestyle that reduces CO2 emissions. Additionally, the plan aims to reduce the use of fossil fuels and save energy to mitigate greenhouse gas emissions, protecting the economy and people when energy prices increase.

After the accident at the Fukushima Nuclear Power Plant (2011), which resulted in long-term damage to the environment, Japan is increasingly interested in developing a "green economy" and "green energy" with new technologies to produce electricity and "cleaner" fuels, including electricity production from endless renewable energy sources available in nature.

Currently, the Japanese government plans to reduce greenhouse gas emissions by 25% by 2020 by introducing a carbon tax policy to reduce carbon emissions to the lowest level in major cities. Tokyo has called for a 30% reduction in greenhouse gas emissions by 2020 and 80% by 2050, reducing dependence on fossil fuels by establishing appropriate frameworks for renewable energy, energy conservation technology, and multimodal transportation systems.

To implement the green economic growth model, the Japanese Government has issued many synchronous policies, including green investment, research, and deployment of green technology, propaganda, human resource training, international cooperation, and especially applying the green tax system - one of the important tools used to promote green initiatives.

In September 2010, Japan established the "Council for Promotion of New Growth Strategy," headed by the Prime Minister, to monitor the implementation of the strategy. At the same time, it has strengthened the organization of the Green Technology Forum to expand international cooperation and exchange in science and technology, share development experiences, and provide technological information. It has implemented the "Green Initiative Campaign" to develop energy and environmental technology, creating investment and employment opportunities.

In addition, Japan focused on environmental service industries, with a scale of USD 873 billion in 2010, encouraging the use of local resources through priority standards for using environmental products and services, subsidies, and tax incentives

for the purchase of green technology and green products.

3.3. Chinese experience

As the world's largest emitter, China faces domestic and international pressure to reduce its emissions while also struggling to maintain annual economic growth of 7% despite the global economic crisis, rising prices, and the threat of social unrest.

China's recent five-year plan is ambitious, with a commitment to reduce energy intensity (energy consumption per unit of GDP) by 16% and CO2 emissions (per unit of GDP) by 17% compared to 2010. The plan also sets targets for companies operating in the field of environmental protection and energy saving to grow by 15% annually and reach a total output of USD 720 billion by 2015 (equivalent to 2% of GDP - Environmental Bulletin No. 2-2017 - Ministry of Industry and Trade). To achieve the set plan, China has focused on applying green growth policy (GGP), concentrating on 6 main policy groups: energy policy, industrial policy, market policy, consumer policy, with direct participation of the public sector in implementing green actions and green public procurement laws, investment policy (such as public investment in energy infrastructure); policies on green technology innovation in industry and energy, and finally management policies (Wilfried Lütkenhorst, 2014).

First, China has developed specific policies and programs to issue regulatory standards for energy-saving (EE) goods. ENERGY-SAVING labels are mandatory for certain goods, such as air conditioners, refrigerators, washing machines, and fluorescent lamp ballasts. Since 2010, EE labels have been applied to goods such as rice cookers, electric fans, etc. Strengthening the institutional framework: "Sustainable Consumption Law" and "Green Purchasing Law" are enacted. Financial support for consumers of green goods is increased in the short term. Subsidies for energy-efficient goods and new energy vehicles are provided. Carbon emission and environmental taxes will be designed and implemented in the medium and long term.

In line with the above orientation, the Chinese Government has issued and implemented the following policies:

First, China built a green tax system and increased budget spending to develop a low-carbon economy.

Environmental and resource degradation costs are incorporated into energy pricing. This includes increasing pollution charges, the collection scope, gradually replacing pollution charges with pollution taxes, and ensuring "polluter pays."

The carbon tax will be initiated early to establish a stable price for low-carbon innovation and large-scale commercialization. It will not be set too high initially, but the carbon tax will be adjusted upwards as the economy grows and social acceptance increases.

Financial support for energy efficiency, renewable energy, and low-carbon technology innovation, including:

- Companies producing energy-efficient goods will receive tax incentives and direct subsidies, and energy efficiency will be given greater importance in government procurement.

- Import duties and value-added tax on renewable energy equipment will be reduced,

and subsidies will be offered to households buying solar panels or small wind generators.

- Investment in low-carbon research and development will be increased, and tax incentives will be provided for enterprises that implement low-carbon research and technological innovation.

- Funding channels will be strengthened by reorganizing and standardizing existing government funds shortly. The focus will be on shifting to sustainable energy development and construction funds, which will focus on energy efficiency, renewable energy development, and technological innovation. A portion of the additional fuel, energy, and carbon tax revenue could be allocated to the sustainable development fund in the medium and long term.

Second, China improved and strengthened the enforcement of laws, regulations, and standards.

- Promulgating and implementing the Energy Law, with ongoing revision to encourage low-carbon regulations in the coal, electricity, energy-saving, and renewable energy sectors, should improve laws on energy production and transfer, energy-saving, solid waste, and forestry.

- A "carbon footprint" labeling system will be gradually implemented, and the scope of this program will be gradually expanded. Public awareness will be raised to switch to consuming environmentally friendly goods, and businesses will be encouraged to develop these goods.

The basic contents of China's energy policy include prioritizing resource conservation, relying on domestic resources, diversifying energy sources, promoting scientific and technological development in the energy industry, paying special attention to environmental protection during development, and strengthening international cooperation for common interests.

China's Renewable Energy Law is widely regarded as the guiding law for developing the renewable energy industry. The law provides a range of financial incentives: a national fund to promote renewable energy development, loans, tax incentives for renewable energy projects, and a requirement for grid operators to purchase feedstock from registered renewable energy producers. The combination of investment and preferential policies has facilitated major strides in China's wind and solar energy development.

Along with the Renewable Energy Law, regulations to encourage price reductions through competitive bidding pricing models have also been used for the wind power market in China. The government has adjusted oil and coal price lists to encourage the reduction of energy consumption; at the same time, China has developed a series of different tax and financial measures. Many media campaigns have been carried out at both the central and local levels to raise public awareness of the benefits of using renewable energy sources. China has also organized many seminars and media campaigns, notably "Energy Saving Weeks" and exhibitions of energy-saving technology in various provinces.

Through the establishment of high-tech development zones, China has issued a series of related regulations and laws, such as regulations on the scope of high-tech science and technology fields to be developed, including microelectronics,

electronic information, space and aerospace, new and high-efficiency energy, ecology and environmental protection, and other alternative technology industries for traditional industries currently in use.

4. LESSONS IN GREEN INDUSTRY DEVELOPMENT FOR VIETNAM

Through studying the experience of green industry development in some East Asian countries, the following lessons can be identified for Vietnam:

In order to promote green industries, the Government has a key role in developing policy frameworks throughout the early stages of the process. Key points to be considered in the development of green industries and renewable energy include: Existing capabilities and infrastructure are important factors to be considered in the development of a green industry; Assessment of overall prospects and readiness levels along the value chain should be conducted; Feedback should be solicited throughout the development process; Collaborative engagement of research institutions and private companies is necessary to ensure consistency in the vision and development goals of the industry. At each stage, the Government should clearly define the objectives, challenges associated with these objectives, and the proposed indicators, along with reports on the effectiveness of the direction and performance results. At the same time, the competitive mechanism will encourage the continuous development of the green industry when businesses continuously innovate their technology and products to adapt to green consumption needs.

It is necessary to review and re-evaluate all legal documents on finance, taxes and fees, environment, energy use, science and technology, infrastructure development, human resources, etc., which are related to green economic development, energy saving, efficiency, climate change response, and environmental protection aiming at sustainable development. Then, Vietnam should point out the achieved results, shortcomings, limitations, and causes of these issues, propose directions for amendments and supplements, and avoid spreading, waste, and overlap between policies. To date, Vietnam has enacted over 33 laws and ordinances with content related to environmental protection, such as the Law on Biodiversity 2008, the Law on Forest Protection and Development 2004, the 2013 revised Land Law, the 2003 Fisheries Law, the 2012 revised Water Resources Law, and the 2010 Mineral Law. However, Vietnam does not have any official documents regarding green economic development. However, their contents related to "low carbon economy," "mitigation and adaptation to climate change," "green growth," "green industry," and "green jobs" have been implemented and are in the process of being completed.

In addition, measures to enhance institutional capacity to support green industry development must be implemented. Accordingly, a state management apparatus must be built, officials must be improved in quality, policy mechanisms must be adjusted and supplemented, and administrative procedures must be simplified. Managers and officials of all levels of government in each locality must actively grasp, deploy, and fully and seriously implement the

Party and Government's unified policies, guidelines, and regulations on green industry development for the whole country and each locality.

At the same time, it is imperative to establish a comprehensive policy and legal system focusing on the early development of laws for each green industry sector. It is necessary to issue guidance documents on the green industry, conduct early research, and unify regulatory documents related to the green industry sector from the central to the local level. Localities need to proactively research and propose solutions for the Central Government to refine existing policies and legal regulations from the Central Government. They should also propose specific regulations and policies to be flexibly applied to the specific context of each locality in developing green industry. The government should allow each locality to issue specific mechanisms and policies for developing a green industry. Vietnam should continue to enhance its legal system, mechanisms, and policies supporting science and technology development and technological innovation in the green industry.

Vietnam should continue to innovate the organization and management mechanism, programs, topics, and financial mechanisms for science and technology, linking science and technology activities with production and business. It must innovate the method of organizing and implementing science and technology programs, topics, and projects to enhance democracy, openness, and seriousness. It is necessary to create policies to motivate science and technology staff and policies to attract talents to encourage science and technology staff. At the same time, it should propose strong solutions and policies in managing science and technology activities to create breakthroughs in advantageous fields, thereby forming key science and technology fields.

Green industry development policy in Vietnam is a new issue, while many countries, such as the US, China, European Union countries, Korea, and Japan, have already implemented green industry development policies. Propaganda and dissemination work for businesses and people is very important to overcome the awareness challenge. The content of propaganda and dissemination focuses on the following key points: 1- Traditional industries, especially mining, cement production, iron and steel, paper production, chemical industry, etc., are "agents" causing environmental pollution and degradation, resource depletion, and various risks to human health and society. Thus, developing a green industry in a green economy is an inevitable trend. 2- Developing a green industry brings many benefits, such as protecting environmental resources, promoting business development, improving the quality of production and the business environment, and improving the health of workers, etc.

5. CONCLUSION

Green industry development is a relatively recent phenomenon in Vietnam although it has already been implemented in many countries, such as China, Korea, and Japan. After nearly 40 years of implementing the reform policy, Vietnam has emerged as a bright spot of economic growth in the region and the world with many remarkable achievements. The country has established important foundations for industrial development, such as transportation infrastructure, socio-

economic infrastructure, energy systems, factories, businesses, human resources, etc. However, Vietnam's increasing economic growth still mainly relies on the intensive use of natural resources. Industrialization based on the "brown economy" model with low resource use efficiency, high waste generation, environmental pollution, and outdated production technology can lead to "deindustrialization". It cannot be the future choice to ensure sustainable economic development. In the increasingly serious climate change situation, studying the experience of developing green industry in some East Asian countries to promote green industry is the optimal choice to ensure sustainable development in Vietnam.

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CIRCULAR ECONOMY AND SUSTAINABLE DEVELOPMENT

EXAMINING POLICY AND LEGAL FRAMEWORK FOR CIRCULAR ECONOMY IN AGRICULTURE IN VIETNAM: A SWOT ANALYSIS

Nguyen Thi Thuy Hang[a]*

[a]School of Economics and Management, Hanoi University of Science and Technology, Vietnam

**Corresponding author: hang.nguyenthithuy@hust.edu.vn*

Abstract: *Agriculture is facing significant environmental degradation and climate change challenges due to its susceptibility to natural conditions. This necessitates a transition toward a more sustainable farming model, with circular agriculture emerging as one of the most suitable solutions. The study aims to identify policy and legal matters governing circular economic practices within Vietnam's agricultural sector via SWOT analysis. Findings reveal that while Vietnam has notably invested in policies fostering circular agriculture, its regulatory framework for this sector remains deficient, lacking precise guidelines for each stage as well as standards and criteria to measure the effective implementation of circular agriculture initiatives. To overcome threats posed by the external environment and effectively capitalize on existing opportunities in alignment with the global trend of circular economy, a strategic matrix concentrating on enhancing the legal framework is recommended.*

Keywords: *Circular Agriculture, Circular Economy, Legal Framework, SWOT analysis.*

1. INTRODUCTION

In contrast to the linear economy characterized by the "take, make, dispose" model, the Circular Economy (CE) eliminates the concept of "waste." In this paradigm, goods currently in use are not discarded or wasted. Instead, these goods are "regenerated" into various resources, re-entering the production and consumption cycle in the future. The concept was introduced in the 1980s by Stahel as a "self-replenishing system (product-life extension)" (Stahel, 1982). In 1990, Pearce and Turner officially defined CE in their book "Economics of Natural Resources and the Environment" (Pearce & Turner, 1989). Nowadays, the Ellen MacArthur Foundation's definition in (MacArthur, 2013) has since become a widely accepted reference. This model is particularly prevalent in the field of agriculture due to its suitability and efficiency. Published research indicated that traditional agriculture is the leading cause of pesticide and fertilizer emissions, freshwater pollution, and biodiversity loss (Batlles-delaFuente et al., 2022). Implementing Circular Agriculture (CA) will facilitate the management and resolution of this issue by efficiently using resources throughout the value chain, while also promoting regeneration and biodiversity (Velasco-Muñoz et al., 2021). A CA approach could enhance water efficiency in MENA countries, reduce environmental pressures in Southeast Asian countries, improve soil fertility in Sub-Saharan Africa, and promote land-saving agricultural practices in Latin America (van Berkum & Dengerink, 2019). However, each country will have varying levels of interest depending on their awareness of this issue. This disparity is evident in the

research landscape, with studies primarily conducted in Europe, Asia, and the Americas, while Russia, Africa, the Middle East, and Oceania show a notable gap (Craparo, Cano Montero, & Santos Peñalver, 2023). Vietnam is also advancing CA to support the UN's Sustainable Development Goals (SDGs), addressing environmental concerns, and resource scarcity, and fostering a cleaner, more flexible agricultural system.

The academic literature on the legal and policy landscape of CA in Vietnam is still limited. Examining literature concerning CE validates the initial supposition that the theoretical framework of CE has yet to be adequately adjusted to the agricultural sector. Therefore, it is necessary to refine the overall CE framework and scrutinize available indicators for assessing the circular efficiency of agricultural production systems (Velasco-Muñoz et al., 2021). This paper examines the relationship between CE and agriculture from a legal perspective in Vietnam. It aims to (i) explore the application of CA theory and practice, (ii) conduct a SWOT analysis to assess Vietnam's strengths, weaknesses, opportunities, and challenges in promoting CA, and (iii) identify legal framework gaps requiring improvement. SWOT analysis has been employed in studies on renewable energy development for agriculture (Dong et al., 2023), blockchain technology for sustainable agri-food supply chains (Vu & Trinh, 2021), and organic agricultural product development (Ha, 2023). However, no dedicated SWOT analysis of CA in Vietnam exists. This research aims to fill this gap. By rigorously assessing existing policies and legal mechanisms, the research identifies inefficiencies and proposes solutions to better support CA, enhance agricultural value chains, and transform by-products into valuable resources.

2. RESEARCH METHODOLOGY

SWOT analysis is a valuable tool for identifying the strengths, weaknesses, opportunities, and threats that a project must face. It is an important tool for situational analysis to help managers identify organizational and environmental factors (GÜREL & TAT, 2017). Originally developed for the marketing and management disciplines, SWOT analysis has since extended its relevance to policy and legal discourse, particularly within energy and natural resources law and policy (Azubuike et al., 2018).

Firstly, internal and external factors are identified. Next, these factors are categorized into strengths, weaknesses, opportunities, and threats. After analyzing, several strategies such as S-O, S-T, W-O, and W-T can be proposed to maximize benefits and minimize negative impacts on the research subject. The author utilizes the SWOT analysis to scrutinize the prevailing circumstances of CE in agriculture in Vietnam, thereby assessing the prospects and obstacles for implementation, and proposing solutions. The SWOT analysis has been also combined with the legal aspect of the PESTEL (Political, Economic, Sociological, Technological, Environmental, and Legal) framework to yield more accurate results and powerful strategic decisions (Benzaghta et al., 2021). This integration can offer a holistic perspective on the agricultural business environment, as SWOT analysis primarily focuses on internal activities and

potential actions within the organization. In contrast, PESTEL analysis acknowledges external factors that are largely beyond the organization's control (Benzaghta et al., 2021; Sigcha et al., 2020). Unlike models such as Porter's Five Forces (Porter, 1989) or the Boston Consulting Group (BCG) Matrix (Henderson, 1970), which primarily concentrate on competition and market dynamics, SWOT and PESTEL analyses offer a more comprehensive and adaptable framework. Porter's Five Forces is limited in its capacity to address broader environmental factors (Grundy, 2006), while the BCG Matrix faces challenges in contemporary strategic management due to its narrow financial emphasis (Madsen, 2017). In contrast, the integration of SWOT's evaluative capabilities with PESTEL's consideration of external factors renders these tools particularly suitable for examining the intricate relationships between legal frameworks and sustainable agricultural practices..

To analyze effectively, the study focuses on answering some research questions: (i) What are the main advantages of CA over traditional agriculture? (ii) How do current policies and legal frameworks impact CA? (iii) What investment or market opportunities exist for CA? (iv) What are the potential risks of CA?.

Qualitative data sourced from Vietnam's policies and legal documents, with a primary focus on the period from 1998 —when Directive No. 36/1998/CT-TW was issued with policies aligning with today's concepts of CE, such as the "application of clean technologies, low-waste processes, and minimal consumption of raw materials and energy."(Communist-Party-of-Vietnam, 1998) to the present. The pertinent statistical data extracted from published reports, as well as scholarly publications concerning CE, and CA authored by researchers both domestically and internationally.

3. RESULTS

A SWOT analysis has been conducted to evaluate the CE in agriculture in Vietnam. Specific criteria have been deliberated upon to classify internal and external factors. Strengths and weaknesses associated with industry advantages, labor, technology, and so forth within the scope of the model's influence are classified as internal. Meanwhile, environmental issues, economic factors, and notably, policy and legal factors, etc., that are beyond the industry's control are classified as external.

i. Strengths

- Achievements in the agricultural sector

Vietnam, characterized by its agricultural orientation, benefits from highly advantageous natural settings, such as an extensive network of rivers, varied topography, and land composition, enabling farmers to diversify their agricultural practices. Therefore, Vietnam's agriculture is considered to have substantial potential, and it is entirely feasible to be enriched through agricultural endeavors (Duong, 2020). According to the General Statistics Office (GSO) in 2023, the export turnover of select agricultural products saw a substantial increase, the livestock industry demonstrated steady growth, and aquaculture thrived. The agricultural, forestry, and aquatic sectors achieved a 3.83% growth rate, the highest

since 2011. This success is largely due to advancements in high-tech agriculture, with science and technology contributing over 40% to recent agricultural production achievements (GSO, 2023).

- The existence and development of CA models

While comprehensive realization and definition of CA remain ongoing, several models embodying CA characteristics have surfaced since the 1980s in Vietnam with VAC model (Table 1). These models are implemented across diverse scales and domains, yielding notable achievements.

Table 1. CA models in Vietnam

Model	Notable Examples
Ecological Chain Transformation and Connection	(i) "Garden - Pond – Barn" (VAC); Garden - Pond - Barn – Biogas" (VACB); "Garden - Pond – Barn – Forest" (VACR); "Garden - Pond – Lake" (VAH); (ii) "rice – shrimp"; "rice – fish"
Using agricultural by-products as catalysts	(i) Using rice husk as fuel - husk firewood; (ii) Using straw to cultivate mushroom straw; (iii) Cultivating worms and black soldier flies for animal husbandry.
Waste recycling	(i) Producing organic fertilizer from agricultural waste; (ii) producing biomass, and biochar originating from agricultural by-products.
Zero Waste Design	(i) 4F (Farm-Food-Feed-Fertilizer) bio-safe breeding complex (Que Lam Group) (ii) "Green circle" in dairy farm (Vinamilk) (iii) Closed-loop cycle from factory to farm (Exporting aloe vera production - VietFarm; Exporting South American ripe bananas - Huy Long An Co., Ltd.

Source: Compiled by the author, based on (Huong, 2023; Quang, 2023)

- Suitability and Effectiveness

The adoption of Circular Economy (CE) principles in agriculture proves highly effective, primarily due to its optimization of agricultural waste as input materials for subsequent production processes through chemical and biological mechanisms. CE principles are evident in the implementation of biological cycles to enhance raw material efficiency and close nutrient loops (Quang, 2023). Agriculture encompasses various interconnected sectors like crop cultivation, livestock husbandry, aquaculture, forestry, and agricultural processing, forming the foundation for agroecological industry chains strengthened through CE principles (Jun & Xiang, 2011). Agriculture inherently aligns with CE principles, seamlessly integrating economic concepts into sustainable development frameworks (Batlles-delaFuente et al., 2022).

- Sustainability

CA aligns inherently with sustainability principles. In (Martínez-Moreno et al., 2024), the authors showed that the potential of CE to achieve environmental, economic, and social sustainability is particularly pertinent to the agricultural sector. Advancements such as water and energy reuse, waste management, and forest management contribute to living within the planet's carrying capacity. This approach has led to ecosystem restoration, improved biodiversity

management (WBCSD, 2010), and made sustainable development more tangible.

ii. Weaknesses

- Wasting the agricultural by-products

Vietnam's agricultural sector faces challenges related to mismanagement of agricultural and forestry by-products, widespread straw incineration, and livestock waste release, resulting in substantial environmental pollution (Thuy, Sinh, & Quan, 2022). Despite the abundant availability of agricultural by-products, their potential for transitioning to a circular economy is compromised by prevalent wasteful practices among agricultural workers, undermining circular economy initiatives. According to GSO and Ministry of Agriculture and Rural Development (MARD) statistics (2020), agricultural waste exceeds 150,000 tons annually, with inadequate utilization. In the livestock sector, approximately 84.5 million tons of waste are released annually, with only around 20% effectively utilized for purposes like biogas production and composting. In crop cultivation, only about 10% of crop residues are used as fuel on-site, 5% as industrial fuel, and 3% as animal feed; more than 80% are not utilized and are directly discharged into the environment or burned, causing environmental pollution. This waste contrasts with available CA models based on organic farming

- Lack of a Comprehensive Legal Framework

Despite the momentum in CE adoption, Vietnam currently operates without a well-structured legal framework dedicated to CE as well as CA. Existing regulations are dispersed and lack specificity and practical applicability. The Environmental Protection Law provides a basis for CE but lacks strong enforcement mechanisms. CA lacks specific evaluation criteria, and standards for scientific and technological aspects are unclear, complicating implementation. Policies on agricultural by-products are still in a formative stage, with no established legal framework for CA or standardized systems prioritizing the use of agricultural by-products. Thus, practically applying CE model in different industries, sectors, and localities takes a long time (Nguyen et al., 2022). The implementation of legal documents in this area remains ineffective, necessitating the establishment of comprehensive standards and technical regulations for products, goods, and waste to support the application of CE measures (Ninh, Phuong Le, & Chung, 2023).

In addition, while some related policies have been developed on time, the transition from enacted policies to specific programs and projects, supported by actual implementation resources, requires further improvement. Many policies lack sufficient supporting mechanisms, leading to ineffective implementation and limited means of evaluating their effectiveness (Son, 2024).

- Time and perseverance

Agricultural activities are prone to losses from pathogens, which chemical agents can eradicate more effectively than microbial and organic products. Developing suitable circular models, networks, and infrastructure is time-consuming (van Bodegom, van Middelaar, & Metz, 2019). Farmland size, income loss risks, economic profit uncertainty, and high up-front technology costs (Hilmi et al., 2024) compel farmers to carefully deliberate before transitioning to circular agriculture.

• Technological barriers

CA activities require stakeholders to have a certain level of understanding of science and technology. The fact that it is also customary to concentrate on technological improvements when CE is operationalized in practice (Dagevos & Lauwere, 2021) such as by applying technology to reduce emissions of ammonia and greenhouse gasses (Martínez-Moreno et al., 2024). The rapid advance in technology and its adoption enables the extension of agriculture practices on farms (Martínez-Moreno et al., 2024). However, Vietnamese farmers often rely on traditional folk experiences instead of exploring and adopting new technologies. Investing in modern production lines or high-tech machinery applications in this field is also a significant challenge due to the limited scale and economic potential.

• Small scale

Despite being highly regarded and having achieved significant accomplishments, many CA models in Vietnam still operate on a small scale (Ninh, Phuong Le, & Chung, 2023). Some models at farms and large enterprises are still operating without much support from the government or clear and specific legal regulations.

• Lack of high-quality labor force

CA models, integrated with diversified livelihoods in rural areas, empower farmers to exploit agricultural by-products and waste to produce agricultural products. Hence, there is a substantial participation of laborers and farmers in circular agriculture in Vietnam (Quang, 2023). However, most of the agricultural workforce has not met the requirements for adopting new technologies. In 2020, the number of agricultural, forestry, and fisheries workers in the labor force age without training was 12.57 million, accounting for 89.97% of the total agricultural, forestry, and fisheries workers in the labor force age (GSO, 2022). Farmers are still accustomed to traditional methods, not proficient in using technology, and have limited discipline in organizing production, complying with procedures, using chemicals, and focusing on short-term profits. Therefore, they face many risks in implementing CA in practice (Dong et al., 2023).

• Limited Investment

Agriculture, a crucial economic sector in Vietnam, receives limited public investment. In 2023, the MARD reported a total capital of 9.852 trillion VND with an 89.5% disbursement rate. For 2024, capital is set at 9.935 trillion VND (MARD, 2023). This amount covers only 60% of the planned budget, prompting MARD to request an additional 5.5 trillion VND in the document of 1333/BNN-KH dated 27/2/2024. Most funding is directed towards infrastructure for irrigation, disaster prevention, and climate change adaptation, with minimal allocation for emission reduction. Foreign Direct Investment (FDI) in agriculture has just been approximately 1.7% (FIA, 2023). The sector aims for $25 billion in FDI by 2030, focusing on projects with advanced technology and eco-friendly practices, despite challenges in attracting such investments.

iii. Opportunities

• Legal Policies

Vietnam has recently advanced CE through strategies, policies, and legal frameworks. Preliminary data indicate that Vietnam has enacted 16 laws to advance the transition to ecological agriculture, low-

carbon agriculture, and the CE in agriculture. Notable among these are the Law on Animal Husbandry of 2018, Law on Crop Production of 2018, Plant Protection and Quarantine Law of 2013, Forestry Law of 2017, Biodiversity Law of 2008, Environmental Protection Law of 2020, and Land Law of 2024. Complementing this legal framework are 33 guiding decrees associated with these laws, many of which provide direct regulation of various industry sectors (Son, 2024).

The 2020 Environmental Protection Law officially defines CE in Article 142, requiring authorities to integrate CE into development strategies, waste management, reuse, and recycling (National-Assembly, 2020). Agriculture, a key sector, has seen numerous programs, including Sustainable Agriculture and Rural Development Strategy for the period 2021-2030, with a vision toward 2050 (Prime-Minister, 2022a), and the Agricultural Restructuring Plan for the period 2021-2025 (Prime-Minister, 2021). Additional initiatives include the CE Development Scheme (Prime-Minister, 2022b), Climate Change Action Plan (Prime-Minister, 2020), Industrial Development Project for animal feed (2021-2030) (Prime-Minister, 2023), and policies for efficient livestock management, farm economic development, and fisheries. The 2018 Law on Crop Production and the Law on Animal Husbandry mandate effective management of agricultural residues and livestock waste (National-Assembly, 2018a, 2018b). Circular No. 12/2021/TT-BNNPTNT provides guidelines on waste treatment and reuse. To attract investment in green agricultural growth, policies include land support (Article 132, Decree No. 08/2022/NĐ-CP), credit policies for rural development (Decrees No. 55/2015/NĐ-CP and No. 116/2018/NĐ-CP), and incentives for enterprise investment in agriculture (Decree No. 57/2018/NĐ-CP). The State Bank's 2015 Directive No. 03/2015/CT-NHNN promotes green credit for environmentally friendly projects. Article 149 of the Environmental Protection Law supports green credit for waste management and environmental improvement projects. In particular, the proposal on the "Development and application of science and technology transfer to accelerate CE in agriculture up to 2030." was approved by Decision No. 540/QD-TTg on June 19, 2024 (Prime-Minister, 2024). The project will emphasize research, technology application, market development, policy frameworks, international cooperation, and communication related to CA. These policies foster a conducive environment for CE advancement, enhancing the legal framework at national and local levels.

- Global trend

CE in agriculture is currently a global trend and is of interest to many international organizations such as FAO, IFAD, UNICEF, WFP... This subject is progressively becoming clear and relevant, correlating with the inception of the SDGs (Craparo, Cano Montero, & Santos Peñalver, 2023). This presents opportunities for agricultural nations like Vietnam. Matters concerning policies, laws, and operational procedures, which have been researched and published in numerous other countries, serve as valuable sources of information for Vietnam. It can be said that CA is the future of agriculture, bringing many different opportunities (Sreekumar, Sudheep, & Radhakrishnan, 2024), deserving to be pursued globally towards sustainable development.

- Consumer perception and market demand

Sweden has elevated its philosophy of CE to a new level with the motto "Changing consumer mindset will lead to changes in production mindset" (VBCSD, 2022). The consumer perception and market demand for CA are implicated with trends towards sustainability, health-consciousness, and transparency in the food industry. As these trends continue to evolve, CA is likely to gain further traction among consumers seeking more environmentally friendly food options.

- Income source and economic growth

CA is evaluated as a "low-cost, high-profit" model with promising potential for generating substantial revenue, particularly as the market for organic products in low and middle-income countries develops (van Bodegom, van Middelaar, & Metz, 2019). This model provides stable, long-term income, suitable for modern society, unlike the short-term benefits of traditional agriculture. CA enhances production by efficiently using agricultural waste as inexpensive input materials. Recycling and reusing agricultural by-products can generate new revenue through the sale of by-products, value-added products, and ecosystem services.

- The ticket to the export market

Green and circular production processes have become priority tickets, facilitating goods to expand into export markets, even the most demanding ones with stringent standards. Producing according to CE models helps businesses eliminate almost all chemical pesticides, synthetic fertilizers, and agrochemicals in the cultivation process, thereby creating high-quality raw materials for production, ensuring cleaner and higher standard output products (Hien, 2023).

iv. Threats

- Climate change and environmental pollution

The global community, including Vietnam, faces critical issues: dwindling natural resources, escalating environmental pollution, and accelerating climate change. The agricultural sector, highly sensitive to environmental conditions, is particularly vulnerable. Negative changes in these factors can hinder agricultural activities, lower product quality, and affect yields. According to the National Environmental Status Report 2016-2020 by Vietnam Ministry of Natureal Resources and Environment (MONRE, 2021), annually, 50-70% of inorganic fertilizers remain unabsorbed by crops, contributing to environmental pollution. Wastewater from intensive agriculture, laden with pesticides and chemical fertilizers, contaminates soil, groundwater, and surface water. Despite progress through sustainable practices, long-term soil and water remediation remains a significant challenge, necessitating coordinated efforts from both the government and the agricultural sector.

- Community Mindset

A community mindset can impede effective waste management, particularly the implementation of selective collection systems (Wikurendra et al., 2022). These systems require separating recyclables, organic waste, and hazardous materials at the source. A resistant or unaware community can hinder waste separation and recycling, leading to contamination of recyclables and increased waste generation, thereby undermining circular economy goals.

• Quality management

An inherent risk identified when implementing CA is the potential for introducing pathogens or harmful substances into the system by recycling organic waste (van Bodegom, van Middelaar, & Metz, 2019). Without stringent regulations and clear criteria, managing safety and output quality becomes challenging. This issue impacts not only individual products and farms but also the broader agricultural system.

In summary, although CA has not been widely popularized in theoretical discourse, it is experiencing significant growth in Vietnam. The country's economic, social, and legal environment presents a mix of strengths, weaknesses, opportunities, and threats for the implementation of a CE in agriculture.

4. DISCUSSION

Based on the SWOT analysis, several strategies can be proposed to effectively promote CA. This study focuses specifically on legal policy recommendations, with other aspects to be explored in future research.

• S-O Strategy

To convert to CA in Vietnam, it is essential to leverage natural advantages through targeted CA practices. Building on successful existing CA models within the country can offer a practical framework for broader implementation. Supportive government policies and incentives provide critical facilitation, while international collaboration and alignment with global sustainability trends enhance both the feasibility and competitiveness of CA practices.

The strategy emphasizes the need for clear legal frameworks to capitalize on opportunities for commercializing and exporting agricultural products through CA models. To support this, targeted policies should establish criteria for identifying and evaluating CA models and set technical standards for production, classification, and recycling.

Key indicators for assessing CA practices, as outlined by Ninh et al., include the reuse and recycling of bio-based materials, material loss, food waste, pesticide and fertilizer use, nutrient balance, renewable energy use, carbon emissions, and financial benefits (Ninh, Phuong Le, & Chung, 2023). Establishing regulations for recognizing and certifying processed by-products will also be essential, allowing businesses to market their products internationally.

• Life Cycle Assessment (LCA), a method used to evaluate the environmental impacts of a product by quantifying the resources consumed and emissions produced throughout its life cycle (Basset-Mens et al., 2007; Kheiralipour et al., 2021), is crucial for evaluating environmental impacts in CA networks, helping optimize resource use and minimize emissions. By developing robust legal standards and leveraging LCA, Vietnam can strengthen its position in global agricultural markets while promoting sustainability.

• W-O Strategy

To address weaknesses in Vietnam's agricultural sector, leveraging available opportunities is crucial. Utilizing waste management innovations, such as composting and biogas production, can mitigate waste issues. Technological advancements and international partnerships can overcome technological constraints, while cooperative models and government

support can scale production effectively. Additionally, targeted educational and training programs can address the skills gap in the workforce. Integrating these opportunities into a cohesive strategy will facilitate the successful adoption of CA.

Firstly, a comprehensive legal framework on CE, ideally the Circular Economy Law, needs to be developed and perfected promptly, with detailed regulations for applying circular economy to specific sectors, including agriculture.

Secondly, more legal policies need to be developed to regulate agricultural by-products to avoid waste and increase economic opportunities, including procedures for collection, preservation, processing, and utilization of agricultural by-products; and establishing regulations for managing and using recycled products and materials for each type of agricultural by-product. It must be re-evaluating waste, particularly agricultural waste, as a resource (Quang, 2023), and an important input, extending the value-added chain in agriculture. Handling and processing agricultural by-products are the shared responsibility of society as a whole.

Thirdly, developing policies and regulations to support vocational training and technical guidance for workers contributes to enhancing the quality of the workforce, expanding the scope of CA projects, and promoting economic growth.

- **S-T Strategy**

The strategy highlights how Vietnam's agriculture sector can leverage its strengths to address significant threats, particularly those posed by climate change and environmental degradation. By integrating advanced technologies and climate-resilient practices, the sector can mitigate the impacts of climate change, while innovations in waste management help reduce pollution. These efforts, coupled with ongoing education and policy reforms, are essential for shifting community attitudes toward sustainability, making it easier for the agricultural sector to transition to CA.

A key component of this strategy is the establishment of monitoring and quality control mechanisms to ensure the safety and quality of both final products and by-products from circular processes. The sector has set ambitious targets, such as processing 50% of by-products of agricultural products are processed, recycled and reused, of which 80% of by-products are collected and reused using technology; 60% of households and 100% of farms to apply technologies and techniques to treat livestock waste and reuse it (Prime-Minister, 2024).

Examining and adapting existing agricultural standards, like GlobalGap and VietGap, to better suit products derived from circular processes is also critical. This includes focusing on specific indicators such as chemical residues and microbiological safety, ensuring that products meet both domestic and international quality standards. and nutritional content.

- **W-T Strategy**

The W-T Strategy focuses on overcoming waste management, limited investment, and inadequate legal frameworks. Enhancing recycling, securing funding, and developing clear regulations are key steps. Addressing small-scale operations, climate change, and pollution through sustainable practices will also support this transition.

The government should prioritize policies to support investment in projects applying CE models, offering tax incentives, land leasing discounts, water surface leasing fees, and facilitating access to credit. Experimenting with Green Credit Funds can stimulate business and investor participation. Initial investment subsidies or targeted loans should be considered (Yang et al., 2022) such as providing 50% support for seeds, materials, and equipment when implementing circular agriculture models in the first 3 years and a 5% interest rate subsidy for bank loans at the start of implementation. Further promoting the implementation and monitoring of green growth strategies, green agriculture, CA, quickly achieve the net-zero emissions goal by 2050.

Policies regarding resource taxes, and environmental protection fees need to be reformed and improved in line with the direction of developing CE, compatible with market pricing mechanisms, and ensure the principle of "the polluters pay" (OECD, 2008). Revenue from environmental protection fees should be allocated directly to investment tasks to address environmental issues, and adapt to and mitigate the impacts of climate change.

5. CONCLUSION

The strong growth of Vietnam's agricultural sector is being threatened by environmental pollution and climate change, with one of the main causes stemming from the one-way flow of traditional agriculture. CA stands as a viable alternative, integrating the economic-agricultural system into a balanced material circulation process (Fortunati, Morea, & Mosconi, 2020).

SWOT analysis shows Vietnam's strong potential for CA, driven by industry achievements and diverse models. Strengths include these accomplishments, while weaknesses involve by-product wastage and technological barriers. Opportunities exist to increase farmer income and access global markets, aided by government policies. However, the lack of a comprehensive legal framework for CA is a significant challenge. Recommendations include developing legal frameworks for by-products, improving models, and adjusting incentives and fees to support sustainability.

Due to the extensive range of agricultural activities, this study serves as an initial exploration to evaluate CA in Vietnam, setting the stage for more in-depth analyses of its legal framework and its influence on CE practices within agriculture in future research endeavors

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EXPERIENCE IN DEVELOPING GEOLOGICAL TOURISM IN SOME SOUTHEAST ASIAN COUNTRIES AND LESSONS FOR VIETNAM

Nguyen Lan Hoang Thao[a]*, Nguyen Thi Thu Ha[a]

[a]Hanoi University of Mining and Geology, Hanoi, Vietnam

**Corresponding author: nguyenlanhoangthao@humg.edu.vn*

Abstract: *Geological tourism is increasingly being paid attention to and developed in many countries around the world. The development of this field benefits tourists, the local community, and businesses in the tourism industry, thereby contributing to the country's socio-economic development. In Vietnam, although geological tourism has had promising beginnings in recent years, the level of development still does not reflect the true potential of this field. In this article, the author will summarize the experiences of some countries in Southeast Asia related to the development of geological tourism. From there, suggestions will be made to help Vietnam effectively exploit the potential and strengths of developing geological tourism in the future.*

Keywords: *geological tourism, experience, development, Southeast Asia, Vietnam.*

1. INTRODUCTION

In 1995, geologist Thomas Hose was the first person to define geological tourism as "a form of tourism that focuses on geological features." With this concept, geological tourism is still fundamentally an activity of exploring geology.

Over time, the concept of geotourism has been expanded. At the International Geotourism Conference in Arouca in 2011, organized by UNESCO, a consensus was reached on the definition of geotourism as follows: geotourism is a type of tourism that helps maintain and enhance the distinctive characteristics of a territory, focusing on its geological, environmental, cultural, aesthetic, heritage, and local community welfare.

Geotourism is a relatively new field of development (since 1995) but plays a crucial role in the tourism industry, closely linked to all other sectors within the tourism industry and the economies of countries. In recent times, many Southeast Asian countries have recognized the great potential of geotourism and have implemented various strategies for geotourism development, contributing positively to the overall socio-economic development of each country. Vietnam possesses rich and diverse geological resources with the potential to develop attractive geotourism products that attract international tourists. However, to effectively and sustainably exploit this potential, Vietnam needs to learn from the experiences of other countries, especially those in Southeast Asia with similar natural and social conditions. Therefore, this article studies the experiences of geotourism development in some Southeast Asian countries such as Indonesia, Malaysia, and Thailand, aiming to draw lessons for Vietnam in its current geotourism development efforts.

2. OBJECTIVE AND RESEARCH METHODS

This article focuses on studying the geological tourism development experiences of Southeast Asian countries, such as Indonesia, Malaysia, and Thailand. The article will draw reference lessons from these countries' successes to open up opportunities for Vietnam in developing geological tourism.

The article is formed by inheriting, selecting, analyzing, and evaluating secondary information and data from scientific topics, reports, reference books, and scientific articles, combined with the authors' personal experiences in this field.

3. RESEARCH CONTENT

3.1. Geological tourism development experiences in some Southeast Asian countries

Indonesia, Malaysia, and Thailand are pioneering countries in geological tourism development in Southeast Asia. Through the research process, the authors have summarized some geological tourism development experiences in these countries as follows:

Firstly, building appropriate strategies and policies for geological tourism development, leveraging the strengths and potentials of the region.

Indonesia is a country that is rich in natural resources and culture, with the potential for geotourism development. Indonesia has three world heritages, 50 national parks, and seven geoparks (Ayu Krishna Yuliawati et al., 2016). Tourism plays an important role in national economic development in this country, so the government pays special attention to tourism development policies (Endy Marlin, Tutut Herawa, 2020). The combination of nature and culture are the two main factors driving the development of the tourism industry in Indonesia (Ayu Krishna Yuliawati et al., 2016). To take advantage of the benefits of natural heritage, the Indonesian government has implemented strategies and policies to develop geotourism. The importance of geotourism development and sustainable tourism was affirmed in Article 32 of the Environmental Protection and Management Law in 2009 (Endy Marlin, Tutut Herawa, 2020). The development of geotourism in this country is based on a precise strategy to optimize the sustainable use of geological diversity, geological heritage, biodiversity, and cultural diversity at various sites. This is fully in line with the Government's direction in Regulation 50, 2011, on the National Tourism Development Master Plan for the period 2010-2025, which clearly states that one of the tourism potentials that can be developed in Indonesia is geotourism. A similar perspective is also mentioned in the Tourism Development Strategy of the Directorate General of Tourism Destination for the period 2012-2014, in which the development of geotourism destinations are destinations associated with geological formations or geological sites. Currently, this country is focusing on considering policies for developing local and national tourism towards the development of Global Geoparks based on the relationship between the natural environment, culture, society, and the interest in tourism in society (Endy Marlin, Tutut Herawa, 2020).

In Malaysia, in the 1990s, tourism focused on mass tourism. In 1999, the brand "Malaysia - Truly Asia" was launched, attracting the

attention of countries, especially Western countries, making Malaysia one of Southeast Asia's most popular tourist destinations. Previously, awareness of the importance of geotourism in Malaysia was quite low. This resulted in important geological heritage sites being damaged or even no longer existing, mainly due to industrialization to boost economic growth. A breakthrough in this issue occurred after the Rio Summit in 1992, which clarified the need for nature conservation in Malaysia. In 1996, geologists established the Malaysian Geopark Heritage Group (MGHG). This day can be considered the beginning of geotourism in Malaysia. The group's main activity is to mobilize relevant parties about the importance of conserving geological heritage, as well as educating the public about the values of geological heritage. Along with the increasing influence of MGHG, they have convinced the Government to make decisions: Establish a national geological heritage database, Compile a list of geological sites, and Establish geoparks. All implemented projects have made Malaysia an internationally important geotourism destination. (Malgozata Mordal, 2014)

In Thailand, initial efforts to conserve natural features began in 1983 when the Office of Natural Resources and Environmental Policy and Planning (ONEP) issued the Natural Site Selection Procedure. At least 2,000 important natural sites have been surveyed and included in the conservation list. In 1989, the Thai Government declared it the Year of Nature and Environment Protection, and 263 sites were selected as natural conservation sites. Most government-recognized sites have geotourism potential (Dony Adriansyah Nazaruddin, 2019). One of Thailand's important tourism policies is to minimize negative impacts on the environment, nature, society, and culture, creating conditions for developing green tourism and ecotourism, including geotourism. In recent development plans, Thailand has proposed the "Circular-Bio-Green (BCG) Economy" model to aim for sustainability in the future (Robert G.J. Edyvean et al., 2023). At the same time, Thailand has also implemented policies to protect geological resources, focusing on the conservation and sustainable exploitation of geological heritage, ensuring that tourism development does not harm these valuable resources (Dony Adriansyah Nazaruddin, 2019).

Secondly, the infrastructure investment policy serves geotourism.

The Indonesian government has set a goal to develop sustainable, environmentally friendly, and harmonious geotourism (Ayu Krishna Yuliawati et al., 2016). All new infrastructure projects aimed at connecting tourist areas are designed to protect the environment, preserve heritage, and be suitable for the characteristics of each region, supporting the realization of sustainable tourism development. This is a strategic step in tourism development and an effort to implement sustainable tourism standards approved by the Indonesian Sustainable Tourism Council. In addition, the Indonesian government is actively improving infrastructure and transportation to domestic geoparks. The development of transportation networks, including airways, roads, railways, and waterways, is considered an important part of this strategy to facilitate convenient travel for tourists from airports to geotourism destinations (Shandra Rama Panji Wulung

et al., 2021). Malaysia is very concerned about improving and enhancing its tourism infrastructure to ensure the best experience for tourists, becoming the country with the best tourism infrastructure in the region (Malgozata Mordal, 2014). The government has invested heavily in developing and improving transportation systems, communication networks, tourist centers, as well as commercial facilities such as supermarkets and shopping centers. These efforts aim to meet the increasing demands of tourists and provide them with convenient travel conditions. Malaysia's transportation system has been upgraded to connect major tourist destinations efficiently. Tourists can easily move between tourist spots using the extensive and modern road network (Lê Văn Phục, 2019).

To promote the overall development of tourism and geotourism, Thailand has built and upgraded a modern transportation system. For a long time, this country has recognized its strategic advantage as the gateway to the Mekong River region and has utilized this to develop transportation infrastructure. The invested and upgraded transportation system has helped shorten travel time between tourist destinations, bringing significant benefits to tourists and allowing them more time to explore, shop, and enjoy other services. Additionally, Thailand has also heavily invested in its air transportation system. In addition to the developed air routes in the capital city of Bangkok, Thailand also has two other major airports, Chiang Mai and Phuket. These air transportation systems provide reasonable costs, making travel easy and cost-effective, attracting many international tourists (Le Van Phuc, 2019).

Thirdly, the involvement of the local community in the development of geotourism.

In Indonesia, local communities must be provided with access or conditions to actively participate in the development and management of tourism, rather than being passive recipients. Geological tourism resources include natural resources and human resources. Natural resources provide beautiful landscapes, while human resources cater to the educational aspect of geological tourism for tourists and the public. Tourists must understand and appreciate the geological and cultural history that has shaped the area's beauty. Therefore, a lack of knowledge about the region can lead to a lack of community awareness and tourist efforts in heritage conservation. One of the main functions of geological tourism, besides sightseeing and preservation, is community education. Regarding education, geological tourism can enhance the understanding of the earth for local communities and tourists. Therefore, the involvement of local communities is crucial, as they are the most suitable geological tour guides with comprehensive knowledge and experience in their respective areas (Krishna Nur Pribadi, Mohamad Sapari Dwi Hadian, 2016).

Based on research documents and the results of geological tourism sites and geological parks, scientists in Malaysia conclude that geological tourism is a tool for economic, cultural, and social development. The success of geological tourism depends heavily on the awareness and support of the local community. Tourists visit geological tourism sites to sightsee, admire the scenery, and learn about the indigenous people or participate in programs with the locals. Currently, in Malaysia, the local people play

both the role of organizers and participants in programs and activities at geological tourism sites. These programs must ensure objectives compatible with heritage conservation and sustainable development. Local authorities empower the local community in the development of geological tourism to improve social welfare while conserving and developing the area where they live (Dony Adryansyah Nazzaruddin and colleagues, 2015).

In Thailand, the government and local people understand that geotourism can create many job opportunities for residents. Local people actively participate in geotourism through activities, services for tourists, cultural performances, an increasing variety of local products for sale, and the organization of geotourism education. The participation of local people in geotourism activities will help tourists understand the processes of Earth formation and the importance of conserving geological heritage, as well as preserving the cultural heritage and traditional values of the local area (Vimoltip Singtuen et al., 2022).

Fourth, geotourism promotion and marketing activities should be promoted and enhanced.

The Indonesian government has built a foundation for developing the tourism industry through a strong promotional strategy, aiming to market Indonesia as an attractive destination. Thanks to these policies, the Indonesian tourism industry has made significant progress, with an increasing number of international tourists and new job opportunities for locals. The geological tourism promotion strategy of Indonesia combines various methods of media communication for the development of geological tourism, specifically: conducting advertising activities, including distributing advertising materials and placing advertisements in airline magazines about tourist destinations, natural heritage, geological heritage, and geological parks; direct marketing through the establishment of social media pages, posting images and videos related to geological tourism activities as well as information about events taking place at geological tourist destinations; organizing activities to invite media agencies to participate in advertising shoots, filming, or communication programs to promote geological tourism products; promoting geological tourism through the provision of geological tour packages combined with other forms of tourism; promoting cooperation between tourism businesses, media agencies, and local authorities to promote and enhance geological tourism (Adnan Hasyim Wibowo, Ralfy Ruben Rialdi, 2023).

Malaysia promotes tourism in general and geotourism through global media channels, with the famous slogan “Malaysia - Truly Asia”. The government has actively collaborated with businesses to implement prominent tourism programs, creating easily recognizable brands (Le Van Phuc, 2019). The Department of Minerals and Geoscience Malaysia (JMG) has enhanced the promotion of geological sites and related information to the public. JMG has created a smartphone application called ‘MYGeotapak’, which means “Geological Sites of Malaysia”. Initially, this application was only intended for experts’ internal use within the department. Due to the importance of sharing such a platform with the public, the second version of the application has been made available for public use. Both versions include

information about Malaysia's geological sites. This application has helped raise public awareness of the value and beauty of the country's natural and geological heritage. Currently, to preserve and promote geological tourism sites, Malaysia will continue to use digital platforms to optimize the effectiveness of promotion and attract the attention of tourists (Muhammad Mustadza Mazni et al., 2022).

The Tourism Authority of Thailand places special emphasis on promotional activities and campaigns with an average annual budget ranging from 80 to 150 million USD. With 36 domestic and 21 overseas representative offices, the Tourism Authority of Thailand actively promotes domestic and international tourism (Le Van Phuc, 2019). Thailand promotes itself with the brand "Amazing Thailand," focusing on the integrity of nature and culture (Guy Redden, 2007). A notable feature of Thailand's tourism policy is that the government promotes tourism. Thai government agencies always aim to attract tourists to the country. High-level government delegations regularly engage with foreign companies to discuss business opportunities in tourism, especially in promotional activities. Thanks to its investment in tourism promotion strategies, Thailand has successfully attracted international visitors, bringing about increasingly high socio-economic benefits (Le Van Phuc, 2019).

Fifth, diversifying geological tourism products.

Indonesia has identified geotourism as an important part of the country's sustainable tourism development strategy. Tourism activities in geoparks are developed to balance economic growth and natural resource conservation. Tourism activities in global geoparks are designed to take advantage of the area's unique geological features while ensuring harmony with the environment. Tourists can participate in various outdoor activities such as hiking, mountain climbing, cycling, swimming at beaches, exploring caves, sightseeing, observing flora and fauna, canoeing, boating, or exploring caves with tubes. These activities provide exciting experiences and help tourists connect more deeply with nature. In addition to geotourism-related activities, Indonesia also expands its combination with other types of tourism such as cultural tourism, ecotourism, and rural tourism, bringing overall development benefits to tourism at the destination (Krishna Nur Pribadi, Mohamad Sapari Dwi Hadian, 2016).

Malaysia's tourism is notable for its diversity of tourism products. The main tourism products in Malaysia include leisure tourism, entertainment, adventure sports, and famous shopping destinations. In Malaysia, there are archaeological and geological tourism packages for tourists aiming to promote the exploration of tourism products related to archaeology, geology, and UNESCO World Heritage sites (Nor Khairunnisa Talib et al., 2022). The richness of Malaysia's landscape facilitates the development of many unique geological tourism products. Tourists can participate in cave tourism, studying tropical limestone landscapes, adventure tourism, and ecotourism. Some geotourism programs and activities that can be conducted at potential geoheritage sites are mountain climbing, cave exploration, camping, hot spring bathing, trekking, hiking, swimming, kayaking, fishing… (Dony Adryansyah Nazzaruddin et al., 2015)

Thailand develops various tourism products to attract tourists and meet the increasing demands of the global tourism market (Le Van Phuc, 2019). The tourism industry in this country not only utilizes its abundant natural resources but also innovates to enhance the tourist experience and create highly attractive tourism products. One of the important strategies for geotourism development is diversifying tourism products in conservation areas and national parks. Thailand also focuses on developing unique geotourism tours, such as cave exploration, trekking on limestone mountain ranges, and visiting ancient volcanic areas and hot springs. In addition to exploring nature, geotourism in Thailand also provides high educational value. Tourists are provided with information about the formation and development of geological structures and the transformation of nature over millions of years, as well as valuable knowledge about the environment and ecology. Thailand also combines geotourism with cultural and historical elements, such as visiting historical sites and ancient temples (Vimoltip Singtuen, Krit Won-In, 2018). Furthermore, Thailand also emphasizes developing supporting services such as restaurants, hotels, and eco-resorts, providing convenient conditions for tourists participating in geotourism tours. The diversity and innovation in tourism products help attract many international tourists, contributing positively to the sustainable development of the tourism industry and the country's economy (Dony Adryansyah Nazzaruddin et al., 2019).

3.2. Lesson for the development of geological tourism in Vietnam.

Based on the experience of developing geotourism from countries in the Southeast Asia region, some suggestions can be drawn to promote the development of geotourism in Vietnam today:

First, there needs to be a clear policy direction for developing geotourism. To develop geotourism in Vietnam, the Government needs to establish policies and develop specific plans for each stage, region, and field, especially in places with potential geotourism development. These mechanisms and policies will directly impact tourism development in general and geotourism in particular. In Vietnam, many policies have been issued to develop tourism, but specific viewpoints and policies for geotourism to promote this activity have not been mentioned. Specifically, the Prime Minister's Vietnam Tourism Development Strategy until 2030 issued under Decision No. 147/QD-TTg, dated January 22, 2020, does not mention the development of a new tourism field, geotourism. Furthermore, the current tourism development in Vietnam has not achieved close connections between sectors, fields, and between the State and businesses and has not attracted the participation of the community in tourism development. Therefore, in the coming time, Vietnam needs to focus on building policies to create strong connections among relevant parties, affirming the role of geotourism development in the overall tourism development. Countries in the region have successfully developed geotourism largely thanks to the construction and implementation of policies related to this new tourism field.

Second, it is necessary to focus on developing infrastructure and facilities to serve tourism. An important factor contributing to the success of tourism development in

countries like Indonesia, Malaysia, and Thailand is that these countries pay great attention to investing in tourism infrastructure. Although Vietnam is considered to have diverse geological tourism potential, one of the current limitations is the infrastructure system, especially the tourism infrastructure, which still has many weaknesses and does not meet the requirements of tourism development and the needs of tourists. It is necessary to concentrate resources on investing in transportation infrastructure in tourist clusters, areas with potential for geological tourism development, and national tourist areas while improving transportation connectivity to tourist destinations and building rest stops along road routes. In addition, expanding the highway system to connect tourist destinations is also an effective solution to shorten travel time and minimize traffic accident risks. Within the scope of geological tourist areas, building a reasonable system of sightseeing and exploration routes is necessary to facilitate tourists without affecting the structure of geological heritage. Only Quang Ninh and Quang Binh are provinces with tourism activities closely associated with geological factors and have their own airports. Other provinces such as Ha Giang, Cao Bang, Ninh Binh, Lao Cai, Lai Chau, and Son La, although they have great potential for geological tourism development, do not have airports or convenient transportation infrastructure. Ha Giang and Cao Bang are the first provinces in Vietnam to have geological parks, but they face difficulties accessing geological tourist destinations due to inconvenient infrastructure and transportation.

Third, developing human resources for the tourism industry at localities. To improve the quality of human resources for geotourism, it is necessary to have close cooperation between tourism training institutions and geology education institutions. This coordination helps build appropriate training programs and instructional materials while training a team of tour guides with in-depth knowledge of geology. Localities should also establish policies to encourage and prepare for the training of geotourism officials. In the initial stage, leveraging international cooperation opportunities, especially within UNESCO's global geoparks network, will be useful for enhancing expertise and exchanging experiences. In addition, training a team of officials and tour guides in geotourism is an important factor in developing geotourism in geoparks. This team helps improve service quality and plays an important role in promoting and developing geotourism activities.

Fourth, enhance tourism promotion. After the pandemic, the trend of tourists is shifting towards untouched natural destinations, less affected by overcrowding and human intervention. This is a great opportunity to explore potential destinations that have not been fully discovered. To reach international tourists from target markets such as China, Australia, India, and other countries, as well as domestic tourists from major cities like Hanoi, Hai Phong, Da Nang, and Ho Chi Minh City, it is necessary to improve geological tourism promotion strategies. New geological tourist sites must have advertising websites with high-quality content and attractive images for tourists. At the same time, it is advisable to utilize social media channels and reputable television and distribute travel

brochures and maps through travel agencies and tour centers. In addition, coordination with relevant agencies is needed to organize seminars and press conferences to introduce the potential and outstanding features of geological tourist sites and promote local geological tourism products.

Fifth, diversify tourism products. Developing diverse tourism products is very important to enhance tourists' experience and optimize profits from the tourism industry. With its natural and cultural advantages, Vietnam has great potential in creating attractive and unique geological tourism products. However, we have not fully exploited these potentials yet. In the future, we must focus on designing geological tours that connect different localities, providing tourists with opportunities to experience various aspects of Vietnam's culture and nature in one journey. Combining geological tourism products with cultural, historical, and culinary elements can create richer and more attractive tour packages. Additionally, increasing activities such as exploring natural heritage and geological heritage, participating in research and conservation programs, or experiencing local culture will enhance the appeal of geological tourist destinations, allowing tourists to have deeper experiences and prolong their stay.

4. CONCLUSION

In recent times, the tourism industry in Vietnam has developed rapidly. It is expected to continue expanding strongly as international tourists come to explore the diversity of the country's natural and cultural heritage. The growth of the tourism sector brings many opportunities for local economic development but also poses challenges for heritage conservation. To ensure that tourism development, including geotourism, occurs sustainably, management based on the principles of sustainable development is necessary. Therefore, studying the experiences of countries in the region regarding geotourism development is very important. The lessons learned from these countries will provide insights for Vietnam in implementing appropriate policies and strategies for geotourism development. However, when applying these lessons, it is important to consider the specific characteristics of Vietnam to ensure that the policies and approaches proposed are suitable for the country's specific conditions and achieve the highest development effectiveness.

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THE IMPACT OF WORKPLACE WELL-BEING ON EMPLOYEE PERFORMANCE: A CASE STUDY OF VIETNAMESE AUTOMOBILE MANUFACTURING COMPANIES

Nguyen Thi Thanh Binh[a]*; Nguyen Thi Hoai Nga[b]

[a]Nguyen Thi Thanh Binh, Hanoi University of Mining and Geology, Hanoi, Vietnam

[b]Nguyen Thi Hoai Nga, Innovations for Sustainable and Responsible Mining (ISRM) Research Group, Hanoi University of Mining and Geology, Hanoi, Vietnam.

**Corresponding author: binhntt.quynhon@gmail.com*

Abstract: *Well-being is a criterion describing a person's position and physical, mental, and spiritual balance in work and life. Studies on Work-Life Conflict reduce the quality of labor's work. Otherwise, Work-Life Balance or a happy workplace positively impacts employee productivity. To determine the relationship between Well-Being and Flourishing, the author used the PLS-SEM technique to assess the reliability of interrelationships among the factors. The analytical model includes nine factors, comprising (1) three independent factors of Family, Work, and Education; (2) five dependent factors: Happiness and Life Satisfaction, Physical and Mental Health, Meaning and Purpose, Character and Virtue, and Close Social Relationships; and a mediating factor - Well-Being. The study results suggest that welfare policies can be used to attract and retain talent, improve employee morale, and promote loyalty among a group of employees at some automotive companies.*

Keywords: *Well-being, welfare policies, relationship well-being, and flourishing.*

1. INTRODUCTION

Well-being is essential to high-achieving organizations' success, productivity, and performance (Andrew Deutscher, 2023). Research in psychology and human resource management demonstrates a correlation between employees' well-being and productivity. In psychology, well-being has been defined as the combination of feeling good and functioning well, the experience of positive emotions such as happiness and contentment as well as the development of one's potential, having some control over one's life, having a sense of purpose, and experiencing positive relationships, according to (Huppert FA, 2009) cited by (Kai Ruggeri et al., 2020). In the human resource management field, Xinggui Zhang et al., 2020 cited (Pecci, 2004; Van de Voorde, 2009) found that scholars have examined the effect of human resource management practices (HRMPs) on Economic Well-being (EWB) to find a balance between organizational performance and EWB. Well-being, therefore, refers to a person's state (labor) of wellness, happiness, health, and contentment in life and work.

Diener, E. had a perspective involving people's cognitive and affective evaluations that progress has been made in understanding the components of SWB: the importance of adaptation and goals to feelings of well-being, the temperament underpinnings of SWB, and the cultural influences on well-being (Diener, E., 2000). On the one hand, (Martin Seligman, 2018) theorized that PERMA (Positive Emotion, Engagement, Relationships, Meaning, and

Accomplishment) are the elements of well-being. To clarify the impact of well-being, (Tyler J. Vander Weele, 2017) summarized the factors that create flourishing.

Several studies demonstrate that well-being and labor productivity have a positive relationship (Minh, 2024; Mahnaz Nazneen & Daniel Sgroi, 2023; Army Isham et al., 2021; Anh, 2020; Keya Sengupta, 2017). According to the International Labour Organization (ILO), well-being has a substantial impact on productivity, especially on health; policies and programs aimed at increasing the well-being of the population, either directly or indirectly, will have a positive impact on productivity performance (Andrew Sharpe & Shahrzad Mobasher Fard). Some studies found that happier workers were 12% more productive than their unhappy counterparts (Van, 2021; Bellet, Clément S. et al., 2024).

In Vietnam, research on work-life balance or happiness indicates that people seek fulfillment in their lives, including stability and wealth in finance, environmental well-being, strong family relationships, and personal satisfaction (Van, 2021). Moreover, (Sirgy & Lee, 2018) demonstrated the importance of work-life balance as the negative impact of conflict in relationship to work quality cited by (Quyen et al., 2022). According to (Hung, 2023), businesses are willing to raise salaries and offer substantial bonuses to experienced, skilled, and creative managers; however, it is difficult to attract highly qualified workers. On the one hand, Well-being-focused companies attract more talented and dedicated employees.

This study aims to find the relationship between employee well-being and flourishing factors by surveying and analyzing partial least squares structural equation modeling (PLS-SEM). The research explored employees' inner thoughts about well-being by surveying 216 individuals working at several automotive manufacturing companies that have difficulty attracting highly qualified workers. Survey data were used to analyze PLS-SEM with 38 variables and nine factors, including three independent, five dependent, and one mediating factor.

2. LITERATURE REVIEW

2.1. The relationship between family, work, education, and well-being

Research has highlighted the influence of education on well-being and the effects of work and family on employee well-being. According to (Francesca Giambona1 et al., 2022, 300), the positive impact of education on well-being is well recognized in terms of economic benefits and opportunities in many domains linked to higher skills and awareness. (Medina-Garrido et al., 2017) stated that organizational efforts to improve employee well-being (EWB) by developing work-family policies may help solve this problem. Work-family policies include work practices aimed at balancing work, family as noted by (López-Ibor et al., 2010), and personal demands, cited by (Medina-Garrido et al., 2017). (Deniz Yucel & Deniz Yucel, 2019, 378) also support this view, drawing on stress process theory (Pearlin et al. 1981, 2005) to understand the actor and partner effects of work-family conflict on three health and well-being outcomes: life satisfaction, mental health, and self-reported physical health.

Based on experimental studies, the study proposes the following hypotheses:

- *H1: Family has a significant positive to Well-being*
- *H2: Work has a significant positive to Well-being*
- *H3: Education has a significant positive to Well-being*

2.2. The relationship between well-being and other factors

Well-being is the human state and impacts factors that influence prosperity; thus, in enterprises, well-being is a bond between members of the organization and commitment to personal discipline. The studies (Beyza ERKOÇ & Fethi GÜNGÖR, 2020; Patrick Lombardo et al., 2018) demonstrated when these factors of well-being include or affect life satisfaction, physical and mental health, meaning and purpose, character and virtue, and close social relationships. According to (Víctor-Raúl López-Ruiz et al., 2021; Ortiz & Roser), well-being impacts national flourishing. Huppert FA defined Well-being as the combination of feeling good and functioning well; the experience of positive emotions such as happiness and contentment as well as the development of one's potential, having some control over one's life, having a sense of purpose, and experiencing positive relationships, cited by (Kai Ruggeri et al., 2020). Based on experimental studies, the study proposes the following hypotheses:

- *H4: Well-being has a significant positive to Life Satisfaction*
- *H5: Well-being has a significant positive to Physical and Mental Health*
- *H6: Well-being has a significant positive to Meaning and Purpose*
- *H7: Well-being has a significant positive to Character and Virtue*
- *H8: Well-being has a significant positive to Close Social Relationships*

3. RESEARCH MODEL

The theoretical and empirical research above has supported building the research model about factors affecting well-being and factors that are impacted by well-being. To study the factors impacting employees' well-being, the authors adopted the questionnaire content from studies measuring the job satisfaction index as referenced in (Knowledge and Management Institute, 2022; Huy, 2022; Tyler J. Vander Weele, 2017) with the research model in Figure 1.

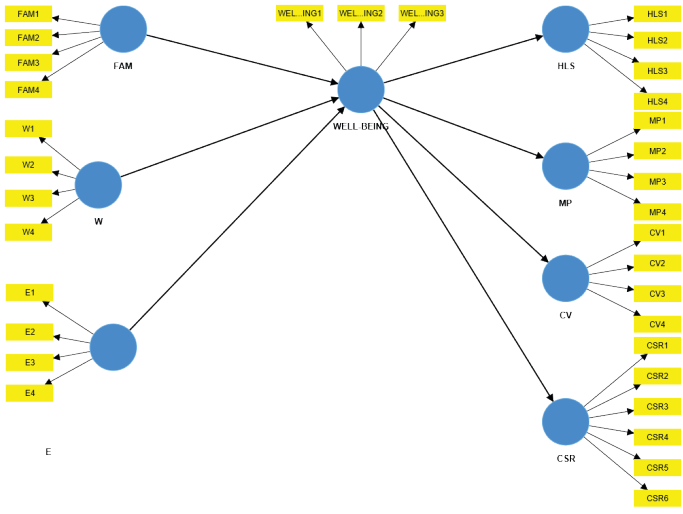


Fig 1. Research model

The survey method measures workplace happiness among many employee levels at the automobile industry enterprises in the Southeast region. The questionnaire is designed as The Likert 5 Scale measures all variables in the model. In addition, to determine the minimum sample size (n), the authors used the formula (Hair, 2006). The model has nine scales and 38 observed variables; the minimum sample size is 190. The authors collected 216 data from online surveys of employees at all company levels working in the automobile industry to observe.

4. RESULT

4.1. Descriptive statistics of the sample

The statistical data shows the similarity and diversity of the data, which can be used for statistical tests (Calder et al., 1981) cited by (Quyen, 2022). The descriptive statistics of the sample were measured by central tendency and frequency. To measure central tendency, authors used a single value with a median and mean to represent the middle of the data set. From SPSS 21 data statistics report, the MEAN ranges from 5.523 to 8.167, and the MEDIAN ranges from 5.0 to 9.0. To summarize individual data from survey participants by counting how often the individual variables within the dataset occur, such as age, gender, education, years of experience, position in the organization, and marital status, the authors use the table below.

Table 1: Summarizing individual data from survey participants

No	Individual variable	Quantity	Frequency
I	**GENDER**	**216**	
I.1	Male	127	59%
I.2	Female	89	41%
II	**AGE DISTRIBUTION**	**216**	
II.1	Between the ages of 20 and 30	45	21%
II.2	Between the ages of 31 and 41	136	63%
II.3	Individuals above 40	36	17%
III.	**MARITAL STATUS**	**216**	
III.1	Single	17	8%
III.2	Married	199	92%
IV.	**EDUCATION LEVEL**	**216**	
IV.1	Postgraduate	9	4%
IV.2	Bachelor's degree	70	32%
IV.3	High school diploma	137	63%
V.	**POSITION**	**216**	
V.1	Staff	104	48%
V.2	Team leader	54	25%
V.3	Department head	41	19%
V.4	Senior Manager & Director	17	8%
VI.	**WORK EXPERIENCE**	**216**	
VI.1	0 to 3 years	37	17%
VI.2	3 years to 10 years	58	27%
VI.3	10 years to 15 years	71	33%
VI.4	Over 15 years	50	23%

4.2. Validity and Reliability of the measures

According to (Hair et al. (2016), there are five steps to analyzing the resulting model using the PLS-SEM technique. The first step is Indicator reliability, the second is Reliability, the third is Convergent Validity, the fourth is Discriminant Validity, and the last is Model Fit.

To ensure the quality of the scale, the authors conduct a quality of the Outer Loading. According to Hair et al. (2016), a scale is considered acceptable when the Outer Loading is greater than or equal to 0.7.

After testing the measure scales, the variables FAM1, FAM4, HLS1, PMH4, and PMH5 do not satisfy the outer loading criteria. To protect the indicator reliability of the Cronbach alpha, the low correction items variables must be removed.

To test the composite reliability (CR) (Henseler & Sarstedt, 2013; Hair et al.,2016; Bagozzi & Yi (1988) Composite Reliability(Hair, 2006) coefficient select priorities Cronbach Alpha and Composite Reliability. The CR and Cronbach Alpha are good and must be greater than or equal to 0.7. After removing the low correction items variables, the scale ensures reliability for quantitative analysis.

To test the Convergent Validity, authors based on the average variance index extracting Average Variance Extracted (AVE). According to (Hock & Ringle, 2010), a scale achieves convergent validity if the AVE is greater than or equal to 0.5. Results of regression estimation

4.3. Model and hypotheses testing

The summary result of regression estimation for Well-being shows that it is most influenced by the W (Work) factor and E (Education). In contrast, the Family factor, which is the negative variable, was predicted to have a significant impact on well-being and, in fact, has the lowest impact. It is shown that the working conditions at the company are pretty good. Employees do not misuse their time working from home; additionally, they are not under financial pressure, suggesting that the salary is relatively stable.

Table 2. Total effects, t values, confidence intervals

	Path Coefficients	Standard errors	T values	P values	Conclusion
E -> WELL-BEING	0.377	0.06	5.686	0	Approval
FAM -> WELL-BEING	0.119	0.052	5.313	0	Approval
W -> WELL-BEING	0.411	0.07	7.915	0	Approval
WELL-BEING -> CSR	0.817	0.074	10.2	0	Approval
WELL-BEING -> CV	0.768	0.091	8.548	0	Approval
WELL-BEING -> HLS	0.815	0.078	12.287	0	Approval
WELL-BEING -> MP	0.791	0.076	11.777	0	Approval
WELL-BEING -> PMH	0.057	0.086	0.795	0.427	Reject

Variables FAM, W, and E impact Well-being in the same direction, with statistical significance (P.Value <0.05). Well-being has a similar direct impact on CSR, CV, HLS, and MP (positive regression coefficient), with a statistical significance of (P.Value <0.05). In summary, hypotheses H1, H2, H3, H4, H6, H7, H8 are appropriate, while hypothesis H5 is not appropriate.

Regarding the impact of well-being on the factors that contribute to individual work productivity, it shows that well-being significantly affects CSR (Close Social Relationships), HLS (Life satisfaction), MP (Meaning and Purpose), and CV (Character and Virtue). On the other hand, PMH (Physical and Mental Health) was predicted to be most affected by Well-being, an outcome that was found to be independent of Well-being.

The study determined three main elements affecting well-being: work significantly impacts personal well-being in the workplace, while family has the least. Comparing the current linear structure model with other complex models shows that family and education have a positive relationship with the W factor. In addition, the influence of well-being on the factors contributing to individual work productivity. Well-being significantly affects CSR (Close Social Relationships) by 25.15%, HLS (Life satisfaction) by 25.09%, MP (Meaning and Purpose) by 24.35%, and CV (Character and Virtue) by 23.65%. PMH (Physical and Mental Health), which was predicted to be most affected by Well-being, appears to be almost independent of Well-being, with an impact of only 1.75%.

5. DISCUSSION

The result study shows that employee well-being is related to factors such as education, Work, Education, Life satisfaction, Meaning and Purpose, Character and Virtue, and Close Social Relationships. Based on the evidence provided, to improve employees' well-being, enterprises focus on life satisfaction, meaning and purpose, and character and virtue by improving:

(i) Employee motivation,

(ii) Working environment

(iii) Improving the knowledge base on individual employees' abilities,

(iv) Help employees balance work and family life by establishing rules for not bringing work home or using it entirely at the moment to optimize performance.

Furthermore, well-being positively impacts Close Social Relationships, Life Satisfaction, Meaning and Purpose, Character and Virtue, and Physical and Mental Health. Thus, to maintain employee performance, it is necessary to improve employee well-being at the enterprise. To effectively communicate well-being practices at businesses, the authors propose applying digital marketing to internal marketing activities as follows:

1. Orienting digital marketing applications to develop internal marketing

2. Develop internal communication channels on a digital marketing platform focusing on factors affecting the happy workload index.

3. Impact the happy workload index by using digital marketing to spread a positive message

4. Investing time in social network interactions.

5. Viral communication activities help businesses create multidimensional interactions between the organization and its employees and between its members.

6. CONCLUSION AND LIMITATION

The study aims to expand the theoretical framework and provide evidence in empirical results about the importance of the Well-being effect indirectly related to employee performance by surveying 05 automobile manufacturing sector enterprises in the Southeast region of Vietnam. The findings emphasize the Significant role of well-being and the relationship between work, education, and employee well-being. The study also provides several profound research insights into the interwoven relationships of factors through a linear structural analysis model. Based on the above findings, businesses are encouraged to focus on human resource activities and utilize Internal Marketing integrated with Digital Marketing to promote well-being practices within their organizations (Binh et al., 2023).

The research has certain limitations. The findings focus on the impact of well-being on employees' inner thoughts and perspectives. In addition, the survey sample data only focused on the automobile manufacturing industry in the Southeast. In the future, more businesses in different regions need to be surveyed, and results across regions need to be compared to enhance the uniqueness of the results.

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THE EXPERIENCE IN THE DEVELOPMENT OF THE ONE VILLAGE ONE PRODUCT PROGRAM IN SOME COUNTRIES IN THE WORLD AND LESSONS FOR VIETNAM

Pham Ngoc Tuan[a*]

[a]*Hanoi university of Mining and Geology, Hanoi, Vietnam*

**Corresponding author: Phamngoctuan@humg.edu.vn*

Abstract: *The One Village One Product (OVOP) program is a local economic development initiative that originated in Japan and was initially developed by the residents of Oita Prefecture in 1961 (Igusa, n.d.-a). However, it wasn't until 1979 that the program truly was expanded and developed under the leadership of Oita Prefecture's Governor, Morihiko Hiramatsu. As a means of promoting local economies, OVOP has focused on creating and promoting unique products from each village, thereby improving income and the quality of life for communities. The program has been widely adopted in many countries around the world, including Thailand, Indonesia, the Philippines, Senegal, and others. OVOP has demonstrated its strength and potential through notable successes and variations in these countries. However, the program still faces several limitations, such as excessive dependence on local resources, limited market access, and sustainability issues. Drawing from the experiences of implementing OVOP in different countries, this paper will provide valuable lessons for Vietnam. These lessons, from successes to failures and challenges, will help Vietnam shape and optimize its One Commune One Product (OCOP) program, which is currently being widely implemented nationwide.*

Keywords: *OCOP, OVOP, OTOP, One Commune One Product, One Village One Product, One Tambon One Product.*

1. INTRODUCTION

The OVOP program was officially launched in Oita Prefecture, Japan, in 1979 under the leadership of Governor Morihiko Hiramatsu. The program aimed to stimulate the development of the local agricultural economy by selecting a high-value product and encouraging communities to produce it as a business (Chiện & Đức, 2024). After a period of development, the program quickly became an effective and sustainable model for socio-economic development. Since the success of OVOP in Japan, many countries around the world have implemented similar programs, notably OTOP (One Tambon One Product) in Thailand, OTOP in the Philippines, OVOP in Indonesia, and similar programs in other countries. With the success of the OVOP program in Japan, the Japan International Cooperation Agency (JICA) supported the OVOP movement in Africa to change community perceptions, reduce poverty by improving income, and promote economic growth in rural areas (Kurokawa & Tembo, 2008). Some countries have taken initiatives to facilitate the development of small and medium-sized enterprises to improve income for local communities and these businesses (Sega & Kanichiro, 2018). In reality, each country, with its unique cultural, economic, and social conditions, has adapted and applied this model in its own way, creating a rich and diverse set of experiences. The OCOP program was initiated by the Vietnamese Government under Decision 490/QĐ-TTg,

dated May 7, 2018. This decision approved the OCOP program for the 2018-2020 period, with the aim of promoting rural economic development by enhancing internal strengths and increasing value (Government Portal, 2018). Vietnam is one of the last countries to implement it compared to other countries that have adopted Japan's OVOP program. After implementation, Vietnam's OCOP program has achieved some notable results. However, several limitations remain after the program's deployment, such as low product quality, poor market access, and a lack of genuine creativity and autonomy among residents. Drawing from the lessons learned from Japan's OVOP program and its variations applied in various countries worldwide, this paper extracts valuable lessons for Vietnam in developing the OCOP program in the future.

2. EXPERIENCE IN DEVELOPING THE ONE VILLAGE ONE PRODUCT (OVOP) PROGRAM IN SEVERAL COUNTRIES IN THE WORLD

2.1. Japan's OVOP Program

The OVOP movement was initiated in 1961 by the residents of Oyama Town, Oita Prefecture, Japan (Igusa,. 2006). Oyama was the poorest mountainous town in Oita Prefecture. Due to the pressures of poverty, young people were outmigrated to the cities in search of higher incomes. The mountainous terrain of Oyama was not suitable for rice cultivation; hence, it was no longer a sustainable livelihood for the local community (Wahlin & Natsuda, 2008). The local community decided not to follow the Japanese government's rural development policy, which was based on rice cultivation. The mayor of Oyama and the chairman of the Oyama Agricultural Cooperative decided to develop the community by leveraging social capital and local knowledge to address the issue of population decline. The "Plum and Chestnut Strategy" was implemented by the town leaders, aiming to shift local agricultural production from rice to more promising crops such as plums and chestnuts (Anh, 2013a). The OVOP movement was later promoted by Governor Morihiko Hiramatsu across the entire Oita Prefecture in 1979. The program is based on three main pillars: First, local yet global, residents are expected to create products that are globally accepted, showcasing the richness, diversity, and uniqueness of cultural identities and natural resources. This uniqueness adds value to the local products, goods, and services, fostering sustainable local economic development. Second, self-reliance and creativity: local people play a crucial role in selecting products to develop, mobilizing funds, and taking responsibility for their decisions. This enhances individual autonomy and creativity. Third, human resource development: it is necessary to reassess the quality of local human resources and have a plan to preserve, enhance skills, and improve professional competence, aiming to create unique products in areas such as agriculture, tourism, and commerce.

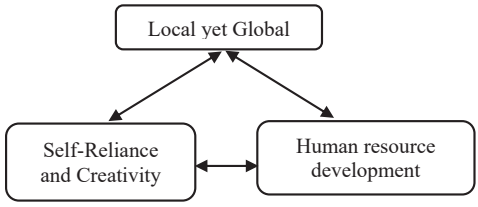


Fig 1. Three principles of OVOP (Igusa,. 2006)

The idea of international perspectives in OVOP policies was implemented in 1983 through a project called "Local yet Global," where young activists visited overseas to study and creatively develop new ideas. This activity marked the evolution of OVOP policies from the original OVOP to the expanded OVOP and then to the new OVOP.

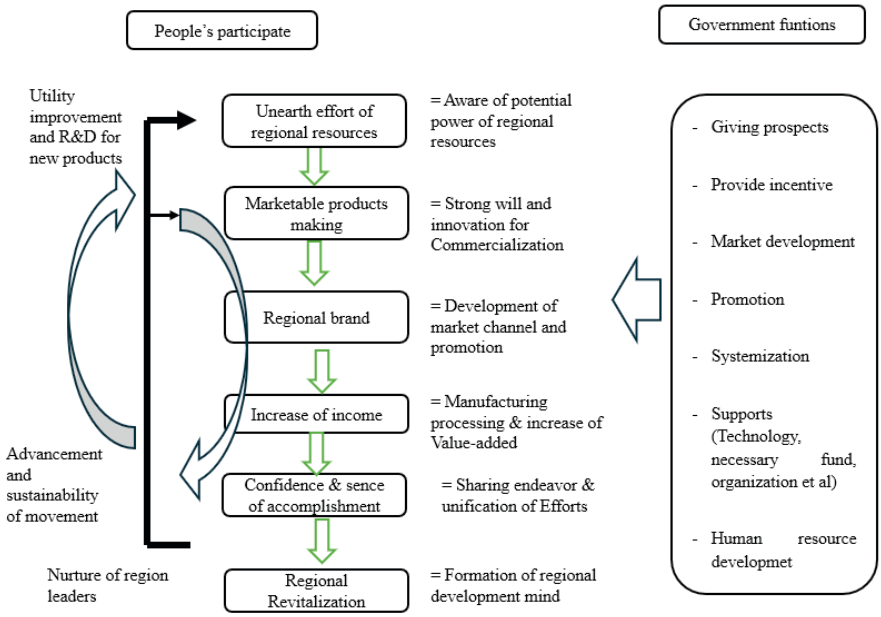


Fig 2. Japan's OVOP Movement (Widiyanti, 2018)

The first activity of the original OVOP was to promote OVOP as semi-industrial industries (industries producing quality products at affordable prices), primarily focusing on agricultural processing. The initial approach of the original OVOP was to establish an OVOP fund with contributions from the private sector to reward individuals or groups with outstanding achievements in the movement and promote sales at "antenna" stores in urban areas. The expanded OVOP approach focused on establishing vocational schools to educate, pass on skills, research, and produce specific products or goods. The new OVOP approach involved spreading information about OVOP activities internationally, with an approach that moved from urban to rural areas.

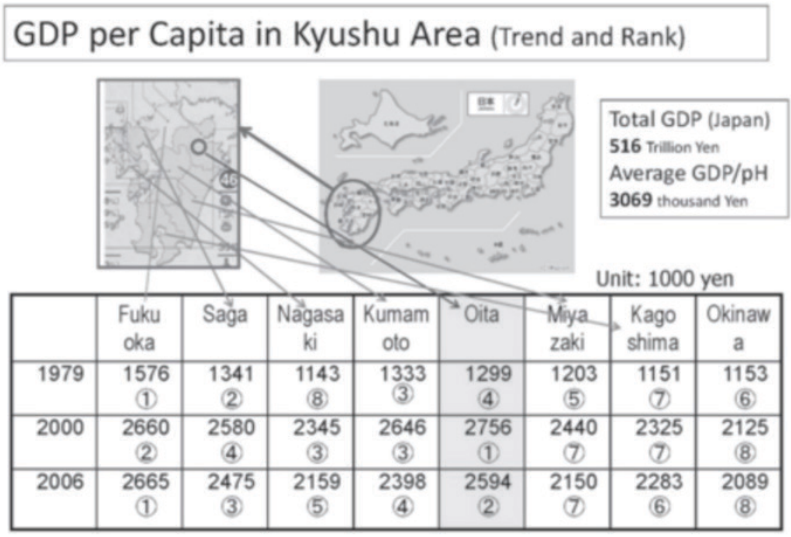
In summary, The original OVOP approach can be understood as OVOP entities providing agricultural products with traditional, unique characteristics of their local areas and ensuring that these products are marketed to urban consumers. The expanded OVOP approach added training and human resource development at Toyonokun School and introduced the OVOP movement internationally. Meanwhile, the new OVOP approach involved attracting urban residents to rural stores and lodgings, thus improving the local economy.

❖ *Achievements of the OVOP Program in Japan*

Japan's OVOP program has become a notable model for sustainable development in rural communities, marking a breakthrough in local economic development and the preservation and promotion of regional culture. The main achievements of Japan's OVOP program include:

- Local Economic Development: The OVOP program has played a crucial role in promoting economic development in rural areas of Japan by focusing on the exploitation and enhancement of the value of local specialty products. Through the development and

commercialization of these products, many rural communities have been able to generate stable sources of income while reducing the migration of residents to larger urban centers.



	Fukuoka	Saga	Nagasaki	Kumamoto	Oita	Miyazaki	Kagoshima	Okinawa
1979	1576 ①	1341 ②	1143 ⑧	1333 ③	1299 ④	1203 ⑤	1151 ⑦	1153 ⑥
2000	2660 ②	2580 ④	2345 ③	2646 ③	2756 ①	2440 ⑦	2325 ⑦	2125 ⑧
2006	2665 ①	2475 ③	2159 ⑤	2398 ④	2594 ②	2150 ⑦	2283 ⑥	2089 ⑧

Fig 3. Economic progress of Oita Prefecture (Igusa,. 2006)

It can be found that after implementing the OVOP program, the economy of Oita Prefecture has made remarkable progress, consistently ranking among the top in terms of per capita income compared to other prefectures in the region. The OVOP program has been successful in increasing local income by encouraging autonomy and creativity within the community. Local incomes have continuously risen by selecting products with competitive advantages, improving processing methods, and enhancing product value. Additionally, the distribution channels have been extensively developed, allowing OVOP products to quickly reach national consumers. Particularly, in the context of declining agricultural returns in Japan, Oyama town in Hita City, Oita Prefecture, stands out with a significant increase in agricultural benefits, thanks to the production of high-value-added products (nongsanviet, 2021).

- Building Local Brands: OVOP not only creates distinctive products that embody the unique cultural, traditional, and customary features of the local people but also contributes to the promotion and branding of local products. Many OVOP products from Japan have become famous in both domestic and international markets, such as Oita Kabosu from Oita Prefecture and sake from Akita Prefecture.

- Enhancing Local Pride and Community Spirit: OVOP has sparked strong local pride and community spirit in rural areas. Participation in the program not only brings economic benefits but also fosters social cohesion, enhances local autonomy, and strengthens community responsibility.

- Promoting Tourism Development: Many OVOP products have become key attractions for tourism, helping rural areas in Japan become appealing destinations. OVOP-related events, such as festivals and local fairs, have also attracted large numbers

of tourists, contributing to increased tourism revenue and promoting local culture.

- Successful Global Expansion: The success of OVOP in Japan has inspired many other countries, leading to the development of similar programs such as OTOP in Thailand, OVOP in Indonesia, OTOP Philippines, and OCOP in Vietnam. These programs have yielded positive results in local economic development across various countries.

❖ *Limitations of the OVOP Program in Japan*

Although c OVOP program has achieved significant success, it also has some limitations, especially when considering the applicability of this model to other countries in the world. These limitations reflect both the inherent challenges of the program and the differences in economic, social, and cultural contexts between Japan and other countries.

- Cultural and Social Context Differences: OVOP was developed based on Japan's strong community culture, where villages have tight-knit bonds and high levels of self-reliance. However, social and cultural structures may differ significantly in many other countries, particularly developing nations. In these countries, rural communities may lack the social cohesion necessary for cooperation and product development, which can reduce the effectiveness of implementing the OVOP model.

- Infrastructure and Economic Condition Differences: Japan has developed infrastructure, including transportation, logistics, and communication systems, which facilitates the easy market access of OVOP products both domestically and internationally. In contrast, many other countries, especially in Africa, Southeast Asia, and South Asia, face significant infrastructure limitations that reduce the ability of local products to access larger markets. The lack of connectivity and transportation means has diminished the effectiveness of OVOP implementation, making it challenging for the model to achieve the same success as in Japan.

- Challenges in Brand Building: One of OVOP's strengths in Japan is the ability to build and develop brands for local products, thanks to support from the government and business organizations. However, in many other countries, the brand building faces challenges due to a lack of experience, resources, and understanding of international markets. The marketing and branding capabilities of OVOP products in these countries are often limited, leading to difficulties in competing with international products.

- Management and Human Resource Training Challenges: The success of OVOP in Japan is largely due to strong government support, including encouraging policies and financial assistance. In many other countries, a lack of government support or inconsistent rural development policies can hinder the effective implementation of the OVOP program. This is especially evident in countries where political and administrative structures do not support the independent and creative development of local communities.

2.2. The OTOP program in Thailand

After the 1997 Asian financial crisis, Thailand was significantly affected due to its dependence on foreign capital. Endogenous development became the priority solution for community development, empowering people to transform local resources (Anh, 2013a). The OTOP movement was initiated by the Royal Thai Government in 2000 under the leadership of Prime Minister Thaksin Shinawatra. A tambon is an administrative unit that is similar to a district. OTOP is

Thailand's version of OVOP. After several visits and learning experiences from Japan's OVOP movement, Thailand adapted OVOP to fit its specific conditions and circumstances (Widiyanti, 2018). The biggest difference between the OTOP movement and the OVOP is the top-down approach directed by the central government, while OVOP employs a bottom-up approach with support from local governments. The OTOP program in Thailand is based on three principles: Global thinking, local action, Independence and creativity, and Human resource development. It is developed and implemented by the Thai central government with detailed product development and marketing guidelines. OTOP is directed and coordinated top-down by the National OTOP Administrative Committee (NOAC), with subcommittees including officials from central, provincial, and district levels. OTOP activities are based on an annual project master plan, funded directly from the national budget. The budget for OTOP is managed by NOAC and used to finance the annual project master plan activities. The Thai government has promoted OTOP by allocating 100 million Baht to 45,000 villages to encourage the independent development of nationally advantageous products. To improve product design quality, the Thai government established the Thailand Creative Design Center in 2005 to manage industry experts, product design, and improvements (Widiyanti, 2018). Unlike Japan's OVOP, OTOP initiatives must be registered with local OTOP subcommittees. Thus, OTOP deviates from the basic characteristics of the OVOP movement, making OTOP not truly an endogenous development policy for the region. In Thailand, the success of the model's expansion depends on whether the central government can maintain its capacity. Meanwhile, local governments cannot replace the central government in providing financial resources due to management capacity limitations.

The Thai government has organized human resource development training for local people. However, the training only provides basic vocational knowledge rather than in-depth knowledge about local products. Therefore, these classes are not very useful for local projects. This issue arises from the fact that local people do not participate in selecting instructors. The training is organized by the government, which does not fully understand local people. As a result, locals struggle to identify comparative advantages for their products and achieve autonomy.

Financial management and budgeting for local businesses in the OTOP program come from special government subsidies. The Thai OTOP program has actively connected its program with agricultural bank credits and agricultural cooperative credits in addition to government subsidies. Local people cannot fully appreciate the importance of their involvement in infrastructure development and lack the motivation to maximize their business potential to eliminate poverty and reduce poverty. Government subsidies do not contribute to the long-term empowerment of the rural poor; instead, they make them more dependent on external financial support and less responsible for the projects they initiate in the OTOP program.

Promotion: The OTOP movement is designed for mass production rather than regional development with a government-directed marketing strategy, such as the export-oriented brand marketing strategy and the OTOP Product Champion Program in 2003, connecting buyers with OTOP. In the Product Champion Program, producers with 3-star ratings or above can access the "OTOP City" program to receive 5-star subsidies (Natsuda, Igusa, Wiboonpongse,

& Thoburn, 2012). Those certified with 4 or 5 stars have an opportunity to receive higher public subsidies or be sent abroad for training.

❖ *Achievements of the OTOP Program in Thailand*

Since its official implementation in 2000, OTOP has not only contributed to the development of rural economies but also helped improve the quality of life for residents, preserve local culture, and enhance the international market presence of Thai products. Some notable achievements of the OTOP program include:

- OTOP's Contribution to Local Economic Development: One of the most significant successes of OTOP is its ability to drive economic development in rural areas of Thailand. By developing and commercializing local products, OTOP has helped thousands of communities increase their income and improve their economic conditions. The sales of OTOP products show a sharp rise from 2009 to 2019, with a slight decline during the COVID-19 pandemic, with estimates indicating an approximately eightfold increase.

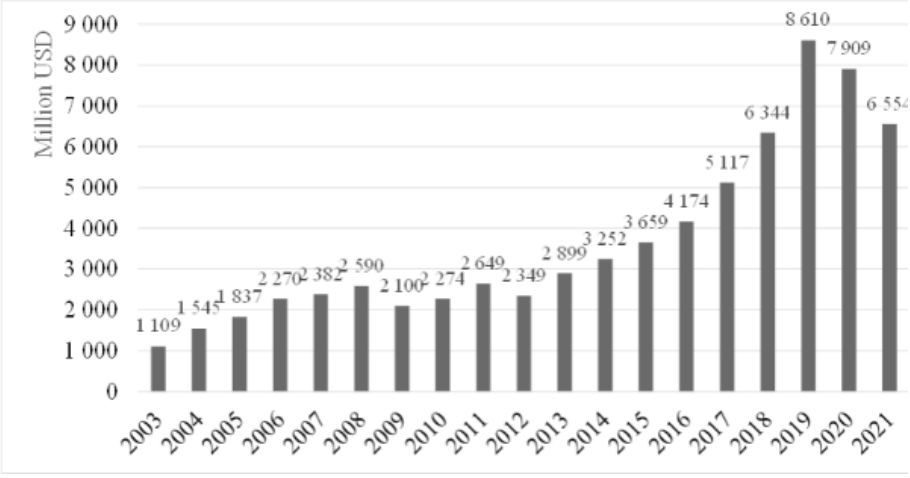


Fig 4. Annual sales of OTOP in Thailand (OTOP in Thailand., 2024)

- Job Creation and Poverty Reduction: Thailand initiated the OTOP program to achieve sustainable poverty reduction. The development of OTOP has contributed to creating millions of jobs for Thai rural farmers, reducing unemployment rates and improving quality of life. By developing local products, people have gained additional income, improved their living conditions, and escaped poverty.

- Local Tourism Development: The development of OTOP products has also boosted the tourism industry in Thailand. OTOP products, especially handicrafts and food items, have become popular tourist souvenirs. OTOP villages have become attractive tourist destinations, drawing domestic and international visitors, contributing to increased tourism revenue, and raising awareness of local culture. Thailand has established many tourist spots by sharing knowledge and stimulating the production of OTOP products, handicrafts, herbal products, etc. Thailand has created 3,273 tours to visit OTOP villages across 111

locations throughout the country (Poverty Reduction Approaches in Thailand, n.d.).

- Preservation and Promotion of Local Culture: The OTOP program has played a crucial role in preserving and promoting traditional cultural values in Thailand. OTOP has helped maintain and develop traditional crafts, cultural festivals, and distinctive customs by encouraging communities to develop products with strong local cultural identities. This generates income and helps preserve cultural identity and maintain ethnic traditions in the context of globalization.

❖ *Limitations of the OTOP Program in Thailand*

The OTOP movement in Thailand, initiated by the Thai government, has raised several questions among researchers about whether the OTOP project can achieve sustainable, comprehensive, and long-term community development. Theoretically, for community development to be sustainable, it should be initiated and led by the community itself, as the community will have the best understanding of its comparative advantages and strengths rather than relying on government initiatives. Some limitations of the OTOP program in Thailand include:

- Challenges in International Market Access: OTOP products from Thailand face difficulties in accessing international markets. This is due to several factors. Firstly, the products lack uniqueness and do not embody local identity. As a result, many products from different regions are very similar. Secondly, product quality has not been a focus, as OTOP products are produced in bulk and do not receive the attention given to handcrafted items (Claymone & Jaiborisudhi, n.d.).

- Government-Driven Production: The OTOP project, being a government initiative, differs from Japan's OVOP project, which was community-driven. Most OTOP projects are produced under government directives, leading to a culture of imitation rather than innovation. This creates barriers to community autonomy and creativity. It can be said that government policies have inadvertently stifled local creativity, making communities rely heavily on government policies and directives.

- Focus on Production Over Human Resource Development: The Thai government has emphasized increasing production to meet market demands instead of facilitating community development through knowledge exchange programs and site visits to learn from other projects. Therefore, the OTOP project tends to focus more on creating products than developing human resources.

2.3. OVOP program in Indonesia

After the Asian Financial Crisis 1997, small and medium-sized enterprises (SMEs) in Indonesia became a lifeline for their economy. This is proof of the importance of SMEs for economic development and poverty reduction (Widiyanti, 2018). In 2007, Indonesia officially introduced the OVOP model to alleviate poverty by improving locally competitive products. The target for OVOP development in Indonesia is small and medium-sized enterprises in local areas. This initiative has become an official government project. The short-term goal of this policy is to promote locally innovative and competitively advantageous products. In the long term, the aim is to increase the number of SMEs to reduce unemployment and eradicate poverty. The OVOP movement in Indonesia adopts a top-down approach. This approach means that all ideas are implemented from the government level and then carried out in local areas. This contrasts with Japan's OVOP model, which takes a bottom-up approach. In Japan, all ideas are proposed by local communities, with the government

only providing support in certain areas while the local communities retain full autonomy. This has led to a dependency of residents on the government. When issues arise, the only thing they rely on is government action.

❖ *Achievements of the OVOP Program in Indonesia*

Despite being implemented later than in other countries, the OVOP program in Indonesia has achieved significant milestones in promoting rural economic development, preserving local culture, and improving the quality of life for its people. Some notable achievements of the OVOP program in Indonesia include:

- Promoting and Developing Local Economy: OVOP in Indonesia has become a crucial driver in rural economic development, significantly improving the living conditions of millions. Since its implementation, OVOP has focused on harnessing the potential of local products, thereby creating numerous new economic opportunities for rural communities. As of 2022, over 2,500 local products, including traditional foods, handicrafts, and regional specialties, have been developed and commercialized through the OVOP program. These products are strongly consumed domestically and exported to international markets, contributing significantly to the economic growth of villages. OVOP products in Indonesia have diversified the local economy, reducing reliance on traditional agriculture and creating new industries. The development of OVOP products has also boosted domestic trade, with many markets, fairs, and trade events organized to introduce and promote local products to consumers.

- Creating Jobs and Reducing Poverty: The OVOP program in Indonesia has contributed to creating thousands of jobs for rural residents, particularly women and youth. Developing local products has generated new economic opportunities, reduced unemployment, and improved living standards. The program has also helped reduce poverty rates in many rural areas, as people can earn extra income from producing and selling OVOP products.

- Preserving and Promoting Local Culture: The program has supported preserving thousands of traditional crafts and the development of products rich in regional cultural identity. This development helps maintain traditional crafts and creates unique products with export value.

❖ *Limitations of the OVOP Program in Indonesia*

The OVOP program in Indonesia differs significantly from its Japanese counterpart. This discrepancy arises from Indonesia's being a developing country with different economic, social, and political conditions compared to Japan, a developed country. After implementing OVOP, Indonesia faced several challenges. While the three core principles of OVOP Japan were retained, the Indonesian version of OVOP underwent significant changes from the original model.

- Self-Reliance and Creativity: Since the government initiated the project from the start, local communities have lacked the awareness that the project belongs to everyone. Most local people feel disconnected from the project because they were not involved in project activities, including initiatives, discussions, and debates about their community issues. Consequently, residents are not actively cooperating with or managing the project (Claymone & Jaiborisudhi, n.d.). There has been a replication of ideas from neighboring communities to fulfill tasks proposed by the government. This does not align with the principle of local community development,

which relies on encouraging local self-reliance and creativity.

- Human Resource Development: The quality of human resources is the biggest challenge faced by Indonesia's OVOP project. The disparity in human resource quality between developing countries such as Thailand, Indonesia, the Philippines, and developed countries is substantial. Educational levels in remote communities are relatively low, which hinders their participation in community development and the OVOP movement proposed by the government.

- Global Thinking, Local Action: The OVOP project in Indonesia has encountered issues related to government policies due to the top-down approach. Government policies directed from the top to local authorities require them to advance the project to meet set goals rapidly. As a result, local communities are pressured to complete the products created by the project as quickly as possible, leading to issues with product quality. This has hindered the ability of local products to reach the global market. The primary cause of this issue is the lack of adequate coordination and support from the central government to local authorities.

3. LESSONS FOR VIETNAM IN DEVELOPING THE ONE COMMUNE ONE PRODUCT (OCOP) PROGRAM

3.1. The OCOP Program in Vietnam

In Vietnam, rural community development has always been a priority for the Party and the State. To narrow the gap between rural and urban areas while ensuring sustainable rural development, the Vietnamese Government has issued and implemented several programs, such as the New Rural Development Program 2010 under Decision No. 800/QD-TTg by the Prime Minister, approving the National Target Program for New Rural Development for the period 2010-2020; Decision No. 1600/QD-TTg on the National Target Program for New Rural Development for the period 2016-2020; Decision No. 490/QD-TTg approving the One Commune One Product (OCOP) Program for the period 2018-2020; and Decision No. 90/QD-TTg on January 18, 2022, approving the National Target Program for Sustainable Poverty Reduction for the period 2021-2025.

❖ *Viewpoint of the OCOP Program in Vietnam*

The OCOP Program is a rural economic development initiative focused on leveraging local resources and enhancing value. It is a solution and task within implementing the National Target Program for New Rural Development. The core of the OCOP Program is the development of agricultural products, non-agricultural products, and services with local advantages according to value chains carried out by private economic entities (enterprises, production households) and collective economies.

The state plays a facilitative role by issuing legal frameworks and policies for implementation, planning commodity and service production areas, managing and supervising product quality standards, and supporting activities such as training, technical guidance, scientific and technological application, brand building, trade promotion, product advertising, and credit (Ocop, 2021).

❖ *Objectives of the OCOP Program*

To develop forms of production and business organization (prioritizing cooperatives and small and medium enterprises) to produce traditional products and services with advantages that meet standards and have competitive potential in domestic and international markets, contributing to rural economic development.

To contribute to restructuring the economy, increasing income, improving living standards for the people, and effectively implementing the "Economy and Production Organization" criteria in the National Criteria for New Rural Communes.

Through production development in rural areas, to contribute to the industrialization and modernization of agriculture and rural areas; promote rational rural labor restructuring (limiting migration to cities), protect the environment, and preserve the valuable traditional values of rural Vietnam.

❖ *Achievements of the OCOP Program in Vietnam*

The OCOP Program in Vietnam officially commenced in 2018 and has achieved significant milestones in promoting rural economic development, reducing poverty, and preserving local cultural heritage. Some notable achievements of the program include:

- Scale of Development: There are four criteria for measuring the scale of the OCOP Program, including the number of provinces participating, the number of provinces evaluating and ranking OCOP products, the number of entities supplying OCOP products, and the number of OCOP products. All these criteria have shown rapid growth over the years.

Table 1. The results of the Implementation of the OCOP Program in Vietnam for the Period 2019-2021 (Vũ Thị Hồng Phượng, 2022)

Indicators \ Year	2019	2020	2021	14/02/2022
Number of participating provinces	20	63	63	63
Number of provinces conducting evaluation and ranking of OCOP products	20	59	62	62
Number of participating entities	619	1573	-	2944
Several OCOP products, including:	946	2965	5320	5401
- Number of 3-star products	638	1821	-	3381
- Number of 4-star products	292	1073	-	1934
- Number of 5-star products	16	72	-	86

After one year of officially implementing the OCOP program, only 20 out of 63 provinces and cities participated, with a modest number of OCOP entities—619 units with 946 products, and only 16 products achieved a 5-star rating. With the promotion and guidance from various levels of government, by February 14, 2022, all 63 provinces and cities had joined the OCOP program. The number of provinces and cities conducting evaluations and rankings reached 62, with 2,944 OCOP entities participating. The number of OCOP products reached 5,401, including 3,381 products with a 3-star rating, 1,934 products with a 4-star rating, and 86 products with a 5-star rating. Thus, over three years, OCOP products and entities increased by 5.7 times and 4.8 times, respectively.

- Product Structure: Overall, products with a 3-star rating accounted for the most

significant proportion throughout the study period, followed by 4-star products, and products with a 5-star rating had the smallest share (1.6% as of February 14, 2022). By the end of the initial phase of the OCOP program (2018-2020), 20 products from 11 provinces/ cities were ranked five stars at the national level. These products include Red Lotus Bowl Set, Swallow Lotus Bowl Set, Dragon and Phoenix Bowl Set, Swallow Lotus Teapot Set, Green Tea Box 100g, Black Tea 100g, Bich Thao Pure Coffee Powder, Tai Hoan Cassava Noodles, Hao Dat Shrimp Tea, Viet Cuong Cassava Noodles, Akoya Pearl Set, SouthSea Pearl Set, Tahiti Pearl Set, Le Gia Shrimp Paste, Darmark Roasted Coffee, Ladoactiso Tube, Ladoactiso Tea Nhat Diep Nguyen Huong, Thien Vuong Specialty Rice, Tien Nu Royal Rice, ST24 Rice (Vũ Thị Hồng Phượng, 2022).

- Product Quality: OCOP products have increased in value after being recognized, helping entities expand production scale and revenue. Currently, 60.7% of OCOP entities with ratings of 3 stars or higher have an average annual revenue increase of 17.6%, and the selling price of products has increased by an average of 12.2% after receiving OCOP recognition. The OCOP program has created a strong entrepreneurial movement, forming many clean agricultural production areas and high-tech agriculture linked with product value chains. Not only urban area products but also those from rural, mountainous, and remote regions have shown high quality, attractive designs, and many unique products. OCOP products combine local resources and traditional culture with scientific and technological applications, creating diverse and traceable products. As a result, OCOP products are increasingly trusted and highly regarded by customers for their quality, gradually establishing value and reputation in the market.

❖ *Limitations of the OCOP Program in Vietnam*

Despite notable achievements, the OCOP program in Vietnam still faces several limitations that need to be addressed:

- Lack of Proactivity from Local Authorities and OCOP Entities: Some localities have not been proactive and have been slow in implementing the OCOP program. In some areas, the program is implemented superficially or in pursuit of achievements without focusing on quality. The selection and development of OCOP products have not been based on the unique characteristics and advantages of the localities; many products focus only on appearance and packaging, neglecting quality. Many localities have not focused enough on developing potential and unique products to enhance quality but rather on selecting available products for the OCOP program.

- Inadequate Trade Promotion Efforts: Trade promotion efforts have been fragmented and lack coherence, failing to highlight the outstanding and unique features of OCOP products. This has failed to create a strong and innovative brand image in the eyes of buyers.

- Complex Administrative Procedures: The procedures for certifying products are complex and obstructive. Developing a complete OCOP product dossier involves considerable time and costs, including obtaining certifications like production facility certifications, product test reports, barcodes, traceability labels, packaging, and intellectual property registrations. This complexity creates reluctance among OCOP entities.

3.2. Lessons for Vietnam

a. Leverage the Potential and Endogenous Strengths of Each Locality to Create Unique, Competitive, and High-Value Products

Harnessing each locality's potential and endogenous strengths is a critical factor

in developing unique, competitive, and high-value products in the OVOP program. Vietnam can learn this important lesson from countries that have successfully implemented this program.

Countries such as Japan, Thailand, and Indonesia demonstrate the importance of utilizing local resources and specialties to develop unique products. For instance, Japan's OVOP program has maximized the use of local resources, such as traditional techniques, natural materials, and regional specialties to create unique products. For example, the city of Oita has developed products from shiitake mushrooms and local specialty foods. This approach increases the economic value of the products and enriches the local cultural identity.

Thailand's OTOP movement is a prime example of developing products based on culture and tradition. Thai handicrafts, textiles, and traditional foods bring economic value and contribute to preserving and promoting the cultural identity of different regions ("Paetongtarn Plans Big Push for Otop Products as Thai Soft Power," 2023). Vietnam can draw lessons by focusing on developing and enhancing traditional village products such as Bat Trang ceramics, Van Phuc silk, and Dong Ho paintings while also integrating cultural and tourism elements to boost value and competitiveness in the market.

b. Flexible Financial Support Policies for Easy Access by OCOP Entities

In developing countries (third-world nations), local small-scale businesses often struggle to raise initial investment capital. To secure this funding, they may borrow from relatives, pawn possessions, or take high-interest loans (Shinawatra, 2005). High interest rates can trap them in a cycle of debt and poverty. To address this issue, microfinance should be used to ensure that base-level finance creates assets rather than debt. When people with low incomes are provided with risk-sharing opportunities, they are likely to work harder than receiving money through grants. Vietnam must establish microfinance programs that offer favorable loans and subsidies to help local OCOP entities (including small and micro enterprises, cooperatives, production groups, and individual businesses) access capital more efficiently. Funding sources for OCOP entities could include Social Policy Bank, Agricultural and Rural Development Bank, Cooperative Development Support Fund, local budgets, non-governmental and international organizations, and private financial institutions.

c. Developing Production Based on Competitive Advantages and Unique Local Products

Many developing countries have adopted mass production models and growth strategies based on exports (Shinawatra, 2005). This strategy is appropriate during stages of development when nations cannot rely on low-value craft or assembly industries. However, to achieve sustainable development and compete effectively in global trade, creating value through high-quality and unique local products is a necessary direction (Anh, 2013b). This approach is relatively suitable for Vietnam, with significant potential to develop local specialty products through the OCOP program.

Vietnam has achieved considerable success with mass production and export strategies, particularly in the textile, electronics, and seafood industries. These sectors have significantly contributed to economic growth and create jobs for millions of workers. However, this model also comes with challenges such as fierce competition,

low profit margins, and the risk of dependence on export markets. To address these challenges, Vietnam has implemented the OCOP program to develop high-quality and economically valuable local specialty products. Products like Thai Nguyen tea, ST25 rice, and various artisanal crafts have been developed and brought to market with support from the government and financial organizations. This program enhances product value, preserves cultural heritage, and promotes sustainable development.

d. Strong Oversight from All Levels of Government is Needed

According to the endogenous development theory, government involvement can sometimes undermine community efforts. However, central government involvement is necessary in some developing countries, including Vietnam, where there is a lack of basic infrastructure for citizen initiative and community-based movements. This requires investment in budget, human resources, time, and other resources for project management. The key is a proper balance between grassroots movements and top-down government involvement. To avoid complications, implementing policies should be assigned to a single ministry. For example, in Thailand, the central government established the Central OTOP Committee and the OTOP Coordination Office, with participation from the Ministries of Industry, Agriculture and Cooperatives, Interior, and Commerce. Close coordination within the government is essential to mobilize local human and material resources effectively. Finally, it is crucial to emphasize local leadership in future development vision, awareness of local conditions, and proactive decision-making.

4. CONCLUSION

Vietnam is one of the latest countries to implement the OVOP globally. Being a latecomer, Vietnam has an opportunity to learn from the successes and failures of pioneering countries. Through studying the OVOP model in Japan and its variations in Thailand and Indonesia, this paper provides important suggestions for Vietnam in developing the OCOP program sustainably. Specifically, it is essential to encourage creativity and autonomy in local communities, leverage endogenous strengths, preserve and promote local cultural identities, and contribute to poverty alleviation. These lessons not only help optimize the effectiveness of the program but also promote comprehensive and sustainable development for local communities in Vietnam.

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RESEARCH ON BARRIERS TO APPLYING CIRCULAR ECONOMY IN THE CONSTRUCTION MATERIALS INDUSTRY OF DONG NAI PROVINCE

Le Anh Chien[a] Nguyen Thi Kim Ngan[b*]

[a]Quyet Thang Construction Joint Stock Company, Hanoi, Vietnam

[b]Hanoi University of Mining and Geology, Hanoi, Vietnam

**Corresponding author: nguyenthimngan@humg.edu.vn*

Abstract: *The Construction Materials industry has great potential for implementing a circular economy model through reusing and circulating waste streams (industry waste products). However, besides those advantages, many barriers exist to applying a circular economy in the Construction Materials industry. The article discusses issues related to circular economy in the construction materials industry in Dong Nai province, especially the barriers to applying circular economy in this field.*

Keywords: *Circular economy, Construction materials, Barrier.*

1. INTRODUCTION

Major environmental issues Vietnam is experiencing include degrading environmental quality, loss of forests and biodiversity, depletion and inefficient use of mineral resources, and rising and urgent contamination of the air, water, and waste. There are several repercussions from the economy's long-term "browning" development. The economic growth rate is relatively high but not sustainable because it primarily depends on capital investments, high-intensity resource exploitation, outmoded technology, and slow innovation. As a result, there is a significant depletion of water resources, environmental degradation, and mineral resources, and the energy use intensity is higher than the global average.

Therefore, a circular economy is becoming inevitable in increasingly degraded and depleted resources, a polluted environment, and fierce climate change. According to the Ellen MacArthur Foundation (2015), the circular economy is an industrial system that is restored and regenerated by design based on three main principles: preserving and enhancing natural capital, optimizing resource productivity resources, and promoting system efficiency (Andrew Morl, Delivering the circular economy: a toolkit for restraining, Foundation Ellen MacArthur, 2015); According to the European Commission, "a circular economy is one in which the value of products, materials and resources is maintained in the economy for as long as possible, and minimal waste is created." " [European Commission, Communication from the commission to the European parliament, the council, the European economic and social committee and the committee of regions: on a monitoring framework for the circular economy, Strasbourg, European Commission, 2018]. The linear economic model only concerns resource exploitation, production, and disposal after consumption, creating huge waste. In contrast, the circular economic model focuses on management and recycling. Generate resources in a closed loop to avoid creating waste. Utilizing resources is done in many forms, such as

repairing, reusing, and recycling, and instead of owning materials, it is aimed at sharing or renting. The Law on Environmental Protection 2020 defines "Circular economy as an economic model in which design, production, consumption and service activities aim to reduce the exploitation of raw materials and materials, prolonging the product life cycle." it limits waste generated and minimizes negative impacts on the environment"

It can be seen that developing a circular economy has excellent benefits in many aspects, such as:

For the country, developing a circular economy demonstrates the country's responsibility to solve global challenges caused by environmental pollution and climate change while improving the capacity and competitiveness of the economy. International. Circular economy helps take advantage of used raw materials instead of consuming processing costs, Minimize exploitation of natural resources, maximize resource value, and Minimize waste and emissions into the environment.

For society, the circular economy helps reduce social costs in management, environmental protection, and response to climate change, creating new markets and job opportunities and improving people's health.

For businesses, the circular economy reduces the risk of product overproduction and resource scarcity crises, creates motivation for investment and technological innovation, reduces production costs, and increases the supply chain…

Dong Nai is a province with abundant mineral resources for building materials. The province of Dong Nai currently has forty-five mines. Of these, the People's Committee of the province of Dong Nai issues 41 permits, while the Ministry of Natural Resources and Environment issues four of them. Planned mineral extraction mines are present in most areas to support construction projects. The largest, with ten mines and a planned area of around 394 hectares, is located in the Phuoc Tan concentrated mining clusters in Tam Phuoc, Bien Hoa City, and Thien Tan, Vinh Cuu district. About 41/137 million m3 of stone, or roughly 30% of the reserves, had been mined by the end of 2022 in the province of Dong Nai. Dong Nai province's construction materials industry has grown significantly in recent years thanks to the advantage of raw materials. This development has helped the province's construction materials industry go from nothing to something, from small to large, from old-fashioned crafts to modernity, and with results to be proud of. Despite its successes, the Dong Nai province's construction materials sector still has numerous challenges, particularly regarding uneven technological levels. Numerous firms still use old-fashioned methods and equipment, which consumes much energy. Poor quality, labor productivity, supply, raw materials, high production costs, inefficient business and production processes, and low competitiveness. Consequently, Dong Nai Province has directed the growth of the building materials sector toward a circular economy in recent years; nevertheless, there are still numerous obstacles to the use of circular economy in the building materials business. However, this is a very new field, and because it requires compliance

with very complex and strict processes, applying circular economy is very difficult to implement and often has many significant barriers, so it is very practical to conduct a study to find obstacles to the application of circular economy in the Dong Nai Province's construction materials sector.

2. CURRENT STATUS OF CIRCULAR ECONOMY APPLICATION IN DONG NAI PROVINCE'S MATERIALS INDUSTRY

Dong Nai is a province that has abundant mineral resources, including over 2,946 billion m3 of construction stone and 543 million m3 of clay, which are commonly utilized as building materials. Products from exploiting mineral resources provide Ho Chi Minh City and the Southwestern provinces and meet the province's demand for construction stone. Because of this, the province of Dong Nai's construction materials industry currently concentrates primarily on producing and exploiting construction stone. It anticipates that there will be a greater need for construction stone in the upcoming years to support the construction of important projects, particularly the Long Thanh airport and the resettlement projects in this region. The results of mineral exploitation operations over 12 years (2011–2023) indicate that the output of construction stone, brick and tile clay, construction sand, and leveling materials is more than 18 million m3. Revenue from these activities reached over 3,000 billion VND, and approximately 450 billion VND was paid in environmental protection fees and natural resources tax.

In recent years, the province of Dong Nai has worked hard to invest in the growth of the construction materials business, taking it from nothing to having, from tiny to huge, from old-fashioned crafts to modern accomplishments deserving of pride. The following companies are currently involved in the construction materials industry in the province of Dong Nai (Table 1).

Table 1. Dong Nai province's building materials industry statistics regarding enterprises to December 31, 2022.

NUMERICAL ORDER	*Material*	*Quantity*	*The number of productions*	*The number of consumption*
1	Cement	05	1.300.000 (tons)	1.359.000 (tons)
2	Ceramic tiles	16	100.000.000 m^2	390.000 m^2
3	Sanitary Ware	01	1.000.000 productions	30.000 productions
4	Construction Glass	01	40.000.000 m^2	35.000.000 m^2
5	Fired Brick	110	423.973.000 pellets	395.113.000 pellets
6	Brick	10	11.300.000 pellets	11.352.000 pellets
7	Roofing sheet	03	4.000.000 m^2	3.200.000 m^2
8	Construction stone	05	2.000.000 m^3	1.800.000 m^3

Source: Department of Construction of Dong Nai Province - 2022

According to the table above, in 2022, the construction materials industry of Dong Nai province will have two types of materials: Porcelain Tiles and Sanitary Ware, which will have a huge decrease in consumption, mainly because these are materials. The material is mainly used to complete construction projects. However, in 2022, the completion of construction projects in Dong Nai province will almost stand still due to the consequences of the COVID-19 epidemic, which will not end until mid-2022. In 2022, factories producing tiles and sanitary wares will still produce on-site during the quarantine period to stabilize jobs for workers and hope to be able to sell their products in early 2023.

To convert the provincial economy to a circular economy, the People's Committee of Dong Nai Province has just issued an action plan for sustainable production and consumption in industry in Dong Nai province. The period 2022-2030 aims to promote the management, rational exploitation, and effective and sustainable use of fuel and material resources in production and consumption and encourage the development and use of natural resources and fuel materials. Renewable, reusable, and recyclable; promote production and consumption based on innovation, creativity, development, and dissemination of sustainable production and consumption models; promote domestic production and consumption, create stable jobs and green jobs, and improve people's quality of life promoting sustainable lifestyles, aiming to develop a circular economy in Vietnam. Implementing the above action plan, the construction materials industry of Dong Nai province has also oriented toward applying a circular economy; however, the application of a circular economy still has many limitations, typically in some types of materials. Specifically, as follows:

Fired bricks: Some enterprises in the province of Dong Nai still produce handmade bricks, which pollute the environment. Due to the antiquated equipment, clay resources are wasted, and more emissions contribute to pollution. Pollution of the environment. Most firms do not use circular economy manufacturing methods. It has not been discussed how burnt brick waste may be reused, particularly emissions, which are mostly released into the environment since it is thought that with one exhaust gas at the outlet, which is the residual heat exhaust gas in the cooling section of the tunnel furnace, is first drawn in by the exhaust fan of the furnace in a long tunnel kiln. There is very little SO2 present. It's possible that the exhaust gas after drying doesn't require desulfurization to be environmentally safe. The main reason is due to the perception of business owners that if it does not affect the environment enough, they are not aware that emissions are also a source of input materials and think that applying the circular economy requires complex organizational work that is not suitable for the scale of small businesses. Through research, the authors propose that all emissions during the brick firing process can be completely returned to brick drying by using double-firing technology. During the firing process in the tunnel kiln, heat emissions at the height of firing or the excess heat exhaust gas are absorbed by the kiln's exhaust fan and then transferred to the drying chamber to dry the brick blanks by the principle of circular economy.

Construction stone: Even though Dong Nai province has made great efforts to manage businesses involved in the extraction and production of construction stone, there have recently been issues with the following: granting mines to individuals and units is not for the right people, does not have enough capacity, the procedures for granting mines are still difficult and harassing, the time limit for granting mines is too short, and most mining uses antiquated technology, which pollutes

the environment. Waste, the environment, and resource depletion. Because blasting and quarrying still don't match modern norms, some businesses have excessive noise, vibration, and dust concentrations. Many businesses that mine and process building stone now produce dust, which pollutes the environment. According to Research 5, these businesses only apply a very small amount of the circular economy. Businesses only invest tens of billions of VND in new mechanical systems to handle and convert dusty stone into sandstone using new technologies. This is Binh Thach Cooperative's investment. The stone transformation will reduce dust pollution and increase product value by converting the quantity of dusty stone into sandstone or concrete sand. The main reason is that these businesses lack investment capital and technology conversion towards a circular economy. Furthermore, changing technology towards a circular economy must comply with current regulatory procedures. Businesses think it is time-consuming and complicated.

Roofing sheet, ceramics, construction sand: In 2020, 10,095,000 m2 of roofing sheets, 33,000,000 m2 of roofing tiles, 1,600,000 sanitary ceramic items, and 25 million m3 of construction sand will be needed. To address the demands for cleaner production (low-level circular economy), businesses in the province of Dong Nai have made an effort to invest in product production technology. However, some small businesses still struggle to access circular economy production because of a lack of connectivity.

3. RESEARCH, EXCHANGE

There are still many obstacles and difficulties in using circular economy principles in the Dong Nai province's building materials sector. The writers' investigation yielded five primary obstacles, including Internal business procedures, technical level, Building material market, and State policy establishments. Table 3.1 offers a detailed analysis of financial economics and obstacles. (Augusto Bianchini, "Overcoming the Main Barriers of Circular Economy Implementation through a New Visualization Tool for Circular Business Models," MDPI, p. www.mdpi.com, 2019.)

Table 2. Barriers and challenges in implementing circular economy principles in the province of Dong Nai's building materials sector

Numerical order	Barriers	Challenges
1	**Internal processes of the business**	- Organization and application of circular economy - Necessary conditions to apply circular economy - Necessary motivation to apply circular economy - Business structure for circular economy application - Corporate culture in applying circular economy
2	**Technology**	- It is necessary to have techniques, technology, and expertise suitable for a circular economy - Apply specific engineering technologies for redesigning circular products (from discarded or recycled substances) to ensure quality in the production system - Procedures for applying new technology in the circular economy - Methods of disseminating and replicating circular economy technology

Numerical order	Barriers	Challenges
3	**Construction materials market**	- Compatibility between business partner models -Support for raw material supply network - Geographic dispersion in the material supply chain - Conflicts of interest between businesses in the supply chain - Customer Acceptance - Business habits - Rigidity in customer behavior
4	**Institutions; State regulations and regulations**	- Deviation in incentives for businesses applying circular economy - Regulations and regulations do not encourage circular economy - The complexity of policies in the circular economy - Poor institutional framework
5	**Economics and Finance**	- There must be a large and long-term investment - Financial planning and financial management are difficult due to the complexity of implementing a circular economy

Identifying barriers to applying circular economy in the construction materials industry in Dong Nai province shows:Implementing the Circular Economy calls for methodical planning to create economic growth initiatives that benefit companies, the community, and the environment, particularly in the construction materials sector. To achieve the goals of reducing the consumption of fuel and raw materials, extending the life cycles of products, and minimizing the amount of waste released into the environment, priority measures like recycling, reuse and remanufacturing, and industrial symbiosis are applied. These measures help agents foster creativity and innovation.

Businesses that manufacture, process, and distribute building materials industry goods and other pertinent parties at the municipal and federal levels must participate in the construction materials industry's implementation of a circular economy. As a result, the authors offer several solutions for businesses in the construction materials industry in Dong Nai province to minimize the impact of barriers and challenges in applying circular economy as follows:

i) Raise awareness of the advantages of implementing the circular economy in the manufacturing and commercial operations of companies in the building materials sector

ii) Develop an organizational culture conducive to the implementation of the circular economy

iii) Encourage the use of circular economy strategies, such as the technology for producing burnt bricks using multiple firings and turning dusty stone into sandstone for use in buildings. iv) Promote funding for technology transfer lines that convert the manufacture of fired bricks into unburned bricks.

4. CONCLUSION

Dong Nai province's development of a circular economy in the building materials sector is necessary to raise the growth standard and the level of competition in the mining sector. On the other hand, it also ensures sustainable production and

consumption, addresses social issues, creates jobs, and reduces poverty. It serves as a core driver for implementing policies on the effective allocation, management, and use of resources and environmental protection for the sustainable development of Đồng Nai province's economy in the context of natural disasters, epidemics, and climate change.

To implement circular economy principles in the Dong Nai province's building materials sector, a lengthy process, including the commitment and efforts of the entire system to progressively develop and run production and consuming activities, is needed. In the economy, inventiveness and originality are founded on utilizing the technological advancements and the fruits of the 4.0 industrial revolution to create a circular value-added chain.

As a result, the authors suggest that the People's Committee of Dong Nai province implement decentralization to improve the efficiency of management of business operations and production in the construction materials industry at the provincial level, particularly in certain production fields that contribute to environmental pollution. To prevent the manufacture of unlawful building materials, the Department of Natural Resources and Environment and the Department of Building must work together to improve oversight and inspection. Unlawfully using antiquated technology, violating the law, polluting the environment, and squandering resources. For firms to invest in manufacturing and employ environmentally friendly building materials using the circular economy, incentive policies and capital assistance must be reviewed and edited.

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THE CIRCULATORY ECONOMY DEVELOPMENT IN SOME COUNTRIES AROUND THE WORLD AND EXPERIENCE-BASED LESSONS FOR VIETNAM

Le Thi Thu Hong[a*], Luu Thi Thu Ha[a], Pham Minh Hai[a]

[a]Hanoi University of Mining and Geology, Ha Noi, Vietnam

[*]Corresponding author: lethithuhong@humg.edu.vn

Abstract: *Humanity is facing the risk of severe shortages of food, clean water, and energy... due to extreme weather phenomena such as storms, floods, droughts, and tsunamis. According to the Intergovernmental Panel on Climate Change (IPCC), when sea levels rise by 100cm, Vietnam's lost land area will reach 40,000 km2, which accounts for 12.1% of the total existing land area. As a result, about 17.1 million people will be displaced, tremendously affecting the hunger eradication efforts and poverty reduction goals as well as Vietnam's sustainable development goals (IPCC,2014). Vietnam is considered one of the countries most vulnerable to this change. The main cause of today's rapid global climate change is the large amounts of CO2 emitted into the environment by humans and the excessive exploitation, production, and consumption of fossil raw materials... If countries do not have appropriate solutions or actions, the amount of waste will exceed the environment's capacity. Therefore, developing a circular economy is objectively necessary to reduce pollution, save resources, protect the environment, and effectively respond to climate change. This article focuses on clarifying the circular economy development trend of some countries, such as China, Germany, Japan, Korea, Sweden, and some ASEAN countries, and draws lessons from their experience for Vietnam.*

Keywords: *Circular economy, experience-based lessons.*

1. INTRODUCTION

The world faces increasing challenges such as resource depletion, energy shortages, environmental pollution, and rising greenhouse gas emissions. These issues have had highly negative effects on the quality of human life. Therefore, the trend toward developing a green and sustainable global economy has become urgent and essential for every country, including Vietnam. The circular economy, based on the principle that "everything is an input for something else", has been adopted by many countries as a model to achieve sustainable development goals and promote the economy's long-term growth.

The circular economy, according to the Law on Environmental Protection 2020 (National Assembly of Vietnam, 2020), is defined as an economic model in which design, production, consumption, and service activities aim to reduce the

exploitation of raw materials, extend the product life cycle, limit the generation of waste and minimize negative impacts on the environment. Compared to the traditionally linear economic model (with the process being exploitation, production, consumption, and finally disposal into the environment), the circular economy brings many benefits to the country, society, and businesses because this new model promotes the effective use of resources by utilizing recycled materials, thus improving the efficiency of production and business while minimizing environmental pollution and improving people's quality of life. Therefore, the circular economy is currently becoming a popular trend worldwide, with the leading countries applying this economic model being China, Germany, Japan, Korea, Sweden, and some ASEAN countries.

2. THE CIRCULAR ECONOMY DEVELOPMENT TRENDS OF SOME COUNTRIES IN THE WORLD

2.1. China

The circular economy is a concept introduced in China to enhance sustainable production and consumption. This economic model has been around since the 90s of the 20th century. However, it only received proper attention at the start of the 21st century - the era of modern science, technology, and artificial intelligence. The development of the circular economy in China can be divided into four stages (ERIA, 2014)

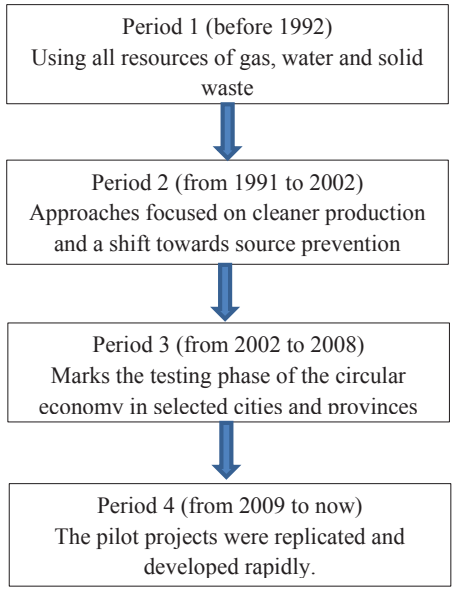


Fig 1. The model of China's the circular economy

In the last 15 years, China has issued many legal documents to serve as a legal corridor for the activities of the circular economy, most notably the Law on Promoting Circular Economy issued in 2009 and the Circular Economy Development Strategy and Action Plan in 2013 by the State Council Communications. The action plan focuses on the policies of 3 economic sectors: industry, agriculture, and services. The main objective is to increase the primary resources, including three energy sources and nine mineral resources, increase the ratio of industrial grain and wood output to 15%, and expand the industrial production of the circular economy to 1.8 trillion yuan, as stated in the Twelfth Five-Year Plan (from 2011-2015) (The State Council of the People's Republic of China, 2013). In addition to manufacturing tools, China's Ministry of Ecology and Environment introduced the

"Zero waste city" pilot program in 2019 to develop an urban model that minimizes waste generation throughout the product life cycle. Standardized indicators and comprehensive management will be developed for the pilot programs in the next two years.

China implements the circular economy model through mandatory measures and law enforcement, with detailed regulations and specific indicators. China combines top-down and bottom-up approaches while leveraging domestic knowledge and international experience (*Journal of Industrial Ecology,* 2017). The application of the circular economy is executed on a large scale. This model is considered the key factor in transforming the economy and society and is included in the socio-economic development strategy (*Journal of Industrial Ecology,* 2015). The circular economy clearly defines the industrial sector's objective and the action plan's implementation. China takes advantage of the concentration of production facilities in eco-industrial parks to create industrial symbiosis and simplify the cooperation process between companies and industries, improving the efficient usage of resources. In conclusion, the circular economy efficiently uses the pilot programs at local levels to test new approaches and identify the best practices before widespread implementation at the city level for companies and other areas.

2.2. Germany

The German Sustainable Consumption Production Framework considers optimizing resource efficiency in the production process a vital part of the circular economy model. In 1996, Germany enacted the Closed Cycle Management Law to improve resource efficiency by managing and preventing waste generation, marking a significant step forward in building a circular economy. Furthermore, the National Action Program for Sustainability, which aimed to be achieved by 2020, included specific solutions for sectors such as textiles, paper recycling, and parking management, all of which contribute to the sustainable development of the circular economy in Germany.

Germany is currently implementing the program "Resource Efficiency II" to promote the sustainable use and conservation of natural resources. Some key targets include doubling 2020's efficiency of raw material use compared to that of 1994, increasing the recycling rate of urban solid waste to over 65% from 2020 onward, raising the electronic waste collection rate to 65% starting from 2019, and boosting the collection, recycling, and high-quality recovery rate of organic waste by 50% by 2020 compared to 2010.

Additionally, Germany is implementing circular economy development solutions across various sectors, focusing on sustainable procurement. The Center for Responsible Procurement ensures that the environmental, economic, and social criteria applied in public procurement contribute to the advancement of the circular economy. Special attention is given to supporting small and medium-sized enterprises to foster innovation in the industrial sector. To this end, the VDI Center for Resource Efficiency (VDI ZRE) was established by the Federal Ministry for the Environment, Nature Conservation,

and Nuclear Safety in collaboration with the Association of German Engineers (VDI). The center provides solutions and expertise to help businesses improve resource efficiency in production, working toward a sustainable circular economy model.

Germany also has strategic solutions for plastic waste management. Under the Extended Producer Responsibility (EPR) system, manufacturers collect and process plastic waste generated during production. Simultaneously, a refund program was implemented for beverage packaging made from glass, metal, and PET plastic bottles to encourage reuse and recycling.

From an international cooperation perspective, Germany is working with the UK to develop a network of industrial symbiosis between countries. Through this, resources and services are shared and optimized to promote eco-innovation in alignment with circular economy principles.

Overall, Germany has adopted a systematic approach to improving resource efficiency by applying a product life cycle strategy spanning resource extraction to production, consumption, and recycling. Supporting small and medium-sized enterprises (SMEs) in improving resource efficiency is critical, as these businesses often face challenges in terms of resources and capacity to implement sustainable production processes. At the same time, establishing public procurement criteria that incorporate environmental factors and economic and social considerations plays an important role in promoting the circular economy in Germany.

2.3. Japan

Despite its limited resources but strong production capacity, Japan has been a pioneer in sustainable production and consumption, focusing on efficient material management as an economic necessity (Government of Japan, 2017). The concept of a “Good Cyclical Material Society” forms the foundation of Japan’s circular economy strategy, aiming to reduce natural resource consumption and minimize environmental impact (IGES, 2017).

Since 2003, Japan has implemented a basic plan to build a cyclical material society based on the Basic Law. In June 2018, the Fourth Basic Plan was adopted, further strengthening the legal framework with laws such as the Law on Promoting the Efficient Use of Resources and the Extended Producer Responsibility law. Additionally, Japan has enforced the Green Purchasing Promotion Law since 2001, which mandates the procurement of environmentally friendly products and encourages eco-labeling to help consumers identify sustainable products (Ministry of the Environment, Japan, 2017).

In response to new challenges such as food waste and plastic waste, Japan has enacted the food resource recycling laws since 2001 (Ministry of the Environment, Japan, 2017) and introduced the Plastic Recycling Strategy in 2019 (Ministry of the Environment, Japan, 2017). The Fourth Basic Plan sets goals for 2025 compared to 2000: (i) doubling resource productivity, (ii) achieving an 18% recycling rate for inflows,

(iii) increasing the output utilization rate by 47%, and (iv) reducing landfill waste by 77% (Ministry of the Environment, Japan, 2017).

This plan addresses resource issues and tackles social challenges such as global instability, an aging population, and climate change. Japan also emphasizes cross-industry and cross-stakeholder cooperation, involving local governments and businesses to achieve the goals of the circular economy effectively.

2.4. Korea

Korea's Third Basic Plan for Sustainable Development (2016-2035) aims to formalize the Sustainable Development Goals (SDGs) (United Nations, 2017), with a strong focus on building a sustainable circular economy. Korea has implemented several related plans, including the Second Five-Year Plan for Green Growth, the Renewable Energy Master Plan, and the Resource Circulation Plan, to promote efficient resource use and recycling.

Korea's legal framework includes the Law on Supporting Environmental Industry and Technology and the Law on Promoting the Consumption of Green Products. The Law on Supporting Environmental Industry and Technology provides a legal basis for the research and development of environmental technology while the Law on Promoting the Consumption of Green Products encourages the use of environmentally friendly products, thereby boosting the market for green products and services.

Korea's circular economy policy focuses on green growth, renewable energy, and resource circulation. The National Green Growth Strategy (2009-2050) promotes the development of a green economy and emphasizes the transition to a circular economic model. Under this strategy, the first 5-year plan (2009-2013) created numerous jobs, increased the market share of green technology products, and expanded green industrial parks, with a strong focus on developing products with carbon labeling.

South Korea has worked to create new markets for green products and services, making significant investments in environmental research and development (R&D) and eco-innovation. International environmental regulations and standards, especially those from the EU, such as RoHS and WEEE, have become norms that Korean businesses must follow to remain competitive in the global market. Adopting circular production models not only enhances competitiveness but also meets the growing demands of environmentally conscious consumers. Korea has promoted initiatives such as green public procurement, eco-labeling, and providing reliable product information, all aimed at building a sustainable circular economy (Ministry of Environment, Republic of Korea, 2016).

2.5. Sweden

Sweden's sustainable development strategy strongly emphasizes building a circular economy, with the primary goal of improving the living environment and promoting science-based sustainable consumption. To achieve this, Sweden set specific environmental goals for 2020,

including minimizing human impact on ecosystems, protecting sensitive habitats, and managing natural resources.

In 2017, Sweden announced a new climate policy framework aimed at achieving carbon neutrality by 2045 and zero carbon emissions by mid-century. This reflects Sweden's commitment to reducing emissions and promoting circular solutions in resource management.

The National Procurement Strategy, introduced in 2016, and the Strategy for Sustainable Consumption in 2017, focus on optimizing resource use through a circular economy. These strategies encourage wise eco-consumption, promote the sharing economy, and extend waste management and product life cycles. Measures such as reduced VAT on recycled and repaired products, eco-labeling, and improved information on hazardous chemicals have been implemented to support sustainable consumption.

In addition, Sweden has targeted the plastics, food, and textile industries for circular initiatives to promote resource efficiency and waste reduction. Companies also play a key role in the circular economy through sustainability reporting, enabling them to actively contribute to environmental and social improvements.

Sweden aims to provide more sustainable products in the market by focusing on the circular economy. This creates opportunities for consumers and businesses to contribute jointly to the country's long-term sustainability goals.

2.6. ASEAN countries

Cambodia has issued a series of important decrees to promote the circular economy, including regulations on the management of municipal solid waste, electrical and electronic waste, plastic bags, wastewater systems, and water treatment. These regulations are crucial in resource management and waste minimization, contributing to the country's sustainable development (United Nations, 2017).

In Indonesia, the circular economy approach is measured by two leading indicators: (i) the number of businesses meeting minimum environmental performance standards and (ii) the number of companies applying the ISO 14001 certification. Between 2002 and 2016, the percentage of companies actively protecting the environment increased from 60% to 85%, while the number of ISO 14001 certifications grew from 1,028 in 2010 to 2,197 in 2017 (United Nations, 2017).

The Philippines is developing a National Action Program on Sustainable Consumption and Production to apply the circular economy to the national context. The Advanced Sustainable Consumption and Production Project (2015-2018) aimed to reduce greenhouse gas emissions by promoting sustainable production and consumption, developing mitigative actions, providing incentives for "green" products, and transitioning to a low-carbon economy through green procurement and specific standards. The Philippines also implements

an ecological solid waste management program with waste recovery facilities and environmental treatment systems, primarily at the local level (United Nations, 2017).

Thailand has established the SDG12 Working Group to implement sustainable development goals, including developing a circular economy. The Roadmap for Sustainable Production and Consumption for 2017-2036 includes initiatives such as education, public transport, assessment and certification of environmentally friendly goods, the Green Industry Policy, Clean Energy-Smart Cities, and green public procurement. These measures aim to enhance resource efficiency and reduce environmental impact through circular economy models (United Nations, 2017).

Malaysia's National Blueprint for Sustainable Consumption and Production (2016-2030) (Ministry of Energy, Science, Technology, Environment, and Climate Change, Malaysia, 2016) and the Sustainable Consumption and Production Pathway have been launched to promote a circular economy. The plan targets achieving 100% green public procurement by 2030, eliminating landfills by 2030, and integrating carbon reduction approaches into the national strategy (United Nations, 2017). Malaysia has identified sustainable production and consumption as a critical tool for achieving green economic growth, encouraging households, businesses, and industries, such as tourism, to adopt circular economic practices. With its goal of becoming a zero-waste nation, Singapore has integrated this philosophy into the Sustainable Singapore Blueprint. The country aims to increase the national recycling rate to 70% by 2030. Specific initiatives include an e-waste management framework based on extended producer responsibility, business reporting on packaging reduction plans, urban waste-to-energy plants, and 3R (Reduce, Reuse, Recycle) awareness programs.

3. EXPERIENCE-BASED LESSONS FOR VIETNAM

Vietnam can draw many valuable lessons from other countries to address environmental challenges and promote sustainable development.

Firstly, it is essential to leverage the circular economy as a key tool for transforming economic and social structures and developing eco-industrial parks. These parks not only help optimize resource use and minimize waste but also enhance economic competitiveness and enable more effective management of environmental issues related to industrial development.

Secondly, Vietnam should adopt a product life cycle approach to improve resource efficiency and support small and medium-sized enterprises (SMEs) in bettering resource management. This approach reduces environmental impact and fosters favorable changes in business practices.

Thirdly, applying measurement indicators for circular economic development will help Vietnam monitor and evaluate the effectiveness of environmental policies and strategies, enhance resource management capabilities, and reduce ecological impacts more effectively.

Fourthly, green growth strategies should be implemented to enhance markets and exports of green goods, develop green products and services, and promote sustainable development while creating new employment opportunities.

Fifthly, improving consumer knowledge and adopting innovative solutions in waste management will help advance sustainable consumption and waste management practices, contributing to overall environmental and sustainable development goals.

Overall, the rapid economic development in Vietnam has led to significant environmental and social challenges, including increased CO2 emissions, land degradation, water and air pollution, and severe impacts of climate change. Vietnam can learn from other countries to enhance its environmental policies, support businesses in regulatory compliance, and promote sustainable development nationally.

4. CONCLUSION

The circular economy is central to Vietnam's sustainable consumption and production strategy, providing a solid foundation for long-term sustainable development. With government support, the circular economy not only enhances the R&D capabilities of businesses but also fosters the integration of sustainable production and consumption principles into trade, imports, and exports. As urbanization rises, focusing on sustainable consumption will be crucial for managing changes in urban consumption patterns. With the active participation of all sectors of society, the circular economy promises to be a comprehensive tool for addressing challenges and seizing new opportunities in Vietnam's sustainable development journey.

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SOME POLICIES SHIFTING TOWARD THE CIRCULAR ECONOMY FOR VIETNAM

Lê Quang Minh[a*]

[a]*Thanh Dong University, Hai Duong City*

[*]*Corresponding author: leeminh86@yahoo.com*

Abstract: *The main aim of this article is to analyze the necessity of transitioning the Vietnamese economy towards a circular economy. This paper will analyze the basic concepts of linear economy and its problems, the circular economy, and the necessity of transiting the Vietnamese economy towards the circular economy. Expected result: Confirming scientifically the necessity of shifting the Vietnamese economy towards the circular economy and recommending some policies to support this transiting process.*

Keywords:

1. INTRODUCTION

The global ecological environment faces unsustainable socio-economic development and lacks attention to managing natural resources and ecosystems. Natural resources are becoming increasingly exhausted, and environmental pollution is getting worse. Many countries have changed their development strategies towards a clean and circular economy for sustainable development to resolve these challenges. Vietnam is not an exception. As a developing country, Vietnam's economy maintains its traditional linear economy, meaning that the growth is still based on broad-based development factors, slowly moving to increase in depth. Production still consumes a lot of raw materials and energy and discharges massive waste. The exploitation and utilization of natural resources are not suitable and economical enough, which leads to the fact that the environment and ecosystem of many areas are severely polluted.

According to the Vietnamese Ministry of Natural Resources and Environment, raw material costs and average disposal levels of Vietnamese enterprises are much higher than the average level of the region and the world. Besides that, the urban area in Vietnam discharges nearly 32,000 tons of household waste, while this figure in rural areas is 12,000 tons.(QDND, 2016) It is forecasted that by 2025, the amount of rubbish in Vietnam will be about 100 million tons per year, including household, industrial, and medical waste. The status of garbage untreated before being discharged into the environment has become an urgent issue in the Vietnamese government's environmental protection.

Faced with the challenges of natural resource depletion and environmental pollution, the concept of a new economy the circular economy is receiving the attention and support of many organizations and governments worldwide. This economic model tends to reuse raw materials, reduce raw material consumption, improve production efficiency, and minimize environmental impact.

This paper will analyze the basic concepts of linear economy and its problems, the circular economy, and the necessity of transiting the Vietnamese economy towards the circular economy.

2. METHOD

This paper uses an overall comprehensive approach to collecting and summarizing recent studies and reports on this topic. All the data and figures are obtained from secondary data from public organizations like the Vietnamese Ministry of Health and Natural Resource and Environment.

3. RESULTS

3.1. Linear economy and its fundamental problems

The linear economy model is an economic model that has been widely applied in the early stages of industrialization in most Western developed countries. It is also the current dominant model of developing countries. The characteristic of the linear economy concept is that waste, as a side result of the production process, is discarded directly into the environment (Figure 1). The concept is based on the principle: "take, make, consume, discard," and it assumes boundlessness and easy availability of material resources (Drljača, 2015)That is, take the resources you need, make the goods to be sold, make a profit, consume it, and discard everything you do not need including a product at the end of its lifecycle.

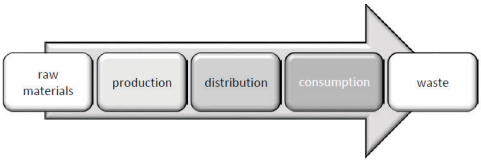


Fig 1. Phases of linear economy model

Undeniably, the linear economy is no longer a tenable model within the limits of our planet. The disadvantages of the linear economy outline the urgency for an alternative model, which can be further interpreted as opportunities for the circular economy. The main problems of a linear economy are found in the lack of solutions for the growing shortage of materials, increased pollution, increased material demand, and the growing demand for responsible products. This economic model can be classified into two types of disadvantages: supply risks and the increase of externality.

3.1.1. Supply risks

In a linear economy, there are uncertainties about material availability because our planet has a limited quantity of materials, and this availability depends on several mechanisms. Increased price fluctuations, critical materials, and the interconnection between products and processes fuel these uncertainties.

Price volatility

Since 2006, the variation in materials prices has increased significantly, raising average prices significantly. This induces problems for producers and buyers of raw materials and increases risks in the market, making investments in material supply less attractive. This can ensure a long-term increase in raw material prices.(Lee et al., 2012)

Critical materials

Some industries extensively use critical materials for their production. These are the metal industry, the computer and electronics industry, the electrical equipment industry, and the automotive and transport industry. Depending on critical materials will ensure that companies depend on fluctuations in material prices, cannot make predictions,

and are less competitive than less material-dependent competitors. (Lacy et al., 2014)

Interconnectedness

Because of the expansion in trade activities, the interconnectedness of commodities has become increasingly sharper. For example, water-scarce countries with a surplus of crude oil trade oil for food, which results in a link between these products in the market. Besides, the production of many products is dependent on water and fuels. Because of this interdependence, the scarcity of one raw material would have a widespread impact on prices and the availability of more goods. (MacArthur, 2013b), (Lee et al., 2012).

3.1.2. Increasing Material Demand

Because of the growth of the population and increases in prosperity, the number of consumers with a higher degree of material consumption will increase by three billion in 2030. Resource consumption doubled from 1980 to 2020 and will triple until 2050, when business-as-usual models are followed. (Macarthur, 2013c), (Fischer-Kowalski et al., 2011). Increase of externalities

Remaining in a linear economy will also induce negative impacts, such as the destruction of ecosystems and a decrease in product lifetime.

Degradation of ecosystems

Following the linear model of 'take-make-dispose' will create waste. The production processes will generate large streams of material that are not used but are burned or left in a garbage dump. This will eventually lead to excess unusable material mountains, overloading ecosystems. This ensures that the ecosystem is hampered in providing essential ecosystem services (such as providing food, building materials and shelter, and the processing of nutrients). (MacArthur, 2013a)

Decreasing the lifetime of products

In recent years, the life of products has been reduced grammatically. This is one of the driving forces behind the expanding material consumption in Western countries. The service life of products is still declining by the process of positive feedback: Consumers want new products more quickly and are using their "old" products for a shorter period. This decreases the need for quality products that can be used long-term, stimulating consumers to buy new products even faster. (Bakker et al., 2014)

3.2. Circular economy and practical solutions

3.2.1. What is circular economy

There are some points of view on the definition of the circular economy. Some authors have provided resource-oriented definitions and interpretations, emphasizing the need to create closed loops of material flows and diminish the consumption of original resources and their attendant harmful environmental impacts. (Sauvé et al., 2016, Preston, 2012)Similarly, a scholar claims that the circular economy "refers mainly to physical and material resource aspects of the economy it focuses on recycling, limiting and re-using the physical inputs to the economy, and using waste as a resource, leading to reducing primary resource consumption."(Zoboli et al., 2014). Another author(Morgan and Mitchell, 2015) goes further and emphasizes the importance in a circular economy of keeping resources in use for as long as possible and extracting the

maximum value from products and materials by using them for as long as possible and then recovering and reusing them.

The literature also contains several interpretations of the concept, each attempting to move beyond managing material resources and incorporating additional dimensions. (Heck, 2006, Su et al., 2013). (Bastein et al., 2013) Emphasize the economic dimensions of the circular economy and suggest that this transition "is an essential condition for a resilient industrial system that facilitates new kinds of economic activity, strengthens competitiveness and generates employment''. According to (Ghisellini et al., 2016)The radical reshaping of all processes across the life cycle of products conducted by innovative actors has the potential to achieve material or energy recovery and improve the entire living and economic model.

One of the most frequently cited definitions incorporating elements from various disciplines has been provided by the Ellen MacArthur Foundation, which describes the circular economy as "an industrial system that is restorative or regenerative by intention and design. It replaces the 'end-of-life' concept with restoration, shifts towards the use of renewable energy, eliminates the use of toxic chemicals, which impair reuse, and aims for the elimination of waste through the superior design of materials, products, systems, and, within this, business models''. Under this framework, the circular economy aims to keep both types of these materials at their highest utility and value at all times through careful design, management, and technological innovation.(MacArthur, 2013a). The overall objective is to "enable effective flows of materials, energy, labor, and information so that natural and social capital can be rebuilt.'' (MacArthur, 2013b).

At the EU level, the (EC, 2015) has included a description of the concept in its Communication "Closing the Loop - An EU Action Plan for the Circular Economy." Specifically, the circular economy is described as "where the value of products, materials, and resources is maintained in the economy for as long as possible, and the generation of waste minimized''. The transition to a more circular economy would make "an essential contribution to the EU's efforts to develop a sustainable, low carbon, resource efficient and competitive economy''.

Based on these schools of thought, a circular economy is an economic system where products and services are traded in closed loops or 'cycles.' This economic system is characterized as *regenerative by design, aiming to have a low environmental impact and maintain as much value as possible for products, parts, and materials. This means that the aim should be to create a system that allows for long life, optimal reuse, refurbishment, remanufacturing, and recycling of products and materials.*

3.2.2. Circular solutions-Five business models driving the circular economy

According to the report, Circular Advantage, by the National Zero Waste Council Circular Economy Working Group in 2014(Accenture, 2014)There are currently five types of circular business models (see Fig 2): circular Suppliers, Resource Recovery, Product life Extension, Sharing platforms, and Products as Services. The company identified these types in its analysis of more than 120 case studies of companies

generating innovative resource productivity improvements.

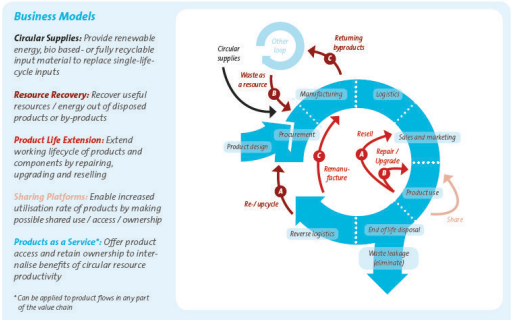


Fig 2. The five business models of circular economy

Source: Accenture, 2014

3.3. The necessity of transiting toward circular economy in Vietnam

During the 20th Century, notating closed-loop production was very popular in Vietnam, especially in the agricultural sector. At that time, there was a prevalent farming model named Vườn (Garden) – Ao (Pond) – Chuồng (Cage), which used waste from one activity as input for another one. For instance, organic garbage from growing vegetables, such as damaged vegetables, old leaves, etc., was used as animal food for fish in a pond or for poultry and livestock living in an enclosure (cage). However, in recent years, most enterprises have not received attention from environmentally friendly production models like the V-A-C. As a replacement for these models, using chemicals (fertilizers, pesticides) and applying automatic farming machines have broken the natural circle of materials and generated more waste, even toxic waste, often released into the environment. (Hoa, 2016).

2.3.1. Environmental aspect

Waste generated by industrial activities and urbanization is one of Vietnam's most serious environmental issues. Vietnam has been called one of the top ten countries in the world with the worst air pollution since 2012(EPI, 2012)On 6 October 2016, Hanoi, Vietnam's capital, was ranked the second worst city in the world for urban air pollution. (Saigoneer, 2016)According to the 2016 Report on the state of the national environment in Vietnam, Vietnam „uses" more than 100,000 tons of plant protection chemicals every year and generates over 23 million tons of household waste. More than 7 million tons of industrial solid waste and over 630,000 tons of hazardous waste are released each year, while a small amount of waste and wastewater is treated before being disposed of in the environment.

Notably, there are 615 industrial zones, of which only about 5% have concentrated wastewater treatment systems. There are over 500,000 manufacturing establishments, over 5,000 mining enterprises, and about 4,500 craft villages, many of which use old technology, which causes environmental pollution. More than 13,500 medical centers generate about 47 tons of hazardous waste daily and 125,000 m^3 of medical wastewater. Besides that, Vietnam currently has 787 municipalities releasing 3,000,000 m^3 of wastewater per day, but most of them have not been processed, and nearly 43 million motorcycles and over 2 million cars are operating. There are 458 landfill sites, of which 337 landfills do not ensure hygienic standards, and more than 100 small-scale domestic waste incinerators, which are in danger of generating dioxin and furan (OpendataVietnam). The conversion of

forest land, mineral exploitation, hydropower construction, and exploitation of biodiversity resources have led to the narrowing area of natural ecosystems, the fragmentation of habitats, and the decline of biodiversity.

3.3.2. Human health aspect

As a consequence, the number of people who are suffering from cancer, acute and chronic respiratory diseases, and allergic reactions in some big cities of Vietnam is rising. According to a study in 2013 by the Hanoi-based Central Lung Hospital, 95% of patients experience chronic obstructive pulmonary disease because of living in a polluted environment. Another 2013 study by the Vietnam Ministry of Health noted that of every 100,000 people, 4,100 or 4.1% have lung diseases; 3,800 contract inflammation of the throat and tonsils; and 3,100 have bronchitis; all of these diseases have a certain relation to environmental pollution. The most problematic problem is that people of working age are those most often affected by air pollution. (Vietnamnet, 2013).

3.3.3. Understanding of Vietnamese SMEs' about circular economy

In June 2016, the Centre for Creativity and Sustainability Study and Consultancy (CCS), a spin-off of the EU-funded SWITCH-Asia project "Sustainable Product Innovation," researched 152 Vietnamese SMEs operating in various sectors. 78.8% of surveyed enterprises said they do not know about the circular economy concept. Only 13.3% of the surveyed companies had some knowledge related to the circular economy, such as sustainable production and consumption, cleaner production, cradle-to-cradle, and resource efficiency. The practice of Vietnamese SMEs towards applying these concepts in business is still insufficient. According to another report produced in 2014 by the Vietnam Environment Administration, only 0.1% (around 200 out of 200 000) of the companies all over Vietnam have been applying cleaner production technology in their factories. (VEA, 2014). Based on these facts, the demand for transiting the Vietnamese economy towards a circular economy is more urgent than ever.

4. DISCUSSION AND CONCLUSION

The circular economy model has been widely applied in many European and developed countries today. This economic model can benefit each country not only in the economic sector but also in advancing the quality of the environment and protecting the diversity of the ecosystem. Based on the analysis of the current state of the environment in Vietnam and the effects of traditional linear economic models above, it can be argued that shifting towards linear models is essential for Vietnam.

In recent years, the Vietnamese government has also been aware of the negative impacts of the linear economic model on the ecosystem and human health, so many policies and measures have been applied to protect the environment and develop the socio-economy. However, to date, the principles of the circular economy are relatively new in Vietnam, and the government-level activities in supporting businesses to move towards a circular economy only stop at specialized conferences. So, the Government needs to build an action plan for the circular economy with specific objectives to orient the economy towards sustainable development.

Besides that, to take advantage of the circular economy concept and learn from the pioneering enterprises, Vietnamese firms should consider the whole value chain to find possibilities for innovating their business models. Capacity building, increased productivity, and especially promotion

towards factory workers and stakeholders along the value chain (upstream to downstream) are also necessary for companies to successfully apply a circular economy approach in the long term. Finally, a strong commitment to these long-term sustainable strategies is essential to ensure the development of circular economy business models and convince investors to invest in new ideas.

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CORPORATE MANAGEMENT

THE IMPACT OF OPEN PIT PRODUCTION SCHEDULE TYPES ON THE MINE ECONOMIC VALUE

Dr Rossen Halatchev[a], Dr Deliana Gabeva[a] , Angel Halatchev[a]

[a]AusGEMCO Pty Ltd, Brisbane, Australia

**Corresponding author: ross@ausgemco.com*

Abstract: *Production scheduling is a crucially important procedure for achieving a sustainable exploitation of open pit mines. It has attracted the efforts of many researchers for the development of efficient scheduling optimization models by accounting for the specific geological and technological features of any open pit mine. This resulted in the formation of a few types of production schedules which reflect different research approaches. The analysis of these approaches indicates that each schedule type has its own reflection of the economic potential and value of open pit mines, which raises the question about the enrichment of the currently existing scientific knowledge of the optimal mine value in economic valuations. The current paper presents a detail analysis of the existing types of production schedules in open pit mining and their impact on the mine value. The analysis incorporates a case study to illustrate the impact of the schedule types on the mine value.*

Keywords*: sustainable mining, mine value, open pit mine design, production scheduling, schedule types.*

1. INTRODUCTION

The problem of defining the types of production schedules is important because, firstly, it is not well studied aspect of the theory of open pit mining (Arsentiev, 1987; Rzhevskii, 1980; Kennedy, 1990; Hustrulid et al., 1998). Secondly, the recent developments of scheduling algorithms with the methods of Operations Research have already prompted the necessity of defining the schedule types in order to compare their efficiency. The availability of many scheduling algorithms creates a little chaos about the selection of the best algorithms by users for practical implementations. Unfortunately, the focus in the marketing of these algorithms is placed mostly on their mathematical content with a simple declaration about their capability to maximize the Net Present Value (NPV) as an objective function of the optimization model.

The author's recent research achievements in the development of a new approach of open pit production scheduling optimization confirmed the importance of the definition of production schedule types (Halatchev, 1993, 2011, 2015; De Koch, 2007; Golosinski et al., 2000). This is well reflected in the publication of Halatchev (2013), where the concept of using different schedule types for open pit mining and their impact on the mine value was presented briefly.

The problem of assessment of the impact of production schedule types in the mine evaluations did not find a place in the fundamental investigations of famous scientists working in the area of Mineral Economics such as Matheron (1968), Masse (1962), Margolin (1974), and Gentry and O'Neil (1984).

The present paper provides a detail analysis of the possible types of production schedules in open pit mining. A case study is organized with a data of a hypothetical open pit mine to illustrate them.

2. THE APPROACH OF COMPARATIVE ANALYSIS

2.1. Tools of mine sequencing and scheduling

The analysis of the currently existing types of production schedules in open pit mining will be done with the utilization of the Cumulative Spatial Graph (CSG), which is the most informative and universal tool for assessment of the efficiency of pit design in the context of arranging the mine sequence (Arsentiev, 1961). The CSG is built usually with the cumulative function of waste-ore quantities of two extreme cases of mine sequence arrangement (Fig. 1). The first case is named 'minimum working width sequence' (*mnwws*) and it is defined as an arrangement of the mine sequence with a consecutive inclusion of cutbacks (or strips) in the mine exploitation. The second case is named 'maximum working width sequence' (*mxwws*) and it is defined as an arrangement of the mine sequence by mining out consecutively each complete bench within the final pit outlines. Both cases of the arrangement of the mine sequence form a feasible optimization domain (FOD) where the optimum mine sequence (*optims*) is searched. The *optims* can have the shape of a linear piecewise function presented as multiple linear segments OMNL as shown in Fig.1. Usually the *mnwws* is the lower sequence of the FOD while the *mxwws* is the upper sequence. The CSG accounts for the spatial aspect of mine sequence arrangement. The time aspect of mine sequence arrangement is accounted by the Cumulative Time Graph (CTG), which is a derivative of the CSG as it presents the excavation process of any mine sequence. The CTG converts the optimum mine sequence or any other sequence into a schedule. Both graphs are applicable for any type of mineral deposit, mining system and mining method.

The utilization of the CSG for economic evaluation of mine projects provides evidence about the interval estimate of the NPV related to both extreme cases of mine sequence arrangement. Usually, the *mnwws* has a higher NPV in comparison with the *mxwws* and both estimates define the interval estimate. The *optims* has an NPV within the interval estimate. The interval estimate of the NPV is due to the time value of money assessed with the project discount rate. If the mineral deposit is presented only by ore with non-homogeneous grade field, the interval estimate of the NPV will be still valid for such a project. In case of the presence of waste in the mineral deposit, the NPV interval estimate is higher because of the different degree of the implementation of waste deferment principle for both extreme mine sequences. In other words, the CSG dismisses any concept of a single estimate of the NPV of an open pit mine project, which is important fact for any economist dealing with evaluation of mine projects.

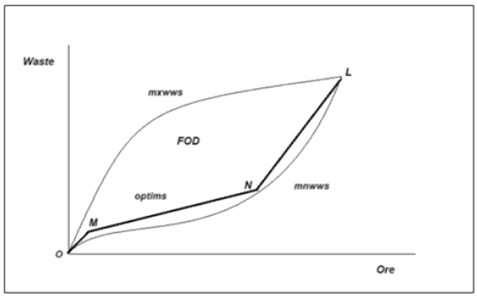


Fig 1. CSG with optimum mine sequence *(optims)*

2.2. The mine sequencing/scheduling method

The sequencing/scheduling optimization method used in the current study is an original development of the author and it is presented by a series of publications cited in the paper introduction. The method employs a linear programming optimization model with an objective function reflecting the structure of the NPV of an open pit project on the basis of discounted cash flow (DCF) analysis. The actual level of the implementation of the DCF analysis corresponds to the level of calculating the earnings before interest, tax, depreciation and amortization (EBITDA). The choice of this level is motivated with the framework of the VALMIN Code (VALMIN Committee, 2005). The expression of the objective function for two ore supply flows (basic and secondary ore) is (Halatchev, 2013):

$$Max\sum_{i=0}^{n} d_i\left(1-R_0\right)\left[\left(S_i-C_i^{ma}\right)\right]M_{b_i}-$$
$$\left[\left(C_{b_i}^{m}+C_{b_i}^{p}+TC_i\right)\left(\alpha_{b_i}\gamma_i\right)^{-1}\right]M_{b_i}-$$
$$\sum_{i=0}^{n} d_i C_{s_i}^{m}\left(\alpha_{s_i}\right)^{-1}M_{s_i}-\sum_{i=0}^{n} d_i C_{w_i}^{m}V_i-$$
$$\sum_{k=1}^{n_m}\sum_{j=1}^{m_k}\sum_{i=0}^{n} d_i h_{kji} NC_{kji}-\sum_{k=1}^{n_m}\sum_{j=1}^{m_k}\sum_{i=0}^{n} d_i u_{kji} DC_{kji} \quad (1)$$

The definition of the constants and variables participating in the objective function is given in Table 1 and Table 2. The subscript "i" in all variables and constants of the model denotes i-th time step of the production scheduling optimization.

The revenue in (1) is associated with the metal of basic ore type (BOT) as a marketable product. The secondary ore metal is not treated as a separate final product because the secondary ore type (SOT) goes to stockpiles for later treatment in case of favorable economic conditions. This ore, which is usually named marginal-subgrade material (MSG), has a cut-off grade that is less the mill-feed cut-off and higher than the break-even cut-off.

The operating expense in the NPV function deals with variable and fixed costs.

Table 1. Objective function constants

Constant	Definition
n	number of time periods to be considered
n_m	number of types of mine equipment
m_k	number of models of equipment per type
S_i	price of payable metal from basic ore
$C_{b_i}^{m}$	unit operating costs of BOT mining
$C_{s_i}^{m}$	unit operating costs of SOT mining
$C_{b_i}^{p}$	unit operating cost of basic ore processing
C_{w_i}	unit operating cost of waste removal

Constant	Definition
C_i^m	marketing cost per unit payable metal
C_i^{met}	metallurgical cost per unit payable metal
R_o	royalty as % of the net revenue
$\alpha_{b_i}, \alpha_{s_i}$	basic and secondary ore grades
γ_i	total recovery of the payable metal
TC_i	time costs
h_{kji}	unit purchase cost of pit capacity of k-th type j-th model of equipment
u_{kji}	unit ownership cost of pit capacity of k-th type j-th model of equipment

The variable operating costs are assigned to the different technological processes of mining and mineral processing that are inherent for mining production as well as for particular time steps of the scheduling horizon. This aims to increase the adequacy of the economic modelling. The fixed (or time) costs also participate in the NPV expression, but they are treated as costs per unit production of basic ore. In this way, the fixed costs perform conditionally as variable costs. This decision makes sense if the annual mill production of the mine varies over the life of mine, which leads to the variation of the annual fixed costs of the mining venture. It, however, contradicts the classical definition of fixed costs that "are independent of throughput" (Gentry et al., 1984). In case that the fixed costs are independent on the variation of the annual mill production then they should not participate in the production scheduling optimization.

Table 2. Model variables

Variable	Definition
M_{b_i}	basic ore metal as a final product
M_{s_i}	secondary ore metal
V_i	waste quantity to be removed
NC_{kji}	new capacity added for k-th type j-th model of equipment
DC_{kji}	capacity decrease for k-th type j-th model of equipment

An original element of the optimization model is the introduction of the new capacity and capacity decrease of each type and model of the mine equipment as model variables. This is reflected in the last two terms of the objective function. Both terms manage the location of the optimum sequence in the FOD of the CSG. The mechanism of this type of management of mine sequence is that every increase or decrease of the mining rate has relevant economic consequences. The economic parameters of the mechanism are the unit purchase and ownership costs of each type and model of mine production equipment (e.g. excavators, trucks, drills) that are related to a unit pit production capacity. These parameters are mine investment parameters, which is an original element of the scheduling model. They also include the unit purchase and ownership costs of the auxiliary equipment which are obtained with regard to the pit

production capacity (Halatchev, 2015). The mechanism provides a stabilization of the mining rate as a piecewise linear function, which is determined as a search for the equilibrium between the purchase and ownership costs of the open pit mine production capacity. Fundamental definition of Mine Capacity is provided by K. Lane (1988). The achievement of mining rate stabilization makes the production schedule viable for practical execution. This specific feature is better explained with the case study presented in the next section of the paper.

The sequencing/scheduling optimization model allows two types of schedules to be modelled: schedule with multi-stage stabilization of mining rate, and schedule with single-stage stabilization of mining rate. Explanations on the schedule types are provided further in this paper.

2.3. Case study

The case study is based on a hypothetical large-scale open pit mine exploiting a gold deposit. The mine design comprises 14 cutbacks that define a partial elliptical mining system (Halatchev, 2013). The annual mill production is 5 Mt/a and the LOM horizon is 34 years, which is split into 34 time steps of the scheduling optimization. Each year is presented with 5534 operating hours. Production equipment comprises a fleet of excavators with production rate of 1800 t/h, availability 85 per cent and utilization 75 per cent.

2.4. Computer implementation

The computer code 'PITFLOW' developed in Microsoft Visual C++ 6.0 version was used for modelling the schedules with mining rate stabilization. The code transforms the geological model into a technological orebody model and provides mine sequence arrangements and production scheduling optimization based on the author's method. The computer code uses the ILOG CPLEX Callable Library (ILOG CPLEX 8.1, 2002) for solving the production scheduling optimization model.

It is worth noting that all figures for cumulative spatial graphs and schedules of the study are taken from the author's paper (Halatchev, 2013) with the exceptions of Fig.1, Fig.8, and Fig.9.

The economic input data of scheduling optimization is summarized in Table 3. The data for the purchase and ownership costs of the mine equipment is summarized in Table 4. It is important to note that the purchase and ownership costs manage the location of the optimum sequence in the CSG, which is transformed into a schedule. Two variants of production scheduling optimization are defined. Variant 1 imposes a restriction on the open pit mine capacity, while Variant 2 does not impose a restriction. The unit purchase cost of pit capacity has the estimate of 2.65 $/t ROM mass while the unit ownership cost of pit capacity is 0.95 $/t ROM mass/a.

Table 3. Economic input data of scheduling optimization

Parameter	Units*	Value
Price*	$/g	50.00
Royalty	%	5.00
Refinery cost	$/g	4.00
Marketing cost	$/g	2.00
Excavation cost	$/t rock mass	1.50
Waste drill & blast	$/t waste	0.36
Waste haulage cost	$/t waste	1.13
Ore drill & blast cost	$/t ROM ore	0.62
Ore haulage cost	$/t ROM ore	1.00
Grade control cost	$/t ROM ore	0.22
Land clearance cost	$/t ROM ore	0.03
Topsoil cost	$/t ROM ore	0.30
Rehabilitation	$/t ROM ore	0.03
Time cost	$/t ROM ore	3.54
Processing cost	$/t ROM ore	7.80
Others	$/t ROM ore	3.40

(*) price and costs are in US dollars

Table 4. Economic input data of mine equipment

Equipment	Purchase cost, $/t ROM mass	Ownership cost, $/t ROM mass/a
Type: production		
Excavators	1.50	0.50
Trucks	0.80	0.25
Drills	0.20	0.15
Type: auxiliary	0.15	0.05
Total pit capacity	2.65	0.95

(*) all costs are in US dollars

2.5. Criteria for strategic scheduling efficiency

The efficiency of the optimum mine sequence in the FOD of the CSG is assessed with representative criteria. The first criterion is the Factor of Economic Compromise, which assesses the degree of compromise of using the *optims* with regard to the *mnwws* sequence known also as the best NPV sequence (Halatchev, 1996). The Factor of Economic Compromise (*FEcC*) is assessed with the formula:

$$FEcC = \frac{NPV_{mnwws} - NPV_{optims}}{NPV_{mnwws} - NPV_{mxwws}} 100,\% \qquad (2)$$

where: NPV_{mnwws} is the NPV of the *mnwws* which has the best estimate; NPV_{mxwws} - NPV of the *mxwws* which has the worst estimate; NPV_{optims} - NPV of the *optims* sequence.

The *FEcC* deals with the assessment of the economic efficiency of long-term production scheduling by using the NPV, which is a pure economic criterion.

The next criterion is the Factor of Technological Compromise (*FTeC*), which is assessed with the formula:

$$FTeC = \frac{S_O}{S_{FOD}} 100,\% \qquad (3)$$

where: S_O is the area of the CSG restricted by *optims* and *mnwws*;

S_{FOD} - area of the FOD.

The *FTeC* assesses the technological potential of the FOD with regard to the mining system used in the pit design.

The integral presentation of the *FEcC* and *FTeC* is the Factor of Total Compromise (*FToC*):

$$FToC = \frac{FEcC\ FTeC}{100}, \% \qquad (4)$$

A new author's criterion is the Factor of Waste Deferment (*FWD*), which assesses the degree of implementation of the principle of waste deferment in the optimum sequence.

$$FWD = 100 - FTeC, \% \qquad (5)$$

The above-described criteria provide a very useful information for the strategic management of surface mining ventures.

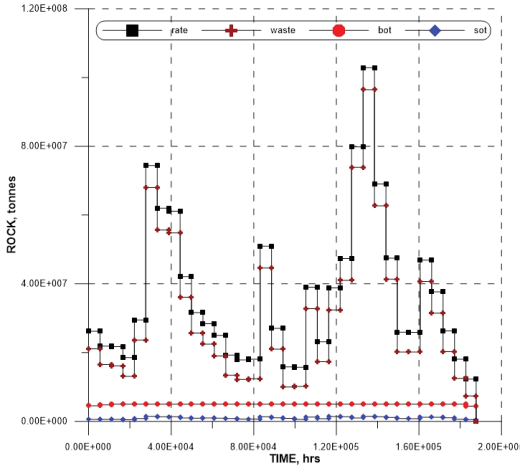


Fig 2. Production schedule based on *mnwws*

3. SCHEDULE TYPES

3.1. Schedule with variable mining rate

The schedule with variable mining rate (VMR) is based on the transformation of the *mnwws* sequence of the CSG (Fig.2). The *mnwws* is shown in Fig.4, which is the lower sequence of the FOD. It meets 100% the processing plant demand of ore without the utilization of stockpiles. This schedule has a continuous supply of a fixed quantity of ore from the mine while the waste removal is a variable quantity. The schedule shows the time distribution of basic ore (BOT), secondary ore (SOT), waste (WST) and mining rate. The analysis of the schedule indicates large fluctuations of the mining rate, which is a summation of waste, basic ore, and secondary ore (MSG) for each scheduling period. The schedule based on the *mnwws* has the trend of increasing the mining rate over the life-of-mine, which reflects the maximum possible degree of the waste deferment as a one of the major mine planning principles in open pit mining.

The estimates of the criteria of the schedule efficiency for this example of a schedule with variable mining rate are as follows: *FEcC* = 0.00%, and *FTeC* = 0.00%. The *FWD* is 100.00%, because the *mnwws* sequence is accepted as an optimum sequence. The NPV estimate is 2728.44 M$. These results are also summarized in Table 5 and Table 6 for the variant of VMR-mnwws.

Another variant of the schedule with VMR is shown in Fig.3, which is a schedule transformation of the *mxwws* sequence of the CSG as an upper bound sequence of the FOD. It also meets 100% the processing plant demand of ore without the utilization of stockpiles. The mining rate also has large fluctuations. The schedule analysis indicates the trend of decreasing the mining rate over the scheduling horizon, which reflects the minimum possible degree of the waste deferment. This explains the difference in the NPV estimates of the schedules based on *mnwws* and *mxwws* sequences.

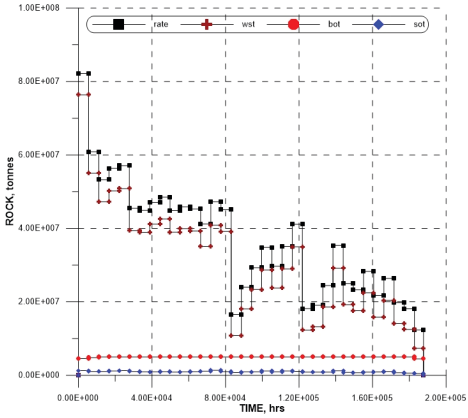


Fig 3. Production schedule based on *mxwws*

The estimates of the criteria of the schedule efficiency for this example are as follows: *FEcC* = 100.00%, and *FTeC* = 100%. The *FWD* is 0.00%, because the *mxwws* sequence is accepted as an optimum sequence. The NPV estimate is 2186.88 M $. The estimates are summarized in Table 3 and Table 4 for this variant of VMR-mxwws.

Both variants of schedules can be viable for practical implementation depending on the degree of fluctuations of the mining rate. Usually they don't have a practical implementation, due to the large fluctuations of the mining rate. This means that their practical realization would require a very frequent increase and decrease in size of the excavation equipment fleet, which is a difficult task. Mining is usually conducted in remote areas where the supply of new equipment is a time-consuming task. The schedule of *mnwws* has the highest possible NPV estimate of the FOD while the schedule of *mxwws* has the minimum NPV estimate because of the impact of the time value of money assessed with the project discount rate.

3.2. Schedule with a single-stage stabilization of mining rate

The schedule with a single-stage stabilization of mining rate (SSSMR) is the schedule of Variant 1 defined in Section 2 of the paper. The schedule is obtained with the author's scheduling optimization model which imposes a restriction on open pit mine capacity. The optimum mining sequence (*optims1*) is shown in the GSG (Fig.4). It is almost a straight line located in the FOD restricted by the mnwws and mxwws sequences. The *optims1* has 34 nodes corresponding to the number of time steps of the scheduling optimization.

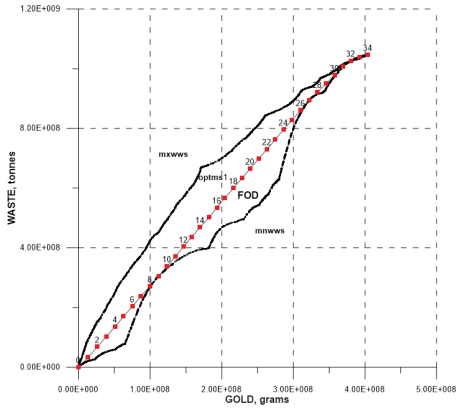


Fig 4. CSG with optimum sequence *optims1*

The schedule is obtained with the transformation of the optimum sequence (*optims1*) as shown in Fig.5. Its analysis indicates 100% match of the basic ore supply with the planned mill ore demand without the utilization of ore stockpiles. In other words, there is no a surplus basic ore scheduled for stockpile inventory. The schedule analysis indicates almost a constant waste removal and mining rate over the scheduling horizon with the

exception of the period of attenuations of the mining operations. Its analysis indicates a dominating period of steady mining rate (38 Mt/a) followed by a few short stages of decreasing the mining rate during the attenuation of the mining operations. With some assumptions this can be accepted as a schedule with a single-stage stabilization of mining rate over the LOM. The schedule is viable and can be practically implemented.

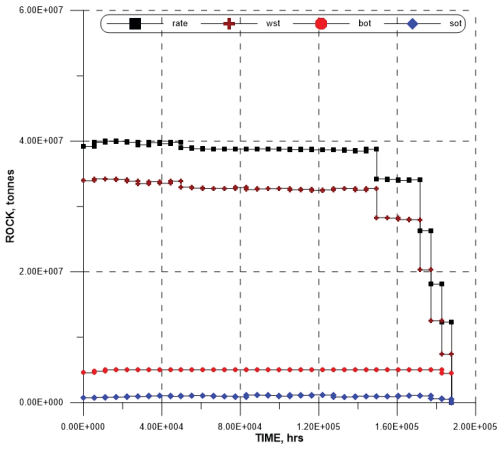


Fig 5. Schedule with SSSMR based on *optims1*

The estimates of the criteria of the schedule efficiency for this example of a schedule are as follows: *FEcC* = 38.34%, *FTeC* = 36.22%, and *FWD* = 63.78%. The NPV estimate is 2540.89 M$. The estimate of the *FWD* indicates that the optimum schedule has a notable implementation of the principle of waste deferment in the optimum sequence (optims1). The NPV estimates is less than the NPV estimate of the mnwws related schedule (Fig.2).

3.3. Schedule with a multi-stage stabilization of mining rate

The schedule with a multi-stage stabilization of mining rate (MSSMR) is the schedule of Variant 2 defined in Section 2 of the paper. The schedule is obtained with the scheduling optimization model which doesn't imposes a restriction on open pit mine capacity. The optimum mining sequence (*optims2*) is shown in the GSG (Fig.6). It is a linear stepwise function located in the FOD. The optims2 has 34 nodes which corresponds to the number of time steps of the scheduling optimization.

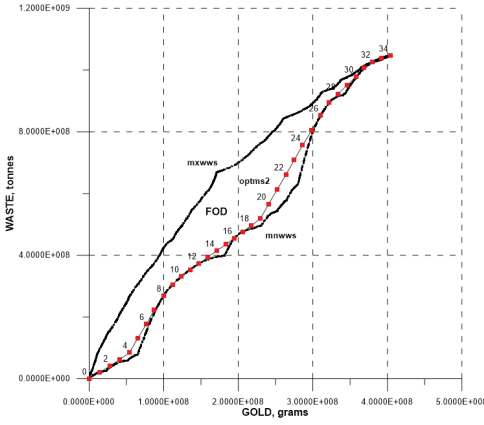


Fig 6. CSG with optimum sequence *optims2*

The optimum schedule is obtained with the transformation of the optimum sequence (*optims2*) as it is shown in Fig.7. Its analysis indicates 100% match of the basic ore supply with the planned mill ore demand without the utilization of ore stockpiles. The schedule has five main stages with constant mining rates. The

mining rates are as follows: first stage – 26 Mt/a; second stage – 52 Mt/a; third stage – 26 Mt/a; fourth stage – 54 Mt/a; fifth stage – 34 Mt/a. The mining rate decreases during the last period of attenuation of the mining operations.

The estimates of the criteria of the schedule efficiency for this example of a schedule are as follows: *FEcC* = 7.84%, *FTeC* = 11.69%, and *FWD* = 88.31%. The NPV estimate is 2687.50 M$. This schedule has a very high estimate of the *FWD*, which means a very good implementation of the principle of waste deferment in the optimum sequence (*optims2*). The NPV estimates is less than the NPV estimate of the *mnwws* related schedule but it is much higher than the NPV of the optimum sequence (*optims1*). The comparison of the schedules of *mnwws* and *optims2* shows that the optims2 eliminates the fluctuation of the mining rate in Fig.2 and makes the schedule in Fig.7 practically viable

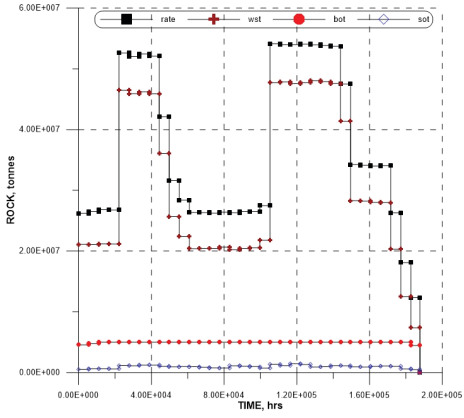


Fig 7. Schedule with MSSMR based on *optims2*

3.4 Schedule with constant mining rate and using ore stockpiles

The schedule with constant mining rate and using stockpiles (CMR-SP) is the most popular schedule type in the world mining industry at present due to the available marketing software. It reflects the simple logic for managing the variable mine ore supply to the processing plant with planned production rate by using stockpiles as a buffer between the mine and plant. The variable mine ore supply means surplus or deficit of ore quantity in time. Generally, the schedule with CMR-SP doesn't meet 100% the planned mill ore rate as a direct mine ore supply and it requires the management of stockpiles. This is the main difference between the schedule with CMR-SP and the schedule of single-stage or multi-staged stabilization of mining rate.

This constant mining rate can be scheduled over the entire life of mine (LOM) or for different stages of the pit exploitation where each stage has its own constant mining rate by achieved by a specific setup of the mining equipment dbase and selection of the number of required equipment units. Generally, there is no optimization procedure for the determination of the mining rate. This is usually a manual procedure or computer algorithm implementation using logical operators which doesn't optimize the mining rate under the requirement for accurately meeting the planned mill ore rate. An example of such scheduling algorithms is XPAC software of RPM Global and SPRY software of Micromine. The methodology behind the schedule of

CMR-SP is that it supports the effective utilization of the available fixed fleet of mine production equipment over a period of time. Mining usually is conducted in remote areas and working with a schedule without constant mining rate creates a problem with the management of the delivery of new equipment units to meet the fluctuations in the schedule.

The practical implementation of the schedule leads to some small fluctuations of the mining rate due to the reliability of the equipment used as well as the presence of uncertainty in the input data of its modelling. These fluctuations define a stationary process of mining rate distribution over its scheduling period.

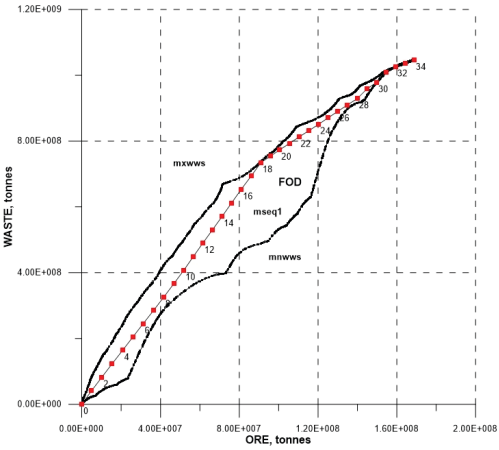


Fig 8. CSG with sequence of CMR-SP schedule

A graphical illustration of the schedule with CMR-SP is presented in the CSG in Fig.8. It indicates a mining sequence of two stages with constant mining rate over each stage. The transformation of the sequence into schedule is shown in Fig.9.

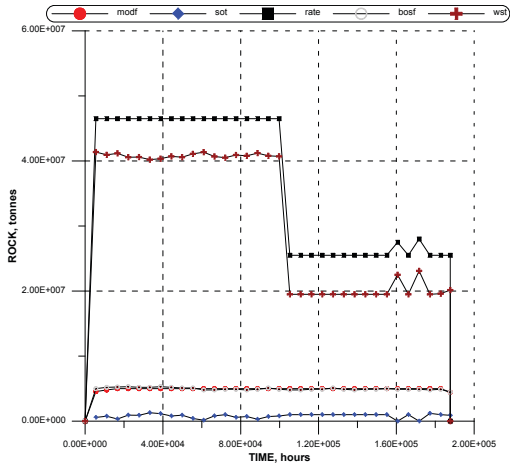


Fig 9. Production schedule with CMR-SP

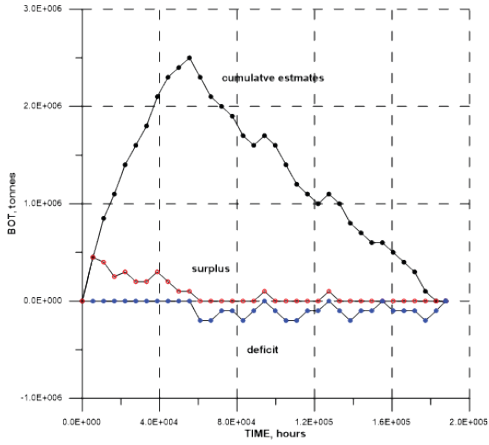


Fig 10. Schedule of ore stockpiles inventory

The first stage has a mining rate of 46.2 Mt/a while the second stage has a rate of 25.4 Mt/a. There are some fluctuations at the last time steps of the schedule because of restriction of the FOD of the CSG. The schedule is presented with two ore functions: mill ore demand function (*modf*) in red color which reflects the planned processing plant rate, and basic ore supply function (*bosf*) in grey color, which reflects the ore supply from the mine to the plant. The difference between both ore functions

determines the surplus and deficit of ore supply to the plant which is managed with a stockpile. The schedule of ore stockpile inventory is shown in Fig.10 with an ore stockpile balance as cumulative estimates, and ore surplus and deficit as single estimates.

The estimates of the criteria of the schedule efficiency are as follows: *FEcC* = 54.75%, *FTeC* = 68.19%, and *FWD* = 31.80%. The NPV estimate is 2431.92M$. The schedule has a high estimate of the *FWD.* The NPV estimates is less than the NPV estimate of the *mnwws* related schedule but it is much higher than the NPV of the optimum sequence (*optims1*).

3.5. Schedule with combined forms of mining rate

The schedule with a combined form of mining rate (CFMR) is a combination of different schedule types within the LOM time horizon. Such a combination is possible to provide better economic results. A good example can be the pit development with the implementation of the schedule of VMR based on mnwws as a first stage and later transition to other types of schedules such as the schedule with SSSMR, CMR-SP or MSSMR. This would maximize the profit during the mine development

4. CONCLUSIONS

The results presented in this paper support the following important conclusions:

- The existence of different schedules types is real in the current practice of open pit mining.
- Each schedule type has a specific economic potential and impact on the mine NPV and ore reserve estimates (please, see Table 5 and Table 6).
- The schedules of SSSMR and MSSMR have the advantage of ignoring the utilization of ore stockpiles which impose addition operating costs on mine production.
- The schedule of MSSMR provides the optimum estimates of the mining rate over each stage as a result of the implementation of an economic optimization model that accounts for the operating costs of all technological process and capital expenditure for the mine equipment. This schedule is characterized with a higher NPV in comparison with the schedule of SSSMR due to the implementation of the mine planning principle of waste deferment which deals with the time value of money via the project discount rate.
- The new criterion introduced as the Factor of Waste Deferment (*FWD*) allows the assessment of the degree of implementation of the principle of waste deferment in any production schedule and it can be used for the decision-making process of strategic mine planning.
- The schedule of CMR-SP has the disadvantage of using ore stockpiles which impacts the production costs. The only exception is the case of a compulsory ore blending. This can be also achieved with the schedule of mining rate stabilization in a more accurate way due to the optimization procedure.
- Sustainable exploitation of open pit mines can be achieved with the schedules

of SSSMR and CMR-SP because of the stationary character of the variation of their discounted cash flows. This is due to the design of a single long stage of working without significant fluctuations of the mining rate. The schedule of MSSMR is the rational alternative for achieving a highest possible NPV by the design of multiple stages of the mine exploitation.

- The schedule types described in the paper are viable for the exploitation of any type of mineral deposits, such as base/ precious metals, critical minerals, rare earth, and coal.

Table 5. Results of the schedules comparison

Schedule type	FTeC,%	FWD,%
VMR-mnwws	0.00	100.00
VMR-mxwws	100.00	0.00
SSSMR	36.22	63.78
MSSMR	11.69	88.31
CMR-SP	68.19	31.80

Table 6. Results of the schedules comparison

Schedule type	FEcC, %	NPV*, M $
VMR-mnwws	0.00	2728.44
VMR-mxwws	100.00	2186.88
SSSMR	38.34	2540.89
MSSMR	7.84	2687.50
CMR-SP**	54.75	2431.92

(*) – NPV calculated with discount rate of 10.00%

(**) – rehandle cost of 1.00$/t is used.

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THE DEVELOPMENT OF A COMPETENCY TRACKING SYSTEM FOR THAILAND'S MINING OPERATIONS

K. Sakamornsnguan[a*]

[a]*Department of Primary Industries and Mines, 75/10 Rama VI Road, Ratchathaewee, Bangkok 10800, Thailand*

**Corresponding author: kridtaya@dpim.go.th*

Abstract: *The Department of Primary Industries and Mines (DPIM), Thailand, has promoted productivity improvements in Thailand's mining and quarrying industry. Capacity building has been an important strategy, working in parallel as a supportive part of the initiatives to enhance the use of digital and information technologies. However, basic information about the industry related to capacity building, such as workforce structure, wages and salary, skills, and available development programs, was limited. To overcome this gap, DPIM has developed a web application to assist companies in keeping track and planning for staff competency development. The application prototype was designed based on user needs identified through multiple sources of information, including interviews, data from past training programs, and a review of competency standards. The application was structured into three main components: company and workforce information system, skill and competency tracking system, and capacity building program database. This web application is expected to assist DPIM in providing information for strategizing capacity-building programs for the sector and contribute to competency improvement in the mining companies.*

Keywords: *mining, competency development, web application, Thailand, capacity building.*

1. INTRODUCTION

Productivity is the key to competitiveness, so the Department of Primary Industries and Mines (DPIM), Thailand, the central authority overseeing mining and quarrying operations in Thailand, has promoted productivity improvements in the sector, corresponding to the national objectives. Capacity building has been an important strategy supporting the implementation of core initiatives, especially those enhancing digital and information technologies and transformation towards industry 4.0. Identifying proper strategy and action plans for promoting capacity building in the mining and quarrying industry and monitoring progress in capacity building requires information such as workforce structure, wages and salary, skills, and available development programs. Implementing capacity-building strategies and programs could be inefficient without proper mechanisms and tools. Information technology is identified as a potential tool to support this task. As a result, a web application was designed and developed to assist mining companies in keeping track and planning to build their staff's skills, which can also facilitate their reporting to DPIM. This paper aims to provide information on how the application prototype is conceptualized and developed to serve a sectoral-level skill and competency development, which could be helpful for reference in the future.

2. WORKFORCE STRUCTURE AND SKILL DEVELOPMENT CAPACITY OF THAILAND'S MINING AND QUARRYING INDUSTRY

According to the data of DPIM (2023), the total number of workers in mines and quarries in Thailand in 2022 was 12,574. About 60% of the workers worked in industrial rock quarries. Around 24% operated industrial mineral mines, whereas employment in a large lignite mine contributed 13% of the sector's employment. The remaining 2% and 1% represent the share of workers in metal mines and dimension stone quarries, respectively. Fig 1 shows the total number of workers in Thailand's mines and quarries in 2022 by type of minerals.

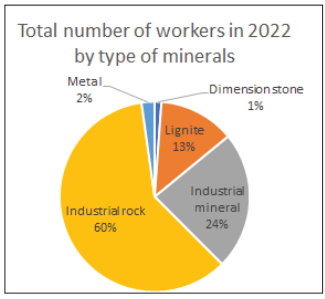


Fig 1. Total number of mine and quarry workers in Thailand in 2022, by type of minerals

The average number of workers per mine in Thailand in 2022 was 68.4. Industrial rock quarries and metal mines employed 25.0 and 23.1 workers per mine, respectively. The amount was less in industrial mineral mines and dimension stone quarries, with average employment at 15.3 and 10.6. On the contrary, the employment in a lignite mine was over 1,620, which indicated the difference in production scale and the size of an organization. Fig 2 shows the average number of workers per mine in Thailand in 2022 by type of minerals.

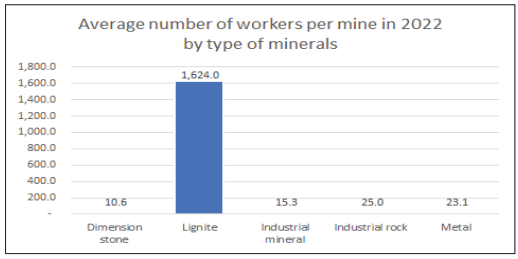


Fig 2. The average number of workers per mine in Thailand in 2022 by type of minerals

The statistical information above indicates a fair number of workers in the sector and reflects the domination of small enterprises in the Thai mining and quarrying sector. This implies limited ability to systematically plan and implement capacity-building programs and use informal methods in knowledge management.

3. IDENTIFICATION OF SYSTEM REQUIREMENTS

3.1. System objectives

The web application is designed to serve two main objectives, namely, (1) collecting overall data and information related to workforce and skill development of the mining sector and (2) assisting mining companies in planning, implementing, and keeping track of their staff's skill development.

3.2. User needs

Target users are divided into two groups: DPIM users and users in mining companies. DPIM users are system administrators who oversee and manage the system. Users in mining companies are mainly personnel staff responsible for staff development, as well as employees and executives whose information, achievements, and abilities are recorded.

Users' needs were identified through personal interviews with DPIM staff and personnel in mining companies, data from

past training activities, and the review of competency standards or frameworks.

3.2.1. The needs of DPIM users

The needs of DPIM users were identified through an interview of the key staff in the group responsible for promoting good practices and capacity building to mining companies. The result of the interview indicated the key information that DPIM users need to understand the human resource development situation of the industry as follows:

- Number of employees in the industry
- Current skills and skill levels of different groups of employees
- Gaps of competency and skill improvement about standard or reference framework

3.2.2. The needs of users in mining companies

The users' needs in mining companies were identified through the questionnaire responses of previous training and field information from the past DPIM consulting programs. Also, an interview was conducted with the executive responsible for personnel issues in a quarrying company and the personnel officer to confirm the understanding of working procedures. The information gathered from the sources indicated the information and tools that targeted users need for planning for the development of their staff's skills and tracking progress as follows:

- Personal records of employees
- Current skills and targeted skills of employees in different positions
- Training and skill development records of each employee
- Courses available for employees
- Recommended training courses for each employee

3.3. Available records

The records from four DPIM training courses are used as a reference for designing the application's data structure. The data structures of course information and participant records follow different patterns depending on the organizing divisions and the information requirements of the courses. Their common field data structures are summarized in Table 1.

Table 1. Data field lists of training course information and participant records

Data set title	Data fields	
	Common	Optional
Training course information	Course title Organizer Training date/period Training duration Training venue Speaker	Frequency per year Type of course/Skillset Other information (such as certificate, prerequisite,

Data set title	Data fields	
	Common	Optional
Participant records (for each course attended)	Personal Information (Name, gender, work title) Contact information (Address, telephone number, e-mail address) Organization (Organization name, address)	Personal Information (ID card number, date of birth, certificate number (if any)) Education and working records Organization information (mining license or permit number, type of minerals) Uploaded documents (e.g. ID card, past certificate/card, company confirmation letter, photo, company registration certificate)

3.4. Structure of competency standards

In this section, five competency standards or frameworks were compared to identify common patterns of competency structure for the application's design.

3.4.1. National Skill Standard (NSS), Thailand

NSS defines the skill standard of each occupation according to professional abilities. The standard classifies professional skills into three levels - basic, moderate, and advanced. It specifies the characteristics of knowledge, skills, and attitude required to perform key tasks at each level.

3.4.2. Occupational Standard and Professional Qualifications, Thailand

Occupational Standard and Professional Qualifications are defined for 52 occupational groups and their sub-occupational groups. The skill standard of each career under sub-occupational groups is divided into different levels according to knowledge, skills, required outcome, accountability, and ethics. At each level, competency and performance criteria and the necessary skills and expertise to fulfill the performance criteria are specified.

3.4.3. National Occupational Standards (NOS), UK

NOS are statements of the standards of performance individuals must achieve when performing their functions at work. They are specified as job functions applicable to multiple occupations in business sectors. Each function contains statements of performance criteria and knowledge and understanding.

3.4.4. National Occupational Standard (NOS), Mining Industry Human Resources Council (MiHR), Canada

MiHR specifies NOS for seven mining occupations: driller, frontline supervisor, hoist operator, industry trainer, minerals processing operator, surface miner, and underground miner. Each occupation's competency areas are identified under tasks, sub-tasks, and references/examples of abilities and knowledge.

3.4.5. Competency Framework, Australia (NSW Resources Regulator)

The NSW Resources Regulator, Australia, developed the competency framework to exercise WHS statutory functions requiring certificates of competence, which focus on the health and safety of mine workers. The competencies are classified by statutory

functions, each of which is described into four domains: statutory functions and regulatory requirements, application and implementation of hazard management through technical knowledge, situational awareness and risk management, and workplace supervision. Under each domain, there are multiple focus areas, each containing the benchmark behaviors of front-line supervisors, under-managers, and managers/ engineers.

Table 2 summarizes the structures of the competency standards or frameworks explored in this study. The common items are the occupation or job function and required abilities in knowledge, skills, and other attributes, which are classified into different levels.

4. SYSTEM COMPONENTS

According to the identified user needs, the application was designed as follows:

4.1. System architecture

The architecture of the web application is shown in Fig 3. Users are divided into two groups, namely DPIM users and users in companies, under which five sub-groups are divided. DPIM users are divided into root admin and system admin, and users in companies are divided into CEO, local admin (human resource officer), and user (employee). The application is a client/ server system that uses a webpage display and HTTP communication protocol. Its operation and data storage takes place on the DPIM server.

Table 2. The structural comparison of five competency standards or frameworks

Source	Structure
National Skill Standard (NSS), Thailand (Department of Social Development, 2024)	- Occupation - Professional ability (3 levels) - Knowledge, skills, and attitude
Occupational Standard and Professional Qualifications, Thailand (Thailand Professional Qualification Institute, 2024)	- Occupational group - Sub-occupational group - Professional qualification level (8 levels based on knowledge, skill, application, and responsibility and ethics) - Competency unit and performance criteria
National Occupational Standards (NOS), UK (National Occupational Standards, 2024)	- Occupation - Job function - Performance criteria - Knowledge and understanding
National Occupational Standard (NOS), Canada (Mining Industry Human Resources Council, 2024)	- Occupation - Area of competency - Tasks - Sub-tasks - Reference/example of abilities and knowledge
Competency Framework, Australia (Department of Regional NSW, 2024)	- Competency of 14 statutory functions - Knowledge domains (4 domains) - Focus area - Benchmark behaviors at responsibility level 1-3

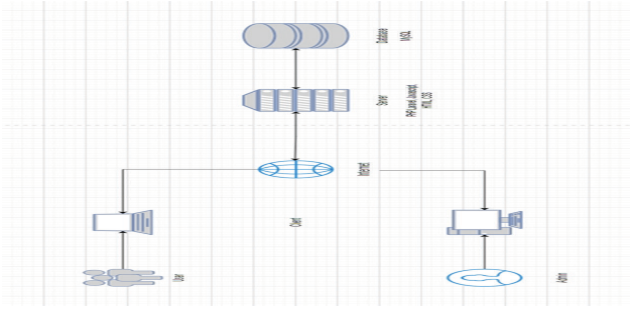


Fig 3. Users and system architecture (DPIM, 2023)

4.2. Functions

The application included three main components: a company and workforce information system, a skill and competency tracking system, and a capacity-building program database. The sub-functions of the application are enumerated below.

1) General functions for all user

·• Log in and manage an user's profile

2) Core functions for DPIM users include

- Function to manage the reference competency framework of different job positions
- Function to manage training course information
- Function to manage users (as a company and as an employee) and their information
- Function to search and export data for further processing
- Function to generate a dashboard and a summary report
- Function to show activity logs

3) Core functions for users in companies

- Function to edit personal data and company profile (for company's HR admin)
- Function to submit and approve training requests
- Function to edit training records
- Function to generate individual skill development plan
- Function to search training course list
- Function to generate a dashboard and summary report for HR admin

5. DEVELOPMENT RESULTS AND EXPECTED OUTCOMES

The system was designed to cover developed and tested to ensure each function works properly. The system contains key features required by the DPIM users and the users in mining companies. Example of dashboards and reports for both groups of users are shown in Fig 4 and Fig 5.



Fig 4. User interface of the application showing personal development information (DPIM, 2023)



Fig 5. User interface of the application showing user summary report (DPIM, 2023)

The system was introduced to DPIM users who will be responsible for the system administrator role as well as the duties on inserting records of past training courses, training course lists, and reference competency framework of different job positions. The users also used the application with the real data of DPIM staff as a pioneer case. A short questionnaire was used to collect feedbacks from five DPIM users. The results showed the scores on system usefulness, using interest, and ease of use/practicality were positive for all users.

6. CONCLUSIONS AND NEXT STEPS

The development of competency tracking system for Thailand's mining operations was carried out as a part of capacity building strategy to promote productivity improvements in Thailand's mining and quarrying industry using digital and information technologies. An application was designed to assist DPIM users in collecting overall data and information related to workforce and skill development of mining sector and to assist mining companies in planning, implementing, and keeping track of their staff's skill development. The structure of the application contains three main components, namely, company and workforce information system, skill and competency tracking system, and capacity building program database. The feedback from DPIM users about system usefulness, using interest, and ease of use/practicality were positive, reflecting the readiness for use of the application at a broader scale.

The next step is to put the application into practice and sustain the use. To do so, DPIM divides its key tasks into four parts. The first part is to develop competency frameworks for key job positions related to production and productivity improvements so the functions related to skill tracking and gap identification can function. The second part is to gather information about training courses and design new capacity building programs which match the skill requirements in the competency framework. The third part is to experiment using the application with a range of companies to collect feedback for improvements. The fourth part is to design steps of implementation to make the use of the application widespread, promote capacity building within the industry according to the competency framework, and increase the level of enforcement over time. With these actions, it is expected that the application will fulfil its objectives as a tool to support competency development and can facilitate productivity improvement of the mining and quarrying industry as planned.

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THE INFLUENCE OF EMPLOYEES' JOB SATISFACTION ON THE BUSINESS PERFORMANCE AT QUANG NINH THERMAL POWER JOINT STOCK COMPANY

Nguyen Thi Hong Loan[a*]; Pham Thu Trang[a]; Nguyen Thi Ngoc Anh[a]; Do Khac Huong[b]

[a]Hanoi University of Mining and Geology, Hanoi, Vietnam

[b]National Economics University, Hanoi, Vietnam

**Corresponding author: nguyenthihongloan@humg.edu.vn*

Abstract: *Job satisfaction refers to workers' attitudes toward their jobs (Lock, 1976). When workers are satisfied with their jobs, they will have a positive attitude toward the work and be more attached to the organization (Karatepe & Kilic, 2007), thereby helping the organization achieve higher labor productivity and profits. The article proposes a model to research the influence of workers' job satisfaction in the organization on the business performance of a company, including (1) Salary and Benefits; (2) Nature of work; (3) Relationships with colleagues and superiors; (4) Training and promotion opportunities; (5) Working environment. The article also uses primary data surveyed in Quang Ninh Thermal Power Joint Stock Company to describe these relationships quantitatively and propose some solutions to improve its performance in the future.*

Keywords: *Job satisfaction, Business performance, Thermal power*

1. INTRODUCTION

Job satisfaction is employees' emotion toward their job, expressed through their happiness/positive attitude towards it (Spector, 1997). According to Locke (1976), job satisfaction is an employee's positive emotional state, which results from evaluating his job or work experience. Job satisfaction is influenced by the employee's characteristics and the working environment (Spector, 1997), and it is also an essential factor affecting the organization's performance (Singh, 2013). Leasez (1998) has shown that employees' job satisfaction is vital to the organization's success. Employees with higher job satisfaction are less absent from work, more productive, and more likely to demonstrate organizational commitment. When employees are provided with tools, structures, environments, and all the elements that enhance job performance, they will be satisfied and thus more engaged, committed, and work harder for the organization's success. Researching employees' job satisfaction and implementing solutions to improve employees' job satisfaction becomes more important as businesses operate in a fiercely competitive environment with the requirements of improving the quality of products and services.

Quang Ninh Thermal Power Joint Stock Company has a very hard-working environment, and employees' working quality and productivity have important impacts on its business results. It needs to identify and measure the importance of the components of employees' job satisfaction and consider the effects of these components on their performance.

2. LITERATURE REVIEW

2.1. Employees' job satisfaction

According to Ellickson and Logsdon (2002), job satisfaction is the degree to which

employees like their jobs and is an emotional or sentimental response to various aspects of their jobs. Job satisfaction is formed from a combination of psychology, physiology, and the work environment, which makes employees like their jobs (Singh, 2013). Employees who feel satisfied with their jobs will have a positive attitude toward them and want to stay with the organization (Karatepe & Kilic, 2009). Abraham Maslow (1954) proposed a five-level hierarchy of human needs, from physiological needs, safety, belonging and love, and respect to self-actualization. Based on Maslow's theory, job satisfaction has been approached by a number of researchers from the perspective of need fulfillment. Job satisfaction and dissatisfaction depend not only on the nature of the job but also on the expectations that the job brings to employees, such as salary, working environment, autonomy, Communication, and commitment to the organization (Vidal et al., 2007).

Smith et al. (1969) proposed the Job Descriptive Index (JDI) model for the measurement of job satisfaction of employees, which includes five factors: (1) Nature of work, (2) Income, (3) Training and development, (4) Relationship with superiors, (5) Relationship with colleagues. Arnolds and Boshoff (2001) argued that employees want more comfortable and physically convenient working conditions. Improving working conditions such as temperature, light, ventilation, hygiene, noise, working hours and means, machinery, equipment, and work means will help increase employees' job satisfaction.

Working conditions that do not meet job requirements will negatively impact employees' mental and physical health (Bhatti & Qureshi, 2007), reducing productivity and creativity in their work. Belias et al. 2015 suggested that factors affecting employee satisfaction in service enterprises include (1) Job characteristics, (2) Training, (3) Career development, (4) Income, and (5) Trust in the organization. The authors also suggested that employees who are satisfied with their jobs tend to be more creative, productive, and committed to the organization than employees who are dissatisfied with their jobs. Ashraf et al. (2014) showed that factors affecting employees' job satisfaction in Pakistan's banks include the working environment, expectations of fair treatment, and employee motivation mechanisms.

Dupe Adesubomi Abolade (2020) also pointed out five factors that positively affect the job satisfaction and performance of the organization, including (1) Working tools and means, (2) Training, (3) the Physical environment of the organization, (4) the Communication in the organization, (5) Organizational structure. Sabina Mziwao and colleagues (2022) pointed out three factors: (1) Working environment, (2) Salary and bonus, and (3) Promotion will positively affect employees' job satisfaction and the performance of the organization (Parvin et al., 2011).

2.2. Job satisfaction and organization performance

Organizational performance is expressed in three aspects: financial results, such as profit and profit margin; market and product results, such as revenue and market share; and results on shareholder and customer benefits, such as shareholder profitability, customer satisfaction, and employee income (Richard et al., 2009). Organizational performance can also be expressed through the organization's potential for future development, competitiveness, resource exploitation, etc. (Tangen, 2004). Organizations with more satisfied employees tend to operate more effectively because employee morale is

related to business performance indicators, customer satisfaction, and turnover (Ryan et al., 1996). Latif et al. (2013) asserted that organizations with satisfied employees will have lower turnover rates, higher productivity, better working environments and reputations. Therefore, employees' job satisfaction has a significant impact on organizational performance. Affirming the relationship between job satisfaction and organizational performance, Platisa et al. (2015) and Mziwao and Mbogo (2022) also asserted that when employees are satisfied with their jobs, it will increase customer satisfaction, employee loyalty, and organizational profits.

2.3. Research model

Intending to study the impact of employees' job satisfaction on organization performance and propose managerial implications related to employees' job satisfaction on business results of Quang Ninh Thermal Power Joint Stock Company, the article proposes a research model (Figure 1), with the dependent variable: Organization performance; intermediate variable: Job satisfaction; independent variables: Salary and benefits; Nature of work; Training and promotion; Working environment; Relationship with superiors and colleagues.

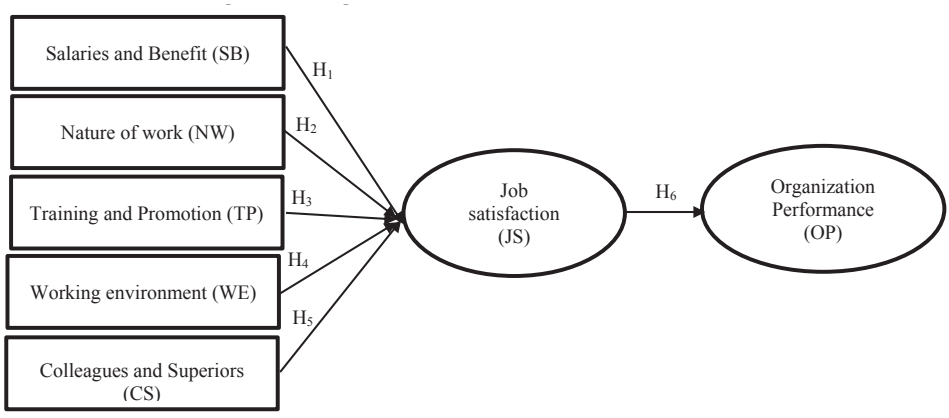


Fig 1. Proposed research model

2.4. Observed variables and research hypotheses

(1) Salaries and benefits

Salaries and benefits are the total wages, bonuses, and allowances of employees. They have a direct impact on their living standards and are one of the important factors affecting employee satisfaction (Parvin, 2011). Salaries that ensure fairness, living standards, and consistency with employees' responsibilities will make them feel satisfied with their jobs.

H1: Salaries and benefits have a positive impact on employees' job satisfaction

(2) Nature of work

The nature of work is described through the suitability of personal capacity, the ability to bring creativity and challenge to the job, and the positive feelings of employees when performing the job. When the job brings employees a sense of challenge, creativity,

and suitability with their capacity, the level of job satisfaction is higher (Tran, 2005).

H2: The nature of work has a positive impact on employees' job satisfaction

(3) Training and promotion

Training is a planned and systematic activity that provides/improves employees' knowledge, skills, and attitudes related to their jobs. Training will help employees improve their knowledge and professional skills, thereby making them more effective (Parvin, 2011). Promotion can be considered a significant achievement in life. It promises to bring more salary, responsibility, authority, independence, and status. Promotion opportunities determine the level of employees' job satisfaction (Sabina, 2022; Zumrah, A. et al., 2022)

H3: Training and promotion have a positive impact on employees' job satisfaction

(4) Working environment

The working environment is related to the ability to equip machinery and equipment for work, labor safety, and hygiene conditions, working time, rest time, etc. Good working conditions will bring employees a sense of safety and comfort, thereby creating a sense of joy and positivity, and they will be more satisfied and work more productively (Bhatti & Qureshi, 2007).

H4: Working environment has a positive impact on employees' job satisfaction

(5) Relationship with superiors and colleagues

Good working relationships with superiors and colleagues are essential because employees always need professional opinions, constructive criticism, and common understanding from leaders and colleagues (Singh et al., 2013; Zumrah, A. et al., 2022). Moreover, good relationships with superiors and colleagues can create a professional working environment, positive attitudes, and job satisfaction.

H5: Relationships with superiors and colleagues have a positive impact on employees' job satisfaction

(6) Organization performance

Singh et al. (2013) pointed out that job satisfaction factors such as the job itself, salary and benefits, working conditions, career development, and promotion, improving employees' morale and satisfaction lead to increased employee performance and productivity, which ultimately leads to high profits, customer satisfaction as well as customer retention. Latif et al. (2013) also pointed out a strong relationship between employees' job satisfaction and productivity and then related to corporate profitability. Employees' job satisfaction positively impacts corporate profitability and improves the performance of organizations and the quality of goods and services (Baluyos G. et al., 2019).

H6: Employees' job satisfaction has a positive impact on the organizational performance

3. RESEARCH METHODOLOGY

3.1. Data collection

Data for the study were collected online through a survey form for Quang Ninh Thermal Power Joint Stock Company employees. The survey form was constructed using 7 scales with 35 observed variables inherited from Belias et al. (2015) and Sabina Mziwao et al. (2022). The observed variables were measured using a 5-level Likert

scale: 1. Completely disagree; 2. Agree; 3. Undecided; 4. Agree; 5. Completely agree.

The sample size was determined according to Hair et al. (2006), and accordingly, it was 175 observations. To ensure the quality of the data, the authors collected data from 265 subjects. After removing the ballots that did not meet the quality standards, the number of ballots included in the analysis was 252.

3.2. Data analysis

The collected data will be cleaned and analyzed on SPSS software, with the following contents: testing the reliability of the scale (Cronbach Alpha test), exploratory factor analysis (EFA), and confirmatory factor analysis (CFA), independently testing the model's hypotheses with a confidence level of 95% to confirm the statistical significance of the scales.

4. RESEARCH RESULTS

4.1. Demographic of respondents

Demographic of respondents of the sample is shown in the table 1.

Table 1. Demographic of respondents of the sample

No	Personal characteristics	Number of person	Proportion, %
1	Gender	252	100
1.1	Male	143	56.7
1.2	Female	109	43.3
2	Working position	252	100
2.1	Direct	161	63.9
2.2	Indirect	91	36.1
3	Ages	252	100
3.1	Under 30 years old	90	35.7
3.2	31- 45 years old	127	50.4
3.3	Over 45 years old	35	13.9

The analysis sample includes 143 male workers, accounting for 56.7%, and 108 female workers, accounting for 43.3%. There are 161 direct workers and 91 indirect workers, accounting for 63.9% and 36.1%, respectively. Workers under 30 years old are 35.7%; workers from 31 to 45 years old are 50.4%; and workers over 45 years old are 13.9%.

4.2. Description of research sample

The satisfaction level of employees of Quang Ninh Thermal Power Joint Stock Company is described in Figure 2.



Fig 2. Employees' satisfaction and company performance

The employees surveyed said the company's performance was good, with income and resource efficiency improving. The rating on this scale was 3.75 points. Overall, the company's employees also affirmed that they were satisfied with their current jobs, with a rating of 3.83/5 points on a 5-point Likert scale. On the training and promotion scale, relationships with superiors and colleagues were rated the highest, with average values of 3.69 and 3.89. Employees said they had been fully trained in professional skills, occupational safety, and health.

The employees interviewed said that the company's performance, income, and resource efficiency were improving. The rating on this scale was 3.75 points. Overall, the company's employees also affirmed that they were satisfied with their current job, with

a rating of 3.83/5 points on a 5-point Likert scale. On the training and promotion scale, relationships with superiors and colleagues were rated highest, with average values of 3.69 and 3.89. Employees said that they had been fully trained in professional skills, occupational safety, and health; the company paid attention to human resource training and development, and training programs met the needs of employees and job requirements, creating conditions for employees to develop their careers. Superiors always care and listen to employees, and colleagues always respect, care, and help each other, which is one of the characteristics of state-owned enterprises in Vietnam in general and in Quang Ninh in particular. In addition, the modern, open, and friendly working environment helps employees easily share their problems and opinions with superiors and receive support from them.

On the scale of the nature of work, working conditions have the lowest rating, respectively 3.15 and 3.50/5 points. In recent years, the company has implemented many solutions to ensure occupational safety and hygiene and provide working tools. The effective enforcement of labor laws in the company also contributed to increasing employee satisfaction with the working environment. Although employees highly appreciated the level of completeness of labor equipment, working time, and rest regimes, the working conditions of employees at thermal power enterprises are relatively heavy and harsh, especially direct labor. The majority of surveyed employees said that they are facing pressure from a large workload, which also limits their creativity and enjoyment of their work

4.3. Assessing the reliability of the scale

The study used the scales' Cronbach Alpha coefficients in the model to evaluate their reliability.

The analysis results of data collected at Quang Ninh Thermal Power Company showed that the observed variables of the independent scales all have a total correlation coefficient greater than 0.3, and the Cronbach Alpha coefficient is equal to or over 0.7. The KMO value is up to 0.931, and the Sig. coefficient of Bartlett's test is 0.000 < 0.5, showing that the observed variables are linearly correlated with each other as a whole and are completely suitable for factor analysis. After conducting an EFA factor analysis with the Eigenvalue > 1 criterion, the Principal Components extraction method, and Varimax rotation, the analysis results show five extracted factors consistent with the proposed model. The total variance extracted is 79.54% > 50%. The factor loading coefficients of these variables are all greater than 0.5, so they are reliable and continue to be analyzed.

The KMO value dependent scale is 0.791, and the Sig. coefficient of Bartlett's test is 0.000 < 0.5, indicating that the observed variables in dependent scales are linearly correlated and are completely suitable for analysis.

The CFA results show that all standardized regression weights of observed variables in the scales (TP, NW, SB, CS) have high values and are statistically significant (SE> 0.5; P-value = 0.000), so the observed variables in the scales achieve convergent validity.

4.4. Testing hypotheses about the relationship between variables

The results of testing hypotheses about the model are presented in Table 2

Table 2. Results of testing hypotheses about the model

Hypotheses		Impact		Estimate	S.E	C.R.	P	Conclude
H_2	JS	◄--	NW	0.27	0.045	3.17	***	Acceptance
H_5	JS	◄--	CS	0.38	0.047	4.22	***	Acceptance
H_3	JS	◄--	TP	0.18	0.058	5.16	***	Acceptance
H_4	JS	◄--	WE	0.22	0.064	6.67	***	Acceptance
H_1	JS	◄--	SB	0.34	0.045	6.81	***	Acceptance
H_6	OP	◄--	JS	0.53	0.91	4.78	***	Acceptance

The results of hypothesis testing showed that, with a 95% confidence level, hypotheses H1, H2, H3, H4, H5, and H6 are all accepted because they are statistically significant (P-value < 0.05).

Bootstrap test results with a C.R. index > 1.96 show that, with a significance level of 5%, the estimated model is considered reliable and can be used to extrapolate to the population.

The regression model describing the relationship between variables is described as follows:

JS = 0.18*TP + 0.27*NW + 0.34*SB + 0.38*CS + 0.22WE + e

OP = 0.53*JS + e

5. CONCLUSION AND RECOMMENDATIONS

Employees' job satisfaction positively impacts the business performance of Quang Ninh Thermal Power Joint Stock Company. With a significance level of 5%, factors such as salary and benefits, nature of work, training, promotion, colleagues and superiors, and working environment positively impact job satisfaction. The analysis results show similarities with empirical studies by Ahmad et al. (2013), Sabina et al. (2022), Latif et al. (2013), and Bhatti & Qureshi (2007).

The regression coefficient corresponding to the job satisfaction variable is 0.53, showing that when employees' job satisfaction increases by 1 point, organization performance will increase by 0.53 points. In the coming time, improving the level of employee satisfaction should be considered one of the important directions to strengthen the company's performance. Colleagues and Superiors are considered to have the most significant impact on the job satisfaction of employees in the company. When working in stressful and harsh conditions, spiritual values and appropriate and timely attention from superiors and colleagues will significantly improve the working environment and increase employee satisfaction. In the coming time, the company needs to organize quality competitions, events, and annual collective activities to enhance the connection and understanding between leaders and employees and between employees.

Salary and benefits have the second largest impact on employee satisfaction. The majority of employees at the company, especially direct workers, are men and play a key role in terms of income in the family. A salary sufficient to ensure life for themselves and their families is essential to employees. The company's salary and benefits regime is implemented relatively well; the average income of employees is much higher than many enterprises in the

industry or the province. Therefore, in the coming time, in addition to ensuring the salary regime according to the provisions of law and EVN, the company needs to perfect the bonus regime with clear criteria to encourage employees to improve productivity and work quality. Their income will be higher, and the level of satisfaction will also increase.

The nature of work, working environment, training, and promotion have a low influence on employees' job satisfaction at Quang Ninh Thermal Power Joint Stock Company. This is explained by the employees' understanding of job requirements and their proactive spirit in overcoming difficulties at the company. On the other hand, most of the surveyed employees are technicians with professional qualifications; working conditions are constantly improving. Therefore, these factors do not impact employees' emotions much. Nevertheless, the company should also improve job positions and the effectiveness of the KPI system to reduce work pressure and encourage employees to be more creative. In addition, the company should also improve the quality of training to improve the quality of work and labor productivity, thereby increasing employees' income, satisfaction, and business efficiency.

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RESEARCH A MODEL SHOWING THE RELATIONSHIP BETWEEN EMPLOYEE TRUST, SATISFACTION, AND COMMITMENT DUE TO THE IMPACT OF CORPORATE SOCIAL RESPONSIBILITY

Pham Minh Hai[a]*, Luu Thi Thu Ha[a], Le Thi Thu Hong[a]

[a]Hanoi University of Mining and Geology, Hanoi, Vietnam

**Corresponding author: phamminhhai@humg.edu.vn*

Abstract: *Since the idea of corporate social responsibility (CSR) was formed, it has become a topic studied by many scientists worldwide. Their research results have demonstrated that CSR impacts internal and external business performance. The satisfaction and trust of workers are content that also needs to be considered by administrators because they affect whether workers are committed to the business. Within the scope of this article, we will research the impact of CSR on objects inside the company, precisely the effect of CSR on the interactive relationship between three factors of employees: satisfaction, trust, and commitment. Through the article, the authors build a model showing the interaction between the above factors through implementing the labor practices of ISO 26000 - a set of standards that integrates the core issue of CSR. Building this model will be a premise for the authors to research more deeply at several economic corporations in the future.*

Keywords: *Corporate social responsibility, ISO 26000, trust, satisfaction, commitment.*

1. INTRODUCTION

CSR is a commitment of businesses to contribute to sustainable development through activities that improve the quality of life of employees, communities, and the whole society in a way that benefits both the business and the overall development of society. CSR is considered an essential strategy for firms in developed countries (Matten & Moon, 2008), in developing countries such as China (Yu, Kuo, & Kao, 2017) and in transition and emerging economies such as Vietnam (Advantage, 2020). Implementing CSR brings many advantages and creates a proactive position for businesses (Wolak-Tuzimek & Tuzimek, 2019), creating a good working environment, implementing good labor policies, having community support activities in charity work, cooperatives, etc., helping businesses attract employees and build good relationships, closely connecting with the community, enhancing the image of the company, enhancing reputation and brand in relations with customers and partners, creating competitive advantages (Twose & Rao, 2003). More and more businesses realize they can maximize profits and fulfill their responsibilities to society, the environment, employees, transparent corporate governance, sustainable production, etc.

To guide businesses to implement CSR, particular and practical guidance documents effectively have appeared in the world, such as improving working conditions in the workplace according to SA 8000, ensuring reliability and quality of sustainable development implementation, promoting

stakeholder participation according to AA 1000 AS, employee participation and improving working conditions in the global supply chain according to BSCI, social responsibility management for sustainable development according to ISO 26000, supply chain assessment according to SMETA 6.1. ISO 26000 is considered the most applied standard among the above standards. This standard was established in 2005 and completed in 2010, aiming to expand the definition and use of the concept of CSR. Organizations that plan and implement environmental, social, and economic sustainability initiatives are the target audience of ISO 26000. This standard provides a theoretical framework to guide businesses in conducting their activities in a way that complies with social and environmental regulations and is consistent with their priorities. Identifying ways for businesses to innovate, minimizing the risk of ecological damage caused by a company's activities, goods, or services, and boosting the competitiveness of organizations implementing the standard are some of the opportunities created by implementing ISO 26000. Complex yet simple, organizations worldwide that wish to integrate CSR into their overall business planning successfully will significantly benefit from ISO 26000. The authors conducted a general study of ISO 26000 and then described the core topic of labor practices. This is the basis for building the hypotheses in this study.

2. BRIEF CONTENT OF ISO 26000

ISO is the International Organization for Standardization. ISO comprises 163 national standards bodies worldwide, including large and small, industrialized, developing, and transitional countries. ISO's portfolio of over 19100 standards provides practical instruments for all three areas of sustainable development: economics, the environment, and society. ISO standards positively impact the world we live in. They promote trade, propagate knowledge, disseminate breakthrough technology advances, and exchange best management and conformity assessment practices. ISO standards present solutions and benefits in almost every industry, including agriculture, construction, mechanical engineering, manufacturing, distribution, transportation, healthcare, information and communication technologies, the environment, energy, safety and security, quality management, and services. ISO only creates standards if there is a demonstrated market requirement. Subject matter experts carry out the work recruited directly from the relevant industrial, business, and technological sectors that identify the need for the standard and then implement it. Others may join these experts with appropriate knowledge, such as representatives from government agencies, testing laboratories, consumer associations, academics, and international governmental and non-governmental organizations. An ISO International Standard represents a global consensus on the state of the art in the standard's subject area.

ISO produced the ISO 26000 standard, developed in 2005 and completed in 2010, to widen the definition and use of the CSR concept. The ISO 26000 standard is aimed at organizations that plan and implement environmental, social, and economic sustainability activities. It provides a framework to help businesses carry out

operations that conform with social and ecological requirements while aligning with their values and identifying techniques for a business to innovate, reducing the risk of environmental damage caused by the company's activities, commodities, or services, and increasing the competitiveness of companies implementing the standard. Organizations worldwide that want to successfully integrate CSR into their business plan would profit significantly from the ISO 26000 standard.

According to Steele & General (2010), ISO 26000 is intended for use by those who are just starting with social responsibility, and those with more experience with its implementation, as organizations, are at various stages of understanding and integrating social responsibility. While experienced users may use this standard to improve present procedures and further incorporate social responsibility into the business, novices may find reading and implementing it as a social responsibility primer helpful. The outline in Table 1 may benefit readers looking for specific types of information on social responsibility, even though this International Standard is intended to be read and applied as a whole.

Table 1. The outline of ISO 26000

Clause title	Clause number	Description of clause contents
Scope	Clause 1	To define this International Standard's scope and identify certain limitations and exclusions.
Terms and definitions	Clause 2	To identify and define critical terms fundamental to understanding social responsibility and using this International Standard.
Understanding social responsibility	Clause 3	Describe the essential factors and conditions that have influenced social responsibility development and continue to affect its nature and practice. It also describes the concept of social responsibility - what it means and how it applies to organizations. The clause guides small and medium-sized organizations in using this International Standard.
Principles of social responsibility	Clause 4	To introduce and explain the principles of social responsibility.
Recognizing social responsibility and engaging stakeholders	Clause 5	To address two practices of social responsibility: an organization's recognition of its social responsibility and its identification of and engagement with its stakeholders. It guides the relationship between an organization, its stakeholders, and society in recognizing social responsibility's core subjects and issues, as well as in an organization's sphere of influence.
Guidance on social responsibility core subjects	Clause 6	To explain the core subjects and associated issues relating to social responsibility. For each core subject, information has been provided on its scope, relationship to social responsibility, related principles and considerations, and actions and expectations.

Clause title	Clause number	Description of clause contents
Guidance on integrating social responsibility throughout an organization	Clause 7	To guide putting social responsibility into practice in an organization. This includes guidance related to understanding the social responsibility of an organization, integrating social responsibility throughout an organization, communication-related to social responsibility, improving the credibility of an organization regarding social responsibility, reviewing progress and improving performance, and evaluating voluntary initiatives for social responsibility.
Examples of voluntary initiatives and tools for social responsibility	Annex A	To present a non-exhaustive list of voluntary initiatives and tools related to social responsibility that address aspects of one or more core subjects or the integration of social responsibility throughout an organization.
Abbreviated terms	Annex B	Contains abbreviated terms used in this International Standard.
Bibliography		Includes references to authoritative international instruments and ISO Standards referenced in the body of this International Standard as source material.

Source: Steele & General, 2010

Table 1 provides an overview of ISO 26000 intended to help businesses understand how to apply this standard. The following factors guide the use of this standard. It is recommended that an organization evaluate the social responsibility principles described in Clause 4 after considering the characteristics of social responsibility and their relevance to sustainable development (Clause 3). Organizations should honor and examine these values and those specific to each vital issue (Clause 6). Before studying the concept's key topics, challenges, and connected activities or expectations, an organization should consider two essential social responsibility practices (Clause 6). These practices include acknowledging one's social duty within its sphere of influence and identifying and engaging with stakeholders (Clause 5). An organization should use clause 7's instructions to assist in integrating social responsibility into all its decisions and operations after it has understood the guiding principles, identified the essential subjects, and identified relevant and critical social responsibility issues. This includes incorporating social responsibility into the organization's policies, culture, strategies, and day-to-day operations; developing internal competency for social responsibility; conducting internal and external social responsibility communication; and routinely evaluating these social responsibility-related actions and practices. Additional guidance on the essential subjects and integration techniques of social responsibility can be received from credible resources (Bibliography), as well as a variety of volunteer programs and resources (some foreign examples are supplied in Annex A) (Steele & General, 2010).

This International Standard is not a management system standard. It is not intended or appropriate for use in regulatory or contractual settings or for certification purposes. Any attempt to certify, or claim to

certify, to ISO 26000 would be a misapplication of the International Standard and a distortion of its meaning and intent. Because it lacks standards, any such certification would be insufficient to demonstrate compliance with this international standard. It is not intended to impede the development of national standards that are different, stricter, or detailed. It is designed to function as a guide. ISO 26000 clarifies that social responsibility must be included in the organization's ongoing, ordinary, everyday operations. According to this, social responsibility must be integral to organizational strategy, with accountability and specified roles at all appropriate organizational levels. It should be taken into consideration when making decisions and carrying out activities. Clause 7 of the standard outlines how to incorporate social responsibility into all organizational activities. Businesses must decide the most successful integration strategies that align with the standard's goals. Clause 7 explicitly states that the standard is intended to serve as a framework for adopting social responsibility inside an organization. It focuses on internal review and communication strategies, as well as corporate decision-making. The organization's governance procedures and stakeholder relationships are also discussed. To assist the user in integrating social responsibility throughout the company and its "sphere of influence," this standard section includes a list of current projects and organizational structures that should be reviewed at the start of the integration process. Clause 7 of ISO 26000 provides comprehensive guidelines on how to integrate social responsibility into an organization's activities. Clause 7 contains advice on understanding social responsibility and how it applies to a given company. Throughout the discourse, it is made clear that not every issue is equally essential to every organization. ISO 26000 recommends several techniques for incorporating social responsibility into all elements of an organization's activities. Clause 7 of the guideline describes how the organization can increase its social responsibility competency and awareness. Specific instructions could be good. The company's governance and decision-making systems may need to be modified to foster social responsibility, motivate employees, and generate ideas for new strategies. It may also need to upgrade the tools it uses to monitor and analyze specific aspects of its performance.

ISO 26000 goes into an organization's sphere of influence, including other parties whose decisions or actions may affect, such as suppliers. Every organization that has or desires to have a relationship with another is encouraged to consider the social, environmental, and organizational governance components, as well as the social responsibility of the other organization. Using incentives or stipulations in contracts is one method of exerting control over other organizations. ISO 26000 defines the direction of social responsibility and guides persons in leadership positions to address the organization's mission, aspirations, values, ethics, and strategy. The organization's top objectives for addressing key subjects and challenges should be translated into realistic organizational goals that include procedures, methodologies, and deadlines. Furthermore, the corporation must determine how to incorporate social responsibility into its policies and governance processes. To do this, policies for integrating social responsibility into investment and purchase

decisions, human resource management, and other organizational duties may need to be developed. According to ISO 26000, the company should consider creating a strategy for dealing with specific social responsibility challenges in the future, considering its resources, competencies, and the significance of the issues and related actions. In addition, many social responsibility-related tasks require communication both internally and externally. ISO 26000 covers the role of communication and provides rules for ensuring that the information transmitted meets the relevant criteria. ISO 26000 offers a wide range of communication strategies. It can also be used as a reference when preparing reports on the company's social responsibility. The purpose of communication should be to initiate a discussion about social responsibility among stakeholders.

ISO 26000's recommendations may be helpful for organizations looking to increase their social responsibility credibility. According to the standard, corporations can accomplish this by directly communicating with stakeholders and providing them with more information in reports and statements. The standard provides additional guidance on resolving disputes or disagreements between an organization and its stakeholders. Organizations must occasionally provide information about their social responsibility performance to non-profit organizations and other interested parties. The organization should conduct rigorous data collection and management systems evaluations to increase its trustworthiness. These assessments may be undertaken by independent individuals or groups (internal or external to the firm) who examine the techniques used in data collection, handling, recording, and utilization. ISO 26000 provides numerous strategies to ensure that attempts to improve social responsibility performance reflect a genuine commitment to continuous improvement.

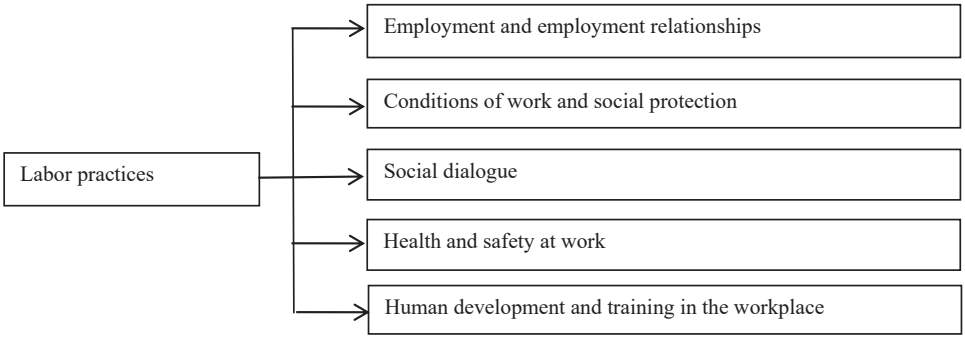
3. LABOR PRACTICES AND HYPOTHESES

The content of ISO 26000 mentions core subjects of social responsibility such as organizational governance, human rights, labor practices, the environment, fair operating practices, consumer issues, community involvement, and development. Starting with the main topic of this article, which is to investigate the influence of CSR on employee interactions with trust, happiness, and commitment, the authors will particularly demonstrate CSR content for employees using ISO 26000 core topic number 6.4 - labor practices.

Labor practices refer to all of the rules and procedures that govern work done by, for, or within an organization, including subcontract work. Labor practices include more than just an organization's dealings with direct employees or its responsibilities at a company location that it owns or directly administers. Labor practices include worker recruitment, promotion, transfer and relocation, disciplinary and grievance procedures, termination of employment, training and skill development, health, safety, and industrial hygiene, as well as any policy or practice affecting working conditions, such as compensation and work hours. To address social issues related to employment, labor practices include recognizing worker organizations and representing and involving worker and employer organizations in collective bargaining, social dialogue, and tripartite consultation. One of an organization's most important economic and social achievements is the creation of

jobs and the payment and other types of compensation received for labor performed. Complete and secure job improves living conditions and is necessary for human development. Most social problems derive from its absence. Work practices have a significant impact on respect for the law and societal perceptions of fairness. Hence, socially responsible labor practices are critical for social justice, stability, and peace.

According to core topic 6.4 of the ISO 26000 series of standards, businesses' CSR content towards employees includes the following criteria: (1) employment and employment relationships; (2) conditions of work and social protection; (3) social dialogue; (4) health and safety at work; and (5) human development and training in the workplace. (Steele & General, 2010). It is represented in the figure below.



Source: Steele & General, 2010

Fig 1. Five issues of core subject 6.4

3.1. Labor practices issue 1: Employment and employment relationships

Employment is very crucial for human growth. An organization that employs people contributes to one of society's most recognized goals: increasing living standards through full and steady employment and decent labor. Every country has legislation that oversees the relationship between employers and employees. Labor law is based on the commonly accepted idea that employees require more excellent protection since the power of the contractual parties is unequal, even though the tests and criteria for determining whether an employment relationship exists vary from country to country. In the organization's and society's best interests, the employment relationship confers rights and imposes obligations on employers and employees. Not all tasks are accomplished within the framework of an employment relationship. Men and women who work for themselves both perform work and provide services; in these cases, the parties are considered independent of one another and have a more equal and business-like relationship. Workers frequently do not receive the rights and protections they are entitled to because the distinction between employment and business partnerships is not always clear or is sometimes improperly defined. The appropriate institutional and legal framework

must be understood and executed for the benefit of society and the individual workers. All contract parties, whether labor is performed under an employment agreement or a commercial contract, have the right to be aware of their rights and obligations, as well as the avenues of recourse available if the terms of the agreement are violated.

According to Steele & General (2010), an organization should:

- be confident that all work is performed by women and men who are legally recognized as employees or who are legally recognized as being self-employed;

- not seek to avoid the obligation that the law places on the employer by disguising relationships that would otherwise be recognized as an employment relationship under the law;

- recognize the importance of secure employment to both the individual worker and to society: use active workforce planning to avoid the use of work performed on a casual basis or the excessive use of work performed temporarily, except where the nature of the work is genuinely short-term or seasonal;

- provide reasonable notice and timely information and, jointly with worker representatives where they exist, consider how to mitigate adverse impacts to the greatest possible extent when considering changes in its operations, such as closures that affect employment;

- ensure equal opportunities for all workers and not discriminate either directly or indirectly in any labor practice;

- eliminate any arbitrary or discriminatory dismissal practices;

- protect personal data and privacy of workers;

- take steps to ensure that work is contracted or subcontracted only to organizations that are legally recognized or are otherwise able and willing to assume the responsibilities of an employer and provide decent working conditions. An organization should use only those labor intermediaries who are legally recognized and where other arrangements for the performance of work confer legal rights on those performing the work;

- not benefit from unfair, exploitative, or abusive labor practices of its partners, suppliers or subcontractors, including home workers;

These lead us to the hypotheses that concern employee trust and satisfaction levels:

H1: Employment and employment relationships have a positive influence on employee trust.

H2: Employment and employment relationships have a positive influence on employee satisfaction.

3.2. Labor practices issue 2: Conditions of work and social protection

Work conditions include wages and other forms of compensation, working time, rest periods, holidays, disciplinary and dismissal practices, maternity protection, and welfare matters such as safe drinking water, sanitation, canteens, and access to medical services. Many work conditions are set by national laws and regulations or by legally binding agreements between those for whom work is performed and those who perform work. The employer determines many of

the conditions of work. Work conditions significantly affect the quality of life of workers and their families and economic and social development. Fair and appropriate consideration should be given to the quality of work conditions.

Social protection refers to all legal guarantees and organizational policies and practices that mitigate the reduction or loss of income in case of employment injury, illness, maternity, parenthood, old age, unemployment, disability, or financial hardship and provide medical care and family benefits. Social protection plays an essential role in preserving human dignity and establishing a sense of fairness and social justice.

According to Steele & General (2010), an organization should:

- ensure that the conditions of work comply with national laws and regulations and are consistent with applicable international labor standards;

- respect higher levels of provision established through other applicable legally binding instruments such as collective agreements;

- observe at least those minimum provisions defined in international labor standards as established by the ILO, especially where national legislation has not yet been adopted;

- provide decent conditions of work about wages, hours of work, weekly rest, holidays, health and safety, maternity protection, and the ability to combine work with family responsibilities;

- wherever possible, allow observance of national or religious traditions and customs;

- provide conditions of work for all workers that permit, to the greatest extent possible, work-life balance and are comparable with those offered by similar employers in the locality concerned;

- provide wages and other forms of remuneration by national laws, regulations, or collective agreements;

- provide equal pay for work of equal value;

- pay wages directly to the workers concerned, subject only to any restriction or deduction permitted by laws, regulations, or collective agreements;

- comply with any obligation concerning the provision of social protection for workers in the country of operation;

- respect the right of workers to adhere to regular or agreed working hours established in laws, regulations, or collective agreements. It should also provide workers with weekly rest and paid annual leave;

- respect the family responsibilities of workers by providing reasonable working hours, parental leave, and, when possible, childcare and other facilities that can help workers achieve a proper work-life balance; and

- compensate workers for overtime by laws, regulations, or collective agreements.

These findings lead to the following hypotheses:

H3: Conditions of work and social protection positively influence employee trust.

H4: Conditions of work and social protection positively influence employee satisfaction.

3.3. Labor practices issue 3: Social dialogue

Social dialogue includes all types of negotiation, consultation, or exchange of information between or among representatives of governments, employers, and workers on matters of common interest relating to economic and social concerns. It could occur between employer and worker representatives on issues affecting their interests and could also include governments where broader factors, such as legislation and social policy, are at stake.

Independent parties are required for social dialogue. Worker representatives should be freely elected, by national laws, regulations, or collective agreements, by either the members of their trade union or by the workers concerned. The government or the employer should not designate them. At the level of the organization, social dialogue takes various forms, including information and consultation mechanisms such as works councils and collective bargaining. Trade unions and employers' organizations, as the chosen representatives of the respective parties, have a vital role to play in social dialogue.

Social dialogue is based on recognizing that employers and workers have competing and mutual interests. It plays a significant role in industrial relations, policy formulation, and governance in many countries.

Effective social dialogue provides a mechanism for developing policy and finding solutions that consider the priorities and needs of employers and workers, thus resulting in meaningful and long-lasting outcomes for the organization and society. Social dialogue can contribute to establishing participation and democratic principles in the workplace, a better understanding between the organization and those who perform its work, and healthy labor-management relations, thus minimizing the need to resort to costly industrial disputes. Social dialogue is a powerful means of managing change. It can be used to design skills development programs that contribute to human development and enhance productivity or to minimize the adverse social impacts of change in the operations of organizations.

Social dialogue can take many forms and can occur at various levels. Workers may wish to form groups with broader occupational, inter-occupational, or geographical coverage. Employers and workers are in the best position to decide jointly the most appropriate level. One way to do this is by adopting framework agreements supplemented by local organization-level agreements following national law or practice.

According to Steele and General (2010), an organization should:

- recognize the importance of organizations of social dialogue institutions, including at the international level, and applicable collective bargaining structures;

- respect at all times the right of workers to form or join their organizations to advance their interests or to bargain collectively;

- not obstruct workers who seek to form or join their organizations and to bargain collectively;

- where changes in operations would have significant employment impacts, provide reasonable notice to the appropriate government authorities and representatives of the workers so that the implications may be examined jointly to mitigate any adverse effect to the greatest possible extent;

- as far as possible, and to the extent that is reasonable and non-disruptive, provide duly designated worker representatives with access to authorized decision-makers, to workplaces, to the workers they represent, to facilities necessary to perform their role and to information that will allow them to have an accurate and fair picture of the organization's finances and activities; and

- refrain from encouraging governments to restrict the exercise of the internationally recognized freedom of association and collective bargaining rights.

This theoretical observation leads us directly to the fifth and sixth hypotheses:

H5: Social dialogue has a positive influence on employee trust.

H6: Social dialogue has a positive influence on employee satisfaction.

3.4. Labor practices issue 4: Health and safety at work

Health and safety at work concern the promotion and maintenance of the highest degree of workers' physical, mental, and social well-being and the prevention of harm to health caused by working conditions. It also relates to protecting workers from health risks and adapting the occupational environment to workers' physiological and psychological needs.

Work-related illness, injuries, and death impose a heavy financial and social burden on society. Accidental and chronic pollution and other workplace hazards that harm workers may also impact communities and the environment. Health and safety concerns arise over dangerous equipment, processes, practices, and substances (chemical, physical, and biological).

According to Steele and General (2010), an organization should:

- develop, implement, and maintain an occupational health and safety policy based on the principle that solid safety and health standards and organizational performance are mutually supportive and reinforcing;

- understand and apply principles of health and safety management, including the hierarchy of controls: elimination, substitution, engineering controls, administrative controls, work procedures and personal protective equipment;

- analyze and control the health and safety risks involved in its activities;

- communicate the requirement that workers should follow all safe practices at all times and ensure that workers follow the proper procedures;

- provide the safety equipment needed, including personal protective equipment, for the prevention of occupational injuries, diseases, and accidents, as well as for dealing with emergencies;

- record and investigate all health and safety incidents and problems to minimize or eliminate them;

- address the specific ways in which occupational safety and health risks differently affect women (such as those who are pregnant, have recently given birth, or are breastfeeding) and men or workers in

particular circumstances, such as people with disabilities, inexperienced or younger workers;

- provide equal health and safety protection for part-time and temporary workers, as well as subcontracted workers;

- strive to eliminate psychosocial hazards in the workplace that contribute to or lead to stress and illness;

- provide adequate training to all personnel on all relevant matters;

- respect the principle that workplace health and safety measures should not involve monetary expenditures by workers; and

- It bases its health, safety, and environmental systems on the workers' participation.

Hence, the hypotheses are expressed in these terms:

H7: Health and safety at work positively influence employee trust.

H8: Health and safety at work positively influence employee satisfaction.

3.5. Labor practices issue 5: Human development and training in the workplace

Human development includes enlarging people's choices by expanding human capabilities and functioning, thus enabling women and men to lead long and healthy lives, be knowledgeable, and have a decent standard of living. Human development also includes access to political, economic, and social opportunities to be creative and productive, enjoy self-respect, and have a sense of belonging to a community and contributing to society.

Organizations can use workplace policy and initiatives to further human development by addressing significant social concerns, such as fighting discrimination, balancing family responsibilities, promoting health and well-being, and improving the diversity of their workforces. They can also use workplace policy and initiatives to increase individuals' capacity and employability. Employability refers to the experiences, competencies, and qualifications that increase an individual's capacity to secure and retain decent work.

According to Steele & General (2010), an organization should:

- provide all workers at all stages of their work experience with access to skills development, training and apprenticeships, and opportunities for career advancement on an equal and non-discriminatory basis;

- ensure that, when necessary, workers being made redundant are helped to access assistance for new employment, training and counseling;

- establish joint labor-management programs that promote health and well-being.

So, it leads to the following two hypotheses of the dissertation:

H9: Human development and training in the workplace have a positive influence on employee trust.

H10: Human development and training in the workplace have a positive influence on employee satisfaction.

4. EMPLOYEE TRUST, SATISFACTION AND COMMITMENT

4.1. Employee trust

While research on trust has identified it as a crucial component of social interaction,

there is no agreement on defining and evaluating trust. Because trust is a complex notion, it has been challenging to define and quantify. We appear to comprehend what trust is, yet there is little agreement on what it means. (Hosmer, 1995). This isn't for lack of effort. The literature on trust is vast, including everything from trusting personality traits to trust as behavior in trade agreements (McKnight, Choudhury, & Kacmar, 2002). According to prior research on trust, various criteria influence how it is defined and measured.

The first dimension is a person's ability to trust others. The first attempts to assess trust focused on the characteristics of persons more prone to rely on others. For example, the Interpersonal Trust Scale looked at demographic (family position, socioeconomic class, religion, etc.) and sociometric (dependence on others, gullibility, humor, popularity, etc.) aspects to see what could predict trusting attitudes (Rotter, 1967). Rotter discovered that trusting individuals were likelier to be trustworthy, pleasant, and honest in their relationships. He also found that high trusters are no more likely to be misled than low trusters.

The second dimension is the interrelated character of trust, which requires opening up to others or becoming vulnerable. Trust is not a sense, but rather the deliberate control over one's reliance on another (Zand, 1972). Furthermore, trust implies that another individual, group, or organization will not exploit one's vulnerabilities. Trust is also the willingness to accept vulnerability in the face of positive expectations about another person's intentions or conduct (Rousseau et al., 1998). This susceptibility and dependency are frequently observed in organizational-public interactions. Dependent stakeholders, in which the organization wields great power and the stakeholder wields little, are in a "vulnerable position of having to trust the organization in times when a strategic decision is made that might affect their well-being" (Spicer, 2007). This can be stressful for those who must extend their vulnerability until they have established trusting relationships with the person on whom they depend. The process of developing trust involves a series of risk-taking acts among groups. A typical trust-building process begins with people recognizing that they can potentially profit from a social transaction and taking a minor risk to evaluate the benefits. As the payoff becomes more apparent, people take on greater risk, and so on until a trustworthy bond is built. The trust serves as a social lubricant in these interdependent relationships, lowering uncertainty (Cook et al., 2005).

The third dimension of trust examines the characteristics of a trustworthy person, organization, or institution. Previous studies have investigated the following trustworthiness characteristics: kindness, competence, honesty, integrity, dependability, predictability, good judgment, concern, and openness (McKnight, Choudhury, & Kacmar, 2002). After evaluating the extensive literature on trust studies in the social sciences, researchers concluded that the variables most typically used to judge another party's trustworthiness were kindness, reliability, competence, honesty, and openness. The result was the following definition: "Trust is one party's willingness to be vulnerable to another party based on the confidence that the latter party is (a) benevolent, (b) reliable,

(c) competent, (d) honest, and (e) open" (Tschannen-Moran & Hoy, 2000).

The authors present the aspects of employee trust in Table 2, starting from the concepts, definitions, and characteristics of trust mentioned, the function of employee trust in CSR activities, the guidance of ISO 26000, and labor practices.

Table 2. The aspects of employee trust under the impact of CSR

Employee trust	Believe in the management capacity of the board of business leaders
	Believe that businesses consistently fulfill their commitments to employees and the community.
	Believe that business leaders always care about the welfare of employees.
	Believe that leaders always care about employees' safety.
	Believe in the future development of the business.
	Believe that the working environment at the enterprise is good.

Source: compiled by author

The above arguments lead to the following two hypotheses of this article.

H11: Employee trust has a positive influence on employee satisfaction.

H12: Employee trust has a positive influence on employee commitment.

4.2. Employee satisfaction

Despite its broad usage in scientific research and daily life, there is still no overall agreement on employee work satisfaction levels. When defining job satisfaction, it is vital to consider the nature and significance of work as a universal human endeavor. Different authors have used various ways to define employee job satisfaction. Hoppock defined job satisfaction as any combination of psychological, physiological, and environmental elements that cause a person to state, "I am satisfied with my job" (Hoppock, 1935). According to this viewpoint, while many external circumstances influence job satisfaction, an internal component is still dictated by how the individual feels. Job satisfaction is a set of factors that lead to a sense of contentment. Vroom's concept of job satisfaction is based on the employee's involvement in the workplace. Thus, he defines job satisfaction as people's affective orientations to their current work obligations (Vroom, 1964). Spector's definition of job happiness is one of the most often used, and it states that job satisfaction concerns how people feel about their job and its various aspects. It is about how much people enjoy or loathe their employment. Job satisfaction and dissatisfaction can exist in every work environment (Spector, 1997). Job satisfaction is the sum of employees' positive and negative feelings about their jobs. Meanwhile, when a worker joins a corporate organization, he brings with him the wants, desires, and experiences that shape the expectations he previously ignored. Job satisfaction evaluates how closely expectations match actual rewards. Job satisfaction is significantly linked to an individual's workplace behavior (Davis, 1989).

Job satisfaction is a worker's sense of accomplishment and success on the job. It is widely believed to be linked to both

productivity and personal well-being. Job satisfaction comprises doing a job you enjoy, doing well, and being reimbursed for your efforts. Job satisfaction implies excitement and delight in one's work. Job satisfaction is essential for attaining recognition, money, promotion, and other goals that lead to a sense of accomplishment (Kaliski, 2007). Job satisfaction is sometimes defined as the extent to which a person is content with the rewards of their employment, particularly in terms of intrinsic motivation (Statt, 2004). Job satisfaction relates to people's attitudes and feelings about their work. Positive attitudes toward the job indicate job satisfaction. Unfavorable attitudes toward the job indicate discontent. Job satisfaction refers to people's attitudes and ideas about their current occupations. People's job satisfaction levels might vary from exceedingly satisfied to extremely dissatisfied. In addition to having broad opinions about their professions. People can develop attitudes on many aspects of their jobs, including the type of work they do, their coworkers, supervisors or subordinates, and their salary (Armstrong, 2006). Job satisfaction is one of the most critical factors impacting the efficiency and effectiveness of commercial companies. Employees should be regarded and recognized as individuals with their interests, needs, and personal goals, demonstrating the importance of job satisfaction in today's enterprises. When analyzing job satisfaction, the reasoning is as follows: a satisfied employee is a happy employee, and a happy employee is a successful employee.

The significance of job happiness is highlighted when considering the multiple negative consequences of job dissatisfaction, such as a lack of loyalty, greater absenteeism, an increased risk of accidents, and so on. Spector (1997) lists three significant components of job satisfaction. First, companies must be guided by human values. Such companies will be devoted to treating their employees fairly and with respect. In such cases, work satisfaction ratings may be a helpful indicator of employee effectiveness. Employees who are highly satisfied with their jobs may have a pleasant emotional and mental state. Second, employees' behavior will be influenced by their level of job satisfaction, affecting the organization's business operations and activities. This leads to the conclusion that job satisfaction results in positive behavior, whereas job dissatisfaction results in negative behavior among employees. Third, job satisfaction can signal organizational activities. Job satisfaction assessments can assist in defining unique levels of satisfaction in different organizational units, which can subsequently be used to evaluate which organizational unit changes will improve performance.

Beginning with the concepts, definitions, and characteristics of job satisfaction mentioned, the role of employee satisfaction in CSR activities, ISO 26000 guidance, and labor practices, the author presents the aspects of employee satisfaction in Table 3.

Table 3. The aspects of employee satisfaction under the impact of CSR

Employee satisfaction	Satisfied with the training and employee development program at the enterprise
	Satisfied with the company's remuneration and social protection regime
	Satisfied with the work to ensure health and safety at work business movements
	Satisfied with the company's charity programs for the community
	Satisfied with the work being done at the enterprise
	Satisfied with the capacity and responsibility of business leaders

Source: compiled by author

Through the basic theories about employee satisfaction towards their commitment in the organization, we have the final hypothesis of the thesis.

H13: Employee satisfaction has a positive influence on employee commitment.

4.3. Employee commitment

Employee commitment can take various forms. Commitment is the bond that employees have with their company. Employees who are dedicated to their organization frequently feel a connection to it, believe they fit in, and understand its objectives. The extra benefit of such workers is that they are more determined, productive, and aggressive in providing aid. Employee commitment is critical because high levels of commitment lead to several beneficial organizational outcomes. It demonstrates employees' identification with the company and devotion to its goals (Beloor, Nanjundeswaraswamy, & Swamy, 2017). Employee commitment is important since it predicts job performance, absenteeism, and other behaviors. Employee devotion and productivity have the strongest correlation with job happiness. Reducing absenteeism and tardiness is only possible with highly engaged employees in the organization, which leads to greater productivity and worthy performance. Employee commitment refers to an employee's decision to stay with a company regardless of the organizational climate or changes within. Commitment demonstrates the importance of a connection between partners and their commitment to continue it in the future. However, when employees see uncertainty, their willingness to continue working for the company wanes. Thus, employee commitment is a psychological condition that defines an employee's relationship with the company and is linked to the decision to stay with the firm (Beloor, Nanjundeswaraswamy, and Swamy, 2017). An organizational commitment is a type of employee commitment that incorporates job, career, and organizational commitments. An employee's organizational commitment is crucial to staff stability and better customer service, ultimately improving business performance. Employee work happiness, job performance, general productivity, and sales are all improved when employees are committed to a company. A high level of employee engagement also lowers turnover, intention to leave, and absenteeism.

Employee commitment to the firm is influenced by individual variables such as age, gender, job level, education level, and work status, among others (Bin et al., 2011). Women are generally more dedicated to their jobs than males. Employees are more loyal when there is a strong match between what they receive and what the company provides. There is a link between great leadership styles and employee engagement and turnover. Focusing on employee progress rather than the mandated evaluation technique enhances employee commitment and retention. The study discovered that transformative leadership is positively connected with employees' normative commitment. Effective leadership with charisma will increase the influence of employees' commitment to the organization (Gelaidan & Ahmad, 2013). The emotional relationship that coworkers share in the workplace is a crucial component of employee dedication to their jobs and the firm. Teamwork, working relationships with management, and the work environment all impact employees' organizational commitment.

The author presents the aspects of employee commitment under the impact of CSR in Table 4, starting with the concepts, definitions, and characteristics of employee commitment mentioned, the role of employee commitment in CSR activities, ISO 26000 guidance, and labor practices.

Table 4. The aspects of employee commitment under the impact of CSR

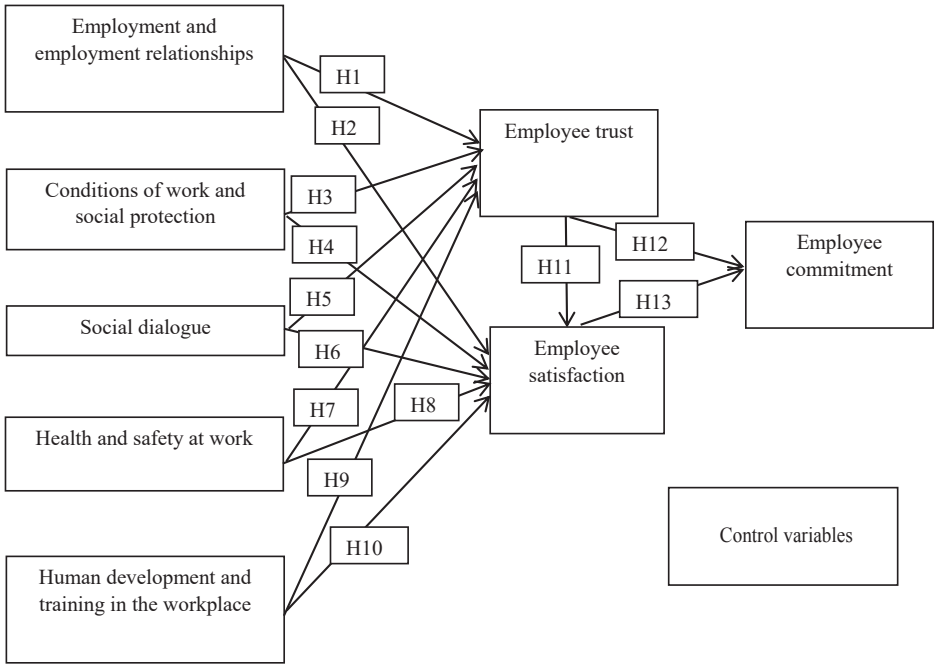
Employee commitment	Commitment to working with your current business for a long time
	Commitment to always saying good things about your business to friends and relatives
	Commitment to introducing friends and relatives to recruitment at the enterprise
	There are often people quitting their jobs and new employees coming into the company.
	Commitment to always being loyal to the business
	Employees work with a collective spirit and solidarity within the enterprise.

Source: compiled by author

5. RESEARCH FRAMEWORK ON CSR ACTIVITIES IN INTERACTION WITH EMPLOYEE TRUST, SATISFACTION AND COMMITMENT

Research framework refers to a framework that supports the research study's hypotheses by giving an introduction, description, and further context for the issue being investigated. The study's core is improved by theoretical frameworks, which are particularly effective in stressing the critical aspects of the issue of interest. It encourages us to evaluate how and when those critical factors may change. Explain, forecast, and comprehend phenomena while adhering to the critical limiting assumptions. In many cases, it challenges and enhances existing knowledge. Starting with the theoretical foundation indicated above, the authors develop a study framework for CSR activities based on labor practices issues and their connection with employee

trust, satisfaction, and commitment. This framework is illustrated in Figure 2. The authors will research the interactive relationship between CSR and employee trust, satisfaction, and commitment using activities across five topics of core labor practice issues.



Source: compiled and proposed by the author

Fig 2. Research framework

Independent variables: employment and employment relationships; conditions of work and social protection; social dialogue; health and safety at work; human development and training in the workplace.

Dependent variables: Employee trust, Employee satisfaction, Employee commitment.

Control variables: Gender, Age, Marital status, Education level, Job position, Working time, and Average monthly income.

6. CONCLUSION

The article highlights the importance of CSR in business performance and systematizes the theoretical basis of ISO 26000, especially the core topic: labor practices. Through the five contents of labor practices, the authors have proposed hypotheses related to the positive relationship between these contents about trust, satisfaction, and commitment of employees. The article's main purpose is to build a model showing the interactive relationship between faith, satisfaction, and commitment of employees under the impact of corporate social responsibility. In the future, the authors will apply the built model to large economic groups in Vietnam, such as Vinacomin, through quantitative analysis.

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SOCIAL RESPONSIBILITY TOWARDS EMPLOYEES AT VIETNAM COAL MINING ENTERPRISES: A CASE STUDY AT HON GAI COMPANY

Nguyen Thi Ngoc Anh[a*], Nguyen Thi Hong Loan[a], Chu Trong Tri[b]

[a]Hanoi University of Mining and Geology Vietnam

[b]Second affiliation, Vietnam National University, Hanoi, Vietnam

**Corresponding author: nguyenthingocanh@humg.edu.vn*

Abstract: *Implementing social responsibility towards employees is recognized as one of the important aspects of corporate social responsibility (CSR) practices. Various standards worldwide, such as SA 8000, ISO 26000, and the BSCI Code of Conduct, provide frameworks for companies to adopt CSR initiatives. This paper examines ISO 26000 in the context of CSR towards employees, specifically focusing on the issue of "labor practices", which encompasses five main aspects. An analysis was conducted at Hon Gai Coal Company, leading to several recommendations to improve the effectiveness of CSR implementation towards employees based on the main aspects of labor practices outlined in ISO 26000.*

Keywords: *CSR towards Employees, ISO 26000, Hon Gai Coal Company.*

1. INTRODUCTION

Corporate social responsibility (CSR) has become crucial to business operations. Implementing CSR benefits businesses economically, fosters strong connections between companies and stakeholders, particularly employees, enhances productivity, and increases employee satisfaction and loyalty. Global organizations such as the United Nations, the World Bank, the Organization for Economic Co-operation and Development (OECD), and the International Labour Organization (ILO) have provided guidelines for researching and promoting CSR practices, especially those related to employees.

Hon Gai Coal Company, a coal mining unit under the Vietnam Coal and Mineral Group, boasts a history of over 60 years of development. The company has effectively implemented CSR for employees to harness its production capabilities, contributing significantly to the national coal industry. It is also one of the entities applying scientific and technical advancements in pursuit of objectives related to a "Green – clean - aesthetically - modern - safe mine with fewer workers". The company currently employs over 4,000 people, with the average salary of direct workers of VND 16-18 million/ person-month. However, compared to other mining enterprises, this salary is still below the expectations of the company and its employees, given the extremely harsh working conditions in the mining sector, labor accidents, and occupational diseases. Thus, CSR for employees needs to be implemented more synchronously, scientifically, and systematically. Although there are many documents guiding the practice of CSR for businesses in general and CSR for employees in particular globally, the implementation of CSR at the company level is mainly based on subjective perceptions and qualitative assessments, lacking precise and specific measurement criteria.

The paper evaluates the current state of CSR implementation for employees at Hon

Gai Coal Company using the ISO 26000 standard, specifically the "labor practice" section. Based on the findings, the paper proposes several recommendations to enhance the effectiveness of CSR practices for employees in Vietnamese coal mining companies.

2. LITERATURE REVIEW

2.1. Corporate Social Responsibility towards Employees

Numerous studies on CSR have been conducted globally. The World Bank describes CSR as "commitments by businesses to contribute to sustainable economic development, cooperating with employees to improve their quality of life in ways that benefit both the business and the community" (Ward & World Bank Group, 2004). Thus, CSR is understood as a commitment by businesses to stakeholders, including individuals and groups benefiting from or suffering from the business's activities (Freeman & Reed, 1983). CSR can be categorized into two types: Internal CSR and External CSR.

External CSR refers to the responsibility of businesses towards external stakeholders such as customers, local communities, and business partners (Longo et al., 2005; Smith, 2007; Turker, 2009).

Internal CSR concerns activities directed toward the internal workings of the business, particularly focusing on employee benefits (Brammer et al., 2007). Ensuring employee rights stimulates creativity, improves productivity and product quality, and enhances management processes, leading to overall success and development for the business (Brammer et al., 2007).

"Corporate social responsibility towards employees represents the company's commitment to fulfilling its obligations to its employees, ensuring their material and emotional benefits align with stakeholder interests" (Hà, 2019). Corporate social responsibility in protecting employees' rights is a crucial aspect in maintaining harmonious, stable, and sustainable labor relations and achieving sustainable development, which contributes to the company's stability, thereby enhancing the company's reputation.

Corporate social responsibility in general and the responsibility of companies towards employees are recognized in many international documents, such as international standards related to corporate social responsibility/standards for organizations like ISO 26000, the international SA 8000 standard issued by the SAI organization, global guidelines and association guidelines on social responsibility towards employees such as the International CSR Framework, OECD guidelines for multinational companies, and standards from the Global Reporting Initiative (GRI).

In Vietnam, the National Technical Standards Subcommittee TCVN/TC/01/SC1 on social responsibility adopted ISO 26000 as a national standard in 2013 to help organizations implement CSR. Two topics directly related to CSR for employees are "human rights" and "labor practices."

Human rights refer to several rights of employees within a company, such as due diligence, risks related to human rights, avoidance of complicity, grievance resolution, discrimination and vulnerable groups, civil and political rights, economic, social, and cultural rights, and fundamental principles and rights at work. Labor practices focus on issues such as employment and employment relationships, working conditions and social protection, social dialogue, health and safety at work, and human development and training in the workplace.

In the theoretical framework, the paper focuses on "labor practices" outlined in ISO 26000, specifically giving brief explanations, regulations, and assessment processes for labor practices under ISO 26000.

2.2 Social Responsibility Regarding Employment and Employment Relationships

As an employer, a company contributes to social goals by improving the living standards of employees through secure, sustainable, and full employment. Employment relationships establish rights and obligations for both employers and employees within the organization and society. This is reflected in the recognized and applied legal framework within various types of labor contracts. All parties in the contract must have the right to know their rights and responsibilities and have appropriate means to address situations where contract terms are not respected.

To achieve this, companies need to ensure transparency in labor contracts, guarantee gender equality in the workplace, avoid evading legal obligations set for employers through disguised relationships, develop effective workforce utilization plans, protect employees' personal data and privacy, refrain from benefiting from unfair, exploitative, or abusive activities with partners and suppliers, and strive to enhance employment, career development, promotion, and empowerment of citizens when operating at an international level.

2.3. Social Responsibility Regarding Employment Conditions and Social Protection

Working conditions include wages and other forms of remuneration, working hours, rest periods, holidays, disciplinary practices, employment termination, protection for pregnant women, and welfare issues such as sanitation systems, canteens, and medical services. Employers must establish working conditions that comply with applicable laws and binding agreements between parties involved in labor relations. Social protection refers to all legal guarantees and practical policies designed to minimize the risk of income reduction or loss in cases of injury, illness, maternity, child-rearing, unemployment, or other financial hardships. It also aims to provide medical care and family benefits.

To address these issues, companies need to undertake several actions such as ensuring working conditions adhere to national laws and regulations, respecting higher standards established through other legally binding instruments like collective agreements, providing favorable working conditions in terms of wages, working hours, rest periods, etc.; creating an environment that promotes work-life for employees which are comparable to what similar employers in that locality offer their employees; paying wages and other forms of remuneration following legal requirements and considering these factors to be collectively bargained with employees through their representatives or collective bargaining; compensating employees for overtime work, and respecting fundamental human rights related to forced labor.

2.4. Social Responsibility Regarding Social Dialogue

Social dialogue encompasses all types of negotiation, consultation, or information exchange between or among government representatives, employers, and employees regarding issues of common interest related to economic and social matters. Effective implementation of social dialogue influences the development of policies and the finding of solutions that consider the priorities of all parties, leading to meaningful and lasting outcomes for both businesses

and society. Social dialogue can address issues of disagreement wherein parties can establish procedures for resolving disputes, grievances, and complaints mechanisms to ensure that fundamental principles and rights at work are adequately protected.

2.5. Social Responsibility Regarding Health and Safety at the Workplace

Health and safety at the workplace involve promoting and maintaining the best possible physical, mental, and social conditions for employees while preventing working conditions that harm their health. This means protecting workers from health risks and ensuring the working environment adapts to their physiological and psychological needs. Businesses must establish, implement, and maintain occupational health and safety policies; analyze and control health and safety risks related to their operations; document and investigate accidents and health and safety issues to minimize or eliminate such occurrences; and provide adequate training for all personnel on all related matters.

2.6. Social Responsibility Regarding Training and Development

Human development encompasses the process of expanding people's choices by enhancing their capacities and activities. Companies can foster human development in the workplace by implementing policies and initiatives, such as anti-discrimination measures, balancing responsibilities, providing employees access to skill development, training, and apprenticeships, and offering career development opportunities on an equal and non-discriminatory basis at all stages of their work experience. They assist redundant workers by offering access to new employment, training, and counseling.

3. IMPLEMENTATION OF SOCIAL RESPONSIBILITY TOWARDS EMPLOYEES AT HON GAI COAL COMPANY

3.1. Labor Situation at Hon Gai Coal Company

Hon Gai Coal Company is an underground coal mining enterprise, a branch of the Vietnam National Coal and Mineral Industries Group (Vinacomin). Under the Group's directive, the company ceased its open-pit mining operations at the end of 2022. As the mining operations progressed to deeper levels and geological conditions became more complex, it significantly impacted the employees' morale and mindset, leading to a decline in the workforce in 2023 compared to 2022.

Table 3.1. Hon Gai Company's Labor Situation in 2022-2023

Unit: People

Indicator	2022	2023
Total number of employees	4,097	4,011
Male	3,695	3,623
Female	402	388
Age		
< 31 years old	1,739	1,713
31 - 45 years old	2,127	1,878
45 - 55 years old	223	407
Over 55 years old	8	6
Education level		
Postgraduate	29	30
University	825	1,029
College	232	225
High school	340	335
Workers	2,671	2,599

(Source: Compiled by the authors)

Job in the underground coal mining sector is quite strenuous, hazardous, and

dangerous, with high-risk potential, creating challenging and harsh working conditions. Therefore, the representation of female workers in coal mining companies is typically modest, with most of them engaged in indirect roles. While the Company's number of direct employees is quite large, the toxic working conditions have made it easy for employees to quit and be dissatisfied with their jobs. With such characteristics, the Company must effectively adopt CSR focusing on employees. In addition to fulfilling legal obligations related to employee rights, the Company should implement measures to enhance CSR concerning employment, sponsorship, working conditions, training, and development in order to increase employee satisfaction, thereby reducing turnover intentions and fostering greater loyalty to the Company.

The Company's statistics reveal that its employees' average age has been decreasing in recent years, indicating a trend towards a younger workforce. Employees under the age of 45 make up over 80% of the Company's total workforce.

Regarding educational qualifications, the company has gradually developed a highly skilled workforce. Statistics show that nearly 50% of employees possess educational qualifications ranging from high school to postgraduate degrees. Over 50% of the workforce consists of skilled workers who meet the requirements and align with the development direction of the coal mining sector.

Overall, under the attention and direction of Hon Gai Coal Company and the Group, the company's workforce is ensured to be sufficient in both quantity and quality to engage in production activities, apply science and technology in mining operations, increase productivity and coal quality, and enhance business efficiency.

However, the Company's employee turnover rate is still about 2.8%-5%, the average number of occupational accidents is 2-3 cases/year, and the incidence of occupational diseases is high even though the company has implemented various measures to improve labor productivity and enhance employees' job satisfaction. One of those measures is adopting CSR for employees not only by legal regulations but also by improving CSR for employees. However, the company still faces many difficulties in implementing CSR for employees. Most do it passively or at the request of relevant parties, and there is a lack of a precise measurement or evaluation framework for CRS practices. Therefore, the authors propose to evaluate the Company's CSR implementation situation for employees based on "labor practices" outlined in ISO 26000.

3.2. Implementation of Social Responsibility Regarding Employment and Employment Relationships

Hon Gai Coal Company is effectively managing employment and employment relationships. The company based its recruitment on each period's production plan, the required professional standards, and job specifications, with employee numbers and structure aligned with the allocation approved by the Group and the Company. The Company maintains a policy of expanding recruitment opportunities to all applicants without discrimination, regardless of region or gender, to ensure equal opportunities for qualified candidates during the hiring process. Currently, 100% of employees have labor contracts that comply with legal regulations, and nearly 100% of employees have signed indefinite-term contracts with the Company.

Currently, the drafting of employment contracts at the company is carried out in

accordance with the Labor Code 2019, Circular No. 04/2021/TT-BCT, dated July 16, 2021, and the internal regulations of Vinacomin. However, some contract clauses do not clearly specify the obligations that employees and employers must adhere to. For example, Article 2 of the employment contract outlines job duties and work location but only refers to the work to be performed based on established labor norms or assigned by direct supervisors according to production requirements. In Article 4, regarding the rights and obligations of employees, it is stated that employees must fully and correctly perform the agreed-upon work. This lack of clarity makes it difficult for employees to refer to applicable regulations, as they do not specify the exact tasks employees are required to complete but are expected to fulfill the commitments. Moreover, the contract mainly focuses on salary, salary increase policies, allowances, and working conditions, with insufficient attention to clauses related to occupational safety, compensation, and other benefits.

3.3. Implementation of Social Responsibility Regarding Employment Conditions and Social Protection

For underground mining jobs, the company adheres to Circular No. 04/2021/TT-BCT, dated July 16, 2021. Working hours are limited to a maximum of 7 hours per day and 42 hours per week. Under normal conditions, employees are entitled to at least 30 minutes of rest during an 8-hour continuous work shift or 6 hours if working hours are shortened according to legal regulations. Employees working night shifts are entitled to a minimum break of 45 minutes within working hours.

Due to the challenging work nature, including exposure to heat, wind, dust, and harsh conditions in underground mines, the Company generally does not schedule overtime for this group of workers. This policy is designed to protect their health, ensure safety, and prevent occupational diseases.

Regarding social protection, the Company has implemented various practical policies and actions to safeguard and support employees, adhering to the "Close–Sharing – Practical" principle in caring for the quality of employees' lives. The Company issued Decision No. 1727/QĐ-VHGC concerning the management and use of reward funds, welfare funds, and managerial bonuses. This decision aims to invest in the construction or repair of welfare facilities, fund collective welfare activities, provide financial assistance to employees in difficulty, and support charitable work for organizations and individuals outside the Company.

3.4. Implementation of Social Responsibility Regarding Social Dialogue

Hon Gai Coal Company's trade union has effectively fulfilled its grassroots organization role. It regularly carries out educational and promotional activities for its members and employees. The union effectively upholds local democracy regulations, organizing periodic dialogues based on principles of democracy, openness, transparency, and cooperation. These efforts have effectively addressed employees' concerns.

The Hon Gai Coal Union has focused on improving both the material and emotional well-being of its members and balancing work and personal life. All the Company's employees are members of the grassroots union. The Company has constructed and operationalized two five-story dormitories with full amenities, providing accommodation for over 700 workers. Annually, it organizes staff visits and vacations, supports 336 families in difficult circumstances, assists in building and repairing homes for those in need, and ensures that employee benefits and policies are upheld.

The grassroots trade union has effectively fulfilled its role as the representative organization for employees, adhering to the provisions of the 2019 Labor Code, the 2012 Trade Union Law, and the Charter of the Vietnam General Confederation of Labor. Annually, the Company organizes dialogue conferences between employees and employers to discuss, exchange opinions, and propose solutions to address policies and benefits for employees, improve the working environment, enhance productivity, quality, and work efficiency, reduce costs, and strengthen occupational safety measures. However, the level of representation of the Company's union remains ambiguous, and it has not effectively advocated for employees' interest in negotiating with employers. Activities such as building collective labor agreements, negotiations, or social dialogue remain limited. However, the research reveals that the Company's union primarily focuses on taking care of employees' well-being while lacking a voice in wages, bonuses, working hours, and safety issues to safeguard the best interests of employees.

3.5. Implementation of Social Responsibility Regarding Health and Safety at the Workplace

As a subsidiary of Vinacomin, Hon Gai Coal Company has effectively implemented health and safety measures for employees complying with Vinacomin's policies. Regarding employees' health-related policies, the Company operates a medical station with 17 health professionals on duty 24/7 to provide first aid in case of accidents and to care for employees' health. Each year, the Company collaborates with provincial hospitals to conduct routine health check-ups for employees, with direct production workers receiving check-ups twice a year to facilitate early detection of occupational diseases. Following these check-ups, employees are provided with nutritional supplements to support their health. In alignment with the Group's policies, employees with occupational diseases, such as pneumoconiosis, receive timely treatment, and the Company has expanded its pneumoconiosis treatment program. The participation rate of employees in annual health check-ups exceeds 98.9%. The Company actively listens to employees' legitimate opinions and requests to implement suitable healthcare initiatives, such as adjusting meal plans, providing portion-controlled meals, ensuring hydration after shifts, and increasing allowances for strenuous and hazardous work by offering nutritionally rich foods.

Regarding workplace safety, the Company regularly organizes safety training, technical management sessions, and hygiene campaigns to promote occupational safety. As an underground mining operation, the Company conducts frequent inspections and evaluations of terrain surfaces to detect subsidence and other potential hazards. It also reviews technical processes, design documents, construction measures, safety procedures, and incident management procedures. The Company incorporates scientific and technological advancements into its production process, promotes a safety-oriented culture, and emphasizes adherence to established procedures and standards, avoiding shortcuts and unsafe practices. In 2022, there were no fatalities due to occupational accidents. However, in 2023, one fatality occurred. In response to such incidents, the Company provides support to the family and dependents, including employment opportunities for the spouse, assistance for the care of children until they reach 18 years of age, and additional support for the deceased worker's family.

As the mining operations at Hon Gai Coal Company progress to greater depths,

with complex geological conditions and challenging, hazardous working environments, employee turnover has noticeably increased during 2022–2023. The average monthly wage for underground miners is VND 19 million per person, which is low compared to other underground mining companies within Vinacomin. Despite the Company regularly organizing labor safety courses and training, occupational accidents and the prevalence of occupational diseases tend to increase due to increasingly harsh mining conditions. Furthermore, employee support policies have not been effectively disseminated, resulting in difficulties for employees in accessing the policies' provisions.

3.6. Implementation of Social Responsibility Regarding Training and Human Development

The company places significant emphasis on training and development, considering it a core and continuous task necessary for enhancing its workforce quality. The goal is to promptly meet the demands of production and business tasks and develop a workforce that is "politically solid, proficient in their skills, and responsible, disciplined, and capable". To achieve this goal, the company actively participates in all training programs organized by the Group, and the Company's Training Department provides advice on drafting regulations related to employee recruitment, mentoring, professional development, and decisions regarding employee training, development, and internships. The company proactively develops training plans, including professional development, mentoring, and skill transfer for staff in various positions to enhance their expertise, regularly update skills, effectively apply new scientific and technological applications, and integrate advanced technology into management and production. The company collaborates with Vinacomin Business Management School to conduct specialized training and workshops for employees and works with the Mining and Minerals College to offer vocational training courses. Additionally, in 2023, the Company's Youth Union initiated summer sports classes for its employee children to promote physical fitness and allow the parents to focus on their work with peace of mind.

The development and training efforts at Hon Gai Coal Company are given significant attention, closely aligned with the directives from Vinacomin and the various organizational entities within the Company's political system. This focus ensures that employees are well-trained and meet the high standards for a quality workforce.

4. CONCLUSION AND RECOMMENDATIONS

Based on ISO 26000, Hon Gai Coal Company has made notable progress in implementing social responsibility concerning worker rights. However, some limitations persist. Labor contracts often contain vague and ambiguous information regarding job responsibilities, complicating the assessment of task completion. Additionally, the regulations for supporting employees affected by occupational diseases or workplace accidents are complex, making it difficult to provide adequate compensation. Regarding occupational health and safety, some persistent issues remain, such as the ongoing prevalence of occupational diseases, limited access to pneumoconiosis treatment, and an increasing trend in workplace accidents. Furthermore, the professional development training programs have not always aligned with the actual needs of employees in their specific roles. Addressing these challenges will be crucial for further enhancing the company's social responsibility practices.

The underlying causes of the above limitations stem from the awareness of the Company leaders and employees. Company leaders may not fully understand CSR with employees and do not pay attention to expanded responsibilities beyond legal

regulations and international labor standards to guarantee and enhance worker rights. Today, many sets of standards, regulations, instructions, and scales exist for implementing CSR with employees worldwide. However, Company leaders often lack a comprehensive understanding of these international standards and are not adequately aware of their role and importance, which has somewhat constrained the effectiveness of CRS initiatives. Besides, there is a lack of understanding among employees regarding their rights in the workplace. Many employees still have limited knowledge about their rights and obligations as well as those of businesses towards them. In fact, the Company's employees have not researched and fully understood the meaning of CSR to employees. Their main concerns are job stability and salaries, issues related to types of labor contracts, working hours, etc. However, working hours, working conditions, and welfare are largely overlooked. The level of labor union representation remains unclear.

From the above situation, the authors propose several recommendations to improve the effectiveness of implementing social responsibility in ensuring the rights of workers according to the issues specified on "labor practices" of ISO 26000, such as :

First, it is essential to clarify certain aspects of employment contracts to ensure that employees fully understand their rights and obligations. Although the company has established a "Regulation on the Management and Use of Reward Funds, Welfare Funds, and Managerial Bonuses," Section 2, Article 7 of this regulation indicates that funds are managed according to legal requirements and Company regulations without specifying the details of allowances, bonuses, and benefits. This lack of clarity may prevent employees from being fully informed about the additional compensation and support they are entitled. The Company should refine its employment contracts to include detailed information about allowances, bonuses, and benefits to address this issue. These details should also be reflected in collective bargaining agreements. By doing so, employees will have a better understanding of their entitlements and benefits, enhancing transparency and ensuring that they are aware of the full scope of their rights under company policies and regulations.

Second, occupational safety, working conditions, and workplace hygiene have not received sufficient attention. Although the company has a relatively high rate of safety training, the incidence of occupational accidents and diseases remains a concern and shows an upward trend. The company must review and update its underground mining operation regulations, standards, and procedures to address these issues. Immediate measures should be taken to rectify and mitigate risks to ensure absolute safety for employees. This includes eliminating high-risk technologies, establishing a mining emergency response center, and implementing risk management using 4.0 technology to minimize incidents.

Third, the Company should implement specialized medical software for monitoring, diagnosing, and treating employees' health. This system would enable timely tracking and early detection of health issues among workers. Additionally, establishing a partnership with the Vietnam Coal and Mineral Industries Hospital to provide regular check-ups and treatment for those at high risk of occupational diseases is crucial. Expanding the group of individuals eligible for lung cleansing and refining regulations concerning the health and treatment of occupational diseases is also important.

Fourth, there should be increased efforts in disseminating labor laws and promoting occupational safety to prevent accidents. The Company must enhance legal

awareness among employees to gradually foster a culture of legal compliance. This initiative will help employees resolve social relationships in accordance with the law, thus reducing conflicts with employers. The Company should organize training sessions and provide fundamental knowledge on strike procedures, and the processes and procedures for resolving collective and individual labor disputes. It also should implement "Legal Q&A" sections on industry magazines and websites and enhance the role of unions and other organizations in supporting workers.

Fifth, training programs should be developed based on employee-specific needs and skill levels to ensure they are effectively prepared for their roles. Currently, the Company's training programs are designed based on Vinacomin's development orientation and strategic goals without sufficient attention to whether the courses are beneficial for the participants or necessary for the employees' job positions. Therefore, training should be based on the needs, qualifications, or competency frameworks specific to each employee's position.

Sixth, the company needs to improve its social responsibility towards employees by enhancing leaders' and managers' understanding of social responsibility and raising employees' awareness of its social responsibility initiatives.

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PERSPECTIVE OF CREATING SHARE VALUES IN ASSESSMENT THE BUSINESS PERFORMANCE OF VINACOMIN

Pham Thu Trang[a], Nguyen Thi Hong Loan[a], Nguyen Thi Ngoc Anh[a], Nguyen Thi Hoa[b*], Chu Trong Tri[c], Nguyen Thi Tuoi[d]

[a]Hanoi University of Mining and Geology, Hanoi, Vietnam

[b]VNU University of Economics and Business, Hanoi, Vietnam

[c]VNU University of Economics and Business, Hanoi, Vietnam

[c]Hung Yen University of Technology and Education, Hung Yen Province, Vietnam

**Corresponding author: triminhha29101991@gmail.com*

Abstract: *Vinacomin, a significant entity in Vietnam's economy, faces various challenges but strives for business efficiency and social contributions. To sustain its growth and social contributions, Vinacomin must adopt a business model that integrates the concept of creating shared value. The study identifies key dimensions of shared value for Vietnamese coal mining enterprises through expert interviews and literature reviews. The critical aspects include business efficiency, environmental impact, employment conditions, supply chain management, automation and innovation, infrastructure development, and social contributions. The research proposes a shared value model tailored to Vinacomin, emphasizing the central role of automation and innovation. By advancing these areas, Vinacomin can enhance economic value, reduce environmental impact, improve supply chains, and bolster working conditions, ultimately leading to sustainable business performance and social development. Furthermore, the study suggests specific criteria for evaluating business performance from a shared value perspective, adapting to the unique context of Vietnamese coal mining enterprises.*

Keywords*: creating shared value (CSV), Vinacomin, business performance.*

1. INTRODUCTION

Vinacomin plays a significant role in the Vietnamese economy. Despite facing numerous difficulties and challenges, Vinacomin has consistently strived to achieve business efficiency while contributing to society. Vinacomin has created nearly 100,000 jobs, with workers' average monthly income reaching VND 16.43 million in 2023. In particular, Vinacomin's mineral mining enterprises have contributed significantly to the state budget, with nearly VND 29,000 billion in 2023 (Mai Chi, 2024). The Group actively shares responsibility with the community through various social security activities. Social security support work focuses on building welfare facilities, new rural development programs, supporting the poor, the disadvantaged, policy beneficiary families, meritorious people, and volunteer associations, which are highly appreciated by central and local authorities (Communist Party of Vietnam, 2014). During the interviews, Vinacomin's business leaders acknowledged that implementing social responsibility initiatives has increased the business's cost burden. Therefore, Vinacomin must adopt a new business model that integrates social and environmental issues into its business strategy from the shared value perspective to promote business development, improve competitiveness, and ensure sustainable social development in the current context.

To identify a new business model that approaches the concept of shared value, the article employs an expert interview methodology involving senior leaders, department managers, and employees from Vinacomin's enterprises with close connections to the Hanoi University of Mining and Geology to explore the characteristics of Vietnamese coal mining enterprises and the shared values that these enterprises create. Additionally, a comprehensive review of relevant research was conducted to propose a business performance evaluation model suitable for Vinacomin.

2. BUSINESS PERFORMANCE AND CREATING SHARED VALUE

2.1. Business Performance

Business performance refers to how well a company achieves its goals and objectives. It encompasses various metrics and indicators that provide insights into different aspects of the company's operations, such as financial performance, operational performance, market performance, employee performance, innovation and development, sustainability, and social responsibility. Evaluating business performance involves analyzing these various metrics to understand the company's overall health and progress, identifying areas of strength and opportunities for improvement, and making informed decisions to drive future success.

Business performance evaluation models continually evolve to suit different stages of economic development. These models can be divided into four groups: financial performance evaluation models (e.g., Dupont financial pyramid model and 4-aspect financial model), business performance evaluation models (e.g., Bruce Clark's market performance evaluation model, Skinner's 5-objective model, Lynch and Cross' SMART pyramid model, Keegan et al.'s matrix model, Fitzgerald et al.'s outcome and determinant model, Brown's input-process-output-result model, Robert Kaplan and David Norton's balanced scorecard model), supply chain performance evaluation models (e.g., Lambert's supply chain performance evaluation model) (Neely, 2007), business performance evaluation models from a social responsibility perspective(Sweeney, 2009), and shared value model (Porter & Kramer, 2011).

Vinacomin, as a state-owned enterprise, is required to meet both economic and social objectives. Consequently, conventional models for evaluating financial performance, business efficiency, and supply chain performance fail to address the Group's unique responsibilities. Moreover, performance models rooted in social responsibility tend to impose significant financial pressures on the organization. The shared value model, however, presents a more robust solution. By embedding social concerns into the Group's core strategy, this model enables Vinacomin to assert control over the process of creating shared value with stakeholders, driving business growth while mitigating external financial burdens.

2.2. Creating Shared Value

In recent years, business has increasingly been viewed as a major cause of social, environmental, and economic problems. Companies are widely perceived to prosper at the broader community's expense. Therefore, companies must take the lead in reconciling business and social interests. However, we still lack an overall framework for guiding these efforts, and most companies remain entrenched in a "social responsibility" mindset, where social issues are peripheral rather than central. The solution lies in the principle of shared value, which entails creating economic value that also generates value for society by addressing its needs and

challenges. Businesses must realign their success with social progress. Shared value differs from social responsibility, philanthropy, or sustainability; it is not peripheral to company operations but is central to them.

The concept of shared value can be defined as policies and operating practices that enhance a company's competitiveness while simultaneously advancing the economic and social conditions in the communities in which it operates. Shared value creation focuses on identifying and expanding the connections between social and economic progress (E. Porter and Mark R. Kramer, 2011).

Creating shared value aims to improve business performance by creating competitive advantages through well-managed social relationships between businesses and stakeholders such as employees, customers, suppliers, and the community where the business operates. To create shared value, businesses must incorporate the community and stakeholders' interests into their goals, strategies, and actions. Only then can businesses improve business performance and help society move forward faster.

The concepts of shared value and corporate social responsibility are often confused, although they have completely different approaches. While the Creating Shared Value (CSV) perspective encourages businesses to integrate economic and social benefits to create competitive advantages, the Corporate Social Responsibility perspective (CSR) only directs businesses to excel in business activities and be responsible for social issues to promote their image. The shared value that businesses create is intentional, opening up new needs, markets, value chains, and ways of thinking about business. This helps create new opportunities in strategic positioning and new competitive advantages.

In the report "Measuring Shared Value - How to Unlock Value by Linking Social and Business Results", Micheal E.Porter et al. (2011) identified three levels of value sharing: 1- Reconceiving product and markets (How targeting unmet needs drives incremental revenue and profits); 2- Redefining productivity in the value chain (How better management of internal operations increases productivity and reduces risks) ; 3- Enabling cluster development (How changing social conditions outside the company unleashes new growth and productivity gains).

Thus, unlike the perspectives of social responsibility and sustainable development, we do not have a model for evaluating business performance based on the shared value perspective that is universally applicable but must be suitable for each business context. The model for evaluating business performance based on the shared value perspective also evolves according to the business's space, time, and business strategy. The shared value of the business will also change along with its development. Awareness of shared values has grown recently, but evidence that operationalizing them increases organizational performance and social outcomes remains limited.

When providing examples of shared value, Porter and Kramer (2011) highlighted aspects such as energy use, water use, employee health, worker safety, employee skills, supplier access and viability, and company productivity. Suripto approaches shared value in three aspects: Business Aspect, Environmental Aspect, and Social Aspect. Suripto also proposes a set of assessment indicators to measure these aspects, focusing specifically on working conditions. (Suripto 2024)

Regarding the value sharing of mining enterprises, two studies by Talifhani Khubana et al. have indicated the managers' perceptions of large mining organizations on value sharing. The author proposes a model of value-sharing factors through a theoretical overview, including environmental impact, employment conditions, value/supply chain considerations, automation and innovation, infrastructure development, and regulatory and legislative conditions. Through quantitative analysis, the paper confirms that the variables "Automation and innovation" and "Employment conditions" positively impact shared value. The study also demonstrates that the results of shared value are competitive advantage and sustainable performance. (Khubana, Rootman, and Elroy E. Smith, 2022)

Based on previous studies, the article proposes a model for evaluating business performance from the perspective of shared value, including the following aspects: Business Aspect, environmental impact, employment conditions, value/supply chain considerations, automation and innovation, infrastructure development, and regulatory and legislative conditions.

Business Aspect:

The business aspect includes indicators of the enterprise's business performance, such as company productivity, revenue growth, market share, profitability, and efficiency. Other indicators include the company's logistics and operating costs, the supply of raw materials, and product quality (Suripto, 2024).

Environmental impact:

Environmental impact, as a variable influencing Shared Value (SV), refers to organizations' actions that can minimize their adverse effects on natural resources, benefiting both communities and the organization. This includes sustainable resource use, eco-friendly practices, pollution control, and waste reduction. According to the European Union (2011), organizations must work with stakeholders to recognize and reduce future environmental harm. Effective environmental management focuses on resource consumption, emissions treatment, and waste disposal in sustainable ways.

Suripto's proposed environmental impact measurement indicators include reducing energy consumption, disclosing water withdrawal based on source, reducing water usage, disclosing recycling and reuse of water, disclosing water releases based on quality and purpose, reducing CO_2 emissions, reducing waste production, disclosing waste by type and disposal method, receiving awards in the environmental field, and disclosing significant impacts on biodiversity (Suripto, 2024).

Employment conditions:

The employment conditions encompass various aspects of the work environment that impact an individual's life and work, including contract types, pay and benefits, workplace safety, equity, professional development, and task allocation. Nilsen and Ringholm (2019) and Mustafa and Ali (2019) describe employment conditions as practices aligning employee and employer expectations. Kang and Na (2020) suggest that by adopting family-friendly and SV-oriented HR policies, organizations can attract and retain talent, support local communities, enhance workforce mobility, and build unique competitive strengths. For mining companies, improving employment conditions and implementing SV policies can contribute to community development, reduce unemployment, and ultimately lower poverty and illiteracy, thereby improving living standards (Porter et al., 2012).

Employment conditions can be evaluated using criteria such as improving occupational safety and health, increasing employee income, reducing employee turnover, increasing job creation, reducing work accidents, and enhancing education through Employee Training Hours (Suripto, 2024).

Value/supply chain considerations:

Value/supply chain considerations involve identifying social or economic gaps within the value-creating network and reconfiguring them innovatively to promote sustainable development for communities. According to Kang and Na (2020), the value chain dissects an organization's value-generating activities, such as HR, IT, and procurement. SV approaches focus on reimagining goods, markets, and competitiveness while fostering local community development. SV organizations innovate their supply chains by reducing costs, using sustainable transport and energy, converting waste into economic resources, and empowering local suppliers (Mumbi Wachira et al., 2020).

Automation and innovation:

Automation refers to the intelligent control of systems using technology to operate without human input, while innovation involves developing new solutions that address unmet needs and create lasting impacts (Ralston et al., 2017). Both automation and innovation span various dimensions, including business model innovation, R&D, digitization, and product redesign (Amit, R. & Zott, C., 2012).

Infrastructure development:

Infrastructure development encompasses the quality, quantity, and accessibility of essential facilities like water and energy supply, transport networks, and other services that drive socio-economic progress. Research widely agrees that infrastructure investment is crucial for promoting development, equity, poverty alleviation, and economic growth (Calderon & Serven, 2010). Sustainable infrastructure enhances citizens' quality of life, protects natural resources, and ensures efficient use of financial resources (Saghir, 2017).

Regulatory and legislative conditions

Regulatory and legislative conditions encompass government interventions to promote economic progress and social well-being for all stakeholders (Moczadlo, 2015). This study focuses on regulations relevant to the governance of mineral resources, including policies, the Mining Charter, and other accountability and transparency measures. The growing stakeholder expectations regarding social and environmental responsibilities have intensified the discussion on Shared Value (SV) (Font et al., 2016).

3. VINACOMIN'S SHARED VALUE

3.1. Current status of Vinacomin's shared value creation

The article uses literature reviews and expert interviews to assess how Vinacomin creates shared value. Experts all agreed that Vinacomin creates shared value by (1) increasing business efficiency, (2) reducing environmental impacts, (3) improving working conditions, (4) perfecting the value chain/supply chain, (5) increasing automation Regarding terms of regulatory and legislative compliance, it is understood that Vinacomin, as a state-owned enterprise, adheres to all relevant state policies and regulations. Furthermore, Vinacomin consistently contributes significantly to the state budget and local communities, reflecting its longstanding tradition of generating shared value for society. The seventh key element, 'contribution to society,' will emphasize Vinacomin's financial contributions to the

state budget and local support, extending beyond mere employment considerations.

Business aspect

Despite facing numerous challenges in 2023, the Group achieved record coal output for electricity production, surpassing the previous year by 4.8 million tons. The Group's total revenue reached VND 170.85 trillion, exceeding the planned target by 101.2%, with an estimated profit of VND 7.8 trillion, an increase of VND 2.8 trillion compared to the plan. (VietnamEnergy, 2024)

Vinacomin maintained and developed State capital and accumulated resources to increase equity capital in the forthcoming period. (Vinacomin, 2023)

Experts have highlighted the importance of incorporating the Group's economic value-added indicator, as it provides a more comprehensive assessment of the Group's economic contributions than traditional revenue and profit indicators. Attention to cost management indicators is also recommended to preserve of the State capital. Consequently, Vinacomin's economic contribution can be evaluated from the following perspectives: increased company revenue, enhanced profitability, improved productivity, cost reduction, and the growth of the Group's economic value added.

Environmental impact

Open-pit mining presents significant environmental challenges, including extensive water consumption, severe pollution of air and water, degradation of landscapes, and irreversible destruction of habitats. Even after the exhaustion of pits and site rehabilitation, these areas continue to pose elevated risks of erosion and flooding. Despite technological advancements to reduce pollution, controlling dust in open-pit mining remains a persistent issue due to challenging environmental conditions. According to the officers from the investment-construction-environment department of open-pit coal mining enterprises, dust treatment remains a primary environmental concern. They note that despite implementing multiple strategies, such as coal conveyor systems, covering transport vehicles, planting trees at waste dumps, establishing dust-blocking tree belts, and utilizing watering systems, complete dust control remains elusive. Strong winds exacerbate the issue in hot and dry conditions, particularly on waste dump slopes.".

While external environmental concerns like wastewater management are generally well-addressed for underground mining, internal challenges persist, including high temperatures, dust, and noise, which negatively impact worker productivity. Dust management and wastewater reuse continue to be significant challenges. Addressing these environmental issues is essential to the shared value that coal mining enterprises must uphold. Business leaders need to integrate these environmental considerations into their enterprises' core development strategy. This includes initiatives such as energy and water conservation, increasing the reuse rate of treated water, and enhancing restoration efforts across various landscapes, including forests (%), wastelands (%), valley pits (%), and mine tunnels (%). Additionally, reducing the number of violations related to environmental regulations, particularly those concerning dust, gas emissions, noise, vibration, wastewater, and groundwater management, is crucial.

Employment conditions

Vinacomin places significant emphasis on salaries, bonuses, insurance policies, and other employee benefits, with health care and education also being

key concerns. Despite these efforts, the challenging working conditions in confined underground mines and the high risks of fire and explosions contribute to a higher turnover rate among direct coal mining workers. The Group consistently invests in technological innovation, automation, and mechanization to address these issues, particularly in underground coal mining. Additionally, the Group ensures adequate protective equipment, gas detection devices, and danger warning systems and continually upgrades the working environment to enhance safety.

Given the immense pressure on coal mining enterprises to safeguard worker health and safety, improving these aspects is crucial. Enhancing occupational health and safety boosts labor productivity, reduces medical expenses, minimizes downtime, mitigates community conflicts, stabilizes worker income, and reduces social burdens. Key indicators that businesses should focus on include improving occupational safety and health (evidenced by a reduction in work accidents), increasing employee income, reducing worker turnover rates, and enhancing education through increased employee training hours.

Value/supply chain considerations

Vinacomin plays an essential role in managing the coal supply chain within the economy. This supply chain encompasses several key stages: exploration, preparation for mining→coal extraction→ screening and processing→loading and transportation to consumption places. Given the current challenges of declining production and business performance in the coal industry, it is imperative for Vinacomin to focus on researching and optimizing the supply chain to maximize social benefits. Vinacomin has the potential to create shared value by enhancing the economic value added across the entire coal supply chain, improving productivity at each stage, reducing operating and logistics costs, minimizing inventory levels, and increasing the profit margin on total investment capital. Addressing these areas effectively will strengthen the coal supply chain and contribute positively to the broader economy.

Automation and innovation

Vinacomin's leadership underscores the pivotal role of technological innovation in coal production, recognizing it as essential for enhancing labor productivity, enúingsuring safety, and addressing recruitment challenges. The company has embraced modern mining technologies, including mechanization across all production stages and the deployment of large-capacity equipment, as evidenced by achieving a record borehole depth in 2023. Significant advancements in underground mining have been realized through support frames and chain supports, which have contributed to increased output, improved safety, and enhanced productivity. In open-pit mining, integrating automation and smart technologies has further optimized operations, reduced labor costs, and improved environmental performance.

Vinacomin is also progressing with its digital transformation initiatives, focusing on geological data management, operational systems, and digital platforms, with the goal of completing this transition by 2025. In addition, coal mining enterprises are actively researching and developing new products, such as recycling mine wastewater for domestic use and repurposing waste rock and soil for land leveling. To evaluate the automation and innovation capabilities of enterprises, several indicators can be utilized, including the number of innovative methods and initiatives applied in production, the efficiency of upgraded equipment, the

reduction in coal loss percentages (%), and the increase in R&D spending as a proportion of revenue. These metrics will provide a comprehensive assessment of Vinacomin's progress in technological innovation and its impact on operational efficiency and sustainability (Vinacomin, 2023).

Infrastructure Development

Significant infrastructure investments are underway to support coal production and transportation in the Quang Ninh coal region, although some road sections need renovation due to deterioration. The conveyor system is expanding, with 12 lines totaling 46.6 kilometers already completed and an additional four lines extending 16.3 kilometers currently under construction. The railway system is fully utilized to efficiently transport coal to export ports and power plants. In inland coal regions, coal transportation is predominantly carried out through existing railways and conveyor belts, with road transport largely phased out. However, despite these advancements, infrastructure connectivity remains limited in certain areas, posing challenges to seamless coal transportation.

Vinacomin's future infrastructure plans focus on enhancing and constructing new facilities to boost coal production efficiency, strengthen environmental protection, and improve disaster prevention measures. The company is committed to modernizing transportation systems, expanding and renovating inland ports, and developing large-scale regional coal ports and logistics systems with advanced, environmentally friendly technology. These efforts aim to meet the growing domestic demand for coal, particularly for power generation. The shared value generated from this infrastructure development can be assessed by considering the number of new infrastructures brought into operation and the overall efficiency of their utilization.

Contribution to society

In 2023, Vinacomin contributed nearly VND 29 trillion to the State budget, surpassing the planned amount by VND 8.5 trillion and achieving 141% of the target. Since 2018, the company has supported 656 trade union shelters with over VND 33 billion, aided 126 policy beneficiary families with over VND 11 billion, and built 23 housing areas for mining workers. Vinacomin has consistently provided social security support in its operating areas, including infrastructure development in impoverished districts, disaster relief, and poverty reduction efforts. However, there is a call for more coordinated and strategic contributions to local communities, aligning these efforts with provincial planning to ensure effectiveness and prevent unnecessary or redundant expenditures. A director remarked, "Coal mining enterprises have actively contributed to the locality. However, spontaneous contributions by enterprises sometimes lead to issues of inefficiency. For instance, many communes in Quang Ninh have an excess of public facilities like cultural houses, while other areas face shortages. Therefore, I believe contributions to the locality should be synchronized with the Group and aligned with the Province's planning to avoid situations where communes make spontaneous requests for funding." To maximize their contributions' social impact and cost-effectiveness, Vinacomin should incorporate these local contributions into the company's long-term strategy and action plan, ensuring they align with local development strategies. This approach would help avoid spontaneous

contributions that are costly for the enterprise and not highly effective socially. Criteria for evaluating Vinacomin 's contributions to society could include the total contributions to the state budget, the extent of contributions to local communities, and the effectiveness or benefits derived by the locality from these contributions.

3.2. Shared value model of Vinacomin

From the study of the current status of the shared value of coal mining enterprises and the opinions of experts, the article finds that in order to increase shared value, Vinacomin must continuously increase automation and innovation in business. Increasing automation and innovation is central to the entire shared value chain. When innovating, Vinacomin will increase economic value, increase social contributions, reduce environmental impacts, develop infrastructure, improve supply chains, and improve working conditions. The following model can represent Vinacomin's shared value (Fig 1).



Fig 1. The model for assessment of Vinacomin's business performance from the perspective of creating shared values

(Source: authors' research)

Table 1 provides a holistic view of CSV, illustrating how business practices can align with different goals to create shared value. This approach enhances the Group's competitive edge and promotes sustainable development and social equity.

Table 1. CSV Measurement Aspects

No	CSV Measurement Aspects
1	**Business aspect** Increase in Company revenue Increased Company Profitability Increasing Company Productivity Cost Reduction Increasing economic value added
2	**Environmental impact** Saving Energy Saving water Increase rate of reused treated water Increased percentage of forest restoration, wasteland areas to be restored (%), valley pits areas to be restored (%), mine tunnel areas to be restored (%) Number of violations of environmental regulations (dust, gas, noise, vibration, wastewater, groundwater) Increase in the proportion of treated water reused

No	CSV Measurement Aspects
3	**Employment conditions** Improvement of Occupational Safety and Health (K3) (The number of Work Accidents is reduced) Increased employee income Rate of workers quitting jobs. Increased Education (Employee training hours)
4	**Value/supply chain considerations** Increasing economic value added of the entire coal supply chain Improving the productivity of the entire coal supply chain Reducing operating and logistics costs of enterprises. Reducing inventory Increasing the profit margin on total investment capital.
5	**Automation and innovation** Number of methods and innovative initiatives applied in production; Efficiency of upgraded equipment. Reduced percentage of loss coal (%) Increased Percentage of R & D spending on revenues
6	**Infrastructure Development** Number of infrastructures put into use The efficiency of infrastructure use
7	**Contribution to society** Contributions to the state budget Contributions to the locality, The effectiveness/benefits gained for the locality from Vinacomin's contributions.

(Source: Pham Thu Trang 2018; Khubana, Rootman, and Smith 2022; Khubana et al. 2022; Suripto 2024; and research of the authors)

4. CONCLUSION

Vinacomin, as a state-owned enterprise, consistently strives to fulfill its dual responsibilities of economic development and addressing social issues assigned by the government. However, the current approach to corporate social responsibility remains separate from business operations, leading to inefficiencies and financial strain on the company. To address this, the study proposes a shared value model designed explicitly for Vinacomin, integrating economic development objectives with solutions to social issues within the company's business strategy. The model emphasizes the central role of automation and innovation. By advancing this aspect, Vinacomin can increase economic value, reduce environmental impact, enhance supply chain efficiency, and improve working conditions, ultimately achieving sustainable business performance and social progress.

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THE RELATIONSHIP BETWEEN JOB SATISFACTION AND ORGANIZATIONAL COMMITMENT OF VIETNAMESE COAL MINING WORKERS

Nguyen Duc Thang[a]*

Le Van Chien[a], Nguyen Thi Huong[a]

[a]Hanoi University of Mining and Geology, Hanoi, Vietnam

**Corresponding author: nguyenducthang@humg.edu.vn*

Abstract: *In the context of the Vietnamese underground coal mining industry experiencing a wave of employee turnover, maintaining a stable workforce has become crucial. This study explores the relationship between job satisfaction and organizational commitment among workers in Vietnam's underground coal mining sector. Utilizing Weiss et al.'s (1967) job satisfaction and Meyer and Allen's (1990) organizational commitment framework, the research employs a mixed-method approach, including quantitative surveys and in-depth interviews, analyzed using Smart-PLS statistical software. The findings indicate that intrinsic and extrinsic job satisfaction positively influence affective, continuance, and normative commitment. Extrinsic job satisfaction has the most substantial impact, particularly on normative commitment. These findings suggest that improving working conditions, welfare policies, and career advancement opportunities can significantly enhance employee commitment and loyalty, contributing to Vietnam's coal industry's stability and sustainable development.*

Keywords: *job satisfaction (JS), organizational commitment (OC), underground coal mining, intrinsic job satisfaction (IN-JS), extrinsic job satisfaction (EX-JS)*

1. INTRODUCTION

In the era of globalization and significant changes in the labor market, human resource management has emerged as a pivotal activity for organizations and businesses. Understanding organizational and individual employee behaviors is essential to foster development in a competitive environment. Job Satisfaction (JS) and Organizational Commitment (OC) are crucial in enhancing operational efficiency and retaining employees. Seminal works by researchers such as Howard Becker (1960), Meyer and Allen (1990), and Griffin and Bateman (1986) have provided deep insights into OC and the factors influencing employees' decisions to stay or leave an organization.

In the Vietnamese underground coal mining industry, which is a sector heavily reliant on labor and characterized by harsh working conditions- there is a worrying rate of job turnover. According to reports from the Vietnam National Coal-Mineral Industries Holding Corporation Limited (Vinacomin) for the period 2019-2022, an average of 4,877 coal mining workers annually terminated or requested to terminate their labor contracts, with the rates of new employees leaving or resigning each year being 9.34%, 8.8%, 8.19%, and 7.99%, respectively. The continuous departure of personnel not only disrupts production processes but also results in significant costs related to training and human resource development.

Although many previous studies have confirmed a strong relationship between JS and OC (Bakan et al., 2004; Malhotra et al., 2007; Yang and Chang, 2008; Froese and Xiao, 2012; Top, Akdere, and Tarcan, 2015), but research by Brunetto et al. (2012), Cramen (1996), and the team of De la Torre-Ruiz et al. (2017) did not find a significant relationship between the two variables. Moreover, there is a shortage of studies on the JS and OC relationship in the coal mining industry, where harsh and high-risk working conditions pose unique challenges for human resource policies. This study aims to fill this gap by determining how JS affects OC in coal mining enterprises in Vietnam.

In this research, the author utilizes the job satisfaction theory of Weiss et al. (1967) and the organizational commitment theory of Meyer and Allen (1990) as the main theoretical frameworks. The study employs a quantitative method combined with in-depth interviews to collect data from workers in the coal mining sector. Data will be analyzed using statistical techniques to determine the relationships between components of JS and OC.

The findings of this study will provide a clearer understanding of the impact of JS on OC among production workers in Vietnam's underground coal mining enterprises. A better understanding of these factors will assist managers in developing more effective human resource policies, thereby improving employee satisfaction and commitment and contributing to workforce stability, production efficiency, and the sustainable development of Vietnam's coal industry.

2. THEORETICAL FRAMEWORK, HYPOTHESES, AND RESEARCH MODEL

2.1. Job Satisfaction

Job Satisfaction (JS) is considered a critical factor affecting productivity, job turnover, and employee retention (Weiss et al., 1967; Chen et al., 2006; Spector, 1997). According to Locke (1968), JS is a positive emotional state resulting from the appraisal of one's job or the realization of one's job values. Further studies differentiate satisfaction into intrinsic and extrinsic types (Rose, 2001; Glisson and Durick, 1988).

Intrinsic satisfaction (IN-IS) refers to the fulfillment an individual derives directly from the job itself, including job characteristics, challenges, autonomy, and a sense of achievement (Weiss et al., 1967; Rose, 2001; Skelton et al., 2019). Research indicates that this factor is independent of external rewards but closely linked to feedback, self-esteem, and a sense of control (Skelton et al., 2019).

Extrinsic satisfaction (EX-JS) relates to receiving material rewards and recognition from leadership (Weiss et al., 1967; Skelton et al., 2019). It focuses on comparisons among individuals, including benefits, salaries, promotional opportunities, and satisfaction from the work environment.

Locke (1969) describes JS and job dissatisfaction as emotional reactions based on the fulfillment or unfulfillment of job values. Job dissatisfaction is seen as a predictor of job turnover (Lee, 1988). JS affects job performance, absenteeism, psychological disorders, and turnover rates (Spector, 1997; Chen et al., 2006).

Determinants of job satisfaction include salary, promotion opportunities, leadership style, and the work environment (Testa, 1999; Chen and Silverthorne, 2008). Williams (1995) found that employee benefits also impact job

satisfaction. Dissatisfied employees often seek satisfaction elsewhere, increasing turnover rates and reducing organizational commitment.

2.2. Organizational Commitment

Organizational Commitment (OC) is a core concept in organizational behavior research, initially defined by Becker (1960) as "*a mechanism that produces consistent human behavior*". Mowday, Steers, and Porter (1979) described OC as "*the strength of an individual's identification with and involvement in an organization*." According to Allen and Meyer (1990), OC encompasses attachment, integration, and effort for the organization's collective benefit. Cohen (2003) and Gordon and Ladd (1990) agree that OC relates to the personalization of organizational goals and values. Currivan (1999) and Loi et al. (2006) emphasize OC as an indicator of loyalty and personal investment in the organization.

Stinglhamber and colleagues (2002) state that commitment also reflects attachment to the organization's common goals. Palumbo and Annarumma (2018) along with Jigjiddorj et al. (2021) propose that OC is a dynamic process that evolves over time, reflecting an employee's willingness to continue or leave the organization.

Becker (1960) and later Porter, Steers, Mowday, and Boulian (1974), laid the foundation for understanding OC through the identification of three core components: affective commitment, continuance commitment, and normative commitment. Meyer and Allen (1984, 1997) further developed this tri-dimensional approach, enriching the theory of OC and highlighting the importance of each component in determining employee commitment levels.

Affective commitment (AC) is considered the foundation of an employee's attachment to the organization, where positive feelings and perceptions about the organization foster this attachment (McMahon, 2007). It represents a strong emotional relationship, reflecting trust and contributing to the stability of this relationship over time.

Continuance commitment (CC) reflects an attachment based on the perceived benefits and costs associated with leaving the organization (Meyer and Allen, 1991; Kanter, 1968).

Normative commitment (NC) relates to a sense of ethical obligation that compels employees to remain with the organization (McMahon, 2007). It reflects the loyalty and responsibility employees feel towards the organization.

Naz and Ali (2012) and Tufail (2012) suggest that individual characteristics, organizational structure, and reward systems also influence OC.

2.3. Hypotheses and Research Model

2.3.1. Hypotheses on the Relationship between Job satisfaction and Organizational commitment

Based on studies by Weiss et al. (1967), this research conceptualizes JS as comprising intrinsic and extrinsic satisfaction. As defined by Meyer and Allen (1991), OC includes three components: affective commitment, continuance commitment, and normative commitment. The relationships between JS and OC can be hypothesized as follows:

(1) Relationship between intrinsic job satisfaction and Normative commitment

In the coal mining sector, IN-JS of workers involves job characteristics and personal achievement feelings and includes a safe working environment, playing a pivotal role in forming normative commitment. This

is supported by the theory of organizational identification by Ashforth and Mael (1989), which suggests that IN-JS reinforces an employee's connection to the organization and encourages loyalty based on moral obligation.

Studies by Markovits et al. (2010), Zopiatis et al. (2014), Senjaya and Anindita (2020), and Hidayat et al. (2024) confirm a positive relationship between IN-JS and normative commitment, emphasizing the need for job satisfaction to maintain long-term attachment and loyalty within heavy industries.

H1: Intrinsic job satisfaction enhances the normative commitment of coal mining workers

(2) *Relationship between intrinsic satisfaction and continuance commitment*

According to Blau's social exchange theory (SET) (1964), the relationship between employees and the organization is viewed as a mutually beneficial exchange. Workers who find their job values aligning with their organizational contributions develop commitment and enhance performance. In the coal mining industry, with its particularly challenging working conditions, satisfaction from safety measures, fair benefits distribution, and autonomy can increase the perceived loss if an employee leaves the organization, thereby strengthening continuance commitment.

Research by Thabane et al. (2018), Bagasworo (2017), Karyono and Hakim (2022), and Mugizi and Kasule (2023) has shown a positive link between IN-JS and continuance commitment. These studies indicate that employees satisfied with internal factors are likely to show long-term commitment to the organization.

H2: Intrinsic job satisfaction positively impacts the continuance commitment of coal mining workers.

(3) *Relationship between intrinsic satisfaction and affective commitment*

SET by Blau (1964) describes the employee-organization relationship as an exchange process. Workers satisfied with job characteristics and the work environment tend to develop a strong affective commitment to the organization. Research by Karyono and Hakim (2022), Mugizi and Kasule (2023), and Yundong (2015) has shown a positive correlation between IN-JS and affective commitment.

H3: Intrinsic job satisfaction positively influences the affective commitment of coal mining workers.

(4) *Relationship Between Extrinsic job satisfaction and Affective Commitment*

EX-JS, which includes promotional opportunities, compensation policies, and relationships with management, significantly impacts workers' affective commitment, especially in the coal mining sector. According to SET, EX-JS, these benefits encourage employees to strengthen their emotional commitment to the organization, which is manifested through loyalty and dedication.

Studies by Ismail and Abd Razak (2016), Juhana (2019), and Jayasingam and Yong (2013) have confirmed a positive relationship between EX-JS and affective commitment. Research from Vandenberghe (2021) and Gaertner (1999) further evidence this, showing that factors like salary, policies, and management have a positive effect on employees' affective commitment.

H4: Extrinsic job satisfaction positively impacts the affective commitment of coal mining workers.

(5) *Relationship between extrinsic satisfaction and continuance commitment*

SET by Blau (1964) explains the relationship between workers and the organization as a continuous exchange process. The high demands for safety and challenging working conditions in the coal mining industry highlight this relationship. Employees who value and benefit from a safe working environment and fair compensation policies develop a continuance commitment to the organization based on the principle of "*give and take*".

Empirical studies such as those by Abdelmoula (2020), Hadian (2019), Sariwulan et al. (2019), and Abd Razak (2016) have demonstrated a positive link between extrinsic satisfaction and continuance commitment (CC). Factors like company policy, working conditions, and a safe environment, when well met, not only increase satisfaction but also encourage employees to maintain long-term attachment to the organization. This satisfaction promotes discipline and enthusiasm at work, reduces stress, and strengthens commitment.

H5: Extrinsic job satisfaction positively influences the continuance commitment of coal mining workers.

(6) *Relationship between extrinsic satisfaction and normative commitment*

Studies by Markovits et al. (2010) and Nazir et al. (2016) have proven a positive link between extrinsic satisfaction and normative commitment, strengthening employee loyalty and attachment.

Findings by Zopiatis et al. (2014) and Günlü et al. (2010) have found this relationship in the hospitality industry. Studies by Harini et al. (2022) in Indonesia and Köse et al. (2017) in Turkey also support this view, showing that satisfaction with working conditions, management, and income enhances normative commitment.

H6: Extrinsic job satisfaction positively influences the normative commitment of workers.

The theoretical research model is illustrated in Fig 1.

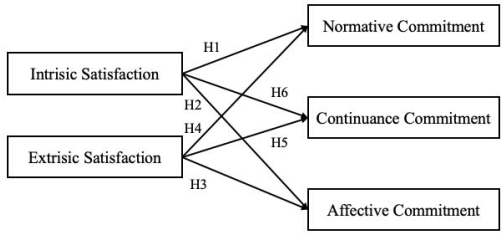


Fig 1. Hypothesized Model

3. RESEARCH METHODOLOGY AND SAMPLING

3.1. Scaling

In this study, the Organizational Commitment (OC) scales were adapted from Meyer and Allen's research (1990) and further studies by Mowday (1979), Buchanan (1974), and Nguyen Thi Hong Ha (2016). The scale's structure includes three main dimensions: affective commitment (AC), Continuity commitment (CC), and Normative commitment (NC), each comprising six observable variables.

The Job Satisfaction (JS) scale is derived from the Minnesota Satisfaction Questionnaire - Short Form (MSQ-SF), developed by Weiss et al. (1967). The MSQ-SF includes 20 indicators, 12 of which pertain to intrinsic and 6 to extrinsic satisfaction.

All scales in this study utilize a 5-point Likert scale, where 1 represents 'strongly disagree,' and 5 represents 'strongly agree.'

3.2. Research Methods

This research employed both qualitative and quantitative methods to evaluate the

factors influencing job satisfaction and organizational commitment among coal mining workers. The initial phase involved qualitative methods, including in-depth interviews with 20 experts and managers to adjust and identify key variables and to gain a deep understanding of the working environment and conditions in the industry. Subsequently, the quantitative phase involved surveying 300 workers, utilizing statistical tools to test hypotheses and determine the relationships between variables. Finally, to further explain anomalies in the results relative to research hypotheses, additional qualitative research with 30 workers was conducted. This mixed-method approach allows for a comprehensive and reliable perspective on the relationship between JS and OC among coal mining workers in Vietnam.

3.3. Sampling Method

The subjects of this study were coal production workers in Vietnam's underground coal mining enterprises. Based on Slovin's formula (1960), assuming a 10% sampling error and 90% confidence level, the minimum sample size required was calculated to be 100 people from a total of over 45,000 underground coal mining workers. The study obtained 230 valid surveys from 300 distributed, ensuring data representativeness and quality.

3.4. Data Collection

Data collection occurred at the end of 2022 through direct workplace surveys using standardized forms designed for this purpose.

Although a convenience sampling method was used, which saves time and costs, it bears the risk of bias and may affect the objectivity of the results. A total of 300 surveys were distributed, with 230 returning valid responses. The discrepancy between distributed and valid surveys reflects the challenges in collecting multidimensional data, which the author carefully considered in the data analysis to ensure the reliability of the study.

The sample primarily consisted of males (94.8%), reflecting the physically demanding nature of the industry. Most were aged between 30 and 40 (57.4%), with over 10 years of experience (45.7%), and those with 5-10 years of experience accounting for 33.5%, indicating a high level of expertise in this field.

In terms of job roles, 37.4% were coal extraction workers, 31.7% were tunnel diggers, 19.6% were mechanical and electrical workers, and 11.3% were in other job positions.

3.5. Data analysis

This study employs Partial Least Squares Structural Equation Modeling (PLS-SEM) to test hypotheses and theoretical models. The reliability and validity of the scales are assessed using indices such as Cronbach's Alpha, Composite Reliability (rhoC), and Convergent Reliability (RhoA), which must exceed 0.7 to ensure reliability (Hair et al., 2018).

The Heterotrait-Monotrait ratio (HTMT) needs to be below 0.90 (Henseler et al., 2015) to ensure adequate discriminant validity between the latent constructs. variance inflation factor (VIF) must be less than 3.0 (Hair et al., 2018) to avoid multicollinearity issues. The PLS-SEM regression analysis determines the relationships between independent and dependent variables using the Bootstrap method with at least 1000 samples to validate the stability and reliability of the regression coefficients.

4. RESEARCH RESULTS

4.1. Qualitative research results

To conduct the qualitative study, we conducted in-depth interviews with 12 human resource experts and managers, and 8 coal miners to assess the suitability of the job satisfaction and organizational commitment scales. The objective was to enhance the accuracy and applicability of these measurement tools.

Feedback from experts and managers indicated that the foreign scale, once translated into Vietnamese, contained many scientifically complex questions and terms, which were excessive and unsuitable for workers with lower educational levels. The interviews with miners also highlighted the necessity of simplifying and clarifying the questions so that workers could understand and respond correctly to their intended aims.

We adjusted the scale with the support of human resource experts, focusing on simplifying the language, reducing specialized terminology, and consolidating questions with similar content. The results were as follows:

- The JS scale was reduced from 20 to 18 observable variables, with 6 Extrinsic job satisfaction indicators (EX-HL1 to EX-JS6) and 12 Intrinsic job satisfaction indicators (IN-HL1 to IN-JS12).

- The OC scale, based on Mayer and Allen (1990), was reduced from 18 to 17 variables, consisting of 5 AC indicators (AC1 to AC5), 6 CC indicators (CC1 to CC6), and 6 NC indicators (NC1 to NC6).

4.2. Quantitative research results

4.2.1. Scale Evaluation

Within the scope of this study, we have assessed the reliability of the measurement scales using indicators such as factor loadings, Cronbach's Alpha, Composite Reliability (rhoC), and Convergent Reliability (rhoA). The convergent validity was determined through the Average Variance Extracted (AVE), and the discriminant validity was assessed based on the Fornell & Larcker criterion (1981).

Regarding factor loadings: The observed variables for CC, NC, AC, and EX-JS scales all exceed the 0.7 thresholds, while the IN-JS scale has indices below this level, indicating issues with convergent validity.

Cronbach's Alpha: Values for CC, NC, AC, and EX-JS are all above 0.8, indicating high reliability.

Composite and Convergent Reliability: Scales for CC, NC, AC, and EX-JS all achieved values above 0.85, reflecting high reliability. The IN-JS scale, however, shows rhoC at 0.866 and rhoA at 0.888 but AVE at only 0.387, suggesting that reliability is insufficient and needs improvement.

Table 1. Reliability analysis of measurement scales

Variable Name	Factor Loading	Cronbach's alpha	rho_a	rho_c	AVE
CC		0.858	0.867	0.894	0.583
CC1	0.740				
CC2	0.773				
CC3	0.781				
CC4	0.779				
CC5	0.754				
CC6	0.754				
NC		0.865	0.872	0.898	0.596
NC1	0.727				
NC2	0.808				
NC3	0.730				
NC4	0.809				
NC5	0.757				

Variable Name	Factor Loading	Cronbach's alpha	rho_a	rho_c	AVE
NC6	0.798				
AC		0.852	0.874	0.893	0.627
AC1	0.735				
AC2	0.836				
AC3	0.813				
AC4	0.805				
AC5	0.767				
EX-JS		**0.886**	**0.888**	**0.913**	0.636
EX-JS1	0.803				
EX-JS2	0.783				
EX-JS3	0.828				
EX-JS4	0.793				
EX-JS5	0.808				
EX-JS6	0.770				
IN-JS		0.831	0.888	0.866	0.387
IN-JS1*	0.154*				
IN-JS10	0.704				
IN-JS11	0.754				
IN-JS12	0.194*				
IN-JS2	0.784				
IN-JS3	0.749				
IN-JS4	0.821				
IN-JS5	0.662*				
IN-JS6	0.760				
IN-JS7	0.317*				
IN-JS8	0.677*				
IN-JS9	0.305*				

* Alpha, rhoC, and rhoA ≥ 0,7 and AVE ≥ 0,4

Variables with * indicate factor loadings < 0.7, which are considered for removal from the structural model to improve scale reliability.

Source: Author's data analysis

Based on this analysis, variables IN-JS1, IN-JS12, IN-JS5, IN-JS7, and IN-JS9 will be removed from the structural analysis model to enhance the reliability and validity of the measurement scale.

Continued reliability analysis of the measurement scale post-removal of unreliable variables is described in Table 2.

Table 2. Reliability analysis of measurement scales (Second evaluation)

Variable Name	Cronbach's alpha	rho_a	rho_c	AVE
CC	0.858	0.868	0.894	0.583
NC	0.865	0.873	0.898	0.596
AC	0.852	0.869	0.894	0.627
EX-JS	0.886	0.888	0.913	0.636
IN-JS	0.875	0.912	0.904	0.612

Source: Author's data analysis

Based on the revised results, all indicators demonstrate high reliability, with Cronbach's Alpha and rho_a all exceeding 0.85, rho_c over 0.89 (Hair et al., 2022; Dijkstra & Henseler, 2015) and AVE above 0.58, indicating a significant level of average extracted variance. These results confirm the accuracy and reliability of the new scales, aligning with the research objectives.

Table 3. Discriminant validity analysis of measurement scales

	CC	NC	AC	EX-JS	IN-JS
CC					
NC	0.389				
AC	0.448	0.271			
EX-JS	0.375	0.523	0.301		
IN-JS	0.144	0.202	0.293	0.065	

Source: Author's data analysis

The author continues to analyze the HTMT values between latent constructs in the model to assess the discriminant validity between them (Table 3). According to standards, HTMT values should be below 0.90 (or in stricter cases, 0.85) to ensure discriminant validity.

All HTMT values in the table are below the threshold of 0.90, indicating good discriminant validity among the model's latent constructs.

The author considered each variable's variance inflation factor (VIF) to evaluate multicollinearity within the structural model. Hair et al. (2018) state that a VIF greater than 3 suggests the potential for multicollinearity. Analysis results (Table 4) show that all VIF values are below 3, with the highest being 2.231 for variable EX-JS3. This indicates no multicollinearity issues in the model, allowing further analysis without removing any observed variables.

Thus, the post-adjustment scales have demonstrated reliability by adjusting and removing certain observed variables, effectively serving the subsequent steps.

4.2.2. Testing the Model and Research Hypotheses

To assess the relationship between external (EX-JS) and internal (IN-JS) job satisfaction and continuous commitment (CC), normative commitment (NC), and affective commitment (AC) among coal mining workers, the author further analyzes using regression coefficients with PLS-SEM software. The results are displayed in Table 4 and Figure 2.

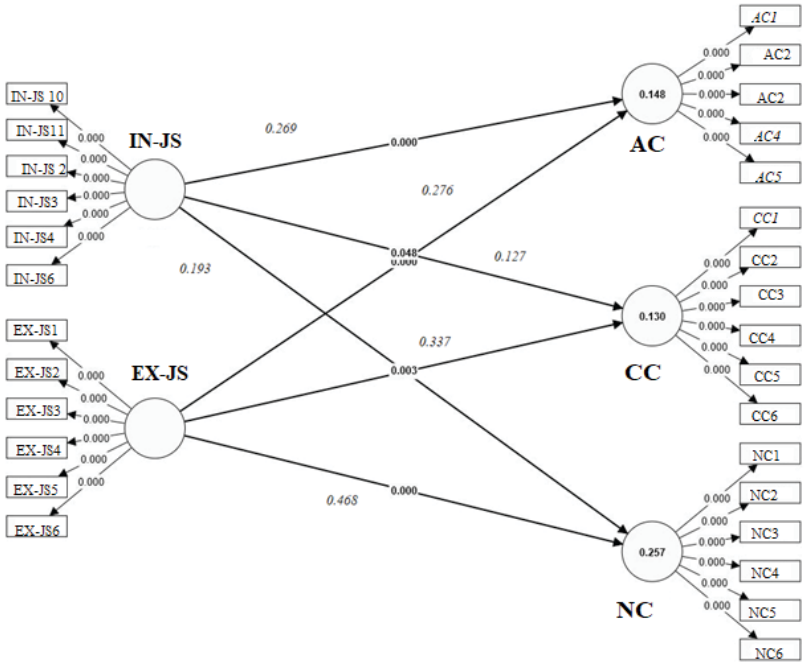


Fig 2. Estimation results of the Research model via PLS-SEM

Table 4. Hypothesis testing results

Hypothesis	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics	P values	Conclusion
EX-JS -> CC	0.337	0.344	0.062	5.438	0.000	Supported
EX-JS -> NC	0.469	0.473	0.063	7.480	0.000	Supported
EX-JS -> AC	0.276	0.280	0.070	3.941	0.000	Supported
IN-JS -> CC	0.128	0.131	0.065	1.978	0.048	Supported
IN-JS -> NC	0.193	0.199	0.065	2.978	0.003	Supported
IN-JS -> AC	0.269	0.272	0.070	3.836	0.000	Supported

Source: Author's data analysis

This research explores the relationships between EX-JS and IN-JS with continuous commitment (CC), normative commitment (NC), and affective commitment (AC) of employees. The regression analysis reveals that EX-JS significantly impacts CC, NC, and AC with coefficients of 0.337, 0.469, and 0.276, all with p-values below 0.05, indicating high statistical significance. Notably, the relationship between EX-JS and NC is the strongest, with a T-statistic of 7.480.

On the other hand, IN-HL also contributes positively, albeit more subtly, to employee commitment. The regression coefficient for CC from IN-JS is 0.128, with a T-statistic of 1.978 and a p-value of 0.048, also showing statistical significance at the 95% level. NC and AC from IN-JS have regression coefficients of 0.193 and 0.269, respectively, with low p-values, affirming the impact of IN-JS.

These results validate the research model and underscore the importance of both EX-JS and IN-JS in influencing the dependent variables.

5. DISCUSSION OF RESEARCH RESULTS

5.1. Discussion of Findings

This study's findings confirm the relationship between job satisfaction and organizational commitment in the underground coal mining industry in Vietnam, aligning with previous research by Bakan et al. (2004), Malhotra et al. (2007), Yang & Chang (2008), and Froese & Xiao (2012). The results indicate that external satisfaction significantly and positively affects all three dimensions of organizational commitment: continuous, normative, and affective commitment. Notably, the strong influence of external satisfaction on normative commitment illustrates how improving working conditions and welfare policies can lead to more profound employee attachment to the organization.

While internal satisfaction also positively affects, its impact is subtler than external satisfaction's. However, the relationship between IN-JS and the dimension of OC still highlights the importance of positive perceptions of the job in forming and maintaining OC. This aligns with social exchange theory, emphasizing that job satisfaction can create a reciprocal obligation between employees and the organization.

This study also contributes additional theoretical insights into human resource management in an industry with challenging labor conditions. It underscores the importance of managing job satisfaction as part of human resource strategies to

enhance commitment and reduce turnover in this distinctive industry.

Finally, these results suggest that managers should focus on improving external factors such as working conditions and benefits to enhance organizational commitment while continually improving aspects of the job to increase internal satisfaction. This approach not only boosts work performance but also contributes to the sustainable development of the coal industry by maintaining a stable and committed workforce.

5.2. Management Implications

Based on the research findings on the relationship between job satisfaction and organizational commitment in the underground coal mining sector in Vietnam, coal enterprises can implement the following actions to enhance job satisfaction and strengthen organizational commitment:

Firstly, managers must improve working conditions, including labor safety, competitive wages, and promotion opportunities to enhance external job satisfaction. This strengthens organizational commitment, consolidates loyalty, and minimizes turnover rates.

Secondly, developing a work environment where employees can demonstrate their capabilities and achieve personal accomplishments will encourage internal satisfaction, promoting affective and continuous commitment to the organization.

Thirdly, managers should build good relationships with employees through effective communication, support, and recognition of their efforts. Satisfaction from high-quality relationships with leadership can lead to an enhanced normative and affective commitment to the organization.

Fourthly, it is essential to invest in training and development programs to improve employees' skills and capabilities. This not only makes employees feel that the organization cares about their careers but also contributes to enhanced work efficiency and organizational commitment.

Finally, organizations should regularly conduct surveys to assess employees' satisfaction and commitment, thereby early detecting issues and timely directing human resource development strategies.

6. LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

The data collection in this study faced challenges, leading to only 230 valid surveys being collected. The small sample size may limit the generalizability of the research findings. Notably, this study focuses on workers in the underground coal mining sector, a specific field with unique factors. Thus, the results may not be broadly applicable to other industries. Specific aspects of the sector, such as working conditions and risk levels, were not integrated into this study, which might reduce the breakthrough nature of the results. Additionally, the current research model did not consider local cultural factors and workers' perceptions, although potentially impacting job satisfaction and commitment.

The present study opens several avenues for further research on the impact of cultural factors on job satisfaction and commitment. Future research could explore the role of management styles and leaders' communication methods on workers' satisfaction and commitment or examine the effects of changes in technology and job organization on workers' satisfaction and commitment levels in the coal mining sector. Additionally, more in-depth research on the relationship between income fluctuations and commitment levels and the impact of income on workers' satisfaction and loyalty could be pursued.

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RESEARCH ON APPLICATION OF ENTERPRISE RESOURCE PLANNING SYSTEM TO COAL MINING ENTERPRISES OF VINACOMIN

Pham Thi Hong Hanh[a]*, Nguyen Thi Minh Thu[a],

[a]Hanoi University of Mining and Geology, Hanoi, Vietnam

**Corresponding author: phamthihonghanh@humg.edu.vn*

Abstract: *Information technology is increasingly developing and making great progress. The application of information technology in business management is becoming an inevitable trend for enterprises in general and coal mining enterprises under VINACOMIN in particular. The enterprise resource planning (ERP) system is an information system with modern information technology applications in business management. It is also an important tool that enables enterprises to improve their competitiveness and better meet international standards. Vietnamese and coal mining enterprises under VINACOMIN are eager to deploy this software application for their management. However, the application of ERP in current management requires enterprises to face many difficulties and challenges. For the above reasons, this article investigates the problems that coal mining enterprises under VINACOMIN will encounter when they deploy ERP applications in the current period, thereby directing enterprises to prepare before applying such software. To achieve the above research objectives, it presents some main contents: (1) Concept and role of ERP system in business management, (2) Overview of the current status of management and application of information technology in management of coal mining enterprises - VINACOMIN, (3) Several solutions for application of ERP in management of coal mining enterprises - VINACOMIN in the current period.*

Keywords: *Integrated information system, ERP, Vinacomin.*

1. OVERVIEW OF ENTERPRISE RESOURCE PLANNING SYSTEM IN BUSINESS MANAGEMENT

1.1. What is Enterprise Resource Planning?

Enterprise Resource Planning System is an "Integrated Information System" used in business management. It is a management information system that integrates information from many sources and many synthetic functions to share information with all affiliates in an enterprise or organization. It is also a solution that consists of many modules that simulate and manage business activities by a process. An integrated information system can be considered a system that uses single software and its modules to perform functions similar to discrete management software systems. Still, these modules can do much more in an integrated environment. According to international standards, the concept of ERP is limited to the scope of resource planning, including human resources (people), material resources (assets, equipment), and financial resources (finance). During the application of information technology to business management, ERP is simply referred to as a type of computer software that automates the operations of the staff to improve the overall performance and management efficiency of an enterprise by integrating the common functions of the enterprise into a single system which serves

the overall computerization of the enterprise (Pham Thi Hong Hanh, 2016).

1.2. Benefits of Enterprise Resource Planning in business management

Acording to Pham Thi Hong Hanh (2016), ERP is an integrated system that brings many benefits to current business management, such as:

(1) Access to consistent and reliable management information: It is the most significant benefit for enterprises when implementing ERP applications in current management. This application enables business administrators to access reliable and consistent management information between different departments quickly. For example, in the past, without ERP, administrators could have looked for information from many different sources from different departments so that the data may differ between departments. However, thanks to ERP applications, information is consistent in the system because it is synthesized from a single input on the system.

(2) Fast, safe, and stable access to information: Thanks to ERP applications, users can quickly access corporate data sources. This system decentralizes data use and the types of data allowed within the allocated authority. It also ensures quick information provision as required by administrators.

(3) Remedy for duplicate data processing: If data sources in an enterprise are not synchronized, there may be duplication between departments during processing. This means that the same data may be processed by many different departments, so the information may not be consistent, and it takes a lot of time to process repeatedly. Thanks to ERP, other departments can access the same data, and data changes are strictly controlled without duplication between departments. Data changed by a department will be unified on the same system.

(4) Reduction in unreasonable costs: The ERP system enables processes to use available resources, and processing results are always available for another process, thus saving time and increasing management capabilities with a comprehensive analysis system of all aspects of an organization. It helps enterprises save unnecessary costs in information processing and costs arising from prolonged processing.

(5) Quick compatibility with business processes: The ERP system is flexible and responds well to changes in business processes or corporate restructuring. Components can be added or removed for proper purposes without any significant effect on the system structure.

(6) Satisfaction of requirements for e-commerce and digital business: Sources of corporate data through security and decentralization mechanisms can directly meet enterprises' requirements for e-commerce. In addition, the ERP system also shortens the geographical distance in the collaborative environment.

(7) Development of a modern and professional working environment: ERP applications are very useful for communicating between employees from different departments. They allow people in an ERP system to contact each other directly to make inquiries. Through the software system, any information can be exchanged on-site without travel between departments in an enterprise.

ERP benefits each activity in business management as follows:

(1) Production and supply of goods and services: ERP is a tool to automate part or all of the production process, from preparing raw materials to finished products, managing inputs and outputs, packaging, and many other things. Because only one computer system is used, the company can save time, reduce costs, increase productivity, and reduce the required personnel.

(2) Control of inventories: ERP controls inventories and determines their location and quantity. It enables enterprises to plan purchasing and storing goods and materials, save storage costs, and free up capital from inventories.

(3) Accounting - Finance: To grasp the situation of their business, managers are required to find data from many different departments, which may pose risks to the accuracy of information in different departments. However, thanks to ERP, all financial information is synthesized in one system, thereby limiting errors between various departments and managers' wrong business performance assessments when the information is inaccurate.

(4) Human resources: Under ERP control, the human resources department can closely monitor working hours, departure times, and the amount of work each employee has done to determine salaries and bonuses paid to employees even when those employees work in different departments and geographical areas.

(5) Communication, socialization of communication within the company: With the application of ERP, the business environment becomes a widely developed working environment like a social network, which is very useful in communication between employees from different departments. It allows people in an ERP system to contact each other directly to make inquiries.

(6) Customer information: As the data is located in one place, all employees in a company can access and view customer information. Several competent people can even change information without fear that customer records will not be updated across different departments.

Thus, ERP plays a crucial role in business management, especially in the era of information technology explosion. It significantly improves business performance and comprehensively changes the working culture in current enterprises.

2. OVERVIEW OF APPLICATION OF INFORMATION TECHNOLOGY IN MANAGEMENT OF COAL MINING ENTERPRISES - VINACOMIN

2.1. Achievements

+ Infrastructure

Until now, VINACOMIN has achieved the following goals: Upgrading IT infrastructure on a centralized model on a cloud computing platform, including a LAN/WAN system (virtual private network model). The current LAN/WAN system is built to ensure high-speed connection and stable operation. Servers (centralized/virtualized model) are invested in a centralized data management model to ensure information storage, security, and safety. The current server and network system have sufficient storage capacity and provide a basis for processing large data in the future. A data center (Data Center) at Vinacomin Tower and a vast area network (WAN) model have been built to ensure data connection with affiliates.

VINACOMIN's affiliates have all designed their network system and divided virtual local area network (VLAN). The affiliates invest in the server system or engage in server services to install services and software applications. Data backup is made on-site, and at the same time, the affiliates have adopted solutions to ensure information safety and security and malware prevention using anti-malware software for enterprises or deploying specialized firewall devices.

Summary: VINACOMIN's IT infrastructure is being upgraded and developed in the Data Center model, meets the requirements of safety and advanced capabilities on the cloud computing platform, is capable of storing and processing data by using modern technologies; the wide area network (WAN) infrastructure system of VINACOMIN is being built step-by-step. Network safety and security are strengthened in accordance with the requirements of the 4th Industrial Revolution (Vinacomin, 2022).

+ *Information technology application*

VINACOMIN and most of its affiliates have deployed IT applications into their production, including:

- Production management: Email system, management of operational documents; some affiliates have deployed smart reporting systems;

- Service of professional tasks/ operations: Accounting, Materials, Human Resources, Investment, Cost Management, etc.

However, most applications run independently to serve each operation without integration and synchronization throughout Vinacomin.

In production activities, affiliates have also gradually deployed IT applications such as: Equipment maintenance management; Factory management and operation; Surveillance camera management; Measurement management (car scales, conveyor belts); Vehicle management by GPS; Gas monitoring in mines and Automation of some stages in production and business.

Some affiliates (Quang Ninh Coal Processing Company, Mao Khe Coal Company, etc.) began to deploy basic subsystems of the ERP system and new information technology applications towards the shared use of data (centralized database in the corporation's direction). Typically, the Minerals Corporation has deployed a synchronized Enterprise Resource Planning (ERP) software system within the Corporation, which enables it to manage production activities more effectively. However, some affiliates deploy independent applications without a direction for synchronous connection between applications (Vinacomin, 2018).

2.2. Limitations

According to Vinacomin (2022), some limitations on IT application of VINACOMIN in general as well as of its affiliates are assessed according to the following criteria:

- Strategy/Direction:

The corporation has yet to develop a strategy or plan and a roadmap for overall IT application, so it has not made a long-term plan (5 years) but follows specific annual requirements. VINACOMIN's annual source of capital for IT application is accumulated by gathering specific requirements (not provided at a fixed rate of revenue/profit but depends on annual needs). The level of IT application in production, business, and affiliates in the same field is uneven.

- Technology (Infrastructure/Application System/Integration)

VINACOMIN's IT infrastructure is being built relatively independently for each affiliate and developed spontaneously, subject to the actual IT application needs from time to time, without planning and direction. IT applications are being developed relatively independently to serve specific professional needs, such as accounting software, human resources, materials, investment, etc. The applications are developed using a wide variety of technologies with many partners. The components are not connected but are integrated and exploit centralized data. Currently, the corporation does not have shared software synchronized from affiliates to the corporation, so any connection, analysis, and synthesis to make reports follow many steps and take time, and the data is unsafe.

- Data (Management reports/data storage/Data mining and analysis):

VINACOMIN's digital data is being designed independently and distributed on different traditional database technology platforms.

In addition, a large quantity of documents/ data exists in paper form, archived records, text files (electronic signature files, soft files, scans), data log files with and without structure, video files, etc., stored on servers and personal computers.

Therefore, it is difficult to manage and search data because data management and maintenance are affected by using great resources, while efficiency is not high, and applicability is low.

The management reporting system has not been digitized in a synchronized manner by using standard processes. Some management reporting applications, such as Financial Accounting, Investment Management, Human Resources Organization, Resources, etc., are independent and have no data connection, so data is duplicated, consuming storage resources and causing risks of data inconsistency.

- Operations (Planning and management/ purchase, supply, warehouse/ distribution, sales/ Production management/ Resource management/ Assets/ Projects/ Risk management and compliance/ Finance and accounting/ Quality management):

Most items, such as operation, planning, supply, distribution, production, risk management, and quality, have not been deployed with IT applications. The steps to perform these tasks are all taken manually or by deploying IT applications using simple tools such as Microsoft Office, Google Sheets, etc.

Most affiliates have deployed applications for financial and accounting management, asset management, warehouse management, materials management, etc. However, the applications are independent and not synchronized; making general reports throughout VINACOMIN is very difficult and time-consuming, and the data accuracy is not high.

- Culture (Human resources management/Communication):

Currently, there is no centralized human resources management system throughout VINACOMIN. Some affiliates have developed human resources management software. Still, it is only used independently at each affiliate and does not cover the entire subsystem of human resources

management, such as human resources, training, health, emulation, and rewards.

VINACOMIN's communication uses traditional methods without interaction in the advanced model.

In summary, the application of information technology in management at coal mining enterprises has been implemented, but this application is not really effective, has not taken advantage of, and exploited the superior features of modern information technology. The application is not synchronous and systematic, so it does not fully promote the capabilities and effects of specific information technology applications, namely management software programs. Management information is processed and provided in each department independently without close connection between departments, so the information is not consistent. Therefore, to remove these limitations, it is necessary to have close and consistent coordination and information linkage from the input database to the outputs, which is the application of integrated software or ERP applications in management.

3. SEVERAL SOLUTIONS FOR ENTERPRISE RESOURCE PLANNING APPLICATION IN THE MANAGEMENT OF COAL MINING ENTERPRISES OF VINACOMIN IN THE CURRENT PERIOD

3.1. Opportunities and challenges for implementation of Enterprise Resource Planning application in the management of coal mining enterprises - VINACOMIN

- Opportunities

VINACOMIN, in general, and coal mining enterprises, in particular, have many opportunities to implement ERP, such as:

(1) Information technology, in general and Vietnam in particular, is developing at a dizzying pace. Hardware, software, communication technology, and ERP suppliers worldwide and in Vietnam continuously provide increasingly modern solutions suitable for enterprises' operating conditions.

(2) The determination of the Party and Government of Vietnam in digital transformation of state administration in general and digital transformation in business management has prompted VINACOMIN's managers to change their awareness in applying information technology to the industry's operations and production management. VINACOMIN has set up a digital transformation project, computerization, and automation programs with the goal that by 2030, VINACOMIN will become a digital enterprise, and the digital transformation process will be completed by 2025. VINACOMIN's managers know that digital transformation focuses on: 1. Taking data and connection (between production and management activities) as the foundation; 2. Taking production and operation as the center; 3. Taking people and subjects.

(3) With the benefits of ERP, VINACOMIN hired the largest software company in Vietnam, FPT, to look for solutions to deploy ERP at VINACOMIN.

(4) VINACOMIN always develops programs and allocates a large training budget to improve information technology applications for managers at all levels.

The awareness and level of information technology application of employees and managers at all levels have increased significantly. Most of the information used for the management functions of the corporation's office and affiliates is processed by specialized software. This is a favorable opportunity for VINACOMIN to easily convert to ERP (Vinacomin, 2024).

• Challenges

In addition to the opportunities and advantages of applying ERP to management, coal mining enterprises also face some difficulties and challenges that make them not bold enough to put it into practice today, specifically as follows:

(1) VINACOMIN is an enterprise that operates in many fields and has many different management functions. When implementing ERP systems requires consolidation and change in management structure. Therefore, restructuring departments is the biggest challenge for coal mining enterprises today. In fact, the departments in these enterprises operate relatively independently and are not closely linked, and processing is subject to overlapping. Specifically, different departments can currently process and provide the same information. To apply ERP, it is necessary to clearly define the tasks, such as processing and providing information by each department to avoid conflicts and disputes during these processes, ensuring that the same information is only processed and provided once consistently throughout the system.

(2) Information technology platforms (hardware, software, communication systems, databases, etc.) and equipment used for production are various in type and provided in many periods. IT systems are fragmented, localized, and not really connected, which is a big challenge in synchronizing and integrating data and synchronizing processes. Besides, due to the specific characteristics of the coal industry (specifically in the production and management model), choosing an ERP solution that ensures compatibility is also a big challenge. For the coal mining enterprises of Vinacomin, the production and business processes are complex. Still, the operating mechanism is flexible because it operates according to economic laws and the State's regulations. Thus, it is confusing to apply ERP in a standard way to ensure consistency throughout the system. ERP is a pre-built integrated software system, so it must be based on the initial unified requirements and implemented according to a particular roadmap. In fact, in the operations of coal mining enterprises, it is compulsory to follow the direction and regulation of the State through the corporation from time to time, so flexibility is required. As a result, it is challenging to integrate software and reality.

(3) Usage of information technology in enterprises: This is also a big challenge for coal mining enterprises today. Although management in these enterprises has been widely computerized, the usage of modern information technology for all employees in management departments is not really thorough. Thanks to ERP applications in management, most of the work must be processed using software, so all employees must be well-informed of this new software application and capable of using it well in the work process. If ERP is applied in management, instructions on use must

certainly be trained, which also requires a lot of time and effort.

(4) Large investment costs, period for conversion from the current system to the ERP system: Costs are always a matter of special concern to enterprises in general and coal mining enterprises in particular. Regardless of the decision made, managers are concerned about the costs compared to the efficiency. Deploying ERP applications in business management also requires enterprises to make large investments. The initial investment aims to purchase an ERP software application to ensure it is suitable for the characteristics of the enterprise, followed by re-investment in facilities and equipment for the effective application of the software. In addition, enterprises are also required to consider the investment costs for training and instructions on how to use the software application. These issues are currently major difficulties that coal mining enterprises are considering.

(5) Synchronization with enterprises within the corporation: This is a difficulty and challenge specific to coal mining enterprises of Vietnam National Coal and Mineral Industries Holding Corporation Limited - VINACOMIN, because enterprises in the corporation are required to provide their information on production and business for the corporation, the information must ensure consistency. The applied ERP system must ensure connection and integration with the whole corporation, which is a considerable difficulty that cannot be overcome at present because the scale is too large, requiring decentralization between the corporation and enterprises in the corporation. To do this requires building a complex ERP system, investment costs are greater than its efficiency, and finding a suitable ERP supplier is very difficult.

In addition, the enterprise itself's reason for applying ERP is that people often do not like changes, while ERP requires them to change their way of working to adapt to the new system. In fact, changing software is not as important as the employees in the company changing themselves to make effective use of the software application. This is also one of the reasons why ERP projects fail in the integration and application phase in current enterprises.

Therefore, to truly benefit from ERP as it is intended, enterprises in general, as well as coal mining enterprises, must recognize and solve the above problems.

3.2. Several solutions to Enterprise Resource Planning application in the management of coal mining enterprises - VINACOMIN in the current period

It is necessary to build an information system that ensures the integration of subsystems, unification, and full support for management functions (an integrated ERP system). It not only undertakes the storage, processing of data and information collection in an enterprise, but importantly, it transmits such information to the decision-making system. That is, the information system is built by using a comprehensive approach to management at the enterprise level, based on the integration of all information and data of the enterprise from the beginning. The system is required to secure a "Data Integration Center". Inputs, processed information, periodic statistical reports, knowledge, and the history of the enterprise are integrated into this center. Information is no longer processed by separate functions

but is integrated at the center and, from there, circulated within the enterprise to affiliates and individuals who require information at the level of access, which forms the basis for reducing costs and increasing business performance by improving coordination and control within the enterprise. The integration model is described as follows:

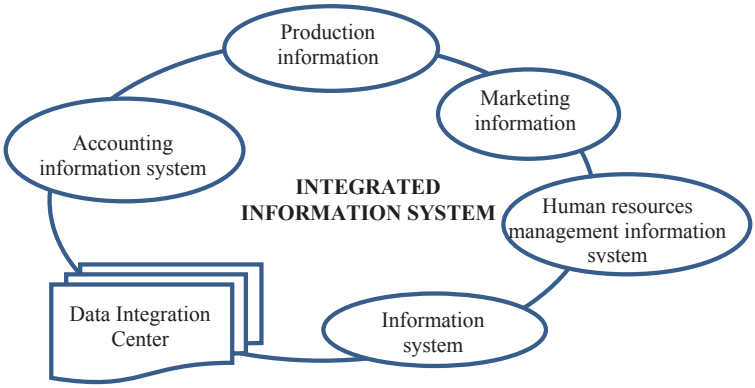


Fig 3.1. Integrated information system model

However, implementing ERP systems integrated into current management faces many difficulties that need overcoming. Specifically, here are several solutions to be adopted:

(1) Restructuring departments: Actually, to apply ERP to management to conduct synchronous and smooth operations, it is necessary to restructure the traditional departments subject to the functions of the sub-information systems in the integrated system, ensuring that each sub-system has its separate role and task, without overlapping or duplication between departments. For example, systems are divided by specific job functions: Accounting information system, Marketing information system, Production information system, Human resources information system, etc.

(2) Software compatibility with the specific features of coal mining enterprises: To ensure software compatibility, coal mining enterprises are required to select software suppliers that clearly understand their characteristics to develop integrated software that provides flexibility that complies with general regulations as well as specific regulations of the corporation, and flexibility when it is necessary to make changes or adjustments in each particular situation.

(3) Usage of information technology in enterprises: Nowadays, to deal with this difficulty, coal mining enterprises, in particular, and corporations must invest in training for their staff to improve their usage of information technology, especially using ERP-integrated software. This specific solution is that before applying ERP, employees need training to understand what ERP is. Its operating mechanism, as well as the values it brings to management. Immediately after applying ERP, employees need training to know how to operate it,

identify common system errors, and correct them to ensure the system operates smoothly and synchronously.

(4) Investment costs: Applying ERP to an enterprise requires a large amount of investment, so the enterprise, as well as the corporation, clearly determines the efficiency of the system compared to its costs and considers it an investment project that is recoverable in many years. The corporation is willing to spend a large amount of money to make the investment. It is necessary to set up and analyze that investment project in detail and create a specific plan to raise sources of investment capital if required.

(5) Synchronization with enterprises within the corporation: The application of ERP to management in the corporation's coal mining enterprises requires synchronization, so the implementation of ERP is not only fragmented in each enterprise within its capacity and needs but needs to be achieved synchronously for all enterprises in the corporation. The corporation must develop a strategy and a specific process for enterprises to apply ERP to management. Establishing a policy to encourage qualified enterprises to proactively apply ERP to management and assist enterprises with capital and human resources difficulties in implementing ERP systems is necessary.

In addition, to encourage and counsel employees to change their working style and adapt to the new system, it is also necessary to help them clearly see the effects and efficiency that ERP will bring in the future for enterprises as well as for their own work. The expected results can be achieved only when employees in the company change themselves to use software voluntarily, consciously, and positively.

Thus, to deploy ERP applications into management in coal mining enterprises, it is essential to overcome these enterprises' difficulties in current conditions.

4. CONCLUSION

Vietnamese enterprises, in general, and coal mining enterprises, in particular, need to deploy ERP applications in business management in the era of information technology explosion and the context of global economic integration. Enterprises that desire to compete with other enterprises in the region and globally must achieve common international standards. The ERP application in business management is also one of the conditions for Vietnamese enterprises to approach international standards. Implementing ERP systems in management in current coal mining enterprises opens up many opportunities but poses specific difficulties and challenges for these enterprises. In order to apply ERP in management, coal mining enterprises are required to calculate and identify the opportunities and challenges that their enterprises will encounter, from which they can consider whether to apply ERP in management and then come up with solutions to those difficulties. Within its content, the article has outlined several opportunities and challenges for coal mining enterprises when implementing ERP systems and several solutions to enable them to deploy ERP applications in management most conveniently and optimally.

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EXPERIENCE IN IMPROVING THE COMPETITIVE CAPACITY OF SOME TELECOMMUNICATIONS ENTERPRISES IN THE WORLD AND LESSONS FOR TELECOMMUNICATIONS SERVICES CORPORATION (VINAPHONE)

Le Manh Hung[a*]

[a]*Trade Union University, Hanoi, Vietnam*

**Corresponding author: hunglm@dhcd.edu.vn.*

Abstract: *The experience in boosting the competitiveness of businesses operating in the field of telecommunications services is diverse and rich. This article explores how several leading companies in this field - such as China Telecom Corporation (China), Korea Electronics and Telecommunications Corporation (SK Telecom), and AT&T Telecommunications Group (USA) – have developed and enhanced their competitive positions. The experience of these companies, whose operations are akin to those of Telecommunications Services Corporation, offers valuable insights into effective approaches for improving the Corporation's competitive performance.*

Keywords: *Competitive capacity, telecommunications enterprises, Vinaphone.*

1. INTRODUCTION

Deep and broad economic integration presents both opportunities and significant challenges for businesses. It not only offers benefits but also intensifies competition, leads to rapid, unpredictable changes in the business environment, and increases competitive pressure in both domestic and foreign markets. These factors pose many challenges for Vietnamese businesses, including telecommunications firms like Telecommunications Services Company. Facing these challenges, to survive and develop sustainably while competing on an equal footing with telecommunications companies in the world, Telecommunications Services Corporation must continuously enhance its competitive capacity and create its own competitive advantages.

Since its inception, Telecommunications Services Corporation has consistently focused on enhancing its competitiveness in the telecommunications sector. Despite its ongoing efforts, the Corporation encounters several challenges in meeting the increasing demand of the current market. Specifically, the Corporation's competitiveness is undermined by various shortcomings, including difficulties in maintaining and expanding market share in some fields and regions, limited market presence, suboptimal quality of some products is not highly competitive, unsustainable business performance, inadequate productivity of production factors, and uncertain innovation capabilities in certain products and services. These limitations represent significant obstacles to achieving robust and sustainable development in the highly competitive environment in which the Corporation operates.

Therefore, it is essential for Telecommunications Services Corporation to analyze and learn from the experiences of both domestic and international telecommunications enterprises to enhance its own competitiveness effectively.

2. EXPERIENCE IN IMPROVING THE COMPETITIVENESS OF SOME TELECOMMUNICATIONS ENTERPRISES WORLDWIDE

2.1. Experience of China Telecom Corporation

China Telecom originated as a government agency of China's Ministry of Posts and Telecommunications. It was officially registered as a distinct legal entity on April 27, 1995, under the name Directorate General of Telecommunications, P&T, China. Subsequently, on May 17, 2000, it was re-registered as China Telecommunications Corporation, commonly known as China Telecom. As a state-owned enterprise, China Telecom has become the largest fixed-line phone service provider and the third-largest mobile phone service provider in China. On a global scale, it ranks as the world's third-largest telecommunications and mobile service provider, following Britain's Vodafone Group and Japan's NTT DoMoCo Group. Throughout its development, China Telecom has always strongly emphasized expanding its presence in domestic markets, particularly in key provinces such as Zhejiang and Guangdong, where it has leveraged its competitive strengths. Moreover, China Telecom has demonstrated significant competitiveness in international telecommunications , even in demanding markets with robust technological capabilities, such as the United States and Japan.

As of 2020, China Telecom serves 335 million users across 110 countries, offering services including broadband internet, mobile, and landline networks. The Corporation boasts total assets amounting to 897,237 million yuan and supports 672,821 direct and indirect jobs. In order to sustain its market share and enhance its competitiveness in recent years, China Telecom has focused on effectively implementing well the following strategies:

Firstly, the Corporation has aimed to consistently maintain and expand its market share while improving product quality domestically and internationally.

The maintenance and expansion of the network coverage of China Telecom, both domestically and internationally, have been prioritized by the Corporation, which continues to enhance its coverage and increase network capacity, focusing on the rapid development of the GSM (Global System for Mobile Communication) network. GSM is a global standard dedicated to mobile communications, utilized by over 2 billion people across 212 countries and territories. GSM networks can roam between each other, allowing mobile phones from different GSM networks to be used in various locations worldwide. The GSM network is the most popular standard for mobile phones globally. Its extensive coverage allows users to use their mobile phones anywhere in the world. GSM differs from its predecessor standards regarding signal, speed, and call quality. It is considered the second mobile communication system. As the network expands, the Corporation may need to develop its transmission infrastructure in some areas where provincial post offices have not yet installed transmission equipment.

Secondly, China Telecom has focused on enhancing the quality of after-sales service and controlling costs to improve business efficiency.

The Corporation consistently views enhancing after-sales service quality as an ongoing and crucial task. It is committed to delivering comprehensive after-sales support and reinforcing customer loyalty concerning its mobile technology, network capabilities, and services. To operationalize this commitment, China Telecom has offered a range of customer service options, including customer helplines, Customer Care Centers, and online assistance for inquiries related to billing, technical issues, and other operational aspects. Moreover, the Corporation strives to improve other aspects of customer service, such as billing accuracy, payment convenience, and the prompt resolution of network issues to strengthen customer loyalty.

In addition, China Telecom has prioritized cost control and enhancing business efficiency as critical objectives. To achieve these goals, the Corporation has deployed advanced information management systems and international management techniques and maintained and attracted highly qualified employees to bolster its profitability. Furthermore, it exploits strategic investment opportunities in the telecommunications industry in China. Given the rapid growth of the Chinese telecommunications industry, the Corporation recognizes the potential for attractive strategic investment opportunities with other telecommunications service providers. At the same time, it strategically utilized its unique position to access international capital markets to exploit opportunities to secure contracts related to mobile communications or telecommunications contracts in China.

Third, maintaining adaptability and technological innovation are critical for China Telecom.

Maintaining adaptability and technological innovation is one of the keys that enables the Corporation to align its business strategies and adjustments with the development of science and technology. The Fourth Industrial Revolution (Industry 4.0) is rapidly unfolding and profoundly impacting all areas of social life, especially the international telecommunications industry. Therefore, China Telecom must conduct appropriate analyses and evaluations to sustain its adaptability and technological innovation in response to this revolution. One of the methods through which the Corporation ensures its adaptability and technological innovation is to apply for licenses and provide 5G services to users. On February 12, 2020, China Telecom received formal authorization from the Chinese Government to utilize the 3300-3400 MHz frequency band for indoor coverage to avoid interference with other systems and networks such as China Unicom and China Broadcasting Network. The three mobile operators are collaboratively responsible for developing and sharing 5G access network infrastructure within indoor environments to reduce infrastructure deployment costs and increase operational efficiency.

Alongside other network operators, China Telecom has swiftly and proactively developed 5G technology infrastructure to meet customer demands and anticipate trends in the field of telecommunications technology. This effort has contributed to positioning China as one of the fastest-growing 5G markets globally. Although 5G deployment licenses were only granted at the end of 2019, with official commercial deployment in 2020, China currently has about 818 thousand 5G stations with 285 million 5G subscribers, accounting for 17.8% of the total mobile subscriptions. The early implementation of 5G infrastructure and service provision has significantly enhanced China Telecom's competitive capacity and adaptability in response to the impact of the Fourth Industrial Revolution.

2.2. Experience of Korea Electronics and Telecommunications Corporation

Korea Electronics and Telecommunications Corporation (SK Telecom) was founded in March 1984 as Korea Mobile Telecom Services Corp. but was renamed Korea Mobile Securities Corp. in May 1988. It was a subsidiary of the state telephone monopoly, Korea Telecom (now KT Corp.), until KT sold it in 1993. In June 1994, SK Group (formerly Sunkyong Group) became Korea Mobile Telecommunications Corporation's largest shareholder. Korea Mobile Telecommunications Corporation officially joined SK Group in January 1997. As of 2020, SK Telecom is Korea's largest wireless carrier, leading the local market with 50.5% market share as of 2008. Over the years, to maintain its position as the leading telecommunications

provider in South Korea, SK Telecom has implemented several strategic policies:

First, actively expanding markets both domestically and internationally is essential.

The active expansion of markets, both domestically and internationally, is one of the business strategies that can increase SK Telecom's competitiveness and influence in the international telecommunications market. To facilitate this expansion, SK Telecom proactively invests in foreign direct investments in countries in the Asia-Pacific region and other places with high development potential. The investments are 100% equity investments from the parent company or mergers and acquisitions of subsidiaries in markets that are countries and territories with strengths and potential for telecommunications development. In addition, SK Telecom implements strategic alliances with other telecommunications companies worldwide and has participated in international information organizations such as ITU and APT.

SK Telecom has developed comprehensive sales policies and paid particular attention to enhancing after-sales services to increase the number of service users within its domestic market. Practice in Korea shows that in today's market, any business that wants to develop must pay attention to customers. Identifying its central target as customers, SK Telecom has carried out appropriate marketing activities to bring better results to customers. On the other hand, SK Telecom's customer care centers are all interconnected. Therefore, a single call will promptly address customers' questions and requests. If customer issues cannot be resolved on the same day, the customer will be compensated.

Second, it is important to invest in research and development (R&D) of new products to meet society's needs.

SK Telecom has paid attention to investment in research and development (R&D) of new products to address societal needs by devoting an increasing amount of resources to this task. Through the development of a series of systems, including TDX switchboard system, ATM switchboard, multimedia services, F-O transmission equipment, IMT-2000 system, and DBMS information system map, SK Telecom has upgraded South Korea's telecommunications technology. In addition, SK Telecom is interested in cooperating with other technology enterprises to invest in high-tech, banking, education, healthcare, and agriculture to develop and exploit products to serve the country's socio-economic development needs and people's increasing demand for technology products, especially smart ones.

Thanks to the research and development of new products that meet societal needs, SK Telecom not only maintains its leading position in the Korean telecommunications industry but also becomes the foremost telecommunications corporation in South Korea with the operating philosophy toward sustainable development through its support of the community inside and outside the Corporation, creating new values for all stakeholders - customers, shareholders, employees, and society - with the slogan "Joining hands to build a happy community". Besides bringing added value to customers through all services provided, SK Telecom is developing and implementing many social programs, of which SK Telecom's advantages are taken advantage of, as well as other humanitarian projects with the desire to share the burden and contribute to building a happy community.

Third, maintaining adaptability and innovation is crucial.

The Fourth Industrial Revolution, which has been occurring rapidly, has profoundly impacted all areas of social life, especially the economy and its key sectors. This situation requires SK Telecom to have

appropriate analysis and assessment to grasp the best and adapt to this revolution. One of SK Telecom's typical adaptation and innovation aspects in the coming time is to accelerate the development of air transportation services in urban areas to promote flying cars actively. SK Telecom is collaborating with Joby Aviation, an American flight service startup, to develop flying cars, thereby expanding its presence in the urban air mobility service segment. SK Telecom said the two sides have signed an agreement to establish a regular consulting group to promote cooperation in introducing flight services in South Korea.

2.3. Experience of AT&T Telecommunications Group (USA)

AT&T Corporation, founded on October 5, 1983, is a multinational telecommunications company headquartered at Whitacre Tower in downtown Dallas, Texas. It is the second-largest mobile phone provider and the largest fixed-line provider in the United States. The Corporation also offers broadband pay-TV services. AT&T ranks as the third-largest employer in Texas (the largest non-oil company, following ExxonMobil and ConocoPhillips, and the largest employer in Dallas). As of May 2013, AT&T was the 21st largest company in the world by trading value and the 13th largest non-oil company. As of 2020, AT&T emerged as the world's largest telecommunications network, with revenue of 161.5 billion USD, ranked 11th among America's largest Fortune 500 businesses. AT&T's phone network has the largest number of subscribers in the United States. To maintain its leading position in the telecommunications industry in the US, AT&T has implemented the following strategies:

First, mergers and restructurings of the Group's member units should be carried out to maintain adaptation, innovation and development.

Merging and restructuring AT&T's member units to maintain adaptation and innovation is crucial to improve the Group's competitiveness and profitability in recent years. Therefore, merging member units into a company operating effectively within each field is an optimal approach that AT&T leaders are interested in. This strategic approach has led to the formation of well-known and valuable brands in the television and telecommunications sectors. Through the merger with Time Warner, for instance, AT&T acquired some of the most modern studios in Hollywood, the HBO movie cable channel, and famous news channels, such as CNN, TNT, and TBS, as well as a series of other popular TV shows, including "Harry Potter" and "Game of Thrones".

In addition, AT&T strategically develops online movie viewing software applications such as HBO Now, an application to watch movies over the internet, which may be a reasonable choice for customers who do not want to use expensive cable television packages. If so, HBO Now could become a competitor to Netflix, Amazon, and other online video services. In addition, AT&T maintains and promotes Time Warner's existing strengths so that AT&T can develop wireless telecommunications, broadband, and pay television services. AT&T aims not only to provide customers with simple television or video viewing services but also to offer customers integrated products with high experience in the future of the digital era.

On the other hand, AT&T has identified the future trend of users watching videos via smartphones. Nonetheless, AT&T remains steadfast in its strategic perspective regardless of the future of media. It will continue to focus on video content. AT&T is identified as a corporation that mainly generates profits from traditional development models such as pay TV channels, which are threatened by new technological innovations

when the Fourth Industrial Revolution is booming and expanding around the world.

Second, AT&T applies simulated 5G signaling technology for enhanced 4G capabilities.

Several years ago, AT&T rebranded its 3G HSPA+ network to 4G, and it has now adopted a similar approach by using simulated 5G signaling technology on phones. AT&T has announced a series of 4G LTE features, such as 4x4 MIMO and 256 QAM, to increase network speeds in select markets. AT&T calls this enhanced 4G experience "5G Evolution". Currently, users of the AT&T network will begin to see the "5G E" icon displayed on their devices. Phones are still equipped with the existing 4G network. However, the appearance of the "5G E" icon indicates an enhanced LTE signal. 5G E is entirely distinct from the 5G network (5G+), which AT&T will soon equip.

3. LESSONS LEARNED FOR VIETNAM TELECOMMUNICATIONS SERVICES CORPORATION

3.1. Enhancing business management and administration

The experience of some telecommunications enterprises demonstrates that effective management and operation are crucial for enhancing competitiveness. Therefore, to improve its competitive position in the future, Vietnam Telecommunications Service Corporation needs to have a consensus among the Corporation's Board of Directors to have sound and comprehensive management and operating strategies. It has to firmly grasp the situation and forecast the domestic, regional, and global development trends of telecommunications services and technology convergence trends. The Corporation has to accelerate and improve the quality of restructuring and stabilizing units/companies with similar functions and responsibilities, as well as reorganizing small sales departments/ centers that lack professionalism and expertise to form a strong telecommunications service provider corporation. A flexible and scientific management model should be implemented to ensure that the process of providing mobile information services is scientific and flexible. This approach guarantees that services are provided quickly and conveniently for customers. Waiting times in supply processes must be minimized.

In addition, in the coming period, VNPT needs to build a system of management and operating mechanisms consistent with the new organizational model - operating under market mechanisms with a customer-centric approach and improving service quality to maximize customer satisfaction. In the internal management mechanism, it is necessary to develop and refine mechanisms related to technological innovation, investment, business operation, and salary distribution of VNPT Vinaphone and other VNPT member units. In particular, special attention should be paid to business coordination mechanisms between member units (units) to increase the overall strength of the Corporation, ensuring cohesion between members. Planning governing mechanisms (capital investment, business plans, technology, markets, brands) is necessary to effectively manage and operate production and business activities. It should also implement maximum decentralization for members to deploy and develop services, especially value-added services, and quickly open new markets, especially for mobile services that will gradually approach and move into mobile commerce, mobile payments, and mobile advertising media. The Corporation must encourage and strengthen business cooperation between units based on specialization. This involves exploring mechanisms that allow members to proactively enter into joint ventures and economic linkages between the parent company and other units of the Corporation,

as well as to invest abroad to promote the strengths of each unit, generate revenue, and foster sustainable development for the Group. It is essential to establish and refine a synchronous management information system throughout the Corporation, including a centralized customer, billing, debt, and cash flow management system while conducting accounting based on services rendered. Internal inspection and supervision, especially on financial issues, also need to be reinforced to improve the Corporation's capital investment efficiency.

3.2. Develop and use human resources appropriately

In an era of rapid technology transfer, many businesses compete using the same technology and machinery. Thus, competitive advantage depends largely on human factors and management skills. Today's business environment requires good human resource management, including effective employee training and coaching.

First of all, in the coming time, the Corporation must create a consensus among all employees to focus on service quality, customers, and labor productivity. Therefore, the Corporation needs to pay attention to measures to motivate workers. All managers should be engaged and share responsibility in human resource management. Employees should be informed and participate in the Corporation's competitive plans and strategies. To achieve these objectives, the Corporation's information system must be transparent, safe, and confidential. In light of these considerations, the Corporation should enhance its competitiveness, strengthen its workforce, and innovate the operational activities of its training facilities. Strengthening linkages and cooperation with reputable domestic and international training institutions is crucial to meet the Group's high-quality human resource training requirements.

Furthermore, the Corporation should promote a scientific labor organization for effective human resource utilization, focusing on building high-quality human resources at management levels, research training facilities, and key business fields. Recruiting the right people and arranging workers based on their strengths, abilities, and job requirements is necessary. Human resource recruitment should be based on actual business operations and business development strategies. The Corporation must develop policies tailored to specific periods and stages to select, train, and utilize talents in the Group's core areas, such as business, management, telecommunications, and information technology. Well-organized training and retraining initiatives will enhance its workforce's professional qualifications and competencies, especially those undergoing job transitions. It is important to avoid superficial training and ensure that the skills developed correspond with the employees' qualifications.

The Corporation should invest in experienced management staff for its subsidiaries and member companies. For employees, it is necessary to provide training on customer-oriented business thinking and the utilization of an appropriate labor structure, focusing on labor and business management. In addition, a combination of both domestic and foreign training will facilitate the development of a stable and high-quality workforce. It is important to plan and create favorable conditions for research and management staff to access, learn, and work cooperatively with partners and new scientific and technological achievements, thereby fostering a professional team of experts. Refining its income distribution and motivation mechanisms for workers is essential to improving productivity and work quality, attracting high-quality human resources, and minimizing labor turnover to other businesses. At the same time, the Corporation should implement a

remuneration regime that is commensurate with the employee's contribution, offer promotion opportunities, encourage the improvement of working methods, promote initiatives, and enhance the spirit of self-awareness and autonomy in the workplace.

To enhance the awareness of officials and employees about the Corporation's restructuring and reform in the coming period, it is necessary to coordinate with trade unions to propagate and disseminate the Party and State's policies concerning the reform. Efforts should be made to minimize organizational and labor disturbances and ensure workers' psychological well-being. Furthermore, the Corporation should plan for labor restructuring labor by field, determine the number of necessary workers, identify the number of redundant workers, and outline compensation for each worker. It should also resolve policies and regimes for employees according to the provisions of the law.

3.3. Increase investment in resources for research and development (R&D)

Increasing investment in resources for research and development is a key focus and strategy prioritized by domestic and foreign telecommunications corporations. SK Telecom Group's experience shows that investing in resources to research and develop new products is crucial for creating endogenous technological strength for telecommunications corporations.

As Telecommunications Services Corporation is a large telecommunications corporation in Vietnam, learning from the experiences of large domestic and foreign telecommunications corporations in research and development is essential to creating and launching new services, especially value-added services, characterized by unique styles with high quality and usability to meet future consumer needs. First of all, the Corporation should prioritize R&D as a regular and important task to introduce new products to the market and propose solutions to improve production organization to enhance its competitiveness. Thus, it needs to strengthen its existing R&D capacity by continuously refining its system of regulations and guidelines for synchronous, comprehensive, and highly feasible R&D activities to attract and encourage the research team to maximize their creativity and develop scientific and technological products that meet the market demand. It should establish a close relationship with member units to identify problems arising from the units and disseminate research results, solutions, and measures to overcome difficulties arising from these units. It should develop and implement key strategic science and technology programs while ensuring adaptability to changes in organization, management model, operation, and production. Investing in technological innovation research is essential to improving competitiveness and business efficiency, with the goal of mastering key technologies to promote the production of export-oriented high-tech products. It is important to support and encourage advanced importation, master and localize imported technology, and cooperate with research institutes and universities in technological and product innovation. It should also enhance investment in developing science and technology potential; institutionalize issues related to training, fostering, using, remunerating, and honoring intellectuals; promote international cooperation in science and technology to bridge the science and technology gap; develop a science and technology information portal to manage science and technology activities and teams; disseminate standards, processes, regulations, science and technology results; update activities and results of key science and technology research programs.

3.4. Enhance the role of State management for telecommunications enterprises

The State plays a key role in the development of the economy in general and the development of the telecommunications industry in particular. State management of telecommunications has been strengthened regularly and drastically, creating favorable conditions for telecommunications and television service businesses to develop infrastructure according to approved plans, thereby improving network and telecommunications service quality. The communication system supports the direction and administration of party committees and authorities at all levels, as well as activities related to flood and storm prevention and disaster rescue. Telecommunications businesses gradually develop new services to meet the increasing market demand.

State management in telecommunications infrastructure has directed and urged businesses to renovate telecommunications cable networks to ensure safety and improve urban aesthetics. At the same time, the government creates favorable conditions for telecommunications enterprises to develop infrastructure based on approved plans, thereby enhancing the quality of telecommunications service networks. It is also necessary to check the inspection regulation implementation of public terrestrial mobile phone base stations, strengthen the management of prepaid mobile subscribers, and improve promotional programs, standards, regulations, and quality of telecommunications services.

State management of the internet sector has been strengthened with regular inspections, especially checking compliance with internet legal regulations for internet agents, providers, and public electronic gaming venues nationwide. Accordingly, violations will be promptly detected and prevented, and instructions will be given to public electronic gaming providers to ensure compliance with legal regulations on the management, provision, and use of Internet and electronic gaming services.

4. CONCLUSION

In this study, the experiences in developing and improving the competitiveness of some foreign businesses operating in telecommunications services are diverse and rich. They are the experiences of enterprises with production and business activities similar to Telecommunications Services Corporation. These enterprises include China Telecom Corporation (China), Korea Electronics and Telecommunications Corporation (SK Telecom), Experience of Telstra Telecommunications Group (Australia), Telecommunications Group NTT DoCoMo, Inc (Japan), and AT&T Telecommunications Group (USA). By investigating their experiences in developing and improving competitiveness, some lessons can be drawn for Telecommunications Services Corporation. These are lessons that Telecommunications Services Corporation can learn and apply to develop and improve its competitiveness.

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THE IMPACT OF INTERNAL MARKETING ON WORKERS' JOB SATISFACTION IN VIETNAMESE COAL MINING ENTERPRISES

Nguyen Thi Hong Loan[a*], Nguyen Thanh Thao[a], Nguyen Ut Dieu Linh[a]

[a]Hanoi University of Mining and Geology, Hanoi, Vietnam

[*]Corresponding author: loanhumg@gmail.com

Abstract: *Internal marketing refers to enterprises using marketing tools to attract and retain their good employees, thereby achieving business performance (Kaur and Sharma, 2015). An Enterprise with effective internal marketing activities will improve employees' job satisfaction, increase labor productivity and product quality, and create a foundation for its development.*

The article proposes a model to study the relationship between internal marketing activities and workers' job satisfaction in Vietnamese underground coal mining enterprises: (1) Empowerment; (2) Training and development; (3) Pays and rewards; (4) Internal communication; (5) Managerial support. Through survey data on employees, the article quantitatively analyzes the impact of internal marketing activities on their job satisfaction at these enterprises. It proposes internal marketing solutions for improving employee job satisfaction, such as arranging jobs according to the capacity and skills of employees, creating conditions for employees to be proactive with their work results, planning and implementing human resource development strategies, changing the selection process of employees for training courses, strengthening communication about the company's vision and strategy, empower employees more to increase their initiative and responsibility, etc.

Keywords: *Internal marketing*, *Job satisfaction, Coal mining enterprises.*

1. INTRODUCTION

Internal marketing (IM), considering employees as internal customers and work as internal products, will help to meet the needs of employees, thereby satisfying them, assisting companies in achieving business efficiency goals, and retaining employees (Berry, 1991). Internal marketing is an organization's marketing activity aimed at internal customers, and the organization needs to carry out recruitment and employment activities to meet the needs and desires of internal customers. The effectiveness of IM activities can help an organization achieve its goals and improve product and/or service quality. Organizations need to prioritize IM activities before external marketing (Kotler, 2000). IM motivates employees, encouraging them to perform well and improve service quality, thereby improving customer satisfaction (Lings & Greenly, 2005). The relationship between IM and employees' job satisfaction has been studied by many authors (Rajyalakshmi & Kameswari, 2012). The authors believe that if an enterprise performs internal marketing activities well, employee job satisfaction will be higher, and employee performance will also be higher (Shabbir, 2016; Ahmed et al., 2003).

Vietnam coal mining enterprises have particularly arduous, toxic, dangerous working conditions with many potential risks (Nguyen, 2022), and they are facing the situation of workers quitting their jobs and difficulty recruiting workers. These

enterprises can implement internal marketing solutions to improve employee satisfaction (Shabbir, 2016); Ahmed et al., 2003), thus attracting and retaining workers (Ashrafi et al. et al., 2018) and improving labor productivity. Through analyzing the impact of IM factors on employees' satisfaction in coal mining enterprises, the article proposes several IM solutions to improve employees' job satisfaction, contributing to attracting and retaining employees and improving labor productivity and business performance.

2. LITERATURE REVIEW

2.1. Internal marketing

IM is understood as "employees are internal customers" and like external customers, internal customers need to satisfy their needs (Berry, 1981). IM is understood as considering employees as internal customers, playing an essential role in bringing satisfaction to external customers (Pitt M. et al., 1999), and treating employees and customers equally through proactive programs to achieve organizational goals (Woodruffe, 1995). IM is the behavior of selling a job to internal customers (employees) on the principle that highly satisfied employees will help create a market-oriented and customer-centered company (Grönroos, 1981). IM is also defined by Stauss and Hoffman (2000) as "The planned use of communication actions to systematically influence the knowledge, attitudes, and behavior of existing employees." According to Rafiq and Ahmed (2003), IM is a planned effort to align, motivate, coordinate, and integrate across employee functions to create motivated and customer-oriented employees geared toward the effective implementation of corporate and functional strategies.

2.2. Internal marketing and employee job satisfaction

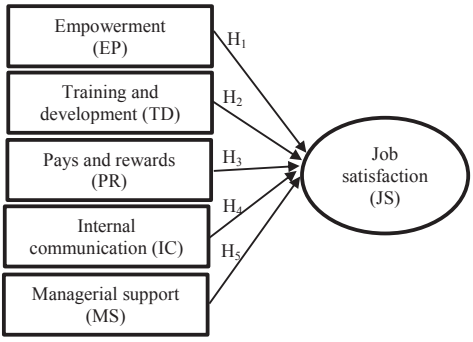
When studying the impact of IM factors on employee job satisfaction, Khalaf Ahmad et al. (2012) empirically pointed out that IM factors affect employees' job satisfaction, including selection and appointment, training and development, organizational support, incentives and motivation, and retention policy. Similar to this view, Ashrafi D. M. et al. (2018) affirmed that IM has a positive impact on employees' job satisfaction and the stronger the IM activity, the higher the employee job satisfaction level and pointed out the variables affecting employee job satisfaction, such as selection and appointment, training and development, organizational support, compensation and rewards, and employee retention policy.

Kamal A. M. Al-Qudah (2013) and Khin Marlar Maung (2020) pointed out that IM factors affecting employee job satisfaction include Training and development, motivation and rewards, Empowerment, and internal communication. Statistical analysis showed that training has the highest impact on employee job satisfaction, followed by Motivation, Empowerment, and Communication (Kamal A. M. Al-Qudah, 2013). According to Kameswari (2012), IM factors such as training and development, work environment, supervisor support, co-worker support, and recognition significantly impact employee job satisfaction. The results also suggest that organizations should treat employees as internal customers, provide them with opportunities for personal development, ensure that they have opportunities for advancement, provide regular feedback along with ensuring a

healthy work environment, maintain good relationships with their internal customers, etc., to increase employee job satisfaction. Alshurideh M. et al. (2023) stated that IM factors that impact employee job satisfaction include Empowerment, training, internal communication, incentives and rewards, and administrative support.

2.3. Research model

The authors' theories and practical research results on the relationship between internal marketing and employee job satisfaction have confirmed that internal marketing has a relationship with employee job satisfaction. These research results are also the premise for building a theoretical model to study the relationship between internal marketing factors and employee job satisfaction in Vietnamese coal mining enterprises. Approaching marketing from the perspective of human resource management and employee characteristics in coal mining enterprises shows that the aspects of IM that benefit employees in Vietnamese coal mining enterprises include empowerment, training and development, salary and bonus, internal communication, and organizational support. These aspects are also mentioned in the authors' theoretical and practical research on the relationship between IM and employee satisfaction. The proposed research model includes Dependent variable: Job satisfaction; Independent variables: (1) Empowerment; (2) Training and development; (3) Pays and rewards; (4) Internal communication; (5) Managerial support. The proposed research model is illustrated in Figure 1.



2.4. Observed variables and research hypotheses

(1) Empowerment impacts on employees' job satisfaction

Empowerment is the organization's ability to allow employees to make decisions (Bowen & Lawler, 1992) and is a personal experience where individuals take responsibility for their actions. Empowerment, or employee participation in making decisions related to their daily work activities, is directly related to job satisfaction (Ahmad et al., 2012). Hancer & George (2003) and Khin Marlar Maung (2020) also confirmed the relationship between empowerment and employees' job satisfaction.

H1: Empowerment has a positive impact on employees' job satisfaction

(2) Training and development impacts on employees' job satisfaction

Training and development is the systematic enhancement or development of employees' knowledge, skills, and attitudes to perform their jobs adequately and effectively (Forrest & Peterson, 2006). Training and development aims to develop tehnical, human, conceptual, and managerial competencies to promote individual and organizational growth (Shahzad & Naeem, 2013). Training is positively related to employees' job satisfaction. Thus, to be effective, training and development programs

need to consider that employees are adult learners (Forrest & Peterson, 2006).

H2. Training and development has a positive impact on employees' job satisfaction.

(3) Pays and rewards impacts on employee job satisfaction

Pays and rewards are significantly related to employee professionalism and job satisfaction (Gerald and Dorothee, 2004). Pay and rewards are essential to IM and affect employee job satisfaction (Ashrafi D. M. et al., 2018). Rewards are one form of recognition of achievements. If the organization increases the opportunity to receive rewards, employees will be more likely to be satisfied and encouraged to increase their productivity and quality of work. A higher salary than others in the same position will satisfy employees, boosting employee motivation. In addition, performance-based evaluation and rewards will increase job satisfaction and allow employees to perform tasks more than their efforts. Therefore, employees will be more satisfied if the organization pays reasonable salaries and increases the opportunities to receive financial rewards and non-financial benefits (Ashrafi D. M. et al., 2018).

H3. Pays and rewards has a positive impact on employees' job satisfaction

(4) Internal communication impacts on employees' job satisfaction

Internal communication is one of the most popular contents of IM (Ahmed & Rafiq, 2003). Internal communication is a crucial prerequisite for communication and coordination between functional departments or individuals and for making the most influential business decisions. Internal communication also helps employees better understand the organization and their work, promotes knowledge sharing among employees, and improves labor productivity (Bansal et al., 2001). According to Ahmed and Rafiq (2003), Internal communication has a positive relationship with job satisfaction. Tourani et al. (2012) also affirmed that internal communication, especially communication within the organization, significantly impacts employee job satisfaction.

H4. Internal communication has a positive impact on employees' job satisfaction

(5) Managerial support impacts on employees' job satisfaction

Managerial support is related to adjusting employee schedules and tasks and providing support tools to help employees manage their work and do their jobs better (Rahel Teka, 2022). Managerial support impacts organizational performance and employee satisfaction (Wassem et al., 2019). The more organizational support, the more satisfied employees are (Ashrafi D. M et al., 2018; Kameswari et al., 2012). Support from superiors and support from colleagues, feedback and recognition of employees, and a healthy work environment will bring satisfaction to employees. Recognition from management, suitable work, and good motivation make employees satisfied with their jobs (Shahzad T. et al., 2013).

H5. Managerial support has a positive impact on employees' job satisfaction

The multiple regression model representing the relationship between IM and job satisfaction of employees in Vietnam Coal mining companies is described as follows:

$$JS = \beta1 *EP + \beta2*TD + \beta3*PR + \beta4*IC + \beta5*MS + U$$

3. RESEARCH METHODOLOGY

3.1. Data collection

Data for the study were collected online through a survey form for employees of Vietnam Coal mining companies. The survey form included six scales with 28 observed variables inherited from Ashrafi D. M. et al. (2018) and Khin Marlar Maung (2020). The observed variables were measured using a 5-level Likert scale: 1. Completely disagree; 2. Agree; 3. Neutral; 4. Agree; 5. Completely agree.

The sample size was determined according to Hair et al. (2006). The research model includes 28 observed variables, so the sample size was determined to be 190. With the set objectives, the topic conducted both EFA analysis and regression analysis, so the minimum sample size was determined to be 190 (people), with an equal distribution to 10 coal mining enterprises. The surveyed workers in each enterprise are indicated according to the criteria of gender, seniority, and job position.

Data was collected by direct method: investigators went to the enterprises to meet, directly gave and collected questionnaires from workers; during the process of answering questions, investigators would answer questions if any and conduct in-depth interviews with many subjects to find out the underlying, essential causes affecting the level of satisfaction of workers. The number of ballots issued was 228, and the number of ballots collected was 228, of which 14 were invalid because the employees missed 1-2 questions and did not answer (13 ballots) or answered with two options for 1 question (1 ballot). The number of valid votes collected was 214, ensuring the minimum sample size for this study.

3.2. Data analysis

The collected data will be cleaned and analyzed on SPSS software with the following contents: testing the reliability of the scale (Cronbach Alpha test), exploratory factor analysis (EFA), independently testing the model's hypotheses with a confidence level of 99% to confirm the statistical significance of the scales.

4. RESEARCH RESULTS

4.1. Descriptive statistics results

4.1.1. Descriptive statistics with nominal variables

Table 1. Demographic of respondents of the sample

No	Personal characteristics	Sample size: n = 214	
		Frequency	Proportion, %
1	Gender	190	100
1.1	Male	108	56.8
1.2	Female	82	43.2
2	Working position	190	100
2.1	Direct	118	55.14
2.2	Auxiliary labor	32	14.95
2.3	Indirect	64	29.91
3	Seniority	190	100
3.3	Under 10 years	84	39.25
3.4	11- 20 years	82	38.32
3.4	21 – 30 years	48	22.43
4	Education	190	100
4.1	High school graduate	53	24.77
4.2	Technical worker	126	58.88
4.3	College graduated	32	14.95
4.4	Postgraduate	3	1.40

About gender: The number of male workers participating in the survey was 137, accounting for 64.02%, and the number of female workers was 77, accounting for 35.98%. This is also a reasonable ratio, reflecting the labor structure according to the specific working conditions of coal mining enterprises.

About education level: The number of workers participating in the survey was 53 high school graduate workers, accounting for 24.77%; 126 technical workers, accounting for 58.88%; 32 people had university degrees, accounting for 14.95%; 3 postgraduate workers, accounting for 1.4%. Direct workers are mainly technical workers and high school graduate workers, which is completely suitable for the characteristics of the mining industry.

About working seniority: 166 of the survey participants were under 20 years old, accounting for 77.57% of the total. The number of people with working seniority from 20 to 30 years was 48, accounting for 22.43%.

About working positions: The number of indirect workers participating in the survey was 64, accounting for 29.91%; the number of direct workers was 118, accounting for 55.14%; and the number of auxiliary workers was 32, accounting for 14.95%.

In general, the research sample is suitable for the labor characteristics of Vietnamese coal mining enterprises and ensures a good reflection of the research results.

4.1.2. Descriptive statistics with quantitative variables

The data in Table 2 describe the research results in more detail. This information also contributes to proposing solutions to increase employee job satisfaction.

Table 2. Descriptive statistics of variables in the model

Variables	N	Minimum	Maximum	Mean	Std. Deviation
EP	214	3	5	3.93	.82
TD	214	2	5	3.67	.68
PR	214	3	5	3.89	.61
IC	214	3	5	3.41	.75
MS	214	2	5	3.86	.84
HL	214	3	5	3.79	.87

According to the data in Table 2, it shows that:

Employees rate the empowerment scale relatively high, with an average score of 3.93 on a 5-point Likert scale. Employees surveyed said they have been given autonomy in solving professional problems but have not been encouraged to implement initiatives and ensure the quality of their work.

The Pays and Rewards scale and the organization's support are rated relatively high, with an average score of 3.89 and 3.86 points. Employees are relatively satisfied with the company's salary and bonus regime, the leadership's capacity, and the material and spiritual support and incentives for employees.

The Training and Development scale has a low assessment level, with an average of 3.67 points. Employees think the company has organized training courses on expertise, political level, and information technology. The training content and methods are reasonable; however, the effectiveness is not achieved because the trainees are the heads of units or those who are undertaking related tasks, not starting from the aspirations and abilities of the employees, leading to not meeting the requirements of training

activities as well as the requirements of the job after training, and creating pressure for employees. The use of trained knowledge and skills in work is not effective. Training courses are mainly short-term and organized internally within the company or group to improve professional knowledge and skills related to job performance. Furthermore, employees do not appreciate the company's support in terms of material and time during the process of learning to improve their expertise.

The Internal Communication scale is rated the lowest, at 3.41 points. Employees do not appreciate communication activities. Employees believe superiors always listen to their wishes and aspirations for reasonable human resources and income policies. Open leadership and fair treatment have created a comfortable mindset for employees, ready to accept contributions from superiors. However, employees do not have many opportunities to exchange information with leaders regularly, and the company does not have many activities to help employees feel the importance of their role in the company's mission and strategy. This does not encourage employees to acquire new knowledge and accumulate experience to improve their jobs and contribute to the company's success.

4.3. Testing the reliability of the scale through Cronbach Alpha coefficient

The results of assessing the reliability of independent and dependent scales in the model "The impact of internal marketing on job satisfaction of employees at coal mining enterprises in Quang Ninh" show that most of the observed variables of the scales have a total correlation coefficient greater than 0.3, Cronbach Alpha coefficient from 0.7 or higher. Thus, all observed variables of the scales ensure reliability and continue to be included in the EFA.

Table 3. Scale reliability analysis

	Component				
	1	2	3	4	5
PR2	.813				
PR1	.811				
PR4	.785				
PR5	.698				
PR3	.670				
EP3		.757			
EP1		.737			
EP4		.725			
EP2		.718			
EP5		.657			
MS4			.843		
MS5			.785		
MS3			.720		
MS2			.671		
MS1			.641		
IC1				.780	
IC3				.730	
IC4				.649	
IC2				.639	
IC5				.539	
LD4					.721
LD2					.735
LD3					.659
LD5					.527
LD1					.511
Eigenvalues	14.766	2.15	1.825	1.37	1.067
Extracted variance (%)	41.340	54.661	63.652	71.135	76.929
KMO value	0.928				
Bartlett's Test	Chi-Square = 4150,031; df = 435; Sig = 0.000				

4.4. Exploratory Factor Analysis (EFA)

After checking the reliability through the Cronbach Alpha coefficient, the research model gives five independent variables affecting the dependent variable "Employee job satisfaction," with 24 observed variables

ensuring reliability to be included in the EFA exploratory factor analysis.

Specifically, The KMO value is up to 0.928, and the Sig. coefficient of Bartlett's test is 0.000 < 0.5, showing that the observed variables are linearly correlated with each other as a whole and are completely suitable for factor analysis.

After conducting EFA factor analysis with the Eigenvalue standard > 1, Principal Components extraction method, and Varimax rotation, the results show five extracted factors consistent with the proposed model. The total extracted variance is 76.929% > 50%, meaning that the first five factors explain 76.929% of the variation in the data. The factor loading coefficients of these variables are all greater than 0.5, ensuring reliability and being included in the analysis.

4.5. Regression analysis

The regression analysis was conducted with five independent variables: (1) Empowerment (EP); (2) Training and development (TD); (3) Pays and rewards (PR); (4) Internal communication (IC); (5) Managerial support (MS) and the dependent variable: Job satisfaction (JS). The results of the regression analysis are presented in Table 4.

Table 4. Results of multiple regression analysis

Model	Standardized Coefficients	t	Sig.	Collinearity Statistics	
	Beta			Tolerance	VIF
(Cont)		-.260	.639		
PR	.371	5.321	.000	.798	1.532
EP	.204	5.154	.000	.843	1.262
IC	.136	4.132	.000	.925	1.981
TD	.267	3.847	.000	.932	1.384
MS	.492	6.689	.000	.886	1.482

Dependent Variable: JS

The analysis results of the suitability of the sample regression function show that the value of the multiple regression coefficient R2 is 0.668, and the adjusted multiple determination coefficient (adjusted R2) has a value of 0.654, indicating that the sample regression model has the required level of suitability. The independent variables explain 66.8% of the variation in the dependent variable. In addition, the F test is used to test the hypothesis about the suitability of the overall linear model or to examine whether the dependent variable is linearly related to the entire set of independent variables. The analysis results show that F = 58.264 and Sig. = 0.000 < 0.01 confirm with 99% confidence that the regression model built and analyzed is suitable. From the data in Table 4, the multiple regression model is written as follows:

JS = 0,371*PR + 0,204*EP + 0,136*IC + 0,267*TD + 0,492*MS

All five independent variables have a positive relationship with the independent variable, or in other words, the better the organization supports its employees, the more proactive and creative employees are in the process of solving work, the more effective and diverse the communication activities are, both from top to bottom and from lower levels to higher levels, the better the salary and bonus, training and promotion activities, the more satisfied employees are with their jobs.

4.6. Testing hypotheses about the relationship between variables

According to the data in Table 4, the Sig. values corresponding to the independent variables: MS, EP, IC, PR, and TD all have values of .000 <0.01, so with a confidence

level of 99%, the hypotheses GT1, GT2, GT3, GT4, GT5 stated in the process of building the regression model are accepted.

5. CONCLUSION AND RECOMMENDATIONS

To confirm the impact of factors on employee job satisfaction at Vietnamese coal mining enterprises, the article analyzed primary data collected from 214 employees. From the results of primary data analysis, some conclusions can be drawn as follows:

- Managerial support is statistically significant in the same direction as employee job satisfaction. This result is similar to the results of empirical research by Khin Marlar Maung (2020), Ashrafi D. M. et al. (2018), and Kameswari et al. (2012). Organizational support is the factor that has the strongest impact on employee job satisfaction in Vietnamese coal mining enterprises. When enterprises create conditions for employees to demonstrate their abilities well, accurately, and promptly evaluate their efforts and contributions, etc., employees will feel more satisfied and want to stick with the enterprise. To improve employee job satisfaction, Vietnamese coal mining enterprises need to analyze the needs, professional capacity, and skills of employees to arrange jobs suitable for their capacity and skills. Furthermore, increasing the level of understanding and initiative in work is necessary, creating conditions for employees to be proactive with their work results. Coal mining companies should allow employees to make their own decisions in their work, especially the final results of their work within the scope of their assignment. To do this, one of the effective tools that should be deployed and applied is the KPIs system. This system, on the one hand, creates conditions for employees to be proactive with their work; on the other hand, it will help the company evaluate work results scientifically and accurately, from which employees also have information to re-evaluate their capacity, promptly adjust their views or draw experiences to achieve work efficiency.

- Pays and Rewards are factors that have a relatively strong and positive impact on employees' satisfaction in Vietnamese coal mining enterprises. This result is similar to the research results of authors Ashrafi D. M. et al. (2018) and Khin Marlar Maung (2020). For employees in coal mining enterprises, Pays and Rewards are not only factors that ensure the material life of employees but also factors that affirm the recognition of employees' contributions. Coal mining enterprises have been and are properly implementing the provisions of the law on salary regime. However, it is necessary to propose and implement measures to increase employees' income, such as bonuses for ensuring work quality, having technical innovation initiatives, saving raw materials, and using used materials. The company can also develop evaluation and reward regulations for employees classified as good. These activities will positively impact workers' psychology, attitude, and creativity at work.

- Training and development are factors that positively and significantly impact employee job satisfaction. This relationship is consistent with the conclusions of Khalaf Ahmad et al. (2012); Ashrafi D. M. et al. (2018); Kamal A. M. Al-Qudah (2013); Khin Marlar Maung (2020); Forrest & Peterson, 2006); Shahzad and Naeem (2013). When the employee's assessment of the suitability and effectiveness of training, the company's

material and spiritual facilitation during the learning process increases by 1 point, the employee's satisfaction will increase by 0.267 points. Coal mining companies need to plan and implement a human resource development strategy. Conduct training according to the company's strategic goals and employees' needs. Increase material and time support for workers to participate in training courses, especially training to improve professional qualifications. Increase cooperation in training and send workers to participate in training courses on management and exploitation skills, etc., in some countries with experience in business management and developed mineral exploitation activities, such as Japan and Indonesia. In addition to professional and technical training, it is necessary to increase training in soft skills and the training of successor staff.

The empowerment and internal communication variables also positively impact employee job satisfaction; however, the impact level is not high enough. This result is similar to the empirical research results of Ahmed and Rafiq (2003), Tourani et al. (2012), Ahmad et al. (2012), and Khin Marlar Maung (2020). Coal mining companies should regularly organize private meetings between employees and managers. The content of these private meetings is not only limited to discussing and listening to difficulties or suggestions of employees at work but also needs to be expanded to topics about friends, family, and society. If the company knows how to guide or share orientation with employees so that they are not too distracted by external issues, it will make employees feel cared for and understood, so they will strive to work harder. In addition, coal mining companies should encourage employees to regularly provide feedback and ideas in meetings and employee work reports. Empowering employees allows them to be more proactive, accountable, and responsible for decisions.

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THE EFFECTS OF COLLECTIVISM ON EMPLOYEE VOICE BEHAVIOR IN VIETNAM - THE MEDIATING ROLE OF PROSOCIAL MOTIVATION

Le Thi Thu Huong[a*], Pham Thi Bich Ngoc[b], Nguyen Canh Nam[c]

[a]Hanoi University of Mining and Geology, Hanoi, Vietnam

[b]National Economics University, Hanoi, Vietnam

[c]Vietnam Energy Association, Hanoi, Vietnam

**Corresponding author: lethithuhuong@humg.edu.vn*

Abstract: *This study examines the impact of collectivism on the voice behavior of lecturers in higher education institutions in Vietnam. The results of a survey of 424 university lecturers show that collectivism is positively related to lecturers' voice behavior. Furthermore, prosocial motivation partially mediates the relationship between collectivism and employee voice behavior. This research advances the literature by highlighting prosocial motivation as a crucial construct linking collectivism to voice behavior. Based on these findings, the authors propose practical recommendations for universities and organizations in general to foster collectivism, prosocial motivation, and employee voice behavior.*

Keywords: *collectivism, employee voice behavior, prosocial motivation.*

1. INTRODUCTION

Although there is an extensive body of literature on employee voice in Western countries, particularly in regions like Europe, there is relatively less understanding of the state of employee voice in the Asia Pacific, including Vietnam, where this gap pertains to the influence of cultural factors (Wilkinson et al., 2020). Morrison (2014) previously highlighted the limited understanding of how national culture affects employee voice, aside from Botero and Van Dyne's (2009) finding that power distance is negatively related to voice, and asserted that cultural differences in voice likely extend beyond power distance. In response to Morrison's (2014) call for further research on cultural differences in employee voice beyond power distance, Kwon and Farndale (2020) explored the influence of four additional national cultural values: uncertainty avoidance, in-group collectivism, performance orientation, and assertiveness. The integrative framework proposed by Farndale and Kwon (2020) could be beneficial for studying employee voice across various contexts; however, we are also eager to see studies that examine potential differences between individual-level variables and employee voice in different cultures (Wilkinson et al., 2020). Indeed, this eagerness is supported by the reality that few studies examine the effects of cultural factors at the individual level on employee voice behavior. Most research on individualism-collectivism (I-C) has approached the topic from a cross-cultural or cross-national perspective, treating I-C as a culture or country-level variable rather than an individual personality characteristic (Perrewé and Spector, 2002). Therefore, this gap will be addressed by investigating the impact of cultural factors on employee voice behavior, specifically on individual-level collectivism in a collectivistic society like Vietnam (which scores 30 on the individualism dimension

according to the Country Comparison Tool from The Culture Factor). This research also responds to the calls made by Wilkinson et al. (2020) and Morrison (2014), as noted earlier.

This study makes several contributions to the existing literature. First, it offers new insights into the cultural factors influencing voice behavior, particularly collectivism, within the context of higher education institutions in Vietnam, which is a collectivistic nation. This addresses the gap in research on these factors (Morrison, 2014; Wilkinson et al., 2020). Second, our model incorporates both the direct effect of collectivism and the mediating role of prosocial motivation in explaining employee voice behavior. Third, we adapt the scale of prosocial voice developed by Van Dyne et al. (2003) by modifying the items to reflect key characteristics of discretionary behavior, specifically its proactive and voluntary nature. Finally, we employ motivated information processing theory to elucidate this behavior. This theoretical framework has rarely been applied in this area, thus enriching our understanding of the theories that explain employee voice behavior.

2. CONCEPTUAL BACKGROUND AND HYPOTHESIS

2.1. Employee voice behavior (EVB)

Although the concept of employee voice can be traced back more than two centuries (Mowbray et al., 2015), Hirschman's (1970) Exit–Voice–Loyalty theory is consistently regarded as the foundational work in the field, as no prior scholar had seriously engaged with the idea (Kaufman, 2013). As a result, Kaufman (2013) recognized that Hirschman deserves credit for being the first to develop a formal theory of voice, a recognition that remains valid today. Farrell (1983), building on Hirschman's (1970) model and the contributions of Kolarska and Aldrich (1980), as well as Rusbult, Zembrodt, and Gunn (1982), expanded the field by introducing "Neglect" as a fourth dimension. Alongside Exit, Voice, and Loyalty, this dimension forms distinct responses to employee dissatisfaction. Mowbray et al. (2015) noted that Farrell (1983) was the first to apply Hirschman's (1970) model to the employee context.

In a comprehensive review of employee voice research, Mori et al. (2022) indicated that most recent voice scholars regard the formal definition and operational measure provided by Van Dyne and LePine (1998) as the foundational starting point for voice research in organizational behavior (Morrison, 2011; Mowbray, Wilkinson, & Tse, 2015; Wilkinson, Barry, & Morrison, 2020). Van Dyne and LePine (1998) built on the framework developed by Van Dyne, Cummings, and Parks (1995) to assess the construct and predictive validity of two forms of extra-role behavior in their typology: helping and voice.

While there are various classifications of voice, they consistently include at least one type of voice as a form of extra-role behavior, which is often seen as having the greatest potential benefits for organizations. In this study, we adopted Van Dyne et al.'s (2003) definition and scale of prosocial voice. Van Dyne et al. (2003) defined prosocial voice as the expression of work-related ideas, information, or opinions based on cooperative motives. This voice behavior is intentional, proactive, and other-oriented, primarily focusing on benefiting others, such as the organization.

2.2. Collectivism (C)

Although most recent studies have adopted a cross-cultural approach, evidence suggests that distinctions between collectivists and individualists may manifest as individual differences within the same culture (Moorman and Blakely, 1995). As Hui and Triandis (1986) observed, cultures labeled as collectivistic or individualistic are simply those in which most individuals display the corresponding individual differences. This observation aligns with Dorfman and Howell's (1988) note that all analyses based on Hofstede's work rely on mean scores aggregated at the national level. Triandis (1995) defined collectivism as the tendency for individuals to view themselves as members of social groups or collectives, prioritizing and being motivated by the goals and norms of these groups. In contrast, individualism refers to the tendency for individuals to see themselves as independent from groups or collectives, with their motivation and priorities centered on personal goals. Collectivists are more likely to submerge personal goals for the good of the group and maintain relationships with the collective, even when personal costs exceed the rewards (León et al., 2011). Triandis (2001) prefers to consider these constructs as an element of personality. In this study, we adopt Triandis's (1995) definition of collectivism and consider it as an aspect of personality.

2.3. Prosocial motivation (PM)

Prosocial motivation is defined as the desire to protect and promote the well-being of others (Grant & Berg, 2012). Grant and Berg (2009) have clarified that prosocial motivation typically encompasses three core psychological processes: direction (toward various beneficiaries such as individuals, groups, or larger social collectives, with the benefits provided spanning different domains including physical, developmental, psychological, or material well-being), intensity (strong or weak), and persistence of effort (short or long duration). Bolino and Grant (2016) indicated that some scholars have conceptualized prosocial motivation as either a trait or disposition, while others have viewed it as a state influenced by situational or contextual factors. Despite the acknowledgment that prosocial motivation can be both a trait and a state, the research we reviewed has predominantly focused on trait-like other-orientation (Bolino and Grant, 2016). In this study, prosocial motivation was conceptualized as a trait. Prosocial motivation is differentiated from intrinsic motivation. At least three key distinctions between these forms of motivation include self-regulation (autonomous vs. introjected/ identified), goal-directedness (process vs. outcome), and temporal focus (present vs. future) (Grant, 2008). Grant and Berg (2009) provided further details into levels of autonomy in self-regulation, noting that prosocial motivation can vary in its intrinsic (autonomous) and extrinsic (controlled) origins. Employees may autonomously choose to be prosocially motivated based on its identification with or integration into their values, or they may feel pressured into prosocial motivation due to feelings of guilt, obligation, or external control.

2.4. Direct effect of collectivism on employee voice behavior

According to social identity theory (Turner, 1987a), humans are not merely individuals, nor are our minds solely individualistic. Individuals, groups, and intergroup relations coexist. Human beings embody individual and group identities, possessing both personal and social

identities. Moreover, individuals can define or categorize themselves at varying levels of abstraction. Salience elucidates how a specific situation (including the self) is categorized and assigned meaning. which the situation is categorized and understood by the perceiver will influence both self-perception and behavior.

Collectivism as an individual difference variable refers to a continuum that ranges from a disposition to see the self in collective, interdependent terms (i.e., "we") and to prioritize collective interest to a disposition to see the self in individualizing, independent terms (i.e., "I") and to prioritize individual interests (Knippenber et al., 2015). Although employee voice behavior raises risks to relationships and potential drawbacks for the individual voicing concerns, it also holds the potential to benefit both the organization and other members (Dyne et al., 1995). Consequently, individuals with a strong tendency toward collectivism are likely to engage in such behavior because they prioritize collective interests (Knippenberg et al., 2015), are more inclined to subordinate personal goals for the welfare of the group, and strive to maintain relationships within the collective, even when personal costs outweigh the rewards (León et al., 2011). Several empirical studies support this assertion. For example, Moorman and Blakely (1995) examined individualism-collectivism (IC) within a single culture, and their findings suggest that individuals who endorse collectivistic values or norms are more likely to engage in citizenship behaviors. Knippenberg et al. (2015) also demonstrated that collectivism moderates the relationship between perceived organizational support and organizational citizenship behavior. Accordingly, it is reasonable to hypothesize the following:

H1: Collectivism is positively related to employee voice behavior.

2.5. The mediating role of prosocial motivation

Based on motivated information processing theory (Kunda, 1990), motivation can influence reasoning by shaping the cognitive processes individuals rely on, affecting which information is considered during the reasoning process. As a result, individuals are more likely to reach conclusions that align with their desired outcomes. Individuals with prosocial motivation are more likely to search, encode, and retrieve information consistent with and conducive to group rather than personal goals and to preserve harmony (De Dreu et al., 2008). Thus, they have more opportunities to identify work-related problems and corresponding solutions. They are more likely to engage in employee voice behavior because they desire to benefit others or expend effort out of concern for others (Bolino & Grant, 2016). Given that employee voice behavior represents a form of challenging organizational citizenship behavior (Van Dyne, 1995) and prosocial motivation implies an orientation toward others, Grant and Mayer (2009) demonstrated that stronger prosocial motives in employees are associated with higher levels of challenging citizenship behaviors. Similarly, De Dreu & Nauta (2009) provided evidence supporting the hypothesis that variations in other orientations moderate the relationship between group-level attributes, such as perceived justice climate, and both prosocial behavior and personal initiative. Moreover, drawing from a review of prior studies, Grant (2009) identified at least three distinct mechanisms by which prosocial motives can increase the likelihood of citizenship behavior. First, employees with prosocial motives tend

to direct their attention outwardly rather than inwardly, thereby enhancing the likelihood of identifying opportunities to contribute to others and their organizations. Second, these employees generally place a higher value on and experience a stronger sense of responsibility for improving the welfare of others and their organizations, which increases their commitment to citizenship behavior. Third, employees motivated by prosocial concerns often prioritize collective interests over personal ones. It is reasonable to argue that prosocial motivation positively affects employee voice behavior.

Additionally, the manifestations of prosocial motivation are consistent with individuals who tend to perceive themselves in collective, interdependent terms (i.e., "we") and prioritize collective interests, as previously mentioned. León et al. (2011) identified collectivism as a significant antecedent to other-oriented motives for engaging in organizational citizenship behavior (OCB), the development of a citizen role identity, and OCB itself. Furthermore, Hnippenberg (2000), drawing on social identity theory, noted that identification fosters a sense of psychological oneness with the identification target. This psychological connection with the group or organization encourages individuals to adopt the group's perspective and perceive its goals and interests as their own (Dutton et al., 1994). Consequently, identification is typically associated with a motivation to achieve group goals and act in the group's best interest.

Based on the comprehensive theoretical framework and the empirical evidence as discussed above, we propose the following hypotheses:

H2: Collectivism is positively related to prosocial motivation.

H3: Prosocial motivation is positively related to employee voice behavior.

H4: Prosocial motivation mediates the relationship between collectivism and employee voice behavior.

Following the literature review and theoretical foundation presented above, the research model outlined in Figure 1 is proposed.

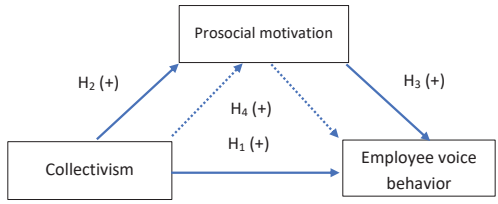


Fig 1. Research model

3. RESEARCH METHODOLOGY

3.1. Sampling and data collection method

With a population of approximately 80,000 university lecturers in Vietnam, the research team used convenience and purposive sampling methods to collect data through a questionnaire-based survey. The targeted participants were lecturers working at universities, primarily in Northern Vietnam. Data were collected by distributing a Microsoft Form link to the respondents. The research team managed the survey process to ensure no data was duplicated through these methods.

3.2. Sample characteristics

424 out of the 450 collected questionnaires were eligible for analysis. Table 1 shows the profile of the respondents.

Table 1: Sample Characteristics

Nr.	Characteristics	Frequency	Percentage (%)
1	Total, of which:	424	100
2	Gender		
-	Male	153	36
-	Female	271	64
3	Age (23-69)		
-	<30	19	4
-	30 - <40	165	39
-	40 - <50	235	55
-	>=50	5	1
4	Seniority (1-35)		
-	<10	62	15
-	10 - <20	250	59
-	20 - <30	106	25
-	>=30	6	1
5	Qualification		
-	Bachelor's degree	15	4
-	Master's degree	230	54
-	Doctorate/PhD	167	39
-	Postdoctoral	12	3
6	Management position		
-	University-level management	14	3
-	Faculty-level management	62	15
-	Department-level management	81	19
-	No management responsibilities	267	63

(Source: Results of the survey conducted in 2024)

3.3. Measurements of constructs

The measures (see Table 2) were tested using a 5-point Likert-type scale that ranged from 1 (completely disagree) to 5 (completely agree).

Prosocial voice: We adapted Dyne, Ang, and Botero's (2003) five-item prosocial voice scale. In the original items, we replaced 'This employee' with 'I' (and adjusted the corresponding possessive adjectives) to reflect the behavior from the actor's perspective. Importantly, we added the adverbs 'proactively' and 'voluntarily' to the end of each item to distinctly highlight the discretionary nature, which is a key characteristic of this voice behavior.

Collectivism: Collectivism was measured using the scale developed by Dorfman and Howell (1988), as cited in Clugston, Howell, and Dorfman (2000). A sample item is, "Group welfare is more important than individual rewards."

Prosocial motivation: We assessed prosocial motivation using a five-item scale developed by Grant and Sumanth (2009). We introduced the prosocial motivation scale by asking lecturers to consider the groups of beneficiaries at their workplaces as the "others" referenced in the scale. A sample item is, "I get energized by working on tasks that have the potential to benefit others."

3.4. Results of reliability and validity testing

We used SMARTPLS 3 to carry out the PLS-SEM algorithm for analyzing the reflective measurement model.

First, an Outer Loadings test was conducted to examine indicator reliability. The results showed that most indicators in the research model had outer loadings greater

than 0.7, with the exception of the C2 item, which was below 0.7. Consequently, the C2 item was removed from the C indicators, and the remaining items ensured high indicator reliability (Hair et al., 2016). The results of the Outer Loadings test (after extracting the C2 item) are presented in Table 2.

Next, Cronbach's Alpha and Composite Reliability tests were performed to evaluate the reliability of the measurement. The test results showed that all variables (after extracting the PR6 item) in the research model achieved reliability greater than 0.7. Therefore, the measurements of the variables in the research model ensured high reliability (DeVellis, 2012; Bagozzi & Yi, 1988). The results of the Cronbach's Alpha and Composite Reliability tests are shown in Table 3.

Test 2. Results of the Outer Loadings test

Items	Code	Outer loadings
Employee voice behavior		
I express solutions to problems with the cooperative motive of benefiting the organization, proactively and voluntarily.	EVB1	0,846
I develop and make recommendations concerning issues that affect the organization, proactively and voluntarily.	EVB2	0,876
I communicate my opinions about work issues even if others disagree, proactively and voluntarily.	EVB3	0,781
I speak up with ideas for new projects that might benefit the organization, proactively and voluntarily.	EVB4	0,862
I suggest ideas for change, based on constructive concern for the organization, proactively and voluntarily.	EVB5	0,839
Collectivism		
Group welfare is more important than individual rewards.	C1	0,804
Employees should only pursue their goals after considering the welfare of the group	C3	0,856
Managers should encourage group loyalty even if individual goals suffer.	C4	0,765
Individuals may be expected to give up their goals to benefit group success.	C5	0,803
Group success is more important than individual success.	C6	0,844
Prosocial motivation		
I get energized by working on tasks that have the potential to benefit others.	PM1	0,805
It is important to me to have the opportunity to use my abilities to benefit others.	PM2	0,858
I prefer to work on tasks that allow me to have a positive impact on others.	PM3	0,792
I do my best when I'm working on a task that contributes to the well-being of others.	PM4	0,858
I like to work on tasks that have the potential to benefit others.	PM5	0,866

(Source: Results of the survey conducted in 2024)

Table 3. Results of Construct Reliability and Validity test

Constructs	Code	Nr of items	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
Employee voice behavior	EVB	5	0,897	0,924	0,708
Collectivism	C	5	0,877	0,908	0,664
Prosocial motivation	PM	5	0,892	0,921	0,699

(Source: Results of the survey conducted in 2024)

Subsequently, an Average Variance Extracted (AVE) test was conducted to determine convergent validity. The AVE for EVB, C, and PM were 0.708, 0.664, and 0.699, respectively, meeting the requirement of being greater than 0.5 (Hair et al., 2016). The results of the AVE test are displayed in Table 3.

Finally, the Heterotrait-Monotrait Ratio (HTMT) test was conducted to evaluate discriminant validity. The results showed that the HTMT values between all variables were below 0.9, thus meeting the discriminant validity requirement (Hair et al., 2016). The results of the HTMT test are reported in Table 4.

Table 4. Results of HTMT and Collinearity Statistics (Inner VIF Values)

Variables	HTMT			Inner VIF Values		
	EVB	**C**	**PM**	**EVB**	**C**	**PM**
EVB						
C	0,445			1,164		1,000
PM	0,617	0,350		1,208		

(Source: Results of the survey conducted in 2024)

4. FINDINGS

We utilized SMARTPLS 3 to evaluate the structural model.

Collinearity statistics were performed to assess multicollinearity among the independent variables. The results indicated that all inner VIF values were below 3. Therefore, multicollinearity did not occur among the independent variables in the model (Hair et al., 2019). The results of Collinearity Statistics (Inner VIF Values) are indicated in Table 4.

To test all hypotheses, bootstrapping (n=5000) was applied to assess the path coefficients, indirect effect. The hypotheses were tested in a structural model that included control variables such as gender, seniority, qualification, and management position (abbreviated as manager). There is only one significant relationship between the control variable, management position, and employee voice behavior ($\beta = 0.126$, $t = 3.084$, $p = 0.002$), indicating that higher management positions are associated with increased employee voice behavior. In contrast to the findings of Eibl et al. (2020) and Yan et al. (2022), gender was found to have an insignificant relationship with employee voice behavior. The results of the hypotheses tests are presented in Table 5.

Table 5. Results of Hypotheses Tests

Hypotheses	Path description	β	T-values	P-values	Conclusion
H1	C → EVB	0.388	6.875	0.000	Accepted
H2	C → PM	0.341	5.311	0.000	Accepted
H3	PM → EVB	0.479	7.798	0.000	Accepted
H4	C → PM → EVB	0.163	4.810	0.000	Accepted

R^2 =0.388, AdjR^2=0.379 (p<0,001)

(Source: Results of the survey conducted in 2024)

The findings in Table 6 showed a positive relationship between collectivism and employee voice behavior (β = 0.388, t = 6.875, p < 0.001), supporting hypothesis 1. Collectivism was positively associated with prosocial motivation (β = 0,341, t = 5.311, p < 0.001), supporting hypothesis 2. As expected in hypothesis 3, prosocial motivation positively influenced employee voice behavior (β = 0.479, t = 7,798, p < 0.001). Finally, hypothesis 4 was supported by evidence demonstrating the mediating role of voice prosocial motivation in the relationship between collectivism and employee voice behavior (β = 0.163, t = 4.810, p < 0.001).

4. DISCUSSION

This study aimed to examine whether collectivism plays a role in motivating employee voice behavior in Vietnam, a collectivistic nation. Drawing on social identity theory and motivated information process theory, our study found that collectivism influences employee voice behavior in Vietnam, with prosocial motivation serving as a partial mediator in this relationship. This influence encompasses not only an indirect effect but also a direct effect on behavior. When lecturers strongly tend toward collectivism, they are more likely to exhibit prosocial voice behavior. The indirect effect of prosocial motivation indicates that lecturers have a strong tendency toward collectivism; they are motivated more by prosocial motivation, which subsequently leads to increased participation in prosocial voice behavior. These findings support previous research demonstrating a positive relationship between collectivism and organizational behavior (Knippenberg et al., 2015; Moorman & Blakely, 1995; León et al., 2011). Notably, this study found that management positions are associated with increased employee voice behavior. In contrast, gender was found to have an insignificant relationship with employee voice behavior, contrary to the results of Eibl et al. (2020) and Yan et al. (2022).

Our study provides additional insight into cultural antecedents of voice behavior, such as collectivism, within the context of higher education institutions in Vietnam, contributing to addressing the scarcity of research on these factors (Morrison, 2014; Wilkinson et al., 2020). We incorporated the mediating mechanism and the direct effect in our model to explain prosocial voice behavior. Collectivism and prosocial motivation account for 37.9% of the variance in lecturers' prosocial voice behavior. Furthermore, we showed the adaptation of Van Dyne et al.'s prosocial voice scale to reflect the discretionary nature of this behavior better. We contributed to construct validation in alignment with the recommendations put forth by Van Dyne et al. (2003).

When individuals define themselves based on the groups they belong to, the stronger their identification with the group, the more motivated they become to engage in actions that benefit the group, as the group shapes their self-concept (Turner, 1987a; Turner & Reynolds, 2012). Therefore, managers should focus on facilitating this process effectively by fostering positive relationships with organizational members, building a positive image for the organization, etc. Additionally, they should allocate employees to roles that align with their tendencies toward collectivism or individualism. Roles that require high levels of team collaboration should prioritize individuals with a strong collectivist orientation. At the same time, those with a more individualistic disposition may be better suited to independent, highly competitive tasks.

Although this study has provided certain practical and theoretical contributions, as discussed above, it has some limitations. With a sample size of 424 lecturers, the findings may not fully represent all lecturers in higher education institutions in Vietnam, despite the research team's efforts to survey lecturers from these universities in different geographical areas. Furthermore, the measurement scale used to assess the variables in the research model is a perceptual scale, which may be influenced heavily by respondents' subjective opinions. Future studies could expand the sample size, consider additional intermediate and moderating variables in the current research model.

5. CONCLUSION

This study provides new insights into the cultural factors influencing voice behavior, particularly focusing on collectivism in the context of higher education institutions in Vietnam, a collectivist society. Drawing on social identity theory and motivated information processing theory, we demonstrate that when employees strongly identify with collectivist values, they experience heightened prosocial motivation, which, in turn, drives prosocial voice behavior. These findings are particularly relevant for organizations in Vietnam, a collectivist nation where most employees exhibit collectivist tendencies. To leverage employees' prosocial voice, managers should prioritize strategies that enhance collectivism among employees, thereby fostering their prosocial motivation, ultimately promoting prosocial voice behavior within the organization.

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FINANCE, ACCOUNTING & AUDITING

THE DETERMINANTS OF GREEN BONDS ISSUANCE: EVIDENCE FROM ASEAN-5

Agung Wibowo[a*]

[a]*Universitas Gadjah Mada, Bulaksumur, Caturtunggal, Depok, Sleman Regency, Special Region of Yogyakarta 55281, Indonesia*

**Corresponding author: agungseptiawibowo@mail.ugm.ac.id*

Abstract: *Introduction/Main Objectives: This research investigates the determinants influencing companies' decisions to issue green or conventional bonds in ASEAN-5 countries from 2018 to 2022. Background Problems: The climate warming issue is escalating and gaining worldwide recognition. Many countries are responding by setting ambitious targets to achieve carbon neutrality in alignment with the Paris Agreement. This trend has created opportunities to develop green financial instruments supporting environmentally friendly projects. Novelty: Previous research has primarily concentrated on developed countries, resulting in a gap in studies regarding the reasons behind green bond issuance in developing countries. This research offers an initial discussion focused primarily on the context of the ASEAN-5 region. Research Methods: This research utilized a binary choice model (Logistic regression) on a sample of 118 corporations from five different countries to assess the direct impact of various factors on the likelihood of these companies issuing green bonds. Finding/ Results: The findings of this study reveal that higher coupon bonds and larger bond issuance sizes negatively impact the likelihood of green bond issuance, whereas longer tenors and larger firm sizes positively influence the probability of green bond issuance. Conclusion: Green bond issuance is a complex decision-making process. Understanding its drivers is crucial for achieving Net Zero Emissions, underscoring the need for regulators to implement strategic policy responses.*

Keywords: *Green Bonds; Issuance, Determinant; ASEAN-5, Logistic Regression.*

1. INTRODUCTION

Climate change and global warming are worsening in the 21st century (Abbass et al., 2022). This is evidenced by the annual increase in global surface temperatures caused by greenhouse gas emissions from various countries' economic activities. In the United States, the majority of greenhouse gas emissions stem from fossil fuel combustion for energy use (EIA, 2023). Similarly, in the Asia-Pacific region, the power and heat generation sector are the largest contributor to greenhouse gas emissions (Statista, 2024).

The deteriorating climate change issue has become a global consensus (Lin & Su, 2022). The United Nations, through the COP21 climate change conference, introduced the Paris Agreement on December 12, 2015. This agreement outlines concrete steps to tackle climate change and its negative impacts, including limiting global temperature rise to 1.5 degrees Celsius, periodically evaluating long-term goals collectively, and providing financial support to developing countries for climate change mitigation (United Nations, 2023). Consequently, many countries aim

to achieve Net Zero Emissions (NZE) by 2050 (IESR, 2023). NZE refers to the overall balance between greenhouse gas emissions produced and those removed from the atmosphere (Climate Council, 2023).

The urgency to achieve NZE by 2050 has opened opportunities for green financial instruments dedicated to supporting environmentally sustainable and low-carbon initiatives (Jin et al., 2020). One such instrument is green bonds. According to POJK 60/POJK.04/2017, green bonds or environmentally oriented debt securities are “debt securities whose proceeds are used to finance or refinance environmentally oriented business activities”. This distinction sets green bonds apart from conventional bonds, offering a standardized instrument to combat the climate crisis through funding activities that benefit the environment.

Globally, the guidelines and standards for green bond usage refer to The Green Bond Principles by the International Capital Market Association (ICMA, 2021) and Climate Bond Standards by the Climate Bond Initiative (CBI, 2024). Regionally, the ASEAN Green Bond Standards by The ASEAN Capital Markets Forum guide green bond issuance in Southeast Asia, along with other standards relevant to each region.

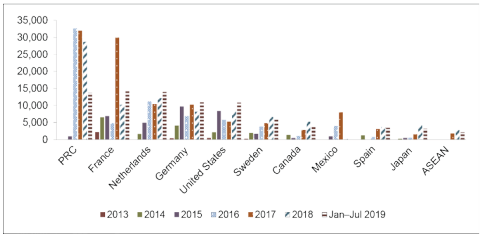


Fig 1. Green Bond Issuance (ADBI, 2020).

The first green bond was issued in 2007 by the European Investment Bank (EIB) through the Climate Awareness Bond. Despite the rapid growth of the green bond market, it represented only about 3% to 3.5% of total bond issuance in 2020, indicating a need for faster growth to meet the Paris Agreement targets (European Parliament, 2022). Countries in Southeast Asia, particularly, have shown commitment to realizing carbon neutrality by integrating green bonds. However, green bond issuance in ASEAN remains relatively low compared to China and other countries (Fig1).

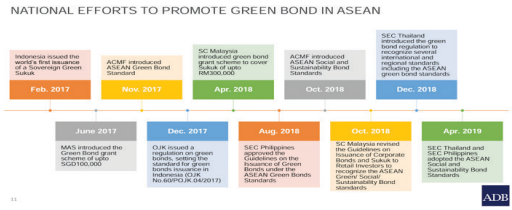


Fig 2. Green Bond Promotion in ASEAN (ADB, 2019).

This research specifically focuses on the ASEAN-5, the five founding countries of the Association of Southeast Asian Nations: Indonesia, Malaysia, the Philippines, Thailand, and Singapore. These countries are the primary promoters of green bonds in the ASEAN region (Fig2). They have set NZE targets for 2050, yet their green bond issuance is relatively lower compared to other countries, creating a gap. Therefore, investigating the factors that influence a company’s decision to issue green bonds is intriguing.

This research aims to assist governments in formulating effective green bond promotion policies by understanding corporate issuance behavior, providing managerial decision-making insights for other companies, and filling the literature gap on the determinants of green bond versus conventional bond issuance, particularly in the ASEAN-5 context. This research uses corporate bond issuance data, both green and conventional, in the five countries (ASEAN-5) from 2018 to 2022, excluding the financial and government sectors.

To gain a deeper understanding of the motivations driving green bond issuance, we theoretically investigate a range of factors that may influence these decisions, along with the mechanisms that underpin them. Our analysis identifies eight potential determinants spanning three key dimensions: the characteristics of the issued bonds, issuer-specific traits, and broader macroeconomic conditions. By employing a logistic binary choice model, we evaluate the direct effects of each identified factor on the likelihood of green bond issuance.

Our overall results firstly reflect that the companies that higher bond coupons rate and larger bond issuance sizes affect decrease the probability of firm to issue green bonds. On the other hand, a longer tenor and larger issuer size are linked to an increased likelihood of green bond issuance. Therefore, these findings offer specific implications for policymakers to encourage the growth of green bonds and provide some managerial recommendations.

The paper is structured as follows: Section 2 presents the literature review and the hypotheses to be studied. Section 3 describes the research framework, data set, and methodology. Section 4 describes and discusses the empirical results from regression. Section 5 contains the conclusions from the research. Lastly, Section 6 contains imitations and future lines of research.

2. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

2.1. Literature Review

2.1.1. Green Bonds

Green bonds are bond instruments whose proceeds are exclusively used to finance or refinance in part or whole from green projects that have met the requirements and are in line with the four components of the Green Bond Principles (ICMA, 2021). Based on the Green Bond Principles issued by the International Capital Market Association (2021), the four components consist of (1) use of proceeds, (2) project evaluation and selection process, (3) fund management, and (4) reporting.

Like conventional bonds, green bonds are fixed-income financial instruments to raise capital from investors through the debt capital market. Bond issuance involves acquiring fixed capital from investors over a certain period, with repayment of the capital (principal) at maturity and payment of agreed interest (coupons) throughout the journey. The fundamental difference between green bonds and conventional bonds lies in granting a “green label” placed by the issuer or other entity. In this context, bonds are given “green” status, indicating a commitment to use funds from green bonds, namely the principal, in a transparent manner. Unlike regular bonds that finance the issuer’s working capital, green bonds must be explicitly used to finance or refinance green projects or assets (Maltais & Nykvist, 2020).

The ASEAN Capital Markets Forum (ACMF) in the ASEAN Green Bond Standards (2018) released green project categories including -but not limited to-renewable energy projects, energy efficiency, pollution prevention and control, sustainable management of biological natural resources and land use, terrestrial and aquatic biodiversity conservation, clean transportation, sustainable water and waste management, climate change adaptation, products/technologies/production processes that are in accordance with the circular economy, and green buildings that meet standards.

2.1.2. Capital Structure Theory

A critical aspect of a company’s decision is the capital structure decision. The capital used by the company to run operations and develop the business can come from equity and debt from third parties. Titman et al.

(2018) explained that the capital structure is a combination of equity and debt used by the company. The main objective of capital structure management is to realize an optimal capital structure that maximizes the company's value. According to Titman et al. (2018), the optimal capital structure is a combination of funding sources in the capital structure that can increase value. Scott (1976) added that the company's capital structure that reaches its maximum point indicates optimal performance, and its financial leverage can reduce the weighted average cost of capital (WACC).

2.1.3. Trade-Off Theory

According to Hanafi (2016), some things prevent companies from using as much debt as possible. This is because the higher the debt, the higher the potential for bankruptcy. Brigham and Houston (2017) explain that the trade-off theory suggests companies balance the tax advantages of debt financing against the risks associated with potential bankruptcy. Thus, the capital structure theory by Modigliani and Miller (1963) is considered less relevant because it does not consider the assumption of the company's bankruptcy costs.

In the context of issuing green bonds, companies will consider the higher interest costs. If the additional costs exceed the benefits received by the company, conventional bonds will be more attractive. Conversely, if the benefits obtained exceed the costs, the company may issue green bonds to get a lower cost of capital with greenium while improving its reputation (Carmichael & Rapp, 2022).

21.4. Signaling and Asymmetric Information Theory

There is a relationship between asymmetric information theory and signaling. Modigliani and Miller (1958) assume that managers and investors have the same information about the company's prospects (symmetric information). However, there is a gap in the information received between them about the company's prospects (asymmetric information). Managers have better information than investors. Hanafi (2016) stated that investors who feel they have less information will try to interpret the behavior of managers. The existence of asymmetric information can potentially cause market failure (Sartono, 2001).

In the context of this research, investors often lack adequate information to assess the company's commitment to the environment. Therefore, from the investor's side, there is a need to distinguish companies committed to the environment from those not. Companies can signal that they are committed to the environment by issuing green bonds.

2.2. Hypothesis Development

Green bonds are specifically crafted to reduce issuance costs and appeal to companies with a strong environmental focus (Gianfrante & Peri, 2019). Regarding the average coupon rate, green bonds have lower issuance yields when compared to conventional bonds (Fatica et al., 2021). Therefore, the cost advantage of green bonds has succeeded in attracting the attention of corporate issuers (Lin & Su, 2022). Green bond coupons are expected to negatively correlate significantly with a company's decision to issue green bonds (Lin & Su, 2022). Companies tend to issue green bonds due to their desire for lower coupon payment obligations, opting to issue conventional bonds for larger debt requirements. This aligns with Barua and Chiesa (2019) observation that lower coupon rates frequently incentivize companies to pursue green bond issuance. Therefore, we propose the following hypothesis:

H1: The COUPON influences the probability of listed companies in the ASEAN-5 countries to issue green bonds.

While green bonds offer numerous advantages, they also present challenges. The

strict requirements related to the allocation of financing proceeds, especially when facing broader financing needs, can be a significant hurdle. This underscores the need for further research and innovation in the field of green finance (Cao et al., 2021). According to Lin and Su (2022), the bond size is expected to have a significant negative correlation with the company's decision to issue green bonds. Green bonds are often chosen when the company has relatively tiny funding needs. This is logical, given that green bonds involve more stringent verification processes compared to traditional debt financing methods. (Cao et al., 2021). Therefore, we propose the following hypothesis:

H2: The LnSIZE influences the probability of listed companies in the ASEAN-5 countries to issue green bonds.

Tenor, the period until the bond matures, is a crucial factor in financial planning. Conventional bonds become more appealing when the bond tenor is extended since they demand a higher issuance size and can have a considerable impact on financing costs. This highlights the importance of careful financial planning and the need for a thorough understanding of the implications of tenor on financing costs (Lin & Su, 2022). According to Cicchiello et al. (2022), the tenor is the average bond maturity expected to negatively correlate with a company's decision to issue green bonds. Companies typically issue green bonds to fulfill lowered loan demand while capitalizing on the improved reputation associated with green activities. Green bonds are not a key source of funding. According to related studies, conventional bonds are preferable since longer bond maturities need higher issue sizes and have an impact on funding costs (Lin & Su, 2022). In addition, longer tenors will increase interest rate risk, which can impact the company's borrowing costs. If interest rates rise significantly in the future, companies will have to pay more for interest on their bonds. Therefore, we propose the following hypothesis:

H3: The TENOR influences the probability of listed companies in the ASEAN-5 countries to issue green bonds.

The current ratio measures a company's ability to pay its short-term liabilities with its current assets. A company's liquidity is reflected in the size of its current assets or assets that are easily converted into cash, including cash, securities, receivables, and inventory (Sartono, 2001). According to Cicchiello et al. (2022), the level of solvency can positively impact the comfort of a company's funding. Since they have less asymmetric information, companies with a greater level of solvency (higher current ratio) would be more inclined to issue conventional bonds. In addition, the flexibility of conventional bonds that do not impose restrictions on the use of funds may also be more attractive to companies with lower current ratios when compared to green bonds (Lin & Su, 2022). According to Cicchiello et al. (2022), the current ratio is a proxy for short-term solvency that negatively correlates with the company's decision to issue green bonds.

H4: The CURRENT influences the probability of listed companies in the ASEAN-5 countries to issue green bonds.

Company size is a scale that reflects the size of a company. The proxy used in this research is the company's total assets transformed into the logarithm of nature. Using total assets as a proxy provides an overview of the total resources owned by the company (Dang et al., 2018). Lin and Su (2022) state that larger companies face lower information costs. Larger companies usually have a good reputation, more access to credit ratings, and more transparent financial statements, so they can quickly obtain funding through conventional methods such as conventional bonds. On the other hand, smaller companies often do not have these

advantages, making it quite challenging to obtain funding through conventional bonds.

As a result, small companies are increasingly turning to alternative funding sources, such as green bonds. A survey by the Asian Development Bank (2022) underscores this trend, revealing that green bond issuers are predominantly smaller companies. Specifically, 40% of issuers have a market capitalization of less than 500 million US dollars, 26% fall between 500 million and 2 billion US dollars, and only 3% have a market capitalization of 50 billion US dollars.

H5: The LnFSIZE influences the probability of listed companies in the ASEAN-5 countries to issue green bonds.

3. RESEARCH DESIGN

3.1. Research Framework

This research will employ a binary response model, specifically a logit model. According to Seo (2016), logistic regression analysis is used to explore the correlation between response probabilities in binary or ordinal form and explanatory variables. Generally, this method fits a linear logistic regression model using the maximum likelihood approach, as explained by Hosmer and Lemeshow in 1989. This research is quantitative involving the use of numerical data collected to answer a specific question (Sekaran & Bougie, 2016). This research will use secondary data, with one dummy dependent variable and five independent variables. These variables will be examined through hypothesis testing based on five hypotheses previously discussed.

The research aims to test the causality between the dummy variable "GREEN" (valued at 1 if the company issues green bonds and 0 if it issues conventional bonds) and three independent variables related to characteristics of bonds ("COUPON," "LnSIZE," "TENOR") and two independent variables related to characteristics of issuer ("CURRENT," "LnFSIZE"). Additionally, there are three country-level control variables ("GROWTH," "INFLATION," and "INTEREST").

3.2. Data Collection and Preview

This research will focus on private companies listed in ASEAN-5 countries, excluding the financial and government sectors. Companies will be selected based on the completeness of their financial reports published during the 2018-2022 period. The sample will be chosen using the data pooling method with purposive random sampling, specifically judgment sampling, which involves selecting samples based on specific criteria. The criteria for this research are:

Table 1. Sample Selection Process

Number	Selection Criteria	Observations
1	Private companies listed in ASEAN- 5 issuing bonds from January 1, 2018, to December 31, 2022	380,776
2	Companies that issue green and conventional bonds with the "Plain Vanilla Fixed Coupon" coupon type	3,416
3	Companies other than the financial, banking and government sectors	2,055
4	Companies that have complete financial report data required for research	541
Final Observations		541

This research uses panel data. According to Gujarati and Porter (2009), Panel data integrates both cross-sectional and time series data. This indicates that panel data has several observations with the same unit over time. Thus, panel data has advantages; first, it allows researchers to control specific characteristics that individuals, companies, or others do not observe. Second, the data also allows researchers to research lags in the behavior or outcomes of a policy (Wooldridge, 2016). The panel data used in this research is unbalanced panel data, which means that the number of observations for each company is different.

The research data was collected through various sources. Data on private companies listed in ASEAN-5 that issued conventional and green bonds during 2018-2022 came from Thompson Reuters Refinitiv Eikon DataStream. Then, it was supplemented with company characteristics data from Osiris, annual and financial reports from the company's official website, and macroeconomic data obtained from the World Bank and CEIC data.

Table 2. Variable Definitions and Summary Statistics

Variable	Definition
	Dependent Variable
GREEN	The dummy variable is set to one if a firm issues a green bond, and zero otherwise (i.e., if the bond is identified as a "green bond" in the Thomson Reuters Refinitiv database).
	Independent Variables
COUPON	Percentage of annual coupon interest rate per year.
	LnSIZE The natural logarithm of the value of the bonds issued.
TENOR	The maturity period of the bond in years
CURRENT	The company's current ratio one year before the bond issuance
LnFSIZE	Firm size, measured by the natural logarithm of total assets
	Control Variables
GROWTH	Annual gross domestic product growth rates of five ASEAN countries.
INFLATION	The inflation rate of the five ASEAN countries, measured by the gross domestic product deflator
INTEREST	The interest rate of the 10-year government bond yield of five ASEAN countries

According to Lin and Su (2022) and Altunbaş et al. (2010), the firm characteristic variable (CURRENT) is used with a lag at time t-1 from the year of bond issuance. This approach is important because the decision to issue bonds is related to the company's financial accounts from the previous year. Additionally, this method can help prevent endogeneity issues.

3.3. Methodology

3.3.1. Logit Regression

The logit regression or logistic regression is a statistical model used to model the probability of a binary outcome variable based on one or more explanatory variables. The response probability in the logit model is a logit function evaluated on the

linear function of the explanatory variable (Wooldridge, 2018). Unlike linear regression, logit regression aims to predict the probability for categorical binary classifications, such as “yes” or “no” and “success” or “failure.” In this case, the logit model analysis aims to see whether the independent variables can predict the probability of the dependent variable.

Binary response models such as logit are nonlinear, so they use the Maximum Likelihood Estimation (MLE) method to find the best model parameters by maximizing the possibility of observing the existing data. To distinguish the kind of issuance as the dependent variable, we use the logit regression model using GREEN as a dummy variable, as indicated by Eq. (1).

$$\text{Ln}\left(\frac{p}{1-p}\right) \text{GREEN}_{i,t} = \beta_0 + \beta_1 \text{COUPON}_{i,t} + \beta_2 \text{LnSIZE}_{i,t} + \beta_3 \text{TENOR}_{i,t} + \beta_4 \text{CURRENT}_{i,t} + \beta_5 \text{LnFSIZE}_{i,t} + \beta_6 \text{GROWTH}_{i,t} + \beta_7 \text{INFLATION}_{i,t} + \beta_8 \text{INTEREST}_{i,t}$$

The choice of issuance is primarily based on the accounts from the previous year, which helps to avoid potential endogeneity issues.

Table 3. Descriptive Statistics

Variable	N	Mean	S.D	Min	Max
GREEN	541	0.3419593	0.4748051	0	1
COUPON	541	0.562616	0.2589992	0.101	1.2
LnSIZE	541	16.75076	1.734579	8.066208	20.86303
TENOR	541	7.066543	4.215405	2	31
CURRENT	541	1.661195	1.820426	0.14	25.31094
LnFSIZE	541	18.15038	2.913327	0.264043	31.8054
GROWTH	541	2.470356	4.169633	-9.518295	8.882354
INFLATION	541	4.398243	3.763805	-2.696455	9.567844
INTEREST	541	48.59827	24.4786	12.18	92.47

Table 3 presents the descriptive summary of all the variables used in this research. The dependent variable, GREEN, has an average value of 0.3419593 based on 541 observations. The independent variable, COUPON, represents the annual coupon interest rate of the issued bonds, with an average of 0.562616 or 56%. The bond with the lowest coupon rate is issued by Central Pattana PCL (Thailand), offering 10.1% for conventional bonds, while PT Global Mediacom Tbk (Indonesia) has the highest rate at 12%. The independent variable, LnSIZE, is the natural logarithm of the bond issue size in USD, averaging 16.75076. The smallest issuance size belongs to PT Global Mediacom Tbk (Indonesia), while the largest, with a value of 20.86303, is by PT Indofood CBP Sukses Makmur Tbk (Indonesia), both for conventional bonds.

TENOR variable represents the time to maturity of the bonds, with an average of 7.066543 years. The shortest tenor, at two years, is shared by bonds issued by Wha Utilities and Power PCL (Thailand), True Corporation PCL (Thailand), Ayala Land Inc (Philippines), PT Oki Pulp & Paper Mills (Indonesia), and PT Intiland Development Tbk (Indonesia). At 31 years, the longest tenor is for bonds issued by PT Indofood CBP Sukses Makmur Tbk (Indonesia).

CURRENT variable reflects the current ratio one year before bond issuance, averaging 1.820426. PT Duta Angggada Realty Tbk (Indonesia) has the lowest current ratio at 0.14, while PT Pelabuhan Indonesia (Persero) has the highest at 25.31094. LnFSIZE variable is the natural logarithm of total assets, indicating the size of the bond-issuing company. The average company size is 18.15038, with the smallest being PT Sinar Mas Agro Resources and Technology Tbk (Indonesia) at 0.264043 and the largest being PT Bumi Serpong Damai Tbk (Indonesia) at 31.8054.

This research also includes three country-level control variables: GROWTH, INFLATION, and INTEREST. GROWTH variable measures the GDP growth of the five ASEAN countries (Indonesia, Malaysia, Philippines, Thailand, and Singapore) from 2018 to 2022, with an average of 2.470356. The Philippines experienced the lowest GDP growth in 2020 at -9.518295, while Singapore had the highest in 2021 at 8.882354.

INFLATION variable represents the inflation rate of the five ASEAN countries over five years, as measured by the GDP deflator, averaging 4.398243.

Singapore had the lowest inflation in 2020 at -2.696455, and Thailand had the highest in 2022 at 9.567844. INTEREST variable refers to the 10-year government bond yield rate of these countries, averaging 48.59827, with Singapore having the lowest rate at 12.18 in 2020 and Indonesia the highest at 92.47 in 2018.

3.3.2. Hosmer-Lemeshow Goodness of Fit Test

Determination testing in the logit model aims to test how well the model fits the observed data. The test used in the determination test (goodness of fit) uses the Hosmer-Lemeshow test. Provisions regarding the Hosmer-Lemeshow test: (1) the probability statistic value (Prob> chi2) <0.05 (95% confidence level), meaning that there is a significant difference between the observation value and the model, (2) the probability statistic value (Prob> chi2)> 0.05 (95% confidence level), meaning that there is no significant difference between the observation value and the model. Thus, a model that has a high H-L test value (> 0.05) is good because it fits the observed data.

4. RESULTS AND DISCUSSION

4.1. Logit Regression Results

This section begins by presenting the main regression results derived from the Logit model, both for the full sample data (ASEAN-5) and for each individual country. At last, we conduct the Hosmer-Lemeshow test.

The results of the nonlinear logit regression in Table 4 cannot be interpreted directly except for the direction of the relationship (positive or negative). Therefore, the interpretation method in this research does not use coefficients or odd ratios but uses the average marginal effect (AME) as in Table 5.

The influence of variables in this research is tested simultaneously using the Likelihood Ratio (LR) test. Based on Table 4, it is known that the Value (Prob > chi2) is 0.0000 or less than 0.05 (95% confidence level). This indicates that there is an influence of at least one independent variable on the dependent variable.

Table 4. Logit Regression Results for Full Sample

Independent Variables	Dependent Variable = 1 if a firm issues green bonds (GREEN)			
	Coeff.	Robust Std. Error.	z	p-value
COUPON	-4.753672***	1.546268	-3.07	0.002
LnSIZE	-0.8624765***	0.139142	-6.20	0.000
TENOR	0.2786519***	0.043299	6.44	0.000
CURRENT	-0.242258**	0.114642	-2.11	0.035

LnFSIZE	0.1410751*	0.0855208	1.65	0.099
GROWTH	0.2097365***	0.0422496	4.96	0.000
INFLATION	-0.2139704***	0.053166	-3.87	0.000
INTEREST	-0.0577247***	0.0196788	-2.93	0.003
Constant	14.4484***	2.30047	6.28	0.000
Num of Obs.		541		
Log pseudolikelihood		-175.14641		
Wald chi2 (8)		132.93		
Prob > chi2		0.0000		
Pseudo R2		0.4960		

Note: In Equation (1), the dependent variable is GREEN; * Significant on 10%; ** Significant on 5%; *** Significant on 1%.

In the context of this research, the average marginal effect informs that each additional predictor variable of one unit is associated with an increase or decrease in the probability of a company issuing green bonds of the result dy/dx multiplied by 100 percentage points (Taberner, 2021).

Table 5. Average Marginal Effects for Full Sample

Independent Variables	Dependent Variable = 1 if a firm issues green bonds (GREEN)			
	dy/dx	Delta-method Std. Err.	z	p-value
COUPON	-0.4856376***	0.1421867	-3.42	0.001
LnSIZE	-0.088111***	0.0083349	-10.57	0.000
TENOR	0.0284672***	0.0030439	9.35	0.000
CURRENT	-0.0247492	0.0166832	-1.48	0.138
LnFSIZE	0.0144123*	0.0082143	1.75	0.079
GROWTH	0.0214268***	0.0041102	5.21	0.000
INFLATION	-0.0218593***	0.0047577	-4.59	0.000
INTEREST	-0.0058972***	0.001737	-3.40	0.001
Num of Obs.		541		

Note: In Equation (1), the dependent variable is GREEN; * Significant on 10%; ** Significant on 5%; *** Significant on 1%.

The first bond characteristic variable, COUPON, which is the percentage of the annual coupon interest rate of the bond, has a regression result of -0.4856376 with a negative relationship direction and is statistically significant at the 1% level, ceteris paribus. This indicates that for every 1 unit increase in the bond coupon, the company's probability of issuing green bonds will decrease by 48.5 percentage points. The second independent variable, LnSIZE, the natural logarithm of the value of the bonds issued, has a result

of -0.088111 with a negative relationship direction and is statistically significant at the 1% level, ceteris paribus. This indicates that for every 1 unit increase in the bond size, the probability of the company issuing green bonds decreases by 88 percentage points. The third independent variable, TENOR (bond maturity period), has a regression value of 0.0284672 with a positive relationship direction and is statistically significant at the 1% level, ceteris paribus. This indicates that for every one-year increase in the bond maturity period, the company's probability of issuing green bonds will increase by 2.8 percentage points. The fourth independent variable, CURRENT (the company's current ratio one year before the bond issuance), has a regression value of -0.247492 with a negative relationship direction and is proven insignificant. The last independent variable, LnFSIZE (logarithm of total assets in kind) or company size, has a regression value of 0.0144123 with a positive relationship direction and is statistically significant at the 10% level, ceteris paribus. This indicates that for every 1 unit increase in company size, the company's probability of issuing green bonds increases by 1.4 percentage points.

This research uses three country-level control variables: GROWTH, INFLATION, and INTEREST. The GROWTH variable has a regression value of 0.0214268 with a positive relationship direction and is statistically significant at the 1% level, ceteris paribus. This indicates that for every 1 unit increase in the company's country GDP growth, the probability of the company issuing green bonds increases by 2.1 percentage points. The INFLATION variable has a regression result of -0.0218593 with a negative relationship direction and is statistically significant at the 1% level, ceteris paribus. This indicates that for every 1 unit increase in inflation in the country where the company operates, the probability of issuing green bonds by the company decreases by 2.1 percentage points. Finally, the INTEREST control variable has a regression result of -0.0058972 with a negative relationship direction and is statistically significant at the 1% level, ceteris paribus. This indicates that for every 1 unit increase in the government's 10-year interest rate in the country, the probability of the company issuing green bonds decreases by 0.5 percentage points.

Table 6. Composition of Research Sample Data

Country	Green Bond (GREEN =1)	Conventional Bond (GREEN = 0)
Indonesia	0	149
Malaysia	133	60
Filipina	4	49
Thailand	41	84
Singapore	7	14
Total	**185**	**356**

Based on the composition between the number of dummy variables with values 1 and 0 in the research sample, logit regression analysis in each country can be carried out in Malaysia (Table 7), Philippines (Table 8), and Thailand (Table 9), except for Indonesia due to the absence of green bond issuance by companies in sectors other than financial and government during 2018-2022 and Singapore with relatively little bond issuance data so that analysis cannot be carried out with many variables (five independent variables and three control variables). However, the logit model used in the analysis per country excludes the independent variable of the size of the issuing company (LnFSIZE) due to the issue of perfect separation that can occur when independent variable perfectly predicts the dependent variable, thus causing a convergence problem in the logit regression. The issue of perfect separation does not arise when the analysis is carried out with ASEAN-5 data due to the higher level of variability in the predictor variables.

Table 7. Logit Regression (Malaysia)

Independent Variables	Dependent Variable = 1 if a firm issues green bonds (GREEN)			
	Coeff	Robust Std. Error.	z	p-value
COUPON	1.962634	7.151375	0.27	0.784
LnSIZE	-1.100442	0.3089086	-3.56	0.000
TENOR	0.6048646	0.1368768	4.42	0.000
CURRENT	-1.371557	0.6275562	-2.19	0.029
GROWTH	0.7080171	0.2545482	2.78	0.005
INFLATION	-0.7745742	0.2090824	-3.70	0.000
INTEREST	-0.3460979	0.1682716	-2.06	0.040
Constant	29.88379	6.768695	4.42	0.000
Num of Obs.	193			
Log pseudolikelihood	-42.217676			
Wald chi2 (8)	36.23			
Prob > chi2	0.0000			
Pseudo R2	0,4960			

Note: In Equation (1), the dependent variable is GREEN; * Significant on 10%; ** Significant on 5%; *** Significant on 1%.

Table 8. Logit Regression (Philippines)

Independent Variables	Dependent Variable = 1 if a firm issues green bonds (GREEN)			
	Coeff.	Robust Std.Error	z	p-value
COUPON	4.436502	5.665863	0.78	0.434
LnSIZE	-0.0425183	0.2328537	-0.18	0.855
TENOR	-0.8527382	0.6132154	-1.39	0.164
CURRENT	-0.6159349	0.3894392	-1.58	0.114
GROWTH	0.0366177	0.1076836	0.34	0.734
INFLATION	-0.4436055	0.5312129	-0.84	0.404
INTEREST	-0.270626	0.0654602	-0.41	0.679
Constant	3.782212	6.627681	0.57	0.568
Num of Obs.	53			
Log pseudolikelihood	-11.862905			
Wald chi2 (8)	4.16			
Prob > chi2	0.7611			
Pseudo R2	0.1635			

Note: In Equation (1), the dependent variable is GREEN; * Significant on 10%; ** Significant on 5%; *** Significant on 1%.

Table 9. Logit Regression (Thailand)

Independent Variables	Dependent Variable = 1 if a firm issues green bonds (GREEN)			
	Coeff.	Robust Std. Error	z	p-value
COUPON	-5.996437	1.748451	-3.43	0.001
LnSIZE	-0.3574055	0.297349	-1.20	0.229
TENOR	0.2293827	0.0683644	3.36	0.001
CURRENT	0.2349334	0.2069906	1.13	0.256
GROWTH	-0.006504	0.1139343	-0.06	0.954
INFLATION	-0.0524295	0.1153463	-0.45	0.649
INTEREST	0.0287785	0.0465421	0.62	0.536
Constant	5.187502	5.735843	0.90	0.366
Num of Obs.	122			
Log pseudolikelihood	-66.582586			
Wald chi2 (8)	28.61			
Prob > chi2	0.0002			
Pseudo R2	0.1201			

Note: In Equation (1), the dependent variable is GREEN; * Significant on 10%; ** Significant on 5%; *** Significant on 1%.

Table 10. Hosmer-Lemeshow Test

Number of Observations	541
Number of Groups	10
Hosmer-Lemeshow chi2(8)	7,80
Prob > chi2	0,4533

The Goodness of Fit test (Table 10) for the logit model in this research used the Hosmer-Lemeshow test. Based on the table above, it is known that the value of Prob > chi2 (0.4533) is greater than alpha 0.05. These results indicate that there is no significant difference between the observed values and the model. Therefore, the logit model in this research is considered good because it fits the observed data.

Regarding bond characteristic variables, COUPON and LnSIZE exhibit a significant negative effect on the GREEN dummy variable. It reveals that the higher the green bond coupon, the lower the company's probability of issuing green bonds. In other words, the findings explain that low bond coupons often encourage companies to issue green bonds (Barua & Chiesa, 2019). Green bonds are designed to minimize issuance costs and are used as a source of funding for eco-friendly initiatives (Giafrante & Peri, 2019). Compared to conventional bonds, the average coupon rate on green bonds is lower (Fatica et al., 2021). However, several costs could potentially arise, given the limited flexibility of use. For example, the cost of green certification for third parties is due to possible policy uncertainty (Lin & Su, 2022). These findings are consistent with studies conducted in Europe (Cicchiello et al, 2022) and China (Lin & Su, 2022). The negative relationship

between LnSIZE and GREEN indicates that green bonds are preferred when a company's funding needs are relatively small. This is supported by the fact that green bonds involve more certification procedures-conducted by third parties-to validate information about the environmental benefits of a green bond project and avoid companies' greenwashing practices (Baity, 2023). This results in inefficiencies when issuing large amounts of debt through green bonds. These findings are consistent with research conducted in China (Lin & Su, 2022). Research by Zhou and Cui (2019) also revealed that green bonds are not the primary financing option for companies but rather are seen as a prestige tool aimed solely at enhancing a company's environmentally friendly reputation.

On the other hand, the third bond characteristic variable, TENOR, has a significant positive effect on GREEN. The findings of this research imply that bonds with longer maturities are suitable for supporting the financing of environmentally friendly projects in ASEAN-5, considering that the green projects being funded are long-term.

For issuer characteristic variables, The LnFSIZE is the only variable that significantly influences the choice between issuing green or conventional bonds. Based on the coefficient sign, larger companies are more inclined to issue green bonds compared to their smaller companies. It's supported by the argument that larger companies have a greater capacity to manage risk and possess sufficient resources to participate in funding environmentally friendly projects through green bonds. According to the theories of asymmetric information and signaling, issuing green bonds is also a step to reduce the information asymmetry between investors and companies regarding their involvement in environmentally friendly projects. Therefore, issuing green bonds can serve as a credible signal to investors that the company is committed to environmental sustainability by participating in green projects.

CURRENT has been found to have no significant impact on the dependent variable GREEN. Companies with relatively low current ratios might choose to issue green bonds if they have credible green projects and receive government support to mitigate financial risks. In the context of ASEAN-5, the intensity of green projects and government support have not yet shown significant influence, resulting in no significant relationship between the CURRENT variable and GREEN. On the other hand, the current ratio measures a company's ability to meet its short-term obligations, while bonds, in general, and green bonds, in this case, are long-term. Thus, there may be a mismatch between the current ratio and the issuance of green bonds.

5. CONCLUSION

The need to understand the determinants of green bond issuance is urgent to achieve the Net Zero Emission target in 2050. Research conducted in the context of ASEAN-5 is essential because the level of green bond issuance is still quite low in contrast to other countries. The variables of the characteristics of the bonds issued, the characteristics of the bond issuer, and external factors - such as the macroeconomic conditions of a country - have been shown to have a significant influence. Thus, a company's decision to issue green bonds is a complex decision-making process. The findings in this research reveal that higher bond coupons rate and larger bond issuance sizes have been shown to have a

significant negative effect on the probability of a company's decision in ASEAN-5 to issue green bonds. On the other hand, the longer the bond tenor and the larger the size of the issuing company have a significant positive effect. This research also reveals that the issuer's current ratio has been shown to have no significant effect on the probability of a company issuing green bonds.

The findings of this research have implications for both government policy-making and corporate management. The determinants that significantly influence a company's decision to issue green bonds include all three factors: bond characteristics, issuer characteristics, and macroeconomic external factors. This suggests that the design of green bond mechanisms and targeted promotional policies play a crucial role in increasing the popularity of green bonds and achieving the targets set by the Paris Agreement.

As a result, governments can start crafting strategic policies to boost green bond issuance, such as tax incentive policies that reduce the tax burden for investors receiving coupon payments from green bonds. This could increase demand for green bonds, encouraging companies to issue them. From a corporate perspective, the findings on green bonds can provide valuable insights before engaging in sustainable investments, helping companies reduce long-term funding costs. Based on these research findings, companies are advised to issue green bonds rather than conventional bonds if the projects being funded have a long tenor.

6. LIMITATIONS AND FUTURE RESEARCH

This research faces four limitations. Firstly, the limited time range is due to the scarcity of data on companies issuing green bonds in the ASEAN-5 region, as green bonds are relatively new in this area. Secondly, the research only employs a nonlinear logit regression model, thus providing results from a single model. Thirdly, this research only examines the determinants of green bond issuance for the ASEAN-5 region and does not focus on individual countries. This limitation is due to the limited number of green bond issuance data in each country, making partial analysis impractical. Fourthly, this research does not include independent variables related to corporate governance in the model, even though some studies in developed countries have incorporated them.

Therefore, future research can make four improvements. First, extend the research period to more than five years as time progresses to increase the number of observations. Second, the research model should be combined with other nonlinear regression models, such as the Probit model, to explore potential differences in results. Third, conduct more in-depth study on the future determinants of green bond issuance, focusing on each ASEAN-5 country to obtain more specific findings. This improvement becomes possible as the data on companies issuing green bonds in ASEAN-5 increases yearly. Finally, independent variables related to corporate governance-such as the percentage of women on the board of directors-should be added to understand better these variables' role in influencing a company's decision to issue green bonds.

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ESG PERFORMANCE ON FINANCIAL PERFORMANCE: INSIGHTS FROM SOUTHEAST ASIA

Dzaky Ramadani[a*], Arika Artiningsih[a]

[a]Department of Accounting, Faculty of Economics and Business, Universitas Gadjah Mada, Yogyakarta, 55281, Indonesia

**Corresponding author: dzakyramadani@mail.ugm.ac.id*

Abstract: *While financial performance remains one of the dominant factors in investment decisions, public attention has arisen on how companies handle non-financial risks, including environmental responsibility, regulatory compliance, and social accountability. This has prompted companies to adopt a holistic approach and disclose their ESG performance. This research aims to study whether ESG performance, consisting of its three pillars, affects corporate financial performance in accounting-based measures, represented by return on assets (ROA), and market-based measures, represented by market capitalization. Various studies conducted in diverse settings yield varying results, and this research explores specifically Southeast Asia settings. The study sample comprises 133 public companies across ASEAN countries with available ESG scores and financial report data from 2015 to 2022 in the LSEG database. This dataset enables panel regression analysis to assess the possible relationship between ESG performance and financial performance, measured using return on assets (ROA) and market capitalization. We found that ESG scores and their pillars, except the governance pillar, negatively impact ROA and market capitalization. When analyzed across the three pillars, social pillar performance demonstrates the most substantial impact on corporate financial performance.*

Keywords: *ESG Performance, Environment Pillar, Social Pillar, Governance Pillar, Financial Performance, ASEAN.*

1. INTRODUCTION

In the context of the stock exchange, a company's financial performance is one of the most dominant pieces of information influencing investment decisions. However, companies do not operate solely within the economic dimension, leading to public attention towards how companies handle non-financial risks such as environmental responsibility, regulatory compliance, social responsibility, and governance. This has driven companies to adopt a holistic approach to their operations and disclose their performance in an ESG report, an acronym for environment, social, and governance. Many institutions and bodies also strive to assess companies' ESG performance as information for the public. As the name implies, ESG performance is evaluated based on its underlying pillars: environmental, social, and governance.

Many studies explain the relationship between ESG and corporate financial performance in different regional contexts. Velte (2017) investigated this topic in the German context, while Duque-Grisales (2021) focused in the Latin American context. Zhao (2018) explored the issue in the

Chinese context. However, there is little to no research in the Southeast Asian context. Compared to other parts of the world, the adoption and implementation of practices in ASEAN countries are relatively early. Conceptually, ESG is not new, with initiatives like the ASEAN Green Bond Standard introduced in 2017 and various country-specific initiatives over the past decades. However, stock exchanges in six ASEAN countries (ASEAN-6) — Malaysia, Vietnam, Indonesia, the Philippines, Singapore, and Thailand — only formed an ESG Working Group (ESG WG) in 2021 to standardize ESG disclosures.

Furthermore, research on this topic has yielded different conclusions in various contexts, as Aydoğmuş et al. (2022) summarized, indicating that ESG performance can positively or negatively impact financial performance. Since we have yet to fully understand the underlying characteristics of companies that may influence these differing research results, without this research, the only prudent conclusion is that ESG performance could impact financial performance in Southeast Asia, though the exact nature of the relationship remains unclear. This underscores the importance of providing deeper insights into this relationship within the specific context of Southeast Asia.

The author also believes that even Asia cannot be generalized entirely, as stated by Wu (2020), who noted that the integration of stock exchanges between East Asia and Southeast Asia is low. This explains the low interdependence between the two and allows for different market reactions to different information, including ESG disclosures. Therefore, this research seeks to determine the influence of a company's ESG performance on its financial performance within the Southeast Asian context, which will sample public companies in ASEAN-6 countries.

2. LITERATURE REVIEW

2.1. ESG on Financial Performance

Financial performance is a broad term, and Orlitzky et al. (2003) have divided it into accounting-based, market-based, and perspective-based measures. Similar to Velte's (2017) and Ahmad et al. (2021) approach in their research, this study will also use accounting-based measures (return on asset) and market-based measures (market capitalization) to represent the company's financial performance. The use of different measures will yield different conclusions. Market-based measures are derived from market movements (Orlitzky et al., 2003), so the conclusions drawn will refer to market activity and investor expectations. Accounting-based measures are influenced by the company's internal policies, reflecting internal decision-making abilities and managerial performance (Orlitzky et al., 2003). Hence, the conclusions drawn are due to these reasons.

Alareeni and Hamdan (2020) have summarized that ESG performance can positively affect ROA by increasing operational efficiency and risk management by reducing additional costs arising from non-green company operations and building a solid reputation that attracts customers. However, ESG performance can also negatively impact ROA due to high implementation and operational costs, as well as potential declines in financial performance due to the expenses incurred

by the company for better ESG performance and its disclosure activities (signaling cost).

For financial performance with a market-based measure, signaling theory (Spence, 1973) can be used to explain the influence of ESG information from the signaler (the company) and the receiver (the investor). In this case, the signaler is the company that is communicating its ESG performance to the market. The receiver, on the other hand, is the investor who is interpreting this information. Connelly et al. (2011) explain that the signaler must determine what and how to communicate while the receiver interprets the information. Multiple interpretations and different investor reactions to corporate actions are common in the stock market. This study aims to answer the question the question of how investors interpret the ESG performance disclosed by the company.

However, it is important to note that Connelly et al. (2011) also explained signal costs from both the signaler and receiver perspectives. From the company's viewpoint, producing ESG disclosures and efforts to improve ESG performance require investments that may affect the company's returns. The impact of the company's efforts in disclosing and improving ESG performance can be measured through accounting-based measures such as Return on Asset (Orlitzky et al., 2003).

Previous research has shown diverse results regarding the relationship between ESG scores and market-based measures. These diverse results are often based on two theories: shareholder theory (principal-agent theory) and stakeholder theory (Ahmad et al., 2021; Alareeni & Hamdan, 2020; Aydoğmuş et al., 2022; Landi & Sciarelli, 2019; Nollet et al., 2016; Orlitzky et al., 2003; Velte, 2017). The adverse investor reaction toward ESG performance can be explained by shareholder theory; investors may interpret the commitment to ESG as a deviation from the company's primary goal of creating value for shareholders. On the other hand, stakeholder theory can explain the positive relationship between ESG performance and financial performance; companies that meet stakeholder expectations, especially in every aspect of ESG, may enhance the company's reputation and subsequently increase the company's market value, represented in this study by Marketcap (Market Capitalization).

2.2. Past Findings

As elaborated by Aydoğmuş et al. (2022) in their paper, the results of previous research related to the relationship between financial performance and ESG performance vary: positive, negative, and mixed. In a meta-analysis by Orlitzky et al. (2003), financial and corporate social performance are positively correlated across various studies. Aydoğmuş et al. (2022) found that accounting-based measures correlate more with corporate social performance than market-based measures. Additionally, Aydoğmuş et al. (2022) found a positive relationship between ESG and its pillars on financial performance, except for the environmental pillar. Aydoğmuş et al. (2022) used a sample of all public companies worldwide with ESG scores. Diverse results were then found in smaller samples, such as Velte (2017). Velte (2017) used a sample of public companies on the German Prime Standard (DAX30, TecDAX, MDAX) and found a positive relationship between ESG and accounting-based measures but not significant for market-based measures.

Giannopoulos et al. (2022) provided valuable insights into the relationship between financial performance and ESG performance in the context of Norwegian public companies. Their findings were distinct from those of Aydoğmuş et al. (2022). They found positive results for market-based measures and negative for accounting-based measures. Ahmad et al. (2021), who studied a similar topic on the FTSE 350 index, found a positive relationship between ESG scores but mixed results when breaking down the model into the three ESG pillars. Similarly, mixed results were found in the studies of Alareeni and Hamdan (2020) on the US S&P 500 and Han et al. (2016) on the Korean Stock Market (KOSPI).

Conversely, Landi and Sciarelli (2019) found a negative relationship between corporate social performance and financial performance in Italian companies listed on the FTSE MIB (Financial Times Stock Exchange Milano Indice di Borsa). Nollet et al. (2016), in a preceding study to Alareeni and Hamdan (2020), also focused on the same context of the US S&P 500 and reported insignificant results regarding the relationship between ESG performance and both accounting-based and market-based measures in a linear model. This finding indicates that the timing and the development of ESG disclosure practices in a particular region might influence the results of this research.

2.3. Hypothesis

Making inferences from the logic constructed in the introduction and literature review, ESG disclosure initiatives of companies in ASEAN have the potential to significantly impact financial performance by accounting-based metric or market-based metric, specifically ROA and Marketcap, in this study. Therefore, the nature of this relationship will be explored further in this research, and the hypotheses to be tested for this research are as follows:

H1: ESG score significantly affects ROA

H1a: The performance of the environment pillar significantly affects ROA.

H1b: The performance of the social pillar significantly affects ROA.

H1c: The performance of the governance pillar significantly affects ROA.

H2: ESG score significantly affects Marketcap

H2a: The performance of the environment pillar significantly affects Marketcap.

H2b: The performance of the social pillar significantly affects Marketcap.

H2c: The performance of the governance pillar significantly affects Marketcap.

3. DATA & METHODOLOGY

3.1. Research Design & Estimation Model

This research will use a quantitative research design on panel data, utilizing multiple linear regression to examine the relationship between ESG performance and financial performance. In addition, three estimation methods are employed to address unobservable effects that may occur in panel data estimation: Pooled OLS (ordinary least squares), Fixed Effect, and Random Effect (Wooldridge, 2020). Therefore, estimation model specification tests for panel data are added, such as the F-test for Fixed Effect, the Breusch Pagan Lagrange Multiplier Test, and the Hausmann Test. We also conduct tests

to ensure adherence to classical statistical assumptions.

3.2. Sample Data

The data is sourced from Refinitiv, now known as the LSEG database. With purposive sampling, this study selects data from publicly listed companies in the ASEAN region, specifically the six countries of Indonesia, Malaysia, the Philippines, Singapore, Thailand, and Vietnam (ASEAN-6), as representatives from 2016 to 2022. The sample consists of companies with complete ESG scores and financial data for the entire period to ensure a balanced panel dataset. Following Velte (2017), this study will also exclude companies in the financial sector from the sample. The following are the population and sample data for this study:

Table 1. Research Sample

Criterion	Number of Observations
The population of publicly listed companies in ASEAN-6 countries from 2016 to 2022.	5409
Non-financial sector companies	4948
Companies with complete ESG scores and financial data.	133
Total observations used (firm-year): 133 companies over 7 years, from 2016 to 2022.	931

3.3. Research Variable

Table 2. Variables Summary

Variables	Description
Dependent Variables	
mcap	Shares outstanding × Stock price
roa	*Net Income/Total Asset*
Independent Variables	
esg	The ESG score is an evaluation of a company's relative performance, commitment, and effectiveness in environment, social, and governance, using publicly available company data and reports.
env	The Environment pillar measures a company's impact on the environment, including air, soil, water, and the overall ecosystem.
soc	The Social pillar measures a company's ability to gain the trust and loyalty of its workforce, customers, and the community.
gov	The Governance pillar assesses the systems and processes that ensure board members and executives act in the best interests of the company's long-term shareholders.
Control Variables	
size	Total Asset
growth	($Total\ Asset_t$ / $Total\ Asset_{t-1}$) - 1
lev	Total Liability/Total Asset
turnover	Net Sales/Total Asset
covid	Dummy variable, with (0) for pre-pandemic years and (1) for post-pandemic years.

As previously explained, ROA and Market Capitalization will be used to represent financial performance as dependent variables, with ROA as an accounting-based measure and Market Capitalization as a market-based measure. The Market Capitalization variable is introduced in the study by Ahmad et al. (2021). As a commonly used profitability indicator, ROA has been employed in previous studies on similar topics to represent financial performance (Aydoğmuş et al., 2022; Giannopoulos et al., 2022; Velte, 2017). For the independent variables, this study will use the ESG score and its pillars (Environment pillar, Social

pillar, and Governance pillar) published by LSEG.

This research will incorporate control variables, consistent with previous studies on similar topics and following the approach of studies such as Aydoğmuş et al. (2022), Ahmad et al. (2021), Alareeni and Hamdan (2020), Landi and Sciarelli (2019), Han et al. (2016), and Giannopoulos et al. (2022). Size variable will be used to account for variations in company size characteristics, and leverage will be utilized to account for company risk levels. Additionally, asset growth and turnover will be included as control variables, following the approach of Alareeni and Hamdan (2020). Finally, to account for the impact of COVID-19 on the research years, a COVID dummy variable will also be included as a control variable. Table 2 summarizes all variables used.

4. RESULT

4.1. Descriptive Statistics

4.1.1. Trend Analysis

Figure 1 shows that, from 2016 to 2017, the average Market Capitalization rose sharply, peaking in 2017. However, the median increased more slowly, indicating that large companies had a bigger effect on the average. From 2017 to 2018, the average Market Capitalization fell sharply, while the median declined more gradually, suggesting smaller companies saw a more moderate drop. The average Market Capitalization partially recovered in 2019 but continued to decline through 2022. This gradual decrease in the average and slower drop in the median are likely due to the economic impact of the COVID-19 pandemic.

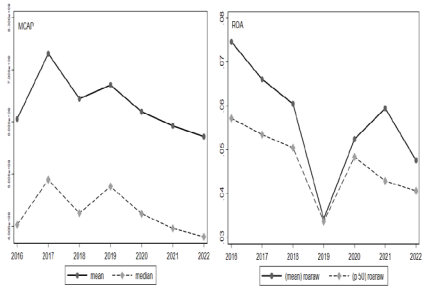


Fig 1. Marketcap Trend

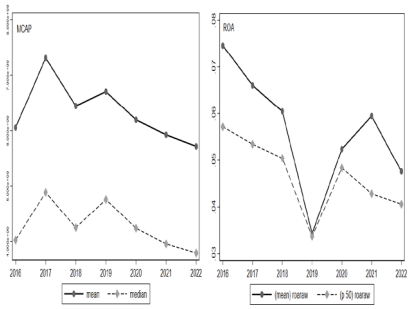


Fig 2. ROA Trend

Referring to Figure 2, the ROA for the sample data declined from 2016 to 2018. A significant drop happened in 2019, with the average and median ROA hitting their lowest points. Unlike Market Capitalization, ROA experienced an immediate decline in the first year of the COVID-19 pandemic. Subsequently, in 2020, the average and median ROA showed significant recovery through 2021, although they fell again in the following year.

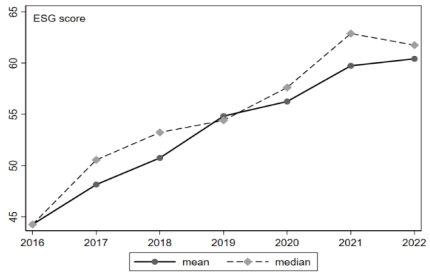


Fig 3. ESG Score Trend

A different trend is observed in Figure 3, where the ESG score shows an overall uptrend and appears unaffected by the pandemic, unlike the trends in Market Capitalization and ROA in the sample data. The decrease in Market Capitalization and ROA around 2020 reflects the negative impact of the COVID-19 pandemic. In contrast, the consistent increase in the ESG score suggests that despite economic challenges, the sample companies continued to enhance their sustainability practices, possibly due to external pressures and a commitment to long-term strategic goals

Table 3. Correlation Matrix

	mcap	roa	esg	env	soc	gov	size	growth	lev	turnover	covid
mcap	1.000										
roa	0.230***	1.000									
esg	0.186***	-0.073**	1.000								
env	0.261***	-0.119***	0.763***	1.000							
soc	0.209***	-0.053*	0.907***	0.682***	1.000						
gov	-0.006	-0.035	0.688***	0.305***	0.467***	1.000					
size	0.552***	-0.376***	0.170***	0.277***	0.155***	0.018	1.000				
growth	0.185***	0.095***	0.010	0.031	0.039	-0.062*	0.064*	1.000			
lev	-0.046	-0.386***	0.032	0.086***	0.007	-0.031	0.317***	0.038	1.000		
turnover	0.154***	0.468***	0.024	0.031	0.019	-0.006	-0.308***	0.020	-0.273***	1.000	
covid	-0.065**	-0.062*	0.257***	0.247***	0.242***	0.129***	0.090***	-0.118***	0.046	-0.087***	1.000
Significance level at, *** p<0,01, ** p<0,05, * p<0,1											

4.1.2. Correlation Matrix

The correlation matrix in Table 3 highlights several key relationships. Market Capitalization is strongly and positively correlated with size (0.552), indicating that larger companies generally have higher Market Capitalization. Market Capitalization also shows a positive correlation with Return on Assets (0.230), suggesting better financial performance is linked with higher Market Capitalization. However, Market Capitalization is negatively correlated with leverage (−0.046) and turnover (−0.154), implying lower turnover rates and minimal direct impact of leverage on Market Capitalization.

ROA displays significant negative correlations with size (−0.376) and leverage (−0.386), indicating that larger companies and those with higher leverage tend to have

lower profitability. On a positive note, ROA is correlated with growth (0.095), showing that asset growth is associated with better returns.

The ESG score positively correlates with Market Capitalization (0.186) and COVID (0.257), suggesting that higher ESG scores relate to higher Market Capitalization and more impact from the pandemic. The ESG score is also strongly correlated with its pillars: environmental (0.763), social (0.907), and governance (0.688), reflecting a close relationship among these components.

Size is positively linked to Market Capitalization (0.552) and growth (0.064) but negatively correlated with ROA (−0.376). Leverage adversely affects ROA (−0.386) and turnover (−0.273), indicating that higher leverage is associated with lower profitability and turnover rates.

It is important to note that potential multicollinearity issues exist, particularly with the strong correlations between the ESG score and its pillars. Given the fundamental nature of these pillars to the ESG score, a strong correlation is expected. To ensure the reliability of the analysis, these four variables will be tested separately, as done by Velte (2017), Aydoğmuş, et al. (2022), and Alareeni and Hamdan (2020). Additionally, a Variance Inflation Factor Test will be conducted to confirm the absence of multicollinearity issues further.

Table 4. Data Distribution

Variable	Mean	Median	Variance	St. Dev	Min.	Max.	Kurtosis	Skewness
mcap	6.34E+09	4.24E+09	4.70E+19	6.86E+09	1.27E+08	4.28E+10	10.17	2.473
roa	0.056	0.045	0.005	0.068	-0.180	0.570	13.783	2.107
esg	53.477	55.570	324.712	18.020	6.442	91.465	2.494	-0.310
env	48.385	50.636	554.880	23.556	0.000	97.134	2.190	-0.225
soc	57.834	58.708	434.686	20.849	2.417	96.500	2.441	-0.324
gov	52.047	53.556	480.571	21.922	2.793	97.312	2.065	-0.126
size	8.96E+09	5.58E+09	1.16E+20	1.08E+10	1.97E+08	9.87E+10	20.83	3.453
growth	0.073	0.045	0.043	0.207	-0.609	3.531	106.539	7.814
lev	0.307	0.305	0.029	0.171	0.000	1.447	4.365	0.416
turnover	0.577	0.422	0.267	0.517	0.005	3.349	9.558	2.195
covid	0.429	0.000	0.245	0.495	0.000	1.000	1.083	0.289

4.1.3. Data Distribution

Based on Table 4, the Market Capitalization (Marketcap) data reveals an average value of approximately USD 6.34 billion, with a median of USD 4.24 billion and a high standard deviation of USD 6.86 billion,

ranging from USD 127 million to USD 42.8 billion. The data exhibits high kurtosis (10.17) and positive skewness (2.47), indicating the presence of a few companies with very high market capitalizations. In contrast, Return on Assets (ROA) has an average of 5.6% and a median of 4.5%, with a wide range from -18.0% to 57.0% and a standard deviation of 6.8%, reflecting a broad data spread. ROA also shows positive skewness (2.11) and high kurtosis (13.78), suggesting a right-skewed distribution with extreme values.

For the primary predictor variables, the ESG score averages 53.48 with a median of 55.57, showing a relatively balanced distribution with a standard deviation of 18.02. The skewness (-0.31) and kurtosis (2.49) are close to normal. The Environment pillar has an average of 48.39 and a median of 50.64, with a standard deviation of 23.56, skewness (-0.23), and kurtosis (2.19). The Social pillar shows a higher average of 57.83 and a median of 58.71, with a standard deviation of 20.85, left-skewed distribution (skewness -0.32), and kurtosis (2.44). The Governance pillar has an average of 52.05 and a median of 53.56, with a standard deviation of 21.92, showing nearly normal distribution (skewness -0.13, kurtosis 2.07).

Control variables include Size, Asset Growth, Leverage, Asset Turnover, and a dummy variable for the COVID-19 pandemic. Size has an average of USD 8.96 billion and a median of USD 5.58 billion, with a standard deviation of USD 10.8 billion, exhibiting a right-skewed distribution (skewness 3.45, kurtosis 20.83). Asset Growth averages 7.3% with a median of 4.5% and a high standard deviation of 20.7%, showing a long right tail (skewness 7.81, kurtosis 106.54). Leverage has an average of 30.7% and a median of 30.5%, with a standard deviation of 17.1%, showing a right-skewed distribution (skewness 0.42, kurtosis 4.37). Asset Turnover has an average of 57.7%, a median of 42.2%, standard deviation of 51.7%, and a right-skewed distribution (skewness 2.20, kurtosis 9.56).

Overall, the data distributions for all variables tend to deviate from normality. According to Hair et al. (2010), data is considered normal if skewness is between -2 and +2 and kurtosis is between -7 and +7. Consequently, the research model will employ natural logarithmic transformations for all variables, following the approach used by Ahmad et al. (2021) and Alareeni and Hamdan (2020).

4.2. Model Construction

Based on the tests conducted, as summarized in Table 5, the F-test shows significant results across all models, indicating the significance of fixed effects and suggesting that the fixed effect estimator is more appropriate than pooled OLS. The Breusch-Pagan LM test also shows significant results across all models, concluding that the random effect estimator is more appropriate than the pooled OLS. Finally, to determine whether to use the fixed effect or random effect estimator, the Hausman test was conducted and produced significant results across all models, leading to the conclusion that the fixed effect estimator is the most appropriate panel data estimation model for this study.

Table 5. Estimation Model Specification Tests Result

Dependent Variable	Independent Variable	F-test	Breusch-Pagan LM	Hausman Test	Model Choosed
mcap	esg	significant	significant	significant	*fixed effect*
mcap	env	significant	significant	significant	*fixed effect*
mcap	soc	significant	significant	significant	*fixed effect*
mcap	gov	significant	significant	significant	*fixed effect*
roa	esg	significant	significant	significant	*fixed effect*
roa	env	significant	significant	significant	*fixed effect*
roa	soc	significant	significant	significant	*fixed effect*
roa	gov	significant	significant	significant	fixed effect

We concluded using a fixed effect estimator and natural logarithm transformation of variables. Therefore, the first model with Return on Assets (ROA) as the dependent variable can be formulated as follows:

$$\ddot{\ln roa}_{i,t} = \beta_1 \ddot{\ln esg}_{i,t} + \beta_2 \ddot{\ln size}_{i,t} + \beta_3 \ddot{\ln lev}_{i,t} + \beta_4 \ddot{\ln turnover}_{i,t} + \beta_5 \ddot{\ln growth}_{i,t} + \beta_6 \ddot{covid}_{i,t} + \ddot{u}_{i,t} \quad (1)$$

where $\mu_{i,t} = \alpha_i + \varepsilon_{i,t}$ and double dots denotes the time-demeaned values.

The second model for this study, with Market Capitalization (Marketcap) as the dependent variable, can be formulated as follows:

$$\ddot{\ln mcap}_{i,t} = \beta_1 \ddot{\ln esg}_{i,t} + \beta_2 \ddot{\ln size}_{i,t} + \beta_3 \ddot{\ln lev}_{i,t} + \beta_4 \ddot{\ln turnover}_{i,t} + \beta_5 \ddot{\ln growth}_{i,t} + \beta_6 \ddot{covid}_{i,t} + \ddot{u}_{i,t} \quad (2)$$

where $\mu_{i,t} = \alpha_i + \varepsilon_{i,t}$ and double dots denotes the time-demeaned values.

In both models above, regression analysis will be conducted with the ESG score as the independent variable. Additionally, regression will also be performed by substituting each ESG pillar as the independent variable.

Conducted tests also assure that the models adhere to classical statistical assumptions. The Normality of Residuals Test results for each model show significant outcomes, indicating that the residuals meet the normality assumption across all models. Significant results were also obtained from the Autocorrelation Test and the Heteroskedasticity Test, revealing the presence of autocorrelation and heteroskedasticity in the panel data. This necessitates the use of robust standard errors in the regression analysis. Finally, the Multicollinearity Test using the Variance Inflation Factor (VIF) shows values below 4 for all combinations of predictor variables, suggesting that multicollinearity is not a concern in the models.

4.3. Regression Result

Table 6 presents the regression results for four models examining the impact of ESG performance on ROA. The R^2 values indicate that the models explain at least 20% of the variance in the response variable. Additionally, the F-test for model fit yields significant results (Prob > F = 0.000) for all models, concluding that the predictors collectively have a significant effect on the response variable.

Table 6. Regression Results of ESG on ROA

Dependent Variable: ROA				
Variable	(1) ESG	(2) Environment	(3) Social	(4) Governance
esg	-0.0113***			
	(-2.95)			
env		-0.00705***		
		(-4.46)		
soc			-0.00798**	
			(-2.52)	
gov				-0.00172
				(-0.68)
size	-0.0407***	-0.0403***	-0.0413***	-0.0434***
	(-6.50)	(-6.80)	(-6.47)	(-6.96)
lev	-0.00568**	-0.00603**	-0.00562**	-0.00543**
	(-2.24)	(-2.38)	(-2.22)	(-2.12)
turnover	0.0144***	0.0145***	0.0141***	0.0140***
	(2.80)	(2.79)	(2.72)	(2.71)
growth	0.0305***	0.0310***	0.0310***	0.0320***
	(4.40)	(4.55)	(4.45)	(4.66)
covid	0.00946***	0.0101***	0.00894***	0.00776***
	(3.93)	(4.15)	(3.76)	(3.14)
Constant	1.004***	0.976***	1.004***	1.027***
	(7.40)	(7.50)	(7.28)	(7.48)
Observation	931	931	931	931
Prob>F	0.0000	0.0000	0.0000	0.0000
R^2	0.217	0.229	0.215	0.208
Companies	133	133	133	133
t-value in parentheses				
Significance level at, *** p<0.01, ** p<0.05, * p<0.1				

The regression results indicate that the ESG score has a significant negative effect on ROA ($p < 0.01$). This negative effect is also observed in the environment and social pillars, while the governance pillar does not show a statistically significant impact. This suggests that better ESG performance is associated with a lower ROA.

Among the control variables, size and leverage significantly negatively affect ROA ($p < 0.01$ and $p < 0.05$, respectively). In contrast, asset turnover and asset growth positively impact ROA ($p < 0.01$). The COVID-19 variable also shows a significant positive effect on ROA ($p < 0.01$). This might be influenced by the purposive sampling method and the data distribution, where the average ROA is 5% with positive skewness greater than 2, indicating a distribution skewed above the median, as shown in Table 4.

On the other hand, Table 7 shows the regression results for four models examining the impact of ESG performance on Market Capitalization. The R^2 test yields values above 15%, indicating that the regression models explain at least 15% of the variance in the response variable, which is lower than in the previous four models. This is expected because two different response variables were tested using the same predictors. The F-test for model fit also yields significant results (Prob>F=0.000) for all models, indicating that the predictors in these models significantly influence the response variable.

The results are similar to the four ROA models. ESG score, environment pillar, and social pillar have a significant negative impact on Market Capitalization ($p<0.05$, $p<0.05$, and $p<0.01$, respectively), while the governance pillar is statistically insignificant. This indicates that better ESG performance tends to reduce Market Capitalization. However, different results are found for the control variables. Size, asset growth, and asset turnover significantly positively impact ($p<0.01$) Market Capitalization. Leverage has a negative impact but is only significant at $p<0.1$ in the model relating

Market Capitalization to ESG. COVID-19 has a significant negative impact ($p<0.01$) in all four models.

Table 7. Regression Results of ESG on Marketcap

Dependent Variable: Marketcap				
Variable	(1) ESG	(2) Environment	(3) Social	(4) Governance
esg	-0.200**			
	(-2.60)			
env		-0.0798**		
		(-2.10)		
soc			-0.125***	
			(-2.83)	
gov				-0.0965
				(-1.65)
size	0.431***	0.416***	0.416***	0.394***
	(3.74)	(3.81)	(3.65)	(3.52)
lev	-0.0582*	-0.0605	-0.0568	-0.0538
	(-1.67)	(-1.64)	(-1.63)	(-1.55)
turnover	0.206***	0.203***	0.199***	0.206***
	(3.14)	(3.15)	(3.09)	(3.09)
growth	0.299***	0.317***	0.311***	0.315***
	(3.31)	(3.52)	(3.45)	(3.60)
covid	-0.132***	-0.138***	-0.144***	-0.155***
	(-3.71)	(-3.85)	(-3.82)	(-4.00)
Constant	13.36***	13.19***	13.41***	13.79***
	(5.52)	(5.53)	(5.45)	(5.72)
Observation	931	931	931	931
Prob>F	0.0000	0.0000	0.0000	0.0000
R^2	0.165	0.164	0.159	0.155
Companies	133	133	133	133
t-value in parentheses				
Significance level at, *** p<0.01, ** p<0.05, * p<0.1				

5. DISCUSSION

The negative relationship between ESG performance and ROA could be due to companies' substantial investments in disclosing ESG performance and efforts to improve ESG outcomes, such as investing in corporate social responsibility (CSR) and greener operations. Other possibilities are that these investments may not yet be substantial enough or precisely targeted to yield the expected returns, or they might not immediately impact profitability, as Nollet et al. (2016) find a non-linear U-shaped relationship between ESG performance and ROA.

Regarding signaling theory, the market's negative response to ESG performance may stem from differing perceptions between the signaler and the receiver. Companies disclose ESG performance to demonstrate their commitment to sustainability practices, which they view as positive. However, investors might interpret this as a shift in focus towards satisfying stakeholders rather than generating profits for shareholders. This interpretation is particularly supported by the regression results from the ROA model, which affirms a negative relationship between ESG performance and profitability.

6. CONCLUSION

The results generally indicate that ESG performance has yet to positively impact the financial performance of companies in the ASEAN region and even has a negative influence. Giannopoulos (2022) found that ESG performance negatively affects profitability (ROA). Additionally, Ahmad et al. (2021) also reported that ESG performance adversely affects Market Capitalization. The social and environmental pillars negatively

influence financial performance, similar to the findings of Alareeni and Hamdan (2020), while the governance pillar shows insignificant results in both models. These findings align with the logic constructed in the introduction, particularly shareholder theory, which suggests that investors expect companies to generate profits, and efforts to improve ESG performance may hinder this goal. Signaling theory further complements this conclusion; investors perceive the impediment to profitability negatively.

7. LIMITATION & SUGGESTION

This study does not address the impact of ESG performance on financial performance using perceptual-based measures. Due to the limited number of companies with complete data over the past seven years, only 931 firm-year observations were collected. Consequently, the findings cannot be generalized to all contexts, as the study primarily aims to describe the current state and enrich existing evidence on the topic. Additionally, the results are based on short-term observations; extending the sample period in future research could allow for applying time lags to ESG performance variables. Furthermore, as the ESG performance data is exclusively sourced from the LSEG database, there is a potential for measurement error, which could introduce bias. Thus, the results may vary from those of studies using different databases.

Future research could benefit from utilizing ESG performance values from a more diverse range of databases and compare them, apply various time lags to ESG performance variables, or even explore potential non-linear relationships. Additionally, further investigation into the underlying factors driving variations in the impact of ESG performance on financial performance would be valuable.

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PATHWAYS TOWARDS FINANCIAL WELL-BEING: THE INTERPLAY OF FINANCIAL ATTITUDE, FINANCIAL KNOWLEDGE, FINANCIAL BEHAVIOR AND PSYCHOLOGICAL FACTORS

Bui Nhat Quang[a], Phan Huu Nghi[a*]

[a]National Economics University, Hanoi, Vietnam.

**Corresponding author: nghiph@neu.edu.vn*

Abstract: *Financial well-being is a crucial component of individuals' overall life quality, encompassing their financial security, stability, and contentment with their present financial status. However, financial well-being is a nascent term that lacks studies exploring its vast possibility of being incorporated as a construct in a research model. Hence, this study seeks to explore the interconnectedness between financial attitude, financial knowledge, psychological factors, and financial behavior with the financial well-being of Vietnamese youth using the Family Resource Management System Model. A sample of 632 young adults was analyzed using the partial least squares structural equation modeling (PLS-SEM) to validate the posited causal relationships compiled from extant literature empirically. Results indicate that financial attitude, financial knowledge, and all five psychological factors (i.e., locus of control, time orientation, impulsivity, social status, and self-control) significantly affect financial behavior and financial well-being; financial behavior also shows good explanatory power in predicting financial well-being. From these results, the authors put forward several policy implications to help enhance the financial well-being of Vietnamese youth, improve personal financial management practices, and heighten the economy's competitiveness.*

Keywords: *financial well-being, financial behavior, financial attitude, financial knowledge, psychological factors, Vietnam.*

1. INTRODUCTION

Attaining overall well-being is ultimately crucial for a rewarding life. In modern society, the pursuit of such an end inevitably involves the empowerment of financial lives. Nonetheless, financial decisions face more challenges in the twenty-first century concerning the ubiquity and amplified complexity of contemporary financial products, such as fintech, internet banking, e-tax, etc. Moreover, the successive economic crises have rendered all economic actors more proactive and responsible for the management of personal financial behavior, including financial budgeting (Kempson et al., 2017), retirement planning (Lusardi, 2009), stock market participation (Van Rooij et al., 2011) and so on. While nations recovered from the great recession in 2008, the abrupt outbreak of the COVID-19 pandemic has wreaked havoc on the global economy, ensuing market instability, causing millions of people to become unemployed and rooted in financial burden. Such financial turbulence calls for prudent management of finance. For this reason, the significance of financial management skills in personal life is increasingly evident and, thus, necessitates immediate measures being implemented to raise the overall level of financial well-being, which reflects the approval of the High Principals Level about National Strategies

for Financial Literacy from the Organization for Economic Cooperation and Development (OECD) endorsed in the G20 meeting (OECD, 2017).

The exploration of financial well-being in scholarly research has been gathering momentum for the last few decades (Kaur & Singh, 2024), as policymakers and scholars alike acknowledge the significance of comprehending and fostering financial health. Such interest in financial well-being reflects a broader recognition of the intricate interrelationship among contextual financial elements, individual behaviors, and implications. Numerous studies have been conducted to investigate various aspects of financial well-being, including its conceptualization, measurement, consequences, relationships with other financial constructs (financial stress, financial behavior, financial knowledge, etc.), and personal determinants, thereby providing an assessment of the overall well-being of the economy and ensuing policy implications. Financial well-being has been examined across diverse academic disciplines, such as economics, financial counseling, developmental psychology, consumer decision-making, and services marketing (Brüggen et al., 2017). However, these studies are mainly conducted in developed countries such as the U.S., Canada, and Australia (Brüggen et al., 2017). In Vietnam, although research in financial well-being has picked up since about 2017, the number of publications is still far from desirable. Most of the research body hails from individual researchers rather than state-wide or government-level clinical trials with a mass sample that can cover the fast-growing population of Vietnam. According to the International Youth Foundation's 2017 report on the Global Youth Well-being Index, about 48% of young people in Vietnam say they feel pressured in life. The reason can be attributable to Vietnamese youth facing financial issues due to their lack of practical experience in personal financial management before completing high school education and almost without financial autonomy during university studies, rendering them vulnerable to impacts from later financial events.

Unfortunately, the amount of research on youth's financial well-being in Vietnam is neither sufficient nor in-depth. Many studies have provided information about financial well-being, predominantly in the US and Europe, such as the UK and Switzerland - capitalist countries with developed economies while little heeding attention to a socialist developing country like Vietnam. Therefore, the solutions pertaining to financial well-being that have been proposed and tested in the world are not suitable for Vietnam and can hardly be applied to the current status quo of the country. According to Lusardi et al. (2010), research on youth financial literacy is essential for policymakers. Timely assessments of young people's financial literacy can help design effective financial education programs targeting youth and assist lawmakers in protecting young consumers. Among the young adults, we chose university students because of evidence reported by Lusardi and Mitchell (2010), in which individuals with lower educational levels are less prone to answer the questions correctly and more susceptible to saying that they do not know the answer. This research will empirically test our conceptual model of the interlinkage between financial well-being, financial attitude,

financial knowledge, financial behavior, and five psychological traits. From these results, we proposed some policy implications for the development of financial well-being for Vietnamese youth, aiming to facilitate the ability to manage personal finance and enhance the economy's competitiveness in general in the long run.

2. LITERATURE REVIEW

2.1. Financial well-being

Financial well-being is a novel concept that devoids a conceptual definition and standardized, universal measurement scales in the extant literature (Sehrawat et al., 2021). In most studies, financial well-being is classified as objective or subjective (Brüggen et al., 2017). The objective assessment of financial well-being is the economic well-being assessment and consists of three further sub-dimensions, namely the entries, the exits, and whatever the individual currently owns. This study argues that, in nature, financial well-being is subjective as it depends on an individual's perception rather than an objective measurement, so the measurement should be conducted based on that (D'Agostino et al., 2020). Accordingly, financial well-being is "a state of being wherein a person can fully meet their current and ongoing financial obligations, where they can feel secure in their financial future, and where they can make choices that allow for the enjoyment of life" (CFPB, 2015). This approach implies that one can only assess well-being without judgment from others (Brüggen et al., 2017).

2.2. Financial behavior

Financial behavior is sometimes generalized by researchers such as Mudzingiri et al. (2018) as a set of observable financial activities by actors in a particular economy. Financial behavior is reflected in activities undertaken or avoided by the individual that can either manifest as positive or negative. Positive financial behavior includes congruous cash flow and credit management, appropriate budgeting, making emergency provisions, planning long-term goals, and minimizing risks through insurance purchases. These financial behaviors are all positively correlated with financial well-being as they reduce financial distress (Gutter & Copur, 2011). Conversely, negative financial behavior includes gambling, binge spending, reliance on employer pension plans, and being elusive of financial education and discussion (Woodyard, 2013). Extant literature agrees that financial behavior is vital in determining financial well-being. People with higher financial behavior also have higher financial well-being (Nguyen Minh Sang, 2021). It was explained that difficulties in comfortably fulfilling everyday financial obligations could lead to reliance on credit for routine expenses, potentially undermining an individual's financial well-being. At the same time, a greater inclination to save is associated with enhanced bargaining power and decision-making capacity, reduced likelihood of liquidating assets during financial crises heightened productivity, and superior financial well-being (Sehrawat et al., 2021). To examine the impact of financial behavior on financial well-being, we propose the hypothesis:

H1: Financial behavior has a positive impact on financial well-being.

2.3. Financial attitude

Financial attitude can be interpreted as individuals' emotions and opinions against financial matters that directly affect their financial behaviors and decision-making (Rai et al., 2019). It is well-established in the extant literature that financial attitude positively impacts financial behavior (Atkinson & Messy, 2012). Individuals with a negative financial attitude are less inclined to save or set aside an emergency reserve and are more focused on the future, often prioritizing their immediate desires. When consumers feel less financially constrained, they perceive themselves as having an enhanced financial position (Sharma & Keller, 2017), thus modifying their financial behaviors accordingly. In contrast, adverse perceptions of financial matters will ensure pernicious decisions such as overspending or compulsive shopping (Rai et al., 2019). According to Rai et al. (2019), financial attitude will determine an individual's assessment of their financial knowledge and the results of each reaction they can make before making the decision they find most appropriate.

H2: Financial attitude has a positive impact on financial well-being via financial behavior.

2.4. Financial knowledge

Financial knowledge denotes individuals' understanding of financial issues and matters (Khan et al., 2017). Both subjective and objective assessments should be accounted for in the assessment (Woodyard, 2013). According to Woodyard (2013), subjective financial knowledge reflects a person's interest in financial matters, enjoyment of working with financial issues, and confidence in financial decisions. On the other hand, objective financial knowledge implies financial knowledge of concepts such as saving, investment, credit, interest compounding, inflation, time value of money, bonds, and stocks, and risk diversification (Khan et al., 2017). While objective measures are often seen in economists' research, subjective measures have been used more often to study different economic or financial behaviors, such as perception of life satisfaction, financial well-being, risk attitude, and credit score. People with better financial knowledge tend to develop a positive financial attitude and absorb new information better, rendering them unfazed by sophisticated market information (Rai et al., 2019). Potrick et al. (2015) also pointed out that advanced training in financial knowledge is one of the decisive factors in forming a more favorable financial attitude and financial behavior. Financial knowledge positively and indirectly impacts financial behavior (Chen and Volpe, 1998;). Individuals who are more knowledgeable about financial concepts are also observed to have more sensible personal financial management behaviors such as better credit, debt, and spending (Lusardi & Tufano, 2009). This relationship is also regulated by financial attitude (Jorgensen & Salva, 2010) - a positive and calm attitude will transform the above information into wise behaviors and vice versa. Similarly, Chen and Volpe (1998) found that young adults with less financial knowledge also tend to have a more negative view of financial topics in general and are more likely to make mistakes in handling personal financial issues. Therefore, these two hypotheses were postulated:

H3: Financial knowledge has a positive impact on financial attitude.

H4: Financial knowledge has a positive impact on financial well-being via financial behavior.

2.5. Psychological factors as drivers

2.5.1. Time orientation

According to Strathman et al. (1994), the concept of time orientation is based on the "consideration of future consequences" (CFC), which evaluates the extent to which individuals contemplate the long-term outcomes of their actions. Thereby, personal financial behavior has been linked to time orientation. When it comes to saving behaviors, having a high future orientation not only leads to a greater inclination to save money but also results in a higher level of actual saving behavior and an increased likelihood of participating in a retirement savings plan (Howlett et al., 2008). Indeed, individuals in debt tend to seek larger immediate rewards compared to those without debt, indicating a more present-oriented mindset. Individuals with a present-oriented outlook are more inclined to borrow money for significant purchases rather than save up. The positive relationship of future orientation with financial well-being is also robust across cultures and countries (Van Rooij et al., 2011; Sehrawat et al., 2021). The results indicated that individuals with a stronger focus on the future tended to make financial decisions that would optimize their future well-being. Hence, we propose the hypotheses:

H5a: Time orientation has a positive impact on financial behavior.

H5b: Time orientation has a positive impact on financial well-being.

2.5.2. Self-control

According to Duckworth (2011), the underlying concept of self-control across various definitions is the notion of the self exerting effortful regulation over itself. Previous research provides evidence about the relationship between self-control and some particular financial behaviors. Gathergood (2012) discovered that individuals experiencing self-control issues in financial matters are at a higher risk of encountering credit withdrawals and unexpected expenses on durable goods, ultimately resulting in over-indebtedness. According to Sehrawat et al. (2021), self-control impacts people's financial situation and their subjective perception of financial well-being. Young individuals with greater self-control are posited to resist unhealthy and financially disadvantageous temptations, leading to improved health and greater financial well-being. Hence, we propose the hypotheses:

H6a: Self-control has a positive impact on financial behavior.

H6b: Self-control has a positive impact on financial well-being.

2.5.3. Locus of control

Locus of control (LOC) pertains to individuals' perceptions or convictions concerning the link between their actions and the outcomes (rewards or punishments) they experience (Rotter, 1966). LOC is a personality variable that encompasses an individual's belief in their capacity for self-control or their mindset regarding

the influence that determines success or failure in life. It is also suggested that LOC is a significant factor in explaining the risky behaviors of young adults and teenagers. Salamanca et al. (2016) discovered that an internal LOC is positively associated with investing behaviors in risky assets. Similarly, Cobb-Clark et al. (2016) found that individuals with a higher LOC save more. They also highlighted that LOC is powerfully relevant to consumers' financial well-being. Individuals with an internal LOC will demonstrate responsible financial management behavior and higher financial well-being (Prawitz et al., 2013).

H7a: Locus of control has a positive impact on financial behavior.

H7b: Locus of control has a positive impact on financial well-being.

2.5.4. Impulsivity

Ottaviani and Vandone (2011) demonstrated a connection between individuals' impulsivity and real-life decisions regarding indebtedness, with impulsivity being a specific predictor of consumer credit. They cited that extant literature revealed impulsivity was linked to distinct aspects of indebtedness, including unsecured and secured debt. Moreover, impulsive behaviors not only lead to being inclined to choose rewarding products, which exhibit their suboptimal decision-making power, but also relate to weak money-management skills (Franken et al., 2008). Additionally, existing literature reinforces the argument that impulsive behavior can lead consumers to jeopardize their financial capacity and sacrifice their financial well-being (Fenton-O'Creevy et al., 2018). Impulsive conduct adversely affects financial decision-making, leading to a decline in consumers' financial well-being (Ottaviani & Vandone, 2011). Hence, we propose the hypotheses:

H8a: Impulsivity has a negative impact on financial behavior.

H8b: Impulsivity has a negative impact on financial well-being.

2.5.5. Social status

Social status is the relative level of social value, such as respect, honor, assumed competence, and deference, that a person is considered to possess (Sauder et al., 2012). High social status can lead to negative consumption behavior. Duesenberry (1949) argued that a concern for status causes people to emulate the consumption patterns of those higher up in the income hierarchy. Additionally, previous research has shown that social status can impact various financial behaviors, such as savings, negative borrowing (Kempson & Poppe, 2018), and participation in the stock market (van Rooji et al., 2011). Kempson and Poppe (2018) indicated that there is a negative relationship between social status and one's financial well-being. Social status, which can influence an individual's desire to conform to their social group, can either facilitate or hinder responsible financial behavior, potentially leading to lower financial well-being. Hence, we propose these hypotheses:

H9a: Social status has a negative impact on financial behavior.

H9b: Social status has a negative impact on financial well-being.

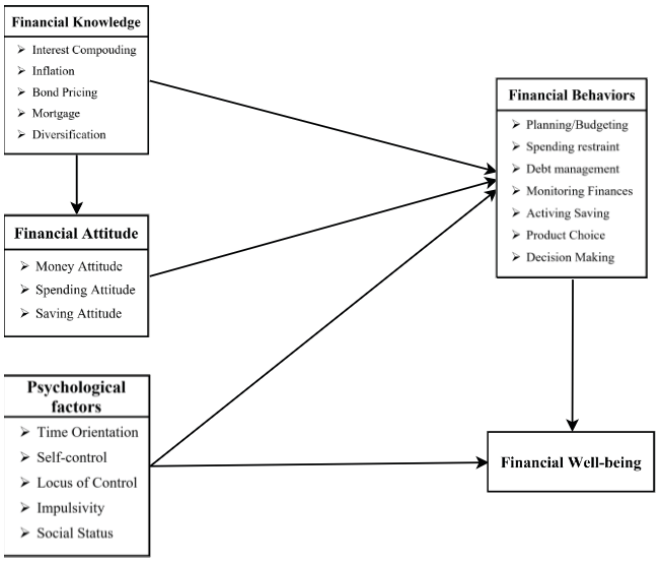


Fig 1. Research model

3. METHODS

This research used the questionnaire to collect the primary data for formal quantitative research. The questionnaire is derived from van Rooij et al. (2011), OECD (2022), Potrich et al. (2015), Kempson et al. (2015), CFPB (2015), and Kempson and Pope (2018). It uses a 5-point Likert scale where (1) indicates complete disagreement and (5) indicates complete consensus. Items with an "R" at the end are reverse-coded to avoid straight-lining.

The sample size of a study is influenced by factors such as demographic characteristics, study objectives, data analysis, time frame, financial constraints, and outliers (Struwig & Stead, 2013). After the measurement scales had passed the preliminary test for reliability and comprehensibility, online questionnaires were posted on many forums and social networks of young people on the Internet through platforms, such as Facebook and Instagram, from November 10, 2023, to December 20, 2023. Out of 756 visits to the survey link, 680 questionnaires were recorded and completed, achieving a response rate of 89.95%. After cleaning and removing outliers, the official data comprised 632 usable responses, yielding an effective response rate of 92.94%. The respondent profile is compiled in Table 1.

Table 1. Respondent profile

Entries	n	frequency
Gender		
Female	250	39.6
Male	382	60.4
Education level		
Did not graduate from high school	38	6
Graduated from high school	39	6.2
Graduated from vocational college	29	4.6
Graduated from college/university	464	73.4
Postgraduate degree (Master's, Doctorate)	62	9.8

Employment status		
Do not go to work	97	15.3
Have a part-time job	213	33.7
Have a full-time job	322	50.9

Source: Author's compilation

Based on Hair et al. (2019) recommendations, we performed PLS-SEM analysis using SmartPLS 3.2.9. to assess the interplay of various constructs as posited in the research model. PLS-SEM is a second-generation advanced statistical technique that facilitates the simultaneous examination of direct and indirect effects of exogenous and endogenous variables. PLS-SEM is suitable for studies to evaluate complex research models with many constructs and paths without strict assumptions in the data distribution and predict key constructs in said research model (Hair et al., 2019).

4. RESULTS AND DISCUSSION

The internal consistency is established via Cronbach's alpha and composite reliability (CR). The Cronbach's alpha of all the constructs meets the generally accepted limit of 0.7 (Hair et al., 2019). Each latent construct also shows acceptable CR, ranging from 0.843 to 0.918 for our reflective scales (Hair et al., 2019). The factor loadings in our model range from 0.771 (FA4R) to 0.945 (FW1R), all being significant and satisfying the reliability test requirements (Hair et al., 2019). Regarding convergent validity, the AVE for each latent construct is above 0.5, which signifies that the constructs can explain more than 50% of the variation concerning the variance due to measurement errors.

Table 2. Measurement model results

Item	λ	α	CR	AVE
Financial knowledge				
FK1	0.856	0.900	0.926	0.713
FK2	0.818			
FK3	0.844			
FK4	0.834			
FK5	0.870			
Financial attitude				
FA1R	0.850	0.836	0.890	0.670
FA2R	0.855			
FA3	0.795			
FA4R	0.772			
Financial behavior				
FB1	0.792	0.926	0.940	
FB2R	0.823			0.693
FB3	0.847			
FB4	0.837			
FB5	0.846			
FB6	0.848			
FB7	0.832			
Financial well-being				
FW1R	0.845			
FW2R	0.878			
FW3R	0.873	0.908	0.931	0.731
FW4	0.850			
FW5R	0.826			
Locus of control				
LC1	0.826			
LC2R	0.880	0.819	0.892	0.734
LC3	0.864			

Item	λ	α	CR	AVE
Social status				
SS1	0.945			
SS2	0.932	0.921	0.921	0.921
SS3	0.912			
Time orientation				
TO1	0.826			
TO2R	0.885	0.816	0.891	0.891
TO3R	0.853			
Self-control				
SC1	0.894			
SC2R	0.889	0.875	0.875	0.875
SC3	0.898			
Impulsivity				
IM1	0.925			
IM2	0.937	0.918	0.918	0.918
IM3	0.920			

Source: Author's compilation

Discriminant validity is established using the Fornell–Larcker method and HTMT ratio. The model's HTMT ratios are all below the threshold of 0.85 (Henseler et al., 2015), while the Fornell-Larcker results show that the correlation of each variable with itself is more significant than that of other latent variables, ensuring discriminant validity (Fornell & Larcker, 1981). Before examining the structural model, multicollinearity was also examined by checking the variance inflation factor (VIF) values for all exogenous constructs (Hair et al., 2019). The VIF values of all constructs in the model are below 3, ranging from 1.662 to 2.924, indicating no collinearity issue in the data and the uniqueness of each construct indicator is established (Becker et al., 2015). The structural model was tested by analyzing the significance of paths between constructs in the research model using the 5,000 bootstrapping re-sample approach (Hair et al., 2019). A hypothesis was accepted when the t-value was larger than the critical value of 1.96 by using a one-tailed test. In our model, various endogenous constructs are being impacted directly and indirectly. Therefore, we only report a specific exogenous construct's direct and indirect effects on an endogenous construct, as demonstrated in Table 3.

Table 3. Path analysis results

Path	β	t-value	R^2
FK -> FA	0.599	16.567*	0.358
TO -> FB	0.082	2.985*	0.503
LOC -> FB	0.155	4.627*	
SC -> FB	0.182	5.933*	
IM -> FB	-0.187	4.777*	
SS -> FB	0.149	3.975*	
FB -> FW	0.199	4.983*	0.555
IM -> FW	-0.188	5.130*	
LOC -> FW	0.107	2.968*	
SC -> FW	0.155	4.793*	
SS -> FW	0.153	4.457*	
TO -> FW	0.098	3.389*	
FA -> FB -> FW	0.030	3.098*	
FK -> FB -> FW	0.020	2.536*	

Note: (*) indicates significance at 1% level.

Source: Author's compilation

As the results indicate, R^2 values for financial attitude (0.358), financial behavior (0.703), and financial well-being (0.736) were all greater than the threshold of 0.10 as recommended by Chin (1998). Thus, the results indicated that the exogenous constructs in the research model aptly explained the endogenous constructs. Furthermore, all the constructs have a Q^2 value of more than zero (i.e., $Q^2 > 0$). The Q^2 values FA = 0.236, FB = 0.486, and FW = 0.532 indicate that each endogenous construct of the model has predictive

relevance (Chin, 1998) and are calculated using the Stone–Geisser criterion with an omission distance of 7.

Empirical results provide strong evidence of the relationship between financial behavior and financial well-being with a path coefficient of 0.199 (p-value = 0.000). Thus, hypothesis 1 is supported (Nguyen Minh Sang, 2021; Sehrawat et al., 2021; She et al., 2021). People with a strong future time orientation are more likely to make choices that benefit their long-term financial well-being. This translates into setting clear goals, like saving for retirement or emergency, congruously tracking income and expenses, and prioritizing saving over immediate desires. In the long run, this focus motivates them to plan for potential expenses, like education costs for their children, and eventually fosters trust in financial institutions. Said individuals will be more likely to seek professional advice and utilize tools like retirement accounts, building a strong foundation for a secure financial future. The model results also show that the direct correlation coefficient of financial knowledge with financial attitude is 0.599 (p-value = 0.000). This means that financial knowledge positively impacts financial attitude, or hypothesis H3 is accepted. Similar to this result, when researching the relationship between financial knowledge and financial attitude at the university level, Chen and Volpe (1998) have found that young adults with limited financial knowledge often have a negative view of financial topics, leading to poor choices in financial decisions. Thus, for youth in Vietnam, financial knowledge is one of the factors that positively affect their financial attitude. More self-awareness about financial knowledge comes with a more confident and calmer financial attitude regarding financial decisions (Jorgensen & Salva, 2010; Potrich et al., 2015).

Our findings suggested that impulsivity shared the highest explanatory power in predicting positive behaviors with a path coefficient of -0.187 (p-value = 0.000). The psychological drivers in order are self-control (β = 0.182, p-value = 0.000), locus of control (β = 0.155, p-value = 0.000), social status (β = 0.149, p-value = 0.000) and finally time orientation (β = 0.082 p-value = 0.003). Within the realm of financial decision-making, impulsivity presents a significant challenge. It can manifest as a propensity for immediate gratification, leading individuals to prioritize short-term desires over long-term goals (Kempson & Poppe, 2018; Sehrawat et al., 2021). Moreover, people with a solid future time orientation, better self-control, and internal locus of control are more likely to make choices that benefit their long-term financial well-being. This translates into setting clear goals, like saving for retirement or emergency (Perry & Morris, 2005), being able to resist temptations that can derail financial goals (Gathergood, 2012), better credit card usage (Strömbäck et al., 2017), possessing high savings rates (Cobb-Clark et al., 2016), better personal financial management practices and informed product choice.

Empirical data also suggested that impulsivity shared the highest correlation with financial well-being with a path coefficient of -0.188 (p-value = 0.000). The psychological factors in impact order are self-control (β = 0.155, p-value = 0.000), social status (β = 0.153, p-value = 0.000), locus of control (β = 0.107, p-value = 0.003), and lastly time orientation (β = 0.098, p-value = 0.001). This is also the result of Howlett et al. (2008), Hoffmann and Risse (2020), Fenton-O'Creevy et al. (2018) and Sehrawat et al. (2021). Impulsive behaviors, characterized by spontaneous and unplanned actions, have the potential to significantly undermine consumers' financial

stability and compromise their overall financial well-being (Ottaviani et al., 2011). Conversely, individuals with heightened internal locus of control, better self-control, and time orientation view themselves to be in near completeness of their financial situation. They are more likely to engage in proactive behaviors like planning, budgeting, saving, and exploring investment opportunities.

However, the positive association of social status with positive financial behavior and financial well-being implies that individuals with high concerns for society, i.e., high social status scores, are involved in responsible financial behaviors, which is similar to the conclusion of Kempson et al. (2017) and Duesenberry (1949). Indeed, comparing oneself with others promotes goal attainment and motivates one to engage in positive financial behavior. To explain this result, according to Social Comparison Theory, Festinger (1954) posited that individuals naturally tend to compare themselves to those with higher abilities and achievements to enhance their capabilities. Therefore, individuals with high social status will continuously pursue the achievements of those they perceive as more successful, driving them to strive for higher financial success and thereby enhancing their financial well-being. This result contradicts the majority of previous studies worldwide, for the existing literature tends to converge on a negative relationship between social status and financial well-being (Kempson & Poppe, 2018). Hence, hypotheses 9a and 9b were rejected.

5. CONCLUSION

The current study adds to the understanding of the college-to-career transition by using longitudinal data and a theoretical framework to understand the simultaneous influences of both parents and self on the motivations behind emerging adults' financial behavior and the effect on their financial well-being after college. Our findings are noteworthy given the period included in the study design; we found associations between parenting during the first year of college and financial well-being three years post-graduation. In this study, personal expectations were a strong motivator of financial behaviors, which is an important finding, given the salience of personal achievement during this life stage. One of the parenting goals is to provide structure and support for their children to learn to be self-sufficient, especially within the financial domain. Encouraging parents to provide opportunities for their children to practice healthy financial behaviors while they are still within their household and expecting them to continue those behaviors on their own have a lasting impact on the link between personal financial behavior and long-term financial well-being.

6. POLICY IMPLICATIONS

Improving financial literacy, behaviors, and psychological factors, especially among youth, is crucial for enhancing financial well-being in Vietnam. Therefore, our recommendations will address financial attitudes, knowledge, behaviors, and psychological aspects like impulsivity and locus of control among young adults. The Vietnamese government must prioritize long-term financial education and training for youth. Early exposure to economics education can mitigate financial struggles in adolescence. Financial institutions, particularly the State Bank of Vietnam, should integrate financial literacy into their sustainable development strategy, educating young adults on banking, investments, and financial management.

Additionally, tailored programs for individuals aged 18-25 should consider

educational backgrounds and be practical and applicable, focusing on key life events like postgraduate studies, budgeting, retirement planning, and investment. Involving families in financial discussions and responsibilities from a young age can nurture practical money management skills and financial independence. Moreover, the government can collaborate with financial institutions to offer transparent savings products and ethical financial services. They can also hold some financial workshops about personal financial planning and making a financial plan, emphasize the importance of saving, and provide tailored recommendations to help individuals set and achieve financial goals. Young people should be taught to establish clear objectives, track expenses, automate savings, and seek financial education resources to improve financial literacy and decision-making. By promoting self-control and addressing impulsivity, collaborative efforts between individuals, financial institutions, and the government can cultivate a savings culture and ensure financial well-being for the future.

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RESEARCH ON FINANCIAL SUSTAINABILITY AT VINACOMIN - MINERALS HOLDING CORPORATION

Phi Thi Kim Thu[a]*, Pham Minh Hai[a]

[a]Hanoi University of Mining and Geology, Hanoi, Vietnam

**Corresponding author: phithikimthu@humg.edu.vn*

Abstract: *Sustainable development is becoming an indispensable global trend. This is a social responsibility for Vietnamese enterprises and a potential new business opportunity. Financial sustainability is the goal financial managers aim for in financial activities. Sustainability requires that the enterprise's financial status be strong enough for the enterprise to continue operating and making profits year after year. Vinacomin - Minerals Holding Corporation (Vimico) is a leading enterprise in mineral exploitation and processing in Vietnam. Hence, financial sustainability is also of interest to managers when planning business development strategies in the context of increasing competition in the domestic and international mineral markets. Therefore, in this article, the authors would like to discuss the theoretical basis of financial sustainability, on that basis, applying research at Vimico.*

Keywords: *Financial sustainability, sustainable development, Vinacomin - Minerals Holding Corporation, Vimico.*

1. INTRODUCTION

Sustainable development is a development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs based on a close and harmonious combination of economic growth, solving social problems, and protecting the environment. In the report "Our Common Future," the President of the World Commission on Environment and Development of the United Nations - Ms. Brundtland, said: "Sustainable development is a development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs" (Brundtland, 1987).

Sustainable development is a concept with a very broad connotation, which can be approached in separate fields and separate scopes. In the financial field, financial sustainability can be considered from the perspective of maintaining a sustainable economy, with the core element being financial services, such as banking. Within the scope of each business, financial sustainability can be understood in terms of ensuring profitability, ensuring solvency, ensuring the ability to provide capital, and preserving and developing capital, especially equity capital, without affecting the long-term development strategy as well as the goals of social equity and environmental protection that the establishment is aiming for.

Vimico is a subsidiary of Vietnam National Coal and Mineral Industries Holding Corporation Limited (Vinacomin), annually contributing billions of VND (equivalent to

hundreds of thousands of dollars) to the State Budget, and is an enterprise with a large and stable number of shares traded on the Vietnamese stock market. Therefore, Vimico's financial sustainability is the foundation for this company to perform well in its business activities. It creates trust for investors, creates sustainable development for the company and the Vietnamese mineral industry, and brings more stable contributions to society. In this article, the authors will discuss the theoretical basis of financial sustainability in a business and, on that basis, evaluate the financial sustainability of Vimico in recent times.

2. THEORETICAL BASIS OF FINANCIAL SUSTAINABILITY IN BUSINESS

If we consider the economy as a whole, financial sustainability is maintaining a sustainable economy, with the core element being financial and banking services. Then, within the scope of each economic organization, financial sustainability can be understood in more specific terms.

An organization is considered financially sustainable if its financial and operational capabilities reach a certain efficiency level. This helps it survive and withstand adverse impacts from the external environment. A financially sustainable enterprise is one that can ensure its ability to pay its debts at any given time and does not negatively impact the economy and community despite adverse developments in the socio-economic environment (Lindgren, Garcia, & Saal, 1996).

According to the International Finance Corporation, financial sustainability is also defined as providing capital and risk management solutions for projects and business activities that promote or do not hinder prosperity, protect the environment, and create equity for society (IFC, 2000).

The financial aspect is the most crucial component in the business world for profit purposes. In addition, to evaluate the financial capacity of an economic organization, the authors also mention the indicators reflecting the financial strength of an enterprise, including capital scale, level of capital preservation and development, especially equity capital, ability to mobilize debt capital, self-financing ability, ability to ensure financial security, profitability (profitability of total business capital, profitability of equity capital) (Niven, 2005).

Some other researchers believe that "financial sustainability" means the proportion of equity capital of enterprises is significant so that enterprises can reorganize their finances with their available resources in a crisis. In financially sustainable enterprises, long-term profits are prioritized over any short-term benefits. To have a financially sustainable business, enterprises need to develop long-term goals and plan the financial intentions that the enterprise wants in the future (profits the enterprise wants to achieve, cash flow requirements, current debts, etc.). Therefore, a plan must be created to help the business reach this position within a specified period. In addition, financial decisions should also focus on achieving long-term goals, avoiding making decisions that will provide the

business with a short-term financial benefit but have a negative impact on the ability to achieve the business's long-term goals (Benn, 2014). From the above observations, financial sustainability is the satisfaction of current financial needs without causing harm to the ability to meet future financial needs.

A corporation is an economic organization consisting of a group of parent companies and subsidiaries with relationships in capital, technology, finance, information, training, research, and other connections arising from the interests of the parties involved, in which the parent company holds the leadership and control over the operations of the subsidiaries in terms of finance and development strategy. More specifically, the financial sustainability of the corporation will be achieved when it operates at the required level of profitability in a safe state. The balance between profitability and safety level must also be maintained for a long time. According to the authors, the financial sustainability of a business can be expressed in the following aspects:

Firstly, it is necessary to ensure long-term profitability. Every business establishment that wants to survive needs to have profit and income. Companies always aim to improve production and business efficiency and increase profitability. A company's profitability is reflected in absolute profit and profitability ratios, the most important of which are the return on total assets (ROA) and return on equity (ROE). For the company to aim for financial sustainability in its production and business operations, in addition to the goal of profit growth, it must maintain this growth steadily and stably over a long period.

Second, companies must ensure financial security in their business operations. When operating in a market economy, companies always face risks. Financial risks arise from the company's failure to use debt capital to finance its production and business activities, leading to the risk of being unable to repay its debts. A company with a high debt-to-equity ratio is using high financial leverage. If the company generates a basic return on capital higher than the debt interest rate, it will amplify the return on equity higher than expected. However, if an event negatively affects the efficiency of capital use, the basic return on capital falls below the debt interest rate. The return on equity will decline much faster than the basic return. When risks occur, costs will arise that reduce revenue and profit. Thus, from a financial perspective, a company must reduce risks and increase financial safety in business operations while still achieving expected profitability to ensure financial sustainability. Thus, the financial safety of a company can be assessed through the following indicators reflecting the ability to pay:

+ Current ratio (shows the level of assurance of short-term assets for short-term debts; if this ratio is greater than 1 or approximately equal to 1, the company can be considered to have the ability to pay short-term debts and the financial situation is normal),

+ Quick ratio (reflects the ability to pay short-term debts with short-term assets that can be quickly converted into cash; this high

ratio shows that the ability to pay and the ability to ensure safety is good),

+ Cash ratio (evaluates the fastest ability of the company to use its assets in the form of cash and cash equivalents to pay short-term debts; the higher this ratio is, the better the ability to pay and the ability to ensure the safety of the company is).

+ Financial safety is also considered by assessing the level of investment capital safety with the debt/equity ratio (DER) (DER = Total Debt/Equity). In principle, the smaller this ratio is, meaning that the debt accounts for a small proportion of total assets or total capital, the less financial difficulties the company has, meaning it is more financially secure. The larger this ratio is, the greater the possibility of the company having difficulty paying debts or going bankrupt, affecting the financial sustainability of the company. According to the provisions of Decree 09/2009/ND-CP dated February 5, 2009, the Government, the safety threshold of total debt to equity for companies with State capital must not exceed 3 times.

Third, it is necessary to preserve and develop equity capital. In a market economy, the key condition for development is capital, which is considered as blood circulating in the body. In the operation of companies, capital must be fully provided to take advantage of business opportunities and not interrupt the production and business process. To provide sufficient capital, it is not always possible to mobilize from outside, but preserving and developing internal capital, especially equity capital, is important. Developing capital from external loans is not sustainable because it has many potential risks and is passive in the use process. Preserving and developing equity capital is a proactive way to help companies develop strongly, stably, and long-term to achieve the goal of financial sustainability. Therefore, the indicator of equity preservation level can be used to assess the level of preservation and development of equity capital. (Equity preservation level = Equity at the time of reporting/equity at the end of the previous period). If this ratio = 1, the enterprise has preserved its capital; if the ratio > 1, it has developed its capital (Circular 220/2013/TT-BTC).

3. FINANCIAL SUSTAINABILITY AT VIMICO

Vinacomin - Minerals Corporation Holding, formerly known as Vietnam Minerals Corporation under the Ministry of Heavy Industry, was established under Decision No. 1118/QD-TCCBĐT dated October 27, 1995 of the Minister of Heavy Industry based on merging Vietnam Rare Minerals Corporation and Mineral Development Corporation. Through the development process, the Gem and Gold Corporation was merged into Vietnam Minerals Corporation, later transformed into a subsidiary of Vinacomin, with the name of Vinacomin - Minerals Corporation Holding, operating under the model of a single-member limited liability company.

On December 30, 2014, the Prime Minister issued Decision No. 2388/QD-TTg approving the equitization plan of the parent company - Vinacomin Minerals Corporation

Holding (Vimico). Accordingly, from October 6, 2015, Vimico officially operates under the model of a joint stock company with a current charter capital of about 2,000 billion VND; the organizational structure includes a parent company (including the executive management agency and 06 branches and representative offices (including 03 production companies)); 01 company with 100% charter capital owned by the corporation, 12 subsidiaries in which the corporation holds controlling shares and 17 joint ventures. The main activities of the corporation are to do business in the main fields such as exploration, exploitation, processing, selection, and refining of minerals, including copper, zinc, lead, tin, iron, cast iron, gold, silver, ilmenite, tungsten, production of sulfuric acid, etc. concentrated in the provinces of Lao Cai, Cao Bang, Thai Nguyen, Tuyen Quang, Bac Kan, Nghe An.

In the period of 2019 - 2023, Vimico will follow the growth model of "Developing a synchronous, advanced and modern mineral industry with a high growth rate based on going hand in hand with extensive development, enhancing in-depth development by applying new, advanced, modern and environmentally friendly technologies" (Vinacomin Minerals Corporation Holding (2023), Annual Report), the development goal is "developing the corporation to become a leading non-ferrous metal mining and processing enterprise in Vietnam; with good financial potential, effective production, and business, sustainable development" (Vinacomin Minerals Corporation Holding (2023), Annual Report), the development orientation is "Sustainably developing the mineral mining - metallurgy industry in a modern direction, maximizing resource recovery, being environmentally friendly, in harmony with the locality and community, with high socio-economic efficiency, etc." (Vinacomin (2023), Annual Report). To achieve this goal and orientation, Vimico is currently focusing resources, effectively using the capital of the corporation and its affiliated units to carry out exploration and survey work according to the strategic orientation of mineral development of Vinacomin; accordingly, continuing to accelerate the implementation of projects to explore copper minerals in Lao Cai province such as Sin Quyen mine, Coc My zinc mine; at the same time, requesting to survey and explore some new mines such as Lung Thang mine, Nam San mine, Nam Mit mine in Bat Xat district, Lao Cai province (Decision No. 866/QD - TTg dated July 18, 2023).

By 2023, the total consolidated revenue of Vimico will reach 11,926 billion VND/11,800 billion VND of the plan, reaching 101.07% of the plan and equal to 97.09% compared to 2022, of which mineral revenue alone will reach 11,657.83 billion VND. The consolidated earnings before interest and tax of the whole corporation will reach 233.61 billion VND/147 billion VND of the plan, reaching 158.92% of the annual plan and equal to 94.51% compared to the previous year. The State budget payment of the corporation will reach 1,528.6 billion VND, 165.3% of the annual plan. The

average income of the whole corporation reached 14,216 million VND/person/month, equal to 99.7% of the plan and 102.85% compared to the same period last year, in which the parent company of the corporation had an average income of 17,207 million VND/person/month.

Vimico is a unit that contributes a large amount of revenue to the State budget every year and plays a key role in the national mineral industry, it has a great influence on the stock value of the mineral industry in the domestic and international stock market, so the financial sustainability of Vimico is very necessary. With the above theoretical basis, the authors evaluate the financial sustainability of Vimico as follows:

- Ability to ensure long-term profitability:

Table 1. Some indicators reflecting Vimico's profitability in the period 2019 - 2023

	Unit	2019	2020	2021	2022	2023
Earning before interest and tax	Billion VND	15.51	243.09	1,303.05	247.17	233.61
Net profit	Billion VND	(43.02)	204.65	1,084.40	202.06	160.00
Average Total Assets	Billion VND	7,845.72	8,165.89	9,911.76	10,973.84	10,024.54
Owner's Equity	Billion VND	2,492.23	2,430.20	2,827.62	3,148.24	3,011.62
ROA	%	(0.55)	2.51	10.94	1.84	1.60
ROE	%	(1.73)	8.42	38.35	6.42	5.31

Source: Authors' calculation based on consolidated financial statements of Vimico from 2019 - 2023

Table 1 shows that in the period from 2019 to 2023, Vimico's production and business activities were profitable, with the highest profit in 2021. The earning before interest and tax was 1,303.05 billion VND, and the net profit was 1,084.40 billion VND. The reason is that in 2021, the corporation overcame the severe impact of the COVID-19 epidemic to ensure progress and initially put into production with large projects. Vimico also promoted initiatives, technical improvements, and applied science and technology to management, production, and business with 145 technical improvement initiatives - production rationalization throughout the corporation, with a profit value of 48.3 billion VND. In 2021, mineral revenue and profits increased due to the high prices of the corporation's main mineral products. In 2021, the corporation completed the procedures to merge Viet Nhat Gemstone Company Limited into the corporation, which also affected the company's strong growth in 2021. In the whole period, only in 2019 was the corporation's profit the lowest due to the serious impact of the Covid pandemic on the global economy, leading to plummeting prices of goods, many areas were isolated and blocked, entry for foreign experts was blocked, so many projects had to adjust progress, slow site clearance affected the

corporation's production and business progress. The net profit in 2019 was negative because the corporation's deferred corporate income tax was too large, up to nearly 30 billion. In the remaining years, the corporation's profit of minerals corporation was maintained at around 200 billion.

Figure 1 illustrates the scale of Vimico's earning before interest and tax in the period of 2019 - 2023. The chart shown in Figure 1 shows that during the whole period, this creteria had quite good growth, especially in 2021, however, in the following years, this growth rate could not be maintained.

To more accurately assess Vimico's profitability, we can base it on the Return on Assets (ROA) and Return on Equity (ROE) ratio. Both of these indicators in Table 1 and Figure 2 show an upward trend, significantly a sharp increase in 2021, with ROA reaching 10.94% and ROE reaching 38.35%. However, in the following years, ROA and ROE tend to decrease, with ROA reaching 1.84% in 2022 and 1.6% in 2023; ROE will reach 6.42% in 2022 and 5.31% in 2023. Although the ratio of ROA and ROE has increased compared to the beginning of the research period, the unstable growth of profitability coefficients in the period 2019 - 2023 shows that the financial situation of Vimico is not stable; this is not a good sign for the sustainable financial development of the Corporation.

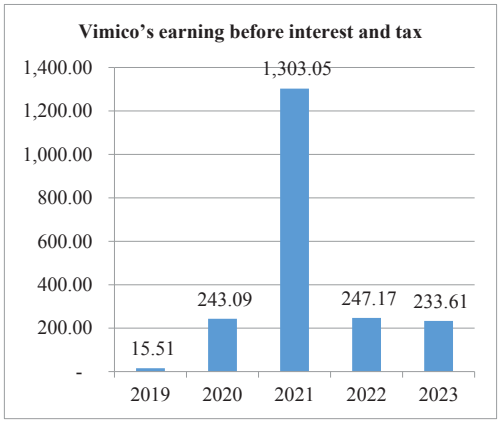


Fig 1. Growth rate of Vimico's earning before interest and tax in the period 2019 - 2023

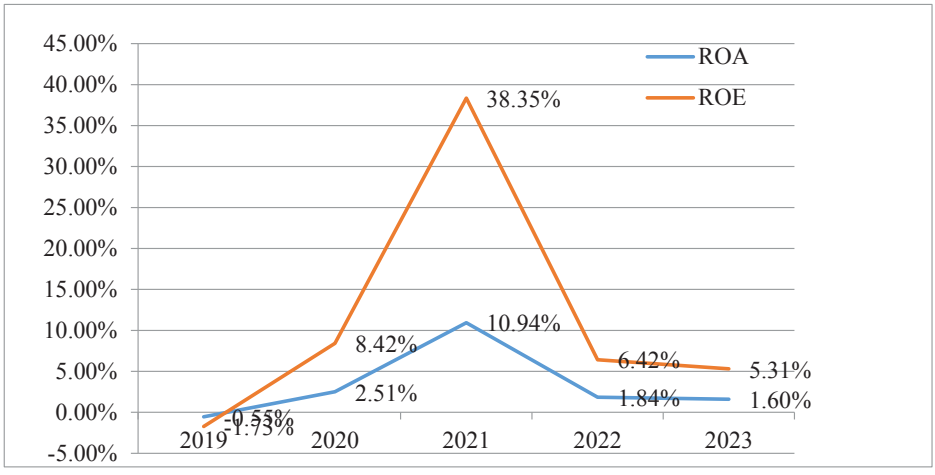


Fig 2. Trend of fluctuations in Vimico's ROA and ROE in the period 2019 - 2023

- Financial security capability

To assess the financial security capability as analyzed above, the authors use indicators reflecting the solvency and consider the level of investment capital safety. The solvency reflects Vimico's ability to pay debts from the Corporation's assets. Through the calculation data in Table 2, it can be seen that the general solvency ratio of the Corporation is always greater than 1, proving that the total assets are sufficient to ensure the total liabilities, the current ratio in the whole period is less than 1, showing that the ability to pay short-term debts with short-term assets of the Corporation is low. However, this ratio tends to increase in the years 2021, 2022 and 2023, showing that the ability to pay short-term debts of Vimico has improved at the end of the research period; Vimico's quick ratio and cash ratio in the period 2019 - 2023 are always less than 0.5, showing that Vimico is having difficulty paying short-term debts with highly liquid assets such as cash and cash equivalents, receivables, which also shows that Vimico's inventories are at a high level. In terms of trends, the quick ratio and cash ratio of the Corporation have increased, but the increase is low and unstable; this is a sign that Vimico has not achieved financial security. This is also a bad sign, affecting financial sustainability.

Table 2. Some indicators reflecting Vimico's financial safety level in the period 2019 - 2023

	End of 2018	End of 2019	End of 2020	End of 2021	End of 2022	End of 2023
Current ratio	0.87	0.78	0.80	0.96	0.92	0.90
Quick ratio	0.38	0.36	0.36	0.22	0.32	0.31
Cash ratio	0.06	0.06	0.06	0.04	0.08	0.07
DER ratio	2.07	2.23	2.48	2.52	2.45	2.20
E/C ratio	0.33	0.31	0.29	0.28	0.29	0.31

Source: Author's calculation based on Vimico's consolidated financial statements from 2019 - 2023

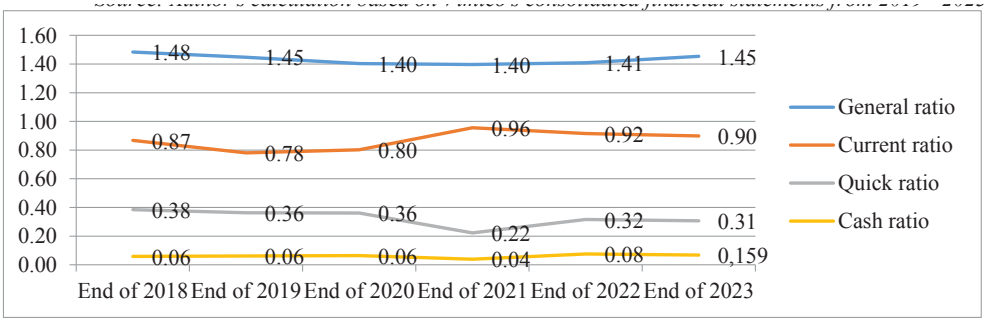


Fig 3. Fluctuation trends of indicators reflecting Vimico's solvency in the period 2019 - 2023

The level of investment capital safety is shown through the Debt/Equity ratio (DER). Table 2 shows that in the period from 2019 to 2023, Vimico's DER is within the allowable threshold according to the regulations on financial management for companies with State capital (stipulated in Decree 09/2009/ND-CP dated February 5, 2009). However, this ratio tends to increase gradually, especially in 2020 - 2022, showing that Vimico tends to increase debts in these years. This is a bad sign from the financial sustainability perspective, showing Vimico's financial safety has decreased.

Self-financing capacity considers the level of financing for the corporation's assets with capital sources belonging to the owner. According to Table 2, in the period 2019 - 2023, in all years, Vimico's self-financing coefficient was < 0.5, which shows that payables mainly financed the corporation's assets. The low self-financing coefficient, and at the same time, the trend shows that this coefficient tends to decrease gradually during the research period, proving that Vimico's self-financing capacity is increasingly decreasing. This is a bad sign for the financial sustainability of the corporation because it shows that Vimico is increasingly dependent on external creditors; Vimico needs to take advantage of its internal financial capacity and make good use of its internal resources. Reducing self-financing capacity also means increasing risks for the corporation. If Vimico does not have a strategy to deal with risks, it will greatly affect future development.

- Ability to preserve and develop equity

Next, we study the data in Table 3 and Figure 4 to evaluate Vimico's ability to preserve and develop equity.

Table 3 and Figure 4 show that from 2019 to 2023, Vimico's equity has increased in quantity, higher each year than the previous year in the years 2020 - 2021. Therefore, if we consider the year's end compared to the year's beginning, the corporation's equity in these years has always been preserved. The increase in the amount of equity is completely reasonable with the increase in the scale of capital and assets of the corporation in these 2 years. However, by the end of 2022, Vimico's equity had decreased again, and this trend continued until 2023. If we consider the trend, the equity conservation coefficient of the corporation and the parent company in this period tends to decrease gradually, showing that the level of equity conservation and development is fluctuating in a direction that is not favorable for Vimico's financial sustainability. In 2022, there are signs of not preserving equity capital, with the total equity preservation ratio of the whole corporation reaching only 0.97 times, that of the parent company is 0.94 times; in 2023, it is 0.94 and 0.95 times, respectively, both less than 1, showing that Vimico has not preserved equity capital in recent years. Thus, in terms of internal strength, there is an increase in equity capital, but this growth rate is not equal to the level of debt, leading to a decrease in Vimico's self-financing ability. From a financial sustainability perspective, Vimico needs to exploit and use its equity capital more effectively to reduce possible damage and future debt burdens.

Table 3. Vimico's equity conservation ratio period 2019 - 2023

	End of 2018	End of 2019	End of 2020	End of 2021	End of 2022	End of 2023
1. Equity (Billion VND)						
- Corporation	2,585.26	2,399.19	2,461.21	3,194.02	3,102.45	2,920.78
- Parent company	2,096.31	2,133.86	2,231.75	2,636.00	2,469.21	2,334.97
2. Equity preservation ratio						
- Corporation		0.93	1.03	1.30	0.97	0.94
- Parent company		1.02	1.05	1.18	0.94	0.95

Source: Authors' calculations based on Vimico's consolidated financial statements from 2019 – 2023

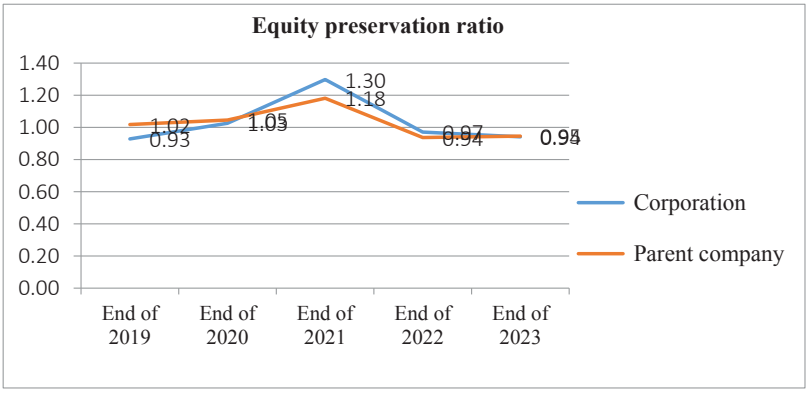


Fig 4. Fluctuation trend of Vimico's equity conservation coefficient in the period 2019 - 2023

4. CONCLUSION

The financial situation clearly reflects the actual state of business operations. Therefore, financial sustainability must be a top priority to achieve stable and long-term business development. Through the above analysis, it can be concluded that in the period of 2019 - 2023, Vimico has not achieved the criteria of financial sustainability, specifically:

- Profit tends to increase but is not stable. By the end of the period, there is a decrease, including earnings before interest and tax, net profit, or profit margin indicators such as ROA and ROE. The most notable decrease is ROE, especially in the last two years of the period, 2022 and 2023.

- Current and quick ratios, although tending to increase, are always lower than the allowable limit; the increase is low and unstable, and by the end of the period, there are signs of a decrease. With the low cash ratio, low self-financing ratio, and decreasing trend, the DER increased during the research period, showing that the capital safety level and the ability to ensure the financial safety of Vimico during this period were low. During the research period, in terms of equity capital, Vimico still had growth. However, the decreasing trend of the equity preservation ratio of the whole corporation and the parent

company, especially in the last 2 years, showed a bad sign for Vimico's financial sustainability.

In the coming time, to improve the financial situation towards financial sustainability, Vimico needs to ensure more stable growth in profitability by increasing productivity, reducing costs, increasing the ability to ensure financial security by increasing solvency ratios, especially the current ratio, improving the level of investment capital safety and self-financing ability, improving the level of preserving and developing equity by increasing the efficiency of using equity, reducing debt within the framework of ensuring an optimal capital structure for Vimico.

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THE ROLE INTERNAL AUDITORS IN VIETNAMESE COMMERCIAL BANK IN DIGITAL TRANSFORMATION

Do Thi Huong[a*], Nguyen Thi Mai Huong[b] , Nguyen Thi Thu Hien[c]

[a]Industrial University of Ho Chi Minh City; Ho Chi Minh University of Banking, Vietnam

[b]Ho Chi Minh University of Banking, Vietnam

[c]Ho Chi Minh University of Industry, Vietnam

**Corresponding author: huongdt@hub.edu.vn*

Abstract: *Internal Auditing is an essential component in the governance apparatus of the enterprise of the enterprise risk management system, according to the "3 lines of defense" model. Internal auditors help businesses achieve their goals by applying a disciplined and systematic approach to evaluate and improve risk management, internal control, and corporate governance effectiveness. In this paper, the approach followed through this research is using qualitative research methods to collect, synthesize, and summarize results obtained from previous studies; we will focus on (i) Understanding Internal Audit (IA) and Internal auditor, (ii) The role Internal Auditors in Vietnamese commercial banks.*

Keywords: *Internal audit, Banks, Risk Management, Financial Reporting Integrity.*

1. INTRODUCTION

Digital transformation is taking place strongly in the banking sector, where 95% of credit institutions operating in Vietnam have planned to build a digital transformation strategy. Of these, 39% of credit institutions have approved a digital transformation strategy or integrated digital transformation into their business development strategy, and 42% of credit institutions are building a digital transformation strategy. The accounting and auditing field shows that the accounting and auditing profession will face important changes in the next three decades, and professional organizations, members, and educational institutions should find ways to adapt. In another research aspect, C. Hoffman (2017) said that accounting and auditing are industries affected by the 4.0 Industrial Revolution. In addition, 40% of accounting and auditing jobs will disappear in the future (Berikol & Killi, 2021). Therefore, research by C. Hoffman (2017) has shown that workers in the field of accounting and auditing need to change and develop themselves to adapt to this transformation.

One perspective on the role of IA emphasizes its function as a strategic partner to management, assisting in achieving organizational objectives and enhancing operational efficiency. This viewpoint aligns with the assertion that internal audit contributes to value creation by providing insights and recommendations for process improvements and risk mitigation strategies (Chang, Yu-Tzu & et al., 2018). By conducting risk assessments, performance audits, and compliance reviews, internal auditors facilitate informed decision-making and strengthen internal controls, thereby safeguarding

organizational assets and enhancing stakeholder trust. Furthermore, IA serves as a catalyst for continuous improvement and innovation within organizations.

Research suggests that IA functions focusing on quality and innovation are better positioned to add value and drive organizational change (Trotman, A. J., and K. Duncan, 2018). Building upon the insights garnered from prior research, this study aims to identify internal audit functions to optimize their contribution to success in Vietnamese commercial banks.

2. RESEARCH METHOD AND MATERIAL

Qualitative research is well-suited for this investigation as it allows for an in-depth exploration of complex phenomena within organizational contexts, such as audit practices and perceptions. By adopting a qualitative approach, this study seeks to understand the intricacies surrounding IA comprehensively.

2.1. Data Collection

Data collection for this study primarily involves the systematic review and synthesis of literature related to IA. A comprehensive search of academic databases, scholarly journals, and relevant publications will be conducted to identify peer-reviewed articles, books, reports, and dissertations addressing the research topic.

2.2. Data Analysis

Data analysis in qualitative research involves systematically examining and interpreting qualitative data to identify patterns, themes, and relationships. In this study, thematic analysis will be employed to analyze the literature and identify key themes related to internal audit. The analysis will begin with identifying key concepts and themes from the literature review. Relevant data, including quotations, summaries, and interpretations, will be systematically coded and organized into thematic categories. Through an iterative process of coding and categorization, overarching themes and patterns will be identified, allowing for a comprehensive understanding of the research topic.

2.3. Research method

This study employs a qualitative research methodology to explore internal audits, drawing on insights from existing literature. This study aims to contribute to a deeper understanding of the complexities surrounding audit practices within organizational contexts by systematically reviewing and synthesizing relevant literature, conducting thematic analysis, and interpreting the findings. Through rigorous data collection, analysis, and interpretation, this study seeks to shed light on the internal audit, offering valuable insights for practitioners, researchers, and policymakers in auditing and organizational governance.

3. RESULTS AND DISCUSSION

3.1. Internal audit

Internal audit (IA) is an independent, objective assurance and consulting activity designed to add value and improve an organization's operations. In 1947, another significant step was made in the United States to strengthen and further develop

IA. This Statement is the first step towards adopting the standard of professional practice of internal audit (Pickett, S., 2011). From developed countries, the practice of IA extends to all countries of the world.

The IA task is to investigate, examine, and evaluate the internal control system and its effectiveness in each business system's operation, report findings, and propose management solutions (Meigs, Whittington, & Pany, 1988). The IA examines the organization and functioning of the accounting system and the related internal controls, the credibility of financial and operational information, the economy, the efficiency and effectiveness of business operations and controls, and the application of policies, plans, and procedures.

The American Institute of Chartered Public Accountants (AICPA) defined auditing as a systematic process of objectively collecting and evaluating evidence of allegations of economic actions and events to the level of reliability of the correspondence of these allegations and established criteria, as well as communicating results to interested parties and users.

The IA was defined in 1999 by the Board of Directors of the Institute of Internal Auditors as "an independent, objective assurance and consulting activity designed to add value and improve an organization's operations; it helps an organization accomplish its objectives by taking a systematic, disciplined approach to evaluating and improving the effectiveness of risk management, control, and governance processes."

According to the Institute of Internal Auditors (IA):

- Concerning the theoretical framework of internal audit, we will cite some of the most significant IA definitions that contain this function's purpose, objective, and tasks;

- IA encompasses evaluating and improving the effectiveness of risk management, control, and governance processes. In contrast, an external audit is characterized as an independent examination of an organization's financial statements and accompanying disclosures by a third-party auditor.

- IA, as delineated by the IIA, plays a pivotal role in organizational governance and risk management. It is widely regarded as an essential function that provides independent and objective assurance to stakeholders while offering valuable consulting services to enhance operational efficiency and effectiveness.

- Recent research has emphasized the evolving nature of IA, particularly in response to dynamic business environments and emerging risks.

For instance, a study by Chen and Chan (2021) underscores the increasing importance of IA in addressing cyber security threats and data privacy concerns. As organizations navigate the complexities of digital transformation and remote work arrangements, internal auditors are tasked with evaluating and strengthening cybersecurity measures to mitigate potential vulnerabilities and safeguard sensitive information. This highlights the adaptability

and relevance of IA in addressing contemporary risk landscapes. IA is a complement of the external audit because, in those organizations where the internal audit function is implemented, the external audit is more determined to appreciate the regularity, sincerity, and fair view of the results and financial statements differently. Recent developments in audit practices have focused on enhancing audit quality and relevance in response to evolving regulatory requirements and stakeholder expectations. Besides, the role of external auditors in detecting and reporting financial statement fraud emphasizes the importance of robust audit procedures and professional skepticism. Furthermore, the concept of IA's role in promoting sustainability and corporate social responsibility (CSR) has gained prominence in recent years. Research by Smith et al. (2023) emphasizes the need for internal auditors to assess and report on environmental, social, and governance (ESG) performance indicators, aligning with broader stakeholder expectations and regulatory requirements.

3.2. Position IA inside the organization

The role of IA in the business decision-making process stems from the fact that the internal audit determines the reliability, reality, and integrity of financial and business information from different organizational units, based on which appropriate business decisions are made at all levels of government. It is a body of business management whose main tasks are planning, organizing, dispensing, coordination, and supervision. IA is significant because it plays a key role in preventing and detecting errors and illegal actions, as well as in assessing and managing the risks of an organization, thereby safeguarding the security of its business.

Internal Auditing is an essential component that helps distribute resources efficiently. It is also beneficial for reducing corruption's outward signs and achieving economic success (Al-Taee & Flayyih, 2022). Therefore, IA is considered a practice that safeguards resources against misuse, confirms the veracity of corporate data, and guarantees adherence to applicable laws and regulations.

IA also aims to stop events from occurring in the bank on purpose or by accident; rather, choices should be created through the IA strategy, and "top management" refers to the data analyzed during Auditing when making decisions (Napitupulu, 2020).

IA protects the business system from within, protects owners and management from the misconduct of associates, and, at the same time, protects owners of the organization's management and, in the broadest sense, the interests of the public.

IA must increasingly focus its potential on the future by advising on anticipated risks in particular business areas. One of the essential tasks of IA is to advise management on the possibilities of risk management, primarily in terms of designing and monitoring the appropriate internal control system as a risk management instrument. The subject of the research is general data on organizations, the organization of IA, its responsibility, i.e. subordination, and its tasks.

The findings of the study by Shuwaili et al. (2023) demonstrate that the IA and the AIS combined have an influential positive on organizational performance. IA is defined as a corporate function that tests and assesses bank operations as a service supplied to the bank. IA must thus guarantee that the AIS captures all crucial economic events and that summarizing and modifying financial data are error-free. According to Sagala (2020), the bank's AIS still faces various risks during the operation. These risks are primarily from natural disasters, accidents, mistakes, dissatisfaction with the bank, or low quality of the staff, where these risk factors will affect the lack of accounting data tangibly, leading to data information errors, making it difficult to allocate resources reasonably, and causing irreparable losses to the bank (Jarah et al., 2023b; Liu, 2023; Jarah et al., 2022a).

Furthermore, implementing AIS is essential for the success of an organization since it enhances the collection, administration, and management of large amounts of organizational data. However, such systems frequently have malfunctions that result in serious operational issues and monetary losses (Al-Taee et al., 2023), while the inadequate implementation of IA was formerly the determining criterion for whether or not AIS qualified. IA is utilized to protect the bank against risk or lessen the consequences of risk incidents. In order to assure the accuracy of the bank's financial statements, internal control must be built into the AIS (Nguyen Thi Que, 2024). As a result, the major goal of IA is to assist the entity in managing risks to meet its goals while it is being constructed and to uphold the bank's work ethic. Moreover, the IA is a policy that protects assets from misappropriation, verifies bank information, ensures compliance with applicable rules and regulations, and prevents things from happening in the bank on purpose or by mistake.

The basic principles defined by the code of professional conduct of internal auditors are independence and skepticism, integrity, objectivity, confidentiality, and competence. The IA of the bank is defined as an "independent management function that includes a continuous and critical assessment of the bank in order to give suggestions for its improvement, create value and strengthen the overall management mechanism including entity risk management and the internal control system." The internal audit task is to "investigate, examine and evaluate the internal control system and its effectiveness in the operation of each particular business part, to report on findings and to propose management solutions" (Allen et al., 2007, p. 156). According to R. Moeller, an internal audit is an independent assessment of business functions established in an organization to examine and evaluate its activities and thus represents a service that is provided to that organization (Boynton & Johnson, 2006). In professional practice, internal audit is defined as "the activity of independent, objective persuasion and consulting activity designed to create added value and improve the bank's operations." From these definitions of the audit, it follows that an internal audit is a consulting activity that, in addition to regular tasks, enables the

creation of added value for the bank, that is, adding value to the actions of the owner.

As a proactive function, IA assumes a multifaceted role aimed at providing independent and objective assurance to management and the board of directors. This assertion is supported by research indicating that IA is a vital component of corporate governance mechanisms, serving as a trusted advisor to management in identifying, assessing, and mitigating risks (Mohammad et al., 2010). Through its broad scope, IA encompasses various activities, including evaluating and improving the effectiveness of risk management, control, and governance processes. By integrating sustainability considerations into their audit processes, internal auditors can contribute to organizations' long-term resilience and reputation.

3.3. Internal auditor

Banks' Boards of Directors have the essential obligation to guarantee that adequate controls are set up to forestall or distinguish misrepresentation and defilement. At the same time, internal auditors are responsible for a few duties to the executives, such as advising them in forestalling and recognizing extortion and debasement. The Audit process is made responsible for collecting and interpreting reports of selected business facts enabling executives to keep track of significant business developments, activities, and outcomes from diverse and voluminous transactions" (Valbona Cinaj & Albania Artur Ribaj, 2020).

The IIA has issued and published the Statement of Obligations and Responsibilities of Internal Auditors, which further defined their position. . IA is an effective instrument of managerial control. Although it is often limited to account revisions, it relates to business performance assessment as a whole (Jenny D. Stewart, 2011). In an attempt to verify the credibility of documentation, internal auditors also evaluate policy, procedures, quality of decision-making and management, the effectiveness of methods and procedures, and other specific business problems (Krogstad, Ridley, & Ritterbeg, 1999). The internal auditors' are part of the organization. Professional standards, the board, and management determine their objectives. Their primary clients are management and the board.

- Objective: The internal auditor's scope of work is comprehensive. It serves the organization by helping it accomplish its objectives and improving operations, risk management, internal controls, and governance processes. Concerned with all aspects of the organization - both financial and non-financial

- The internal auditors focus on future events as a result of their continuous review and evaluation of controls and processes;

- Independence: IA must be independent of the audited activities (not the same: External audit is independent of its client, the organization, its independence being specific to liberal professions);

- Approach of internal control: IA regards all the aspects of the organization's internal control system

Applying the audit: IA covers all the organization's transactions.

- Consideration of risk factors: IA takes into consideration at least the following risk factors (Colbert, J.L.,1995):

- Ethical climate and pressure on management to meet objectives;
- Competency, adequacy, and integrity of personnel;
- Asset size, liquidity, or transaction volume;
- Financial and economic conditions;
- Competitive conditions;
- Impact of customers, suppliers, and government regulations;¾Date and result of previous audits;
- Degree of computerization;
- Geographic dispersion of operations;
- Adequacy and effectiveness of the system of internal control;
- Organizational, operational, technological, or economic changes;
- Management judgments and accounting estimates;
- Acceptance of audit findings and corrective action taken;
- The approach of fraud: IA is concerned about fraud from all activities of the organization.

Today, IA has emerged as a critical aspect of effective controls and risk management. In times of economic crisis, internal audits are one of the most powerful and quickest strategies to minimize operational expenses and offer the firm competitive benefits in the global market (Jarah et al., 2022a). IA is a distinct activity that provides objective assurance and consulting services to improve and enhance an organization's operations. IA helps banks achieve their objectives by utilizing a rigorous, disciplined approach to examine and enhance the efficacy of risk management and control (Mervelito et al., A. (2021). Internal auditors may, therefore, assist management in carrying out control operations of the bank activities since they can efficiently create information required by managers to fulfill defined bank goals, and IA checks are performed by bank personnel who are not involved in the bank's business activities and who record the bank's financial statements. Internal auditors may help the bank achieve efficiency, effectiveness, and compliance in business activities (Yusuf & Kanji, 2020). Napitupulu's (2020) research showed that the efficacy of IA has little influence on the AIS in rural banks.

Internal auditors are responsible only for the bank's governing body (not executives), and their targets change as per the board's necessities. IA should generally look for the possibility of such abuses and should seek to identify serious deficiencies in internal control that may allow these events to occur. An internal auditor who discovers evidence or suspects misconduct should report the evidence found or reasonable doubt to the appropriate management level. Management must figure out what further advances should be taken. Internal audits have to distinguish the control targets inside every framework and analyze these controls, using tests to guarantee that they work and are satisfactory. When conducting these examinations, the internal auditor should be

vigilant about potential misconduct, but it is not his responsibility to identify all fraud and irregularities within a system. Also, auditors are not expected to provide such assurance or assurance to management. However, the tests performed by internal auditors should be designed to ensure, as far as possible, the detection of any underlying irregularities and those that occur consistently.

3.4. The role internal auditors in Vietnamese Commercial banks.

In June 2012, the Basel Committee on Banking Supervision issued The Internal Audit Function in Banks, the Revision of Internal Audit in Banks, and the Supervisor's Relationship with auditors4 issued in 2001. The internal audit function in banks should be a reaction to the crisis that began in 2007 and should consider the primary failure of both individual banks and the system as a whole. As this 2012 document is the reaction to the crisis suffered, the comparison with the previous document should demonstrate whether the current principles are stronger and will be sufficient and whether these can effectively help prevent the spread of the crisis.

Recently, the State Bank of Vietnam (SBV) issued Circular No.13/2018 on May 18, 2018, to provide more detailed regulations for the internal control systems of commercial banks and branches of foreign banks. The Circular introduces many changes and is a comprehensive regulatory framework for internal controls, aiming to prevent, detect, and manage risks.

Over the past few years, banks in Vietnam have undergone remarkable changes in many aspects. The SBV issued Circular No.44/2011 in December 2011 to regulate their internal control and internal audit functions. The Circular has gradually helped banks set up their internal control and audit functions. However, the Circular is quite general and does not provide sufficient guidance for implementing adequate internal controls in banks. Circular No.13/2018 of the State Bank of Vietnam, which the SBV recently issued, contributes to solving practical problems in developing the internal control systems in banks.

According to the new regulations in Circular 13, the scope of work of the internal audit function will fit its purpose as the third line of defense. The IA function is responsible for conducting independent audits and assessments of the bank's compliance with internal mechanisms, policies, and regulations, including senior management oversight, internal control, risk management, and internal capital adequacy assessments to identify shortages, constraints, and causes. In addition, the internal audit function reviews and assesses the compliance of internal mechanisms, policies, and regulations with state regulations. In summary, under the high expectations of banks' boards of management and supervisors, the role of internal audits has become increasingly important. Internal audits help banks deal with risks and seize opportunities while complying with the regulatory framework and providing sufficient information to support the decision-making process of the board of management.

Circular 13 contains some new regulations in line with current international

practices. Some commercial banks and branches of foreign banks have already systematically developed and applied internal control models that align with the Basel II application roadmap in Vietnam. The role of IA needs to change from that of an "auditor" (an assurance role) to a "trusted advisor" (providing counseling and value creation) by enhancing internal audits and focusing on achieving compliance, efficiency, and profitability objectives in banking operations. Thereby, banks can meet international standards for internal audits and follow the Basel II roadmap in Vietnam.

However, many other commercial banks will need to step up their efforts to build an internal control system in accordance with the new Circular 13. However, this is not only a matter of compliance but, more importantly, of ensuring banks' safety, survival, and development in the competitive banking market. Therefore, commercial banks need to develop a comprehensive road map for applying Basel II in accordance with Circular No. 41/2006/ of the State Bank of Vietnam, and the internal control system should be developed accordingly. In particular, the internal audit function should become the last line of defense to promptly detect and deal with banking risks. Considering the new requirements regarding senior management oversight, internal control, risk management, and internal capital adequacy assessment that Circular 13 has introduced.

Management control is organized by the company's leader's decision, setting forth the legal frame and appointing the main activities or goals. The Internal Auditors and the management controllers aim to help the entities efficiently manage the resources entrusted to them or in their patrimony. Internal auditing mainly involves preventive activities based on risk analysis, while management controllers check the activities or processes.

Digital transformation brings to the internal audit industry in banking, such as optimizing work efficiency, creating a better working environment, and storing data securely. In Vietnam, banking is one of the pioneering industries in digitalization. Digital transformation strategies, most banks choose to digitally transform both the customer communication channel (Front-end) and internal operations (Back-end) or digitize the entire channel; a few banks plan to digitize the customer communication channel (Front-end only) (Pham Tien Dung, 2021). However, in reality, banks have only focused on digitizing the customer experience by launching digital banking applications, and there have not been many records of digitizing internal business processes. This is similar to the World Retail Banking Report published by Capgemini, which shows that 31.5% of bank executives rate their Front Office digitalization level as high, and less than 15% are satisfied with the Back Office area's digitalization level. Most banks focus on digitizing the customer experience but are missing out on a potential opportunity to digitize their back-office operations. Back-office departments can also contribute to a dissatisfying customer experience if the information delivery process is not fast and flexible enough. In addition, traditional methods are often paper-intensive

and costly. Therefore, digitizing the back office will improve customer experience and reduce paperwork and bookkeeping costs.

However, research results by PwC (2020) show that the digital skills of the Vietnamese workforce have dropped four places to 96th in the 2020 Global Talent Competitiveness Index (GTCI) and 37th in the Knowledge and Technology Output Index (ranked 37). According to the report of the World Economic Forum (WEF) and Strategy Consulting Firm A.T. Kearney on the level of readiness for future production in 2018, Vietnam has a fairly low level of technology and innovation use: ranked 90/100; technology platform ranked 92/100; Human resources ranked 70/100 (in which, specific indicators are all low: Knowledge of workers ranked 81st, vocational training quality ranked 80th, quality of universities ranked 75th, on-the-job training ranked 74th, quality of engineers and scientists ranked 70th). On July 17, 2019, the Governor of the State Bank of Vietnam issued Decision No.1537/2019, approving the Action Plan of the Banking Industry to implement the Strategy for the Development of the Vietnam Banking Industry to 2025, with a vision to 2030 in the field of Human Resource Development, showing the rapid grasp of changes in the human resource needs of the Banking Industry and taking appropriate steps to prepare for the future. However, it is still necessary to continue to actively implement Directive No.16/2017, dated May 4, 2017, of the Prime Minister on enhancing the capacity to access the 4.0 Industrial Revolution, focusing on training human resources, especially internal audit human resources, to be able to adapt to the requirements of the digital age.

4. CONCLUSIONS

Digital technology has strongly impacted and changed how data is analyzed and processed and the scope, content, and methods of conducting audits. Therefore, commercial banks must identify digital transformation for internal audit as a priority and first priority. Hence, to do this, first of all, there needs to be support and awareness from the leadership, thereby having certain support in the digital transformation process of IA at the bank. The digital transformation of internal audits needs to be understood as a management and change process, not simply the work of computerizing IA.

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FACTORS AFFECTING THE QUALITY OF ACCOUNTING INFORMATION ON PROVISIONS IN ENTERPRISES OF VINACOMIN

Nguyen Thi Minh Thu[a]*, Pham Thi Hong Hanh[a]

[a]Hanoi University of Mining and Geology, Hanoi, Vietnam

**Corresponding author: nguyenthu2012@gmail.com*

Abstract: *The article demonstrates a mixed research method (which combines both qualitative and quantitative methods) to identify the factors affecting and measure the extent of their impact on the quality of accounting information on provisions in enterprises belonging to Vietnam National Coal and Mineral Industries Holding Corporation Limited (Vinacomin). The qualitative methods include case studies and expert interviews, while the quantitative methods involve Exploratory Factor Analysis (EFA), Pearson correlation testing, and regression analysis using SPSS software. The research results indicate that there are 05 factors affecting the quality of accounting information on provisions in Vinacomin enterprises: qualifications and experiences of accountants; pressure from inspection and auditing; regulatory environment; information and media; and consulting support from professional organizations.*

Keywords: *quality of accounting information, provisions, influencing factors, enterprises belong to Vinacomin.*

1. INTRODUCTION

In a market economy, Vietnamese enterprises may face various risks in their production and business process, which could lead to significant losses. Provision information provides a comprehensive and detailed view of the risks that enterprises may encounter, including the extent of the impact, the likelihood of occurrence, etc. This information serves as a basis for making more accurate conclusions about the enterprise's ability to survive, operate, and develop. Provision information also helps internal stakeholders clearly assess risks. It assists enterprises in strategizing and creating effective response plans. Additionally, it enables enterprises to manage their finances proactively through established contingency funds.

Managers of enterprises belonging to Vinacomin are very concerned about risks and seek measures to mitigate them. Many types of inventory are used to extract, process, and transport minerals. They can depreciate in value during use. The coal consumption situation has faced many difficulties in recent years. The output of coal supplied to domestic thermal power plants and the quantity of coal exported have shown a declining trend. This leads to a high level of coal inventory. Recovering receivables remains difficult. Vinacomin has a diversified investment policy, but management still needs to be improved. This leads to significant challenges in generating returns from financial investments. The difficulties and challenges mentioned above lead to the necessity of having accounting information on provisions to ensure quality provided to management. This helps the business plan for handling losses when they occur. The users of the accounting information of these businesses will be able to make sound economic decisions.

Thus, providing high-quality accounting information on provisions is crucial for many stakeholders within and outside the enterprise. Identifying the factors that

influence and the degree of impact of each factor on the quality of accounting information on provisions is necessary to guide solutions for improving this quality. For each influencing factor, specific and targeted solutions can be developed based on its level of impact to enhance the quality of accounting information on provisions.

2. THEORETICAL FOUNDATION

2.1. Quality of accounting information on provisions

Concept of accounting information quality

Accounting information quality is a topic that many authors have researched. There is no specific, widely accepted, and singular definition of "accounting information quality". Callen et al. (2011) suggested that the quality of accounting information was the accuracy with which financial reports informed investors about future cash flows. On the other hand, Hribar et al. (2010) argued that the quality of accounting information was the extent to which it accurately reflected the enterprise's current operating performance. It was helpful in predicting future performance and aided in evaluating the enterprise's value.

The criteria for evaluating the quality of accounting information in financial statements

There were various ways to assess the quality of accounting information in financial statements. In this research, the authors chose to evaluate the quality of accounting information based on information quality attributes because high-quality accounting information in financial statements should be assessed according to how well it meets the needs of information users. This method ensured a more comprehensive evaluation, allowing for the determination of how accounting information affected the enterprise's activities and transactions.

According to the Financial Accounting Standards Board (FASB, 1993), "the quality of accounting information in financial statements has included the following characteristics: fundamental characteristics such as relevance and reliability; and secondary characteristics such as consistency and comparability." According to the International Accounting Standards Board (IASB, 2010), "the quality of accounting information in financial statements has been characterized by: understandability, relevance, reliability, and comparability." The International Accounting Standards Board (IASB, 2018) has summarized the attributes of accounting information to include "suitability, honest presentation, comparability, verifiability, timeliness, and understandability."

Criteria for evaluating the quality of accounting information on provisions

Provisions accounting must meet the general accounting requirements but must also satisfy specific requirements unique to the provisions accounting. Distinct characteristics of provisions accounting include the often complex and judgmental process of identifying and evaluating provisions for recognition. Measuring the value and timing of these provisions is usually carried out using various estimation methods, such as statistical probability method, discounted cash flow method, and regression analysis, with data accepted based on reliable input. Therefore, the results provide a reliable basis for the enterprise to recognize provisions.

Based on the distinctive characteristics of provisions accounting mentioned above, combined with the general attributes of accounting information quality according to the IASB 2018 perspective, it can be seen that the quality of accounting information on provisions is also evaluated based on the

following attributes: 2 fundamental attributes, which are suitability and honest presentation; and four enhancing attributes, which are comparability, verifiability, timeliness, and understandability.

2.2. Fundamental theories for identifying factors affecting the quality of accounting information on provisions

The Resourse Dependency Theory

In Resource Dependence Theory (Pfeffer and Salancik, 1978), managers and human resources in an enterprise played a crucial role and contributed significantly. Research by Dalton et al. (1999) and Hillman et al. (2000) highlighted that managers and human resources were vital for the organization's survival. On the other hand, when employees were valued, their capabilities and contributions were maximized, interests were harmonized, and a good working environment was provided, the enterprise's operations face reduced risk (Oliver, 1991). Based on Resource Dependence Theory, the authors developed the idea that factors such as the manager's qualifications and awareness and the qualifications and experiences of accountants impact the quality of accounting information on provisions.

The Technology Diffusion Theory

The Technology Diffusion Theory was first introduced by Gabriel (Gopalkrishnan, 2013). Gabriel and his colleagues explained that some innovations spread throughout society while others did not. Attewell (1992) pointed out that enterprises often lag in adopting technology due to the lack of knowledge about accounting information systems. Ismail and King (2007) suggested that because managers do not fully understand the importance of accounting information, the accounting information systems have not effectively met information needs. Based on the Technology Diffusion Theory, the authors developed the idea of factors such as information and media affecting the quality of accounting information on provisions.

The Institutional Thoery

The Institutional Theory was developed with three factors: regulations, norms, and diffusion, by researchers DiMaggio and Powell (1991). Institutional pressure requires organizational structures to achieve consistency within an institutional environment. The Institutional Theory addresses how changes in the legal environment create pressures that lead to changes in management practices, which may include adjustments in the scale of the organization's operations. Research by Meyer and Rowan (1977) suggested that enterprises often comply extensively with regulations and laws to maintain legitimacy within the institutional environment. Based on Institutional Theory, the authors developed the idea about the influence of factors such as the Regulatory Environment and Pressure From Inspection and Auditing on the quality of accounting information on provisions.

3. RESEARCH METHODOLOGY

The authors chose a mixed research methodology that included both qualitative method and quantitative method.

3.1. Qualitative research methodology

The qualitative research method focused on two main aspects: developing a measurement scale for assessing the quality of accounting information on provisions and identifying the factors affecting the quality of accounting information on provisions in enterprises within Vinacomin.

The current research on the quality of accounting information on provisions still needs to be expanded, with no specific research available. Other related research mainly focused on the quality of accounting information in financial statements. Therefore, the authors decided to use a case study approach for the qualitative research and then validate it through focused discussions with experts. The participants in the discussions include university lecturers specializing in accounting, accounting staff responsible for provisions, general accountants, chief accountants, directors of enterprises within Vinacomin, and the control board of Vinacomin.

Data collection and analysis were conducted using a discussion outline, with questions derived from theoretical foundations and previous research. The formal factors were incorporated into the theoretical research model based on the agreement on the scenarios. After the focused discussions, the measurement scales were refined and included in the survey questionnaire.

3.2. Quantitative research methodology

The authors used quantitative methods to test the measurement scales and analyze and quantify the relationships between variables in the research model. Typically, sample size determination is based on experience. Hair et al. (2006) suggested that the sample size should be at least five times the number of observed variables. According to Nguyen Đinh Tho (2014), $n \geq 50+8\times pn$, where n was the minimum required sample size and p was the number of independent variables in the model.

Table 1. Determining the Sample Size for the Survey

Target	Number of observed variables	Number of independent variables	Sample size
EFA	37	7	185
MLR	37	7	106
Used for the research			185

(Source: Authors' calculations)

The authors used a convenience sampling method, meaning that the researcher selects elements they can access.

The survey participants included accountants, chief accountants, managers, and controllers in enterprises within Vinacomin.

Data collection were conducted through a survey questionnaire. Data analysis was conducted through descriptive statistics, Cronbach's Alpha reliability test, exploratory factor analysis (EFA), and multiple linear regression with the support of SPSS 22.0 software.

5-point Likert scale was used to measure the values of the variables.

4. RESEARCH RESULTS

4.1. Qualitative research results

Based on the theoretical framework, the study identified 5 factors affecting the quality of accounting information on provisions. Then the authors conducted a case study with a sample size of 11. Through the case study, the authors identified 7 factors impacting the quality of accounting information on provisions: Manager's qualifications and awareness (MQA); Information and Media (ISE); Qualifications and Experiences of Accountants (QEA); Accountant's Mindset

(AM); Regulatory Environment (RE); Pressure From Inspection and Auditing (PFA); Consulting Support from Professional Organizations (CSPO). The research hypotheses are summarized in Table 2.

Table 2. Research Hypotheses

Serial No.	Research Hypotheses
H01	Manager's qualifications and awareness positively impacts on the quality of accounting information on provisions.
H02	Qualification and experience of accountants positively impacts on the quality of accounting information on provisions.
H03	Accountants' mentality negatively impacts on the quality of accounting information on provisions.
H04	Information and media positive impacts on the quality of accounting information on provisions.
H05	Regulatory environment positively impacts on the quality of accounting information on provisions.
H06	Pressure from inspection and auditing positively impacts on the quality of accounting information on provisions.
H07	Consulting support from professional organizations positively impacts on the quality of accounting information on provisions.

(Source: Authors derived from qualitative research results)

Through focused discussions with experts, the authors synthesized 9 measurement scales for the dependent variable (QAP) and 28 measurement scales for the independent variables. These included 4 scales for the Manager's Qualifications and Awareness (MQA) variable, 4 scales for the Information and Media (ISE) variable, 5 scales for the Qualifications and Experiences of Accountants (QEA) variable, 4 scales for the Accountant's Mindset (AM) variable, 5 scales for the Regulatory Environment (RE) variable, 3 scales for the Pressure From Inspections and Audits (PFA) variable, and 3 scales for the Consulting Support From Professional Organizations (CSPO) variable.

4.2. Quantitative Research Results

The authors conducted the survey in 2023, distributed 320 questionnaires and collected 312 responses. After careful review, 300 responses were deemed valid.

4.2.1. Evaluation of Measurement Scale Reliability

The Cronbach's α coefficient for the dependent variable measurement scale was 0.876, which was quite high. The correlation coefficients for each variable were above 0.3, indicating good reliability for the measurement scales. The Cronbach's α coefficient for the independent variable measurement scales ranged from 0.651 to 0.785, which were also quite high. The correlation coefficients for each variable were above 0.3, indicating good reliability for these scales.

4.2.2. Testing measurement scale validity using Exploratory Factor Analysis (EFA)

Table 3. Bartlett's Test and KMO Test for the dependent variable measurement scale

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		**.914**
Bartlett's Test of Sphericity	Approx. Chi-Square	1,028.828
	Df	36
	Sig.	.000

(Source: Actual survey data from 2023)

Table 4. Bartlett's Test and KMO Test for the independent variable measurement scales

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.872
Bartlett's Test of Sphericity	Approx. Chi-Square	1,635.040
	Df	210
	Sig.	.000

(Source: Actual survey data from 2023)

The results of Bartlett's Test and the KMO Test in Table 3 and Table 4 showed that the Sig value of Bartlett's Test was 0.000, which was less than 5%, and the KMO value was greater than 0.5. This indicated that the measurement scales were suitable for Exploratory Factor Analysis (EFA).

4.2.3. Exploratory Factor Analysis (EFA)

Exploratory Factor Analysis (EFA) for the dependent variable measurement scale

The authors developed the measurement scale for the dependent variable based on the IASB 2018 framework and expert discussions, which included: 2 basic attributes: Suitability (ST1-2) and Honest Presentation (HP1-2); and 4 advanced attributes: Understandability (UDS), Comparability (CP1-2), Verifiability (VRF), and Timeliness (TL).

Table 5. Factors and Extracted Variance of the Dependent Variable Measurement Scale

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.550	50.551	50.551	4.550	50.551	50.551
2	.764	8.485	59.036			
…	…	…	…			
9	.310	3.443	100.000			

(Source: Actual survey data from 2023)

The results of the analysis in Table 5 showed that there was 1 factor extracted with an Eigenvalue of 4.550 > 1, and a Total Variance Extracted (TVE) of 50.551% > 50%. Therefore, this measurement scale had discriminant validity.

Table 6. Factor weight matrix for the dependent variable measurement scale

	Component
	1
QAP_TL	.844
QAP_CP2	.711
QAP_HP1	.706
QAP_UDS	.706
QAP_HP2	.700
QAP_VRF	.693
QAP_CP1	.686
QAP_ST2	.678
QAP_ST1	.658

(Source: Actual survey data from 2023)

From Table 6, the authors observed that all measurement scales had factor weights greater than 0.5 for each corresponding observed variable. This indicated that the factors measuring the quality of accounting information on provisions were appropriate.

Exploratory Factor Analysis (EFA) for the independent variables measurement scale

The authors used Principal Components Analysis (PCA) and Varimax Rotation. The authors used these methods to explain the factors comprehensively. Then the authors eliminated variables with factor loadings less than 0.5 or the distance between 2 factor loadings less than 0.2.

The EFA results showed 6 factors with a total variance extracted (TVE) of 58.609% > 50%, These measurement scales achieved discriminant validity. After running EFA, the authors removed the variables: MQA1, MQA2, MQA3, MQA4, QEA5, ISE1 and ISE3. The variable Manager's Qualifications and Awareness (MQA) was entirely removed, while other variables had 1-2 scales removed. The remaining 6 factors were: Information and Media (ISE2, ISE4), Qualifications and Experiences of Accountants (QEA1, QEA2, QEA3, QEA4), Accountant's Mindset (AM1, AM2, AM3, AM4), Regulatory Environment (RE1, RE2, RE3, RE4, RE5), Pressure from Inspections and Audits (PFA1, PFA2, PFA3), and Consulting support from professional organizations (CSPO1, CSPO2, CSPO3).

The authors included the factor rotation matrix with factor loadings > 0.5 and ensured that no two factor loadings have a difference < 0.2 for better visualization of the observed variable groups.

Table 7. Factors and extracted variance of the independent variable measurement scales

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	5.694	27.114	27.114	5.694	27.114	27.114	2.650	12.618	12.618
2	1.849	8.804	35.917	1.849	8.804	35.917	2.351	11.195	23.813
3	1.449	6.899	42.817	1.449	6.899	42.817	2.137	10.176	33.990
4	1.177	5.604	48.421	1.177	5.604	48.421	2.081	9.907	43.897
5	1.112	5.297	53.718	1.112	5.297	53.718	1.697	8.082	51.979
6	1.027	4.891	58.609	1.027	4.891	58.609	1.392	6.630	58.609
7	.825	3.929	62.538						
...	...	...	...						
21	.358	1.704	100.000						

(Source: Actual survey data from 2023)

Table 8. Factor rotation matrix for the independent variable measurement scales

	Component					
	1	2	3	4	5	6
RE2	.774					
RE3	.731					
RE5	.669					
RE4	.626					
RE1	.595					
QEA1		.739				
QEA3		.684				
QEA2		.670				
QEA4		.663				
CSPO1			.759			
CSPO3			.728			
CSPO2			.698			
AM2				.707		
AM4				.668		
AM3				.651		
AM1				.640		
PFA2					.745	
PFA1					.719	
PFA3					.616	
ISE2						.785
ISE4						.704

(Source: Actual survey data from 2023)

4.3. Testing the theoretical model and research hypotheses

Table 9 showed that the Sig values were all 0 < 0.05. All variable pairs had linear correlations. The Pearson correlation coefficient between the Accountant's Mindset variable and the dependent variable was less than 0.4, indicating that the Accountant's Mindset variable did not have a strong correlation with the dependent variable. The remaining variables had Pearson correlation coefficients greater than 0.4, meaning these variables were strongly correlated with the dependent variable.

Table 9. Testing the correlation between independent variable groups and the dependent variable

Correlations								
		QAP	ISE	QEA	AM	RE	PFA	CSPO
QAP	Pearson Correlation	1	.447**	.583**	.326**	.509**	.570**	.484**
	Sig. (2-tailed)		.000	.000	.000	.000	.000	.000
	N	300	300	300	300	300	300	300
ISE	Pearson Correlation	.447**	1	.389**	.303**	.288**	.348**	.283**
	Sig. (2-tailed)	.000		.000	.000	.000	.000	.000
	N	300	300	300	300	300	300	300
QEA	Pearson Correlation	.583**	.389**	1	.364**	.390**	.417**	.390**
	Sig. (2-tailed)	.000	.000		.000	.000	.000	.000
	N	300	300	300	300	300	300	300

Correlations								
		QAP	ISE	QEA	AM	RE	PFA	CSPO
AM	Pearson Correlation	.326**	.303**	.364**	1	.297**	.308**	.234**
	Sig. (2-tailed)	.000	.000	.000		.000	.000	.000
	N	300	300	300	300	300	300	300
RE	Pearson Correlation	.509**	.288**	.390**	.297**	1	.365**	.526**
	Sig. (2-tailed)	.000	.000	.000	.000		.000	.000
	N	300	300	300	300	300	300	300
PFA	Pearson Correlation	.570**	.348**	.417**	.308**	.365**	1	.374**
	Sig. (2-tailed)	.000	.000	.000	.000	.000		.000
	N	300	300	300	300	300	300	300
CSPO	Pearson Correlation	.484**	.283**	.390**	.234**	.526**	.374**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	
	N	300	300	300	300	300	300	300

**. Correlation is significant at the 0.01 level (2-tailed).

(Source: Actual survey data from 2023)

4.4. Regression Analysis

Establishing the official research model

The authors established the formal research model after performing EFA as outlined in Figure 1.

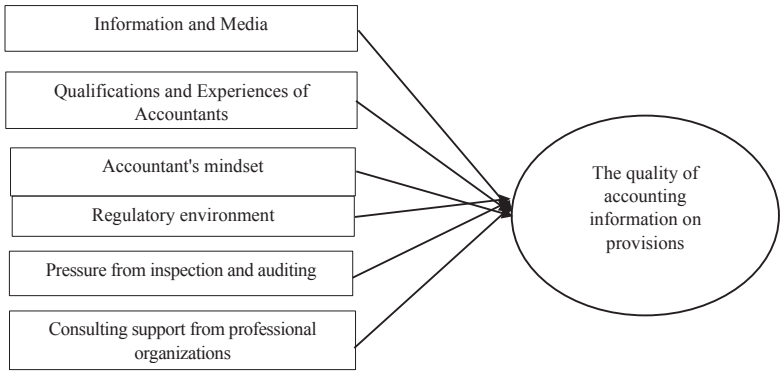


Fig 1. Formal research model

(Source: authors derived after EFA)

Regression Analysis

The equation was of the form:

$QAP = \beta_0 + \beta_1.ISE + \beta_2*QEA + \beta_3*AM + \beta_4*RE + \beta_5*PFA + \beta_6*CSPO + e.$

Table 10. Model summary of the study

Model Summary[b]					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.742[a]	**.550**	**.541**	.40112	1.821
a. Predictors: (Constant), CSPO, AM, ISE, PFA, QEA, RE					
b. Dependent Variable: QAP					

(Source: Actual survey data from 2023)

The results in Table 10 showed that the R^2 coefficient was 0.550 and the adjusted R^2 was 0.541. Table 11 provided a significance level (Sig) of 0.000, indicating that the regression model was appropriate. This meant that 54.1% of the variance in the dependent variable was explained by the independent variables.

Table 11. F-Test results of the study

ANOVA[a]						
	Model	Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	57.627	6	9.605	**59.693**	.000[b]
	Residual	47.143	293	.161		
	Total	104.771	299			
a. Dependent Variable: QAP						
b. Predictors: (Constant), CSPO, AM, ISE, PFA, QEA, RE						

(Source: Actual survey data from 2023)

Table 12. Regression coefficients table of the study

Coefficients[a]								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF	
1	(Constant)	.301	.185		1.627	**.105**		
	ISE	.109	.033	**.147**	3.317	**.001**	.778	1.286
	QEA	.255	.043	**.284**	5.936	**.000**	.672	1.488
	AM	.006	.040	**.007**	.153	**.878**	.805	1.242
	RE	.166	.044	**.183**	3.777	**.000**	.655	1.527
	PFA	.270	.044	**.283**	6.143	**.000**	.722	1.386
	CSPO	.106	.040	**.128**	2.661	**.008**	.661	1.512
a. Dependent Variable: QAP								

(Source: Actual survey data from 2023)

Table 12 showed that the Sig values for the variables ISE, QEA, RE, PFA, and CSPO were all less than the statistical significance level of 5%. In contrast, the variable AM had a Sig value of 0.878 (87.8%), which was greater than 5%. This indicated that variables ISE, QEA, RE, PFA, and CSPO had a significant impact on the quality of accounting information on provisions, while the variable AM did not have a significant impact. Based on Table 12, the authors constructed the following regression model:

The impact of the above factors on the quality of accounting information on provisions is explained as follows: When the factor of the Qualifications and Experiences of Accountants increases by 1 point, the Quality of Accounting Information on Provisions increases by 0.284 point; Similarly, for the factor of Pressure from Inspection and Auditing, the increase is 0.283 point; for the Regulatory Environment factor, the increase is 0.183 point; for the Information and Media factor, the increase is 0.147 point; and for the Consulting Support from Professional Organizations factor, the increase is 0.128 point.

5. CONCLUSION AND RECOMMENDATIONS

5.1. Conclusion

5.1.1. Quality of Accounting Information for Provisions in Vinacomin Enterprises

The research results showed that the quality of accounting information on provisions in enterprises belonging to Vinacomin was currently rated between 3.523 and 3.753. Six attributes measured the quality of accounting information on provisions:

The attribute "Verifiability" was rated the highest, with an average score of 3.733. This indicated that the accounting of provisions could be verified through the vouchers and documents system.

The attribute "Comparability" was rated with an average score of 3.683 and 3.753. It showed that changes in accounting policies and estimates related to provisions were explained quite specifically.

The attribute "Honest Presentation" was rated with an average score of 3.630 and 3.743. This showed that the processes, methods, and principles of accounting for provisions in Vinacomin enterprises were rated highly regarding comprehensive and clear explanations and adequate supporting documentation.

The attribute "Understandability" of the accounting information on provisions was rated with an average score of 3.683. It indicated that the information was presented clearly and understandably.

The attribute "Suitability" of the accounting information on provisions was rated with an average score of 3.643 and 3.563. This showed that accounting information on provisions provided information about risks in production and business, helping enterprises make decisions about managing risks.

The attribute "Timeliness" of the accounting information on provisions was rated the lowest, with an average score of only 3.523. However, this was not considered a low score, so the accounting information on requirements provided by Vinacomin's enterprises was still considered timely.

In summary, the survey results showed that the quality of accounting information on provisions in Vinacomin enterprises was relatively good.

5.1.2. Results of Hypothesis Testing and Regression Analysis

The results of hypothesis testing and regression modeling showed that there were five factors affecting the quality of accounting information on provisions: Qualifications and Experiences of Accountants (β = 0.284), Pressure From Inspection and Auditing (β = 0.283), Regulatory Environment (β = 0.183), Information and Media (β = 0.147), Consulting Support from Professional Organizations (β

= 0.128). These results validated 5 out of 7 hypotheses and eliminated two hypotheses. This indicated that the selected research methods and procedures align well with the study's objectives and characteristics. All these factors positively impacted the quality of accounting information on provisions.

5.2. Recommendations

Based on the research results, the authors proposed recommendations to improve the quality of accounting information on provisions as follows:

5.2.1. Recommendations for Government regulatory agencies

The quantitative research results indicated that several factors influence the quality of accounting information on provisions. Among these, the Regulatory Environment had the third most substantial impact and positively impacted the quality of accounting information on provisions. Therefore, adjusting and supplementing regulations and legal documents related to accounting on provisions is crucial.

The Vietnamese Ministry of Finance should enhance the legal framework by including more specific, detailed, and cohesive guidelines on provisions accounting. In addition to issuing Accounting Standards, the Accounting Regime should provide detailed guidance on provisions, ensuring that asset impairments and liabilities are recorded at their actual values when they arise. The Accounting Regime should also guide enterprises in determining provision levels and accounting for each type of provision.

It is essential to avoid overlapping regulations by integrating the content of legal documents to reduce implementation time and prevent difficulties for accounting departments. Monitoring compliance with accounting standards should be improved. The application of accounting and tax legal frameworks should be clearly delineated. When enterprises carry out accounting tasks, they should adhere to the accounting legal framework, while tax filings should follow the relevant tax regulations.

5.2.2. Recommendations for the Vietnam Coal and Mineral Industries Group

Vinacomin should develop specific accounting policies and detailed guidelines for accounting for provisions to ensure that enterprises within Vinacomin can fully comply with and accurately reflect the nature of provisions in the coal and mineral industry.

In particular, Vinacomin should reassess the methods for determining costs and pricing products according to the plan to prevent the recognition of provisions as a way of evenly distributing estimated costs according to the plan rather than reflecting the true nature of the item. Additionally, Vinacomin should avoid imposing control requirements that may distort the nature of accounting treatments, such as those related to handling events occurring after the end of the accounting period.

5.2.3. Recommendations for Vinacomin's enterprises

Regarding accounting staff

Enterprises within Vinacomin need to pay attention and have good policies to enhance the qualifications and experience of their accountants further. These enterprises should recruit accounting personnel well to ensure that they meet the requirements of capacity and experience.

Enterprises within Vinacomin need to establish policies to train their accounting staff. Enterprises need to help their accountants access and easily apply general accounting regulations, specifically the regulations on provisions. Accounting staff should participate in more professional training sessions and develop skills in information technology and specialized software. They should actively engage in training courses that guide IAS 37, IAS 02, IAS 28, and IFRS 09, which address provisions in detail.

Regarding Information and Media

Provisions involve several functional departments within the enterprise. Therefore, to ensure that accounting can establish provisions based on complete evidence, departments must provide full relevant information, such as the actual costs incurred related to these expenses and the losses due to the decline in the market value of assets, etc.

Provisions are related to various accounting functions. Therefore, to establish provisions, other accounting functions need to provide full necessary information related to each provision. Accounting software should be used to ensure that the recording, processing, and presentation of provision-related information in financial reports are accurate and compliant with requirements.

5.2.4. Recommendations for Other Stakeholders

For inspection and auditing organizations

Inspection and auditing organizations should focus on enhancing the specialized skills of auditors and inspectors. Given the unique characteristics and numerous provisions in Vinacomin subsidiaries, auditors and inspectors should possess substantial experience and a profound understanding of this field. Therefore, auditors should regularly participate in courses and self-study to bolster and update their knowledge of accounting and provisions in particular. They should engage more with international accounting standards concerning provisions. Additionally, auditors and inspectors should require Vinacomin's enterprises to provide complete, honest, and timely explanations and make necessary adjustments to ensure high-quality, useful provision of information.

For professional associations

Professional associations should encourage and motivate accounting professionals in Vinacomin's enterprises to join accounting organizations such as the Vietnam Federation of Accountants and Auditors, the Center for Accounting Research and Consulting, the National Chief Accountant Club, and the Vietnam Institute of Chartered Accountants. They should enhance quality control by assisting and advising on proper provision accounting practices. Effective and swift communication methods should be established to address questions and resolve difficulties accountants encounter when accounting provisions. Regular training sessions should be organized to update accountants on new accounting regulations and frequently changing legal provisions, especially those related to complex accounting functions such as provisions.

For accounting training institutions

These organizations largely determine the qualifications and experience of accountants. Therefore, it is necessary to improve the quality of accounting and auditing training. Training programs need to be built and

completed to meet standards. Improve the qualifications and quality of the teaching staff so that they have practical knowledge and experience teaching about accounting on provisions.

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RESEARCH ON MANAGEMENT ACCOUNTING OF REVENUE, EXPENSES, AND BUSINESS RESULTS AT THE COAL MINING ENTERPRISES OF VINACOMIN

Nguyen Thi Huyen Trang*[a], Do Minh Thanh[b]

[a]Hanoi University of Mining and Geology, Hanoi, Vietnam

[b]Thuongmai University, Hanoi, Vietnam

**Corresponding author: nguyenthihuyentrang@humg.edu.vn*

Abstracts: *Management accounting of revenue, costs, and business results is an essential content in accounting work at enterprises, especially in the era of international integration, implementing global economy with sustainable development, which provides complete and useful information for the management work of enterprises. However, the correct and full understanding of both theory and implementation organization in enterprises has yet to be unified. The article analyzes to clarify the basic theories of management accounting of revenue, costs, and business results, evaluates the current status of management accounting of revenue, costs, and business results at coal mining enterprises of Vinacomin, proposes solutions to improve management accounting of revenue, costs, and business results at these enterprises.*

Keywords: *Management accounting of revenue, costs, and business results; coal mining enterprises; Vinacomin.*

1. INTRODUCTION

Management accounting is a part of accounting work in enterprises with the functions of collecting, processing, analyzing, and providing information to manage enterprises; management accounting of revenue, cost, and business results is an important content that provides detailed and valuable information on revenue, cost, and business results for helping managers plan, monitor and evaluate the situation of revenue, cost and business results to make management decisions for improving the quality and efficiency of business operations.

Vietnam National Coal - Mineral Industries Holding Corporation Limited (Vinacomin), in general, and coal mining enterprises, in particular, play an essential role in economic development, production, and business activities. They have specific characteristics in the trend of international integration and implementing the development strategy of Vietnam's coal industry in 2030, even up to 2045, to develop a green and sustainable economy. It is necessary to be a breakthrough in innovating production and business organization methods and management methods, and innovation in accounting and management accounting of revenue, cost, and business results is significant. However, an actual survey showed that the management accounting and management accounting of revenue, cost, and business results have not been rightly and are implemented by many departments, leading to inconsistent and subjective information and no promoted roles of management work in enterprises such as classification, selection of cost determination

methods, information analysis for managers. Therefore, the study of completing management accounting of revenue, costs, and business results contributes significantly to the theory and practice of the coal mining enterprises of Vinacomin.

2. THEORETICAL BASIS ON MANAGEMENT ACCOUNTING OF REVENUE, COSTS AND BUSINESS RESULTS IN ENTERPRISES

2.1. Theoretical basis on management accounting of revenue, costs and business results

2.1.1. Concept of revenue, costs and business results

- Concept of revenue

According to VAS 14, revenue: "is the total value of economic benefits that were obtained during the accounting period, arising from the normal production and business activities of the enterprise, contributing to increasing equity of the owner." (Decision 149/2001/QD - BTC issued on December 31, 2021). Revenue is based on determining expenses that were consumed in the production and business processes as well as the capital circulation processes. The scale of the enterprise is shown by the revenue indicator to maintain continuous and sustainable production and business activities. The enterprise's items are considered revenue, including revenue from sales activities, financial activities, internal revenue, and extraordinary revenue. Items are not considered revenue, including third-party revenue (agent fees, surcharges, indirect taxes (VAT, special consumption tax, environmental protection tax, export tax), surcharges, and additional fees, but they do not receive the benefit. Revenue is the most crucial indicator of enterprises' production and business activities. Revenue brings economic benefits as well as income during the period. It is an indicator for evaluating the enterprise's business performance.

Understanding the nature of revenue accurately, clearly, and sufficiently will record and measure revenue and profit indicators on the financial statements reliably, timely, and honestly, helping to use information more clearly.

- Concept of costs

According to VAS 01: "Cost is the total value of items reducing economic benefits in the accounting period in the form of expenditures, asset deductions or arising debts leading to a decrease in equity, excluding distributions to shareholders or owners". (Decision No. 165/2002/QD-BTC issued on December 31, 2002) Costs are waste, so enterprises want to reduce and save maximum to decrease product costs and increase profits. Cost is not only of interest to businesses and consumers but is also related to many issues of both businesses and society. Costs directly affect production and business efficiency, which promotes business development. Business profits are calculated by taking the total revenue minus the total production costs. If businesses want to increase or maintain profits and revenue, reducing or maintaining costs stably is necessary. According to VAS: "Business performance is the final result of normal production activities and other activities of the enterprise in a certain period, expressed by profit or loss."

- Concept of business results

Business results represent the ultimate goal in the production and business activities

of enterprises. Now, enterprises must achieve profit to maintain and develop. Profit is an indicator that is cared for by both enterprises and many other objects, such as investors, banks, and the state. Determining business results is the ultimate goal of making accurate business decisions, helping enterprises maximize profits, expand markets, increase competitiveness, and have a strong position in the market. Based on identifying and determining revenue, costs, and business results correctly, to meet management requirements, it is necessary to classify revenue, expenses, and business results.

2.1.2. The role of management accounting in managing revenue, expenses, and business results

Management accounting for revenue, costs, and business results is a content of management accounting in enterprises, collecting, processing, analyzing, and providing information on revenue, costs, and business results to serve the management requirements in the enterprise. Management accounting for revenue, costs, and business results provides complete information on the present and future in each period and each accounting year. Managers have timely strategies to ensure the safety of the enterprise's development strategies. The role of collecting, providing, processing, and analyzing information meets the requirements of managers in making decisions. Management accounting of revenue, costs, and business results provides specific information about fluctuations, growth, and decline rates, helping to calculate, measure, and control costs, increase revenue, and increase the competitiveness of enterprises. The role of management accounting is valuable information not only to serve management levels in making decisions but also to show the process of identifying management accounting information in operating organizations. Management accounting information plays a crucial role in governing all business activities of operating organizations. It is an essential basis for making short-term and long-term decisions. Based on the nature and role of management accounting for revenue, cost, and business results, the need for information serving management in enterprises about management accounting of revenue, cost, and business results includes identifying, determining, and classifying revenue, cost, and business results according to management requirements, building norms, estimating revenue, cost and business results, collecting and providing information of implementing revenue, cost and business results according to management requirements, analyzing and providing information for making management decision.

2.1.3. Classification of revenue, cost and business results

- Classification of revenue

Identify, correctly determine, and classify revenue, expenses, and business results.

Revenue is an indicator that helps administrators evaluate the implementation of plans of capital turnover to analyze business efficiency at each stage. Classification of revenue helps to manage revenue better. For administrators to develop

more business areas and expand the scale of the enterprise, the revenue index contributes to promoting the re-business processes to maintain enterprises' business activities. Thus, to serve business management, apart from the mentioned criteria, there are different classification methods, such as the relationship between the break-even point and the payment method.

- Classification of cost

Cost is cared for most by enterprises. From the viewpoint of management accounting, cost has many different items that are considered from many other points of view. This management is the key to measuring the successful strategy of enterprises. The classification of costs is important in controlling and saving costs. Depending on the purpose and requirements of enterprise management, the classification of cost includes the following criteria:

Costs are related to the cost-bearing object, operating function, the business results calculation period, and cost behavior. Managers' ability to control costs is determined by the cost usage requirements in choosing a business plan.

- Classification of business results

Business results are the final results of an enterprise's activities over a certain period. They are classified by the scope of activities and the arising location.

2.2. Contents of management accounting of revenue, expenses and business results

- Establishing cost norms at manufacturing enterprises

- Make estimates of manufacturing enterprises' revenue, cost, and business results.

- Collect, process, and provide information on revenue, costs, and business results for checking and evaluation

- Analyze information on revenue, costs, and business results for management

3. CURRENT STATUS OF MANAGEMENT ACCOUNTING OF REVENUE, COSTS, AND BUSINESS RESULTS AT COAL MINING ENTERPRISES OF VINACOMIN

3.1. Overview of coal mining enterprises of Vinacomin

3.1.1. General overview of coal harvesting enterprises

Coal mining enterprises of Vinacomin carry out coal mining in many different areas, but mainly in Quang Ninh include 9 subsidiaries whose charter capital is 100% held by Vinacomin include: Uong Bi Coal Company, Mao Khe Coal Company, Hon Gai Coal Company, Khe Cham Coal Company, Quang Hanh Coal Company, Nam Mau Coal Company, Duong Huy Coal Company, Thong Nhat Coal Company, Ha Long Coal Company.

The member unit is a joint stock company, has legal status and independent economic accounting in Vinacomin including 8 subsidiaries: Vang Danh Coal Joint Stock Company, Ha Lam Coal Joint Stock Company, Deo Nai Coal Joint Stock Company, Mong Duong Coal Joint Stock Company, Ha Tu Coal Joint Stock Company, Nui Beo Coal Joint Stock Company, Coc Sau

Coal Joint Stock Company, Cao Son Coal Joint Stock Company.

3.1.2. Characteristics of production and business activities and management organization of Vinacomin's coal mining enterprises

Coal mining enterprises organize production based on technological processes. Depending on geological and mineral conditions, mining enterprises can use two technologies: (1) - Underground mining technology and (2) - Open-pit mining technology. These mining technologies include many different complex stages and affect the cost collection and cost management in the enterprise. Coal mining enterprises that are subsidiaries belonging to the Group directly operate and manage activities. In the stages of processing and consuming coal products, the Group directly leads and manages. The organization of production associated with construction sites and workshops is a characteristic of coal mining enterprises. Each stage is arranged for production at different construction sites and mining workshops. At these places, costs are directly arised, the cost collection object is confirmed through the characteristics of production organization. The products are raw coal or clean coal after processing and production. According to the management mechanism of the Group, mining costs are accounted by internal prices - contract prices decided by Vietnam Coal - Mineral Industries Group.

Climate directly affects coal mining. Vietnam climate is tropical monsoon, with two different seasons: dry season and rainy season, the quality and output of coal mining are affected by the weather. The impact of climate on mining is inevitable, which affects the revenue of the mining industry. Heavy rain, large rainfall affects the coal mining process, easily causing landslides and accidents in the mines. The cost is very large for draining, electricity supply, and reinforcement of water pumping systems during the rainy season; Prioritize stable production associated with labor safety; invest in equipment, mine construction for rationalizing production lines, reducing fuel and labor to increase productivity and output of longwalls. Therefore, it is necessary to manage revenue, costs and business results fully and reasonably.

3.2. Current status of management accounting of revenue, costs and business results at the coal mining enterprises of Vinacomin

Among the coal mining enterprises, Mong Duong Coal Joint Stock Company and Cao Son Coal Joint Stock Company are large-scale and long-standing coal mines with all the favorable conditions as well as difficulties that other mines face, so the author chooses the data of 2 companies for two underground and open-pit coal mining processes representatives of the remaining businesses.

- Identifying, determining, and classifying revenue, costs, and business results

At Vinacomin - Mong Duong Coal Joint Stock Company, the classification is shown in the following:

Table 1. Revenue Reporting in 2023

(Unit: VND)

	Total revenue	Consolidated revenue	Net revenue
Total	2,697,441,780,864	2,697,441,780,864	2,697,441,780,864
Coal	2.684,988,479,207	2,684,988,479,207	2,684,988,479,207
Minerals			
Electricity			
Explosives			
Other	12,453,301,657	12,453,301,657	12,453,301,657

(Source: Mong Duong Coal Joint Stock Company)

From the perspective of management accounting, at coal mining enterprises in general and Mong Duong Coal Joint Stock Company in particular, revenue is classified according to business situation, including Revenue from the sale of coal, minerals, electricity, explosives, and other revenues. Through Table 1, the revenue of Mong Duong Coal Joint Stock Company – Vinacomin is mainly from the business of selling coal and providing services. Tables 2 and 3 show that revenue is classified according to the relationship with the enterprise, including internal revenue and revenue provided outside Vinacomin.

Table 2. Report on the Internal Sales Revenue in 2023

Customer	Q4 2023			Year 2023		
	Quantity	Unit price	Value (VND)	Quantity	Unit price	Value (VND)
Total	401,196.10		715,362,123,857	1,577,925.52		2.692,136,668,737
Export						
Domestic	401,196.10		715,362,123,857	1,577,925.52		2.692,136,668,737
Details by purchasing company	401,196.10		713,424,339,030	1,577,925.52		2,684,988,479,207
Vinacomin - Cua Ong Coal Preparation Company	396,085,23	1,761,597	697,742,669,847	1.559,957,610	1,686,988	2,631,629,087,402

Customer	Q4 2023			Year 2023		
	Quantity	Unit price	Value (VND)	Quantity	Unit price	Value (VND)
Vinacomin- Cam Pha Port & Logistics Company	5,110.870	3,068,297	15,681,669,183	17,967.910	2,969,750	53,359,391,805
Details by type	401,196.10		713,424,339,030	1,577,925.52	1,686,988	2,684,988,479,207
Raw coal	396,085,23	1,761,597	697,742,669,847	1,559,957,610	1,686,988	2,631,629,087,402
Salable coal	5,110.870		15,681,669,183	17,967.910		53,359,391,805
1C brand	5,110.870	3,068,297	15,681,669,183	17,967.910	2,969,750	53,359,391,805
Other revenue			1,937,784,827			7,148,189,530

(Source: Mong Duong Coal Joint Stock Company)

Table 3. Report on sales revenue outside Vinacomin in 2023

customer	Q4 2023			Year 2023		
	Quantity	Unit price	Value	Quantity	Unit price	Value
Total			3,444,214,440			4,949,279,400
Export						
Domestic			3,444,214,440			4,949,279,400
Details by purchasing company			3,444,214,440			4,949,279,400
Vietnam Joint Stock Commercial Bank for Industry and Trade - Cam Pha Branch			10,462,140			41,241,000
Saigon - Hanoi Joint Stock Commercial Bank, QN Branch			24,198,300			95,420,700
Hon Gai Mechanical Joint Stock Company			3,385,544,000			4,788,617,700
Quang Ninh, Telecommunications, Center 3			24,000,000			24,000,000
Details by type			3,444,214,440			4,949,279,400
Other revenue			3,444,214,440			4,949,279,400

(Source: Mong Duong Coal Joint Stock Company)

Cost classification has only been implemented for financial accounting, not for management accounting. Business results are classified according to the scope of activities, including: Business results of the entire enterprise and business results of departments.

Table 4. Report on business performance by component in 2023

(Unit: VND)

	Total	Coal	Other Minerals	Electricity	Others
Net revenue	2,697,441,780,864	2,697,441,780,864			12,453,301,657
Cost of goods sold	2,434,327,959,863	2,427,953,888,164			6.392,071,672
Selling expenses	18,438,850,233	18,438,850,233			
Administrative expenses	150,085,762,871	150,085,762,871			
Financial income and expenditure difference	(28,028,299,359)	(28,028,299,359)			
Other income and expenditure difference	855,537,797				855,537,797
Profit/ loss	67,416,446,362	60,499,678,580			6,916,767,782

(Source: Mong Duong Coal Joint Stock Company)

- Establish norms and estimates of revenue, costs, and business results.

Based on the cost norms prescribed by Vinacomin, coal mining enterprises establish norms and assign costs to relevant departments such as the planning, labor and salary, and materials departments. Recording information related to the establishment of norms is implemented according to the regulations of this corporation. Through surveys of coal mining enterprises, established norms are the main cost factors for each stage applied according to the general unit price norms that TKV has issued on Decision 199/QD-TKV dated February 10, 2017, of Vinacomin about the general unit price of coal production stages.

Norms of direct material cost: The supplies department and related departments establish material norms for each piece of equipment and machine as a basis for the planning department. Let cost management establish cost plans and assign costs to units. Materials, fuel, and electricity prices are calculated based on current prices and the region.

Table 5. Norms and Prices of Some Input Factors

	Code and type	Unit	Unit price
1. Explosives for underground mining	Emulsion used in underground coal	VND/kg	40,830
	Pit emulsion for stone kiln	VND/kg	41,020
2. Explosives for open pit mining	Alfo explosives unpackaged	VND/kg	17,110
	Alfo explosives packaged	VND/kg	17,610
3. Differential electric detonator in the mine		VND/unit	12,500
4. Timber used in mining	Mine timber	VND/m3	1,239,000

	Code and type	Unit	Unit price
	Furnace reinforcement wood	VND/m3	1,010,000
5. Car tires	Domestic medium distance tires	VND/tire-set	11,287,000
For vehicles with load capacity, tons	40 tons, Michelin equivalent	VND/tire-set	10,400,000
For vehicles with load capacity, tons	60 tons, Micheline equivalent	VND/tire-set	187,500,000
	100 tons, Micheline equivalent	VND/tire-set	362,800,000
6. Furnace steel	CBII	VND/kg	15,000
7. Diesel Oil	VAT Included	VND/l	16,170
	No VAT	VND/l	14,700
8. Gasoline	VAT Included	VND/l	18,590
	No VAT	VND/l	16,900
9. Dynamics	Voltage 6KV, no VAT	VND/kWh	1,690
10. Salary according to Decision No. 1387/QD-TKV dated 29/7/2019	- Meal in the product cost - Cost of a meal - Toxic compensation	VND/person/month VND/person VND/person	730,000 65,000 15,000
11. Depreciation	Depreciation calculated at the rate specified in Circular 45/2013/TT-BTC dated 25/4/2013		

(Source: Cao Son Coal Joint Stock Company)

Norms of direct labor cost: Labor costs are established by the labor and salary department, based on costs of labor, time, number of workers in departments, construction sites, workshops, and the planned salary fund of the enterprise. From the salary scale to the regimes and policies of the State, the salary department changes the principle suitably. Labor standards and productivity of some essential Vinacomin equipment are issued under Decision No. 2798/QD-TKV dated December 31, 2015. The salary scale system, salary statement, and allowance regime of the parent company - Vinacomin, are issued on Decision No. 818/QD-TKV dated April 25, 2016. Based on labor cost standards, estimate and assign labor costs to units.

Norms of general cost: In coal mining enterprises, general costs include general production costs, enterprise management costs, and centralized deductions. General production costs are used for auxiliary stages such as supply systems, repair of electricity, water, roads, mechanical repair, mine electromechanical, mine surveying, quality control, receiving and transporting materials for production, training costs, transporting workers in the mine, drilling exploration in front of wall, etc. General costs are calculated uniformly for underground coal production, open-pit coal production, and screening plants, according to the scale and type of enterprises.

- Current status of collecting information on revenue, costs, and business results for decision-making

Collecting, processing, and providing information: a survey of 17/17 enterprises showed that the reports only present the numbers that reflect the actual occurrence and the set plan. The analysis of new data only compares the plan with the actual implementation. Revenue and cost management do not have synchronization and unity among managers in coal mining enterprises.

Vinacomin assigns the coal mining companies: Production costs are determined from the production stages. Vinacomin is assigned by Decision 199/QD-TKV, dated February 10, 2017, of Vinacomin about the total unit price of coal production stages with adjustments for fuel, electricity, salary, and insurance costs according to current regulations. The total cost ratio calculates general costs, the ratio of direct production costs, and management costs. The general cost ratio and management costs are applied to Decision 199/QD-TKV dated February 10, 2017, of TKV about the total unit price of coal production stages according to the annual planned output scale. Taxes and fees are calculated through the state's yearly regulations. Planned coal revenue (estimate) = Total cost + standard profit. Vinacomin regulates standard profit from the annual rate. Collecting future information: coal mining enterprises collect future information through market prices of materials, technology, machines, labor wages, stage unit prices, regulations of the Ministry of Finance, and regulations of Vinacomin to establish a planning report in the next five years.

- Analysis of information on revenue, costs, and business results at coal mining enterprises for management requirements

Coal mining enterprises establish reports to analyze management work and check and evaluate it. Based on the information provided during the planning, implementation, inspection, and evaluation process, information analysis is used to choose the most appropriate and optimal options and make timely and accurate decisions about maintaining and developing coal mining enterprises.

According to a survey, 100% of coal mining enterprises establish reports comparing output, value of actual revenue, and costs with plans. Reports on revenue, costs, and business results are established through the detailed card book of cost and revenue. From the detailed book of revenue and costs, coal mining enterprises establish tables of expected sales revenue and a report comparing costs between the plan and reality. Coal mining enterprises only compare but do not analyze the causes, determine responsibilities, and propose remedies. 100% of coal mining enterprises have not investigated the relationship between volume costs, revenue, profits, and break-even points, and no established business results report in the form of profit on variable expenses. Coal mining enterprises have not realized the importance of the management accounting reporting system yet, so they have not cared about building a specialized and precise management accounting reporting system; now, it is only presented in detail to support the managers. Management accounting reports mainly serve financial accounting work and add more detailed information that managers require. Therefore, management accounting reports have not provided appropriate, timely, and valuable information for managers.

4. SOLUTIONS

4.1. Solutions for completing the classification of revenue, costs

Revenue in coal mining enterprises is classified according to economic content, which meets financial accounting

requirements. To serve management accounting, enterprises must classify revenue based on the break-even point, including safe and break-even revenue, have appropriate plans to avoid risks and make optimal decisions. Costs in coal mining enterprises are classified only by aspects such as pre-production costs, production costs, and post-production costs for financial accounting work. There are no cost classification solutions for management accounting work, so the author proposes some ways: Cost items in coal mining enterprises need to be classified according to cost behavior, including fixed costs, variable costs, and mixed costs. This classification meets the requirements and purposes of administrators and helps businesses forecast costs accurately and quickly based on the activity level. According to the relationship with the calculation period, costs are divided into period and product costs.

4.2. Completing establishment of estimates on revenue, cost and business results

The establishment of estimates of direct material cost helps coal mining enterprises to determine the cost of raw materials for the next production period. Establishment of estimates of direct material cost is calculated by the following formula:

Cost estimate

Raw materials directly	=	Coal mining output	x	Consumption norm for 1 ton of salable coal	x	Unit price of raw materials	(1)

Making an estimate of direct labor cost helps coal mining enterprises to determine labor efficiency in labor use, calculated by the following formula:

Estimate of direct labor costs in the period	x	Expected product volume in the period	x	Production time norm per unit of product	x	Unit price of direct labor	(2)

Making estimates of general production costs based on norms, direct material cost estimates, and direct labor costs helps coal mining enterprises control fixed costs and variable costs in general production costs detailedly and clearly. Making estimates of business results based on cost and revenue estimates helps enterprises predict the achieved profits in this period. It is possible to check and orient the business activities most effectively through estimates.

4.3. Completing collection, processing, and provision of information on revenue, costs, and business results to serve the needs of managers

a. Completing a collection of future information: The survey showed that the collection of future information at coal mining enterprises had not been taken care of. Making the next 5-year plan at coal mining enterprises is only based on the previous year's activities rather than being proactive in the future.

b. Making management accounting reports at coal mining enterprises: Establishing estimate reports; Establishing a system of management accounting reports to provide information for decision-making.

c. Completing analysis of fluctuations in revenue, costs, and business results

- Analysis of cost fluctuations

For the analysis of cost fluctuations, coal mining enterprises evaluate objective and subjective causes through the evaluation of items such as the costs of raw materials, labor, and production. From the analysis of cost fluctuations, coal mining enterprises have direction and methods to achieve high profits.

Analysis of fluctuation in direct material costs The cause of fluctuation in direct material costs is the difference in quantity and price purchased, used actual materials, and the amount of estimated materials. Fluctuation in direct material costs is the difference between actual direct and estimated direct material costs. Suppose the fluctuation in actual direct material costs is smaller than the estimated direct material costs. In that case, it is a good sign for coal mining enterprises because of cost savings, effectively controlling cost management, and maximizing profits. Suppose the fluctuation in actual direct material costs is bigger than the estimated direct material costs. In that case, it is necessary to check the source of supporting materials and find a more reasonable source price suitable to achieve profits for the enterprise.

$$\text{Price movement} = (\text{Actual price} - \text{Normative price}) \times \text{Actual quantity of supplies} \quad (3)$$

$$\text{Volume Volatility} = (\text{Actual quantity} - \text{Normative quantity}) \times \text{Normative unit price} \quad (4)$$

Analysis of Direct Labor Cost Fluctuation: The direct labor cost fluctuation is the difference in both the number of workers and the unit price of wages, directly producing 1 ton of salable coal. It is the difference between the fluctuation of price and the fluctuation of the quantity of labor.

$$\text{Price fluctuations} = \text{Actual salary unit price} - \text{Unit price of normative salary} \times \text{Actual working hours} \quad (5)$$

$$\text{Fluctuations in quantity} = \text{actual number of workers} - \text{the number of workers according to the norm} \times \text{Unit price per hour of rated work} \quad (6)$$

- Analysis of general production cost fluctuations

Analysis of fixed cost fluctuations includes fixed cost and norms cost. Analysis of variable cost fluctuations includes price fluctuations and quantity fluctuations

- Analysis of revenue fluctuations

Analysis of revenue fluctuations helps coal mining enterprises assess the implementation status and the causes of timely revenue increases. It decreases to improve production efficiency and achieve the most significant revenue.

- Analysis of departmental business performance reports

There are two distinct departments in coal mining enterprises: the office and the production. Many departments implement the mining stages in the production block to produce one ton of salable coal. Analyzing departmental business performance reports of the management accounting is essential, as it helps enterprises evaluate in detail each department's contributing profit level.

d. Completing the analysis of the cost-volume-profit relationship

In coal mining enterprises, managers have not used the cost-volume-profit relationship for analysis. Coal mining enterprises need to determine and calculate many indicators such as contribution margin, contribution margin ratio, break-even output, break-even

revenue, safe revenue, and safe revenue ratio, as shown in the following table:

Table 6. Cost-volume relationship breakdown –profit

(Unit: VND)

Quota	Units of Calculation	Amount
Unit selling price		
Consumption Output		
Turnover		
Variable charge		
Billing		
Guaranteed balance of unit fees		
Guaranteed Balance Ratio		
Breakeven output		
Breakeven revenue		
Realized revenue		
Safe Revenue		
Safe turnover ratio		

(Source: Compiled author)

5. CONCLUSION

The goal is to develop a highly competitive coal industry both domestically and globally. In the trend of international integration, Vinacomin and coal mining enterprises need to have a breakthrough in comprehensively changing all aspects, such as organization, innovation in production and business methods, management methods, and the system of management tools. Therefore, completing the accounting management of revenue, costs, and business results is an important requirement that Vinacomin must be implemented.

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FACTORS AFFECTING IFRS ADOPTION: EVIDENCE IN HANOI ENTERPRISES

Thi Du Nguyen[a*], Ngoc Anh Do[a], Ngoc Bich Do[a], Thi Minh Chau Nguyen[a], Thi Dung Pham[a], Chieu Duong Le[a]

[a]Hanoi University of Industry, Hanoi, Vietnam

**Corresponding author: nguyendu@haui.edu.vn*

Abstract: *This study investigates the factors affecting the adoption of International Financial Reporting Standards (IFRS) at businesses in Hanoi. The research model is constructed with 05 independent variables: Company size, International Commerce, Ownership Structure, Financial Resources, and Administrator Support. Employing descriptive statistical tools, Cronbach's Alpha, EFA tests, and regression analysis, the research examines the factors affecting the application of IFRS at businesses in Hanoi. Analysis data were collected from a sample of 236 Vietnamese enterprises. The research results reveal that Company size, International Commerce, Financial Resources, and Administrator Support affect the intention to implement International Financial Reporting Standards (IFRS) at businesses in Hanoi.*

Keywords: *IFRS, factors, adoption, enterprises, IFRS adoption.*

1. INTRODUCTION

Adhering to a common set of financial reporting standards (FRSs) globally is essential for Vietnam to create a "common language" of financial reporting and enhance the comparability and quality of accounting information, thereby increasing investor confidence. According to the International Accounting Standards Board (IASB), as of today, 131 out of 143 countries, representing 93% of the countries surveyed by the IASB, have some form of adoption of IFRSs. As of 2023, 166 countries worldwide have either adopted IFRS or have a roadmap for IFRS adoption for all or most public company entities and financial institutions in their countries (IFRS Foundation, 2023).

On March 16, 2020, the Vietnam Ministry of Finance issued Decision No. 345/QD-BTC approving a Project on the Adoption of Financial Reporting Standards. The adoption of IFRS in Vietnam will be rolled out in three phases: the preparation phase from 2020 to 2021, Phase 1 of voluntary adoption from 2022 to 2025, and Phase 2 of mandatory adoption from 2025 onwards. Enterprises that are subject to the Project have different needs and resources. To identify the differences that affect the implementation of the Project, it is necessary to study the factors that affect enterprises' intention to apply IFRS in Vietnam, specifically in Hanoi.

In this study, both qualitative and quantitative research methods are employed. The qualitative research method was implemented through a literature review and expert interviews to identify factors. For the quantitative research method, we surveyed 245 staff including directors, chief accountants, auditors, and others, at enterprises in Hanoi. The survey yielded 236 valid responses. The research team conducted tests and analysed to

determine the factors affecting the intention of Vietnamese enterprises to adopt IFRS on the following aspects: company size, international commerce, financial resources, and administrator support.

2. LITERATURE REVIEW AND THEORETICAL BACKGROUND

2.1. Literature review

The application of International Financial Reporting Standards (IFRS) needs to be made easier for investors, analysts, and managers. These provisions have ensured that IFRS has been raised as a 'common accounting language' worldwide. There are many studies on factors affecting the intention to apply IFRS, and the literature review focuses on the following key contents:

According to L. Stainbank (2013), cultural variables are the most important explanatory variables for IFRS adoption in African countries and indicate the importance of creating high-quality financial reports for a developing country. The balance between domestic accounting traditions and harmonizing international accounting standards remains challenging for accounting policymakers, which may limit a country's ability to adopt IFRS fully. In addition, it is important to recognize that adopting IFRS at the corporate level depends on the decision of countries to allow or mandate IFRS adoption. Social media, legal, economic, financial, and internal organizational dynamics are decisive factors in adopting International Financial Reporting Standards (Maria Ming Bengtsson, 2021).

During the integration and transition process to IFRS, Vietnamese universities also need to change their training programs for accounting and auditing to improve the quality of accounting education for students. Professional awareness is a motivating opportunity, but it can also be a reason to slow down a country's integration process. In particular, students' English proficiency is a limitation, significantly affecting accounting and auditing students when accessing IFRS study materials. In addition, students' financial ability is a factor that significantly affects their ability to access and learn IFRS, as the IFRS courses are high-quality or advanced programs. Therefore, tuition fees are usually high (Nguyen Thuc Huong Giang, 2021).

IFRS brings many advantages, such as increasing the ability to compare companies in different countries, enhancing the reliability of financial statements, better utilizing external investors, and entering the international market faster than Vietnam's current accounting systems (Do Khanh Ly, 2022).

2.2. Hypothetical basis

The theory of planned behavior

The theory of planned behavior (TPB), developed by Ajzen in 1991, is the development of the theory of reasoned action. This theory incorporates a factor that is perceived behavioral control. TPB believes that specific behavior is directly influenced by behavioral intention. The theory of planned behavior (TPB) and related studies on the ability to apply IFRS, including research by Do Khanh Ly (2022), Maria Ming Bengtsson (2021, 2013), and Le Viet (2020), show the adoption of IFRS through positive or negative attitudes towards the behavior of applying International Financial Reporting Standards. In The United States, IFRS is

a much-discussed topic, especially after the SEC allowed foreign companies to use IFRS without reconciling with US GAAP (Halyer, 2010). Attitude can affect behavioral intention. Thus, based on the theory of planned behavior, the author establishes a relationship between the awareness and attitude of managers, expenses, the pressure of economic integration, and the professional qualifications of accountants with the ability to adopt IFRS of enterprises.

New institutional sociology theory

New institutional sociology theory was developed by DiMaggio and Powell (1983). This theory suggests that businesses will become stable and highly homogeneous after adopting institutional, ensuring they maintain and develop stably (Powell and DiMaggio, 1991). Some studies have applied institutional theory to explain the adoption of IFRS on a national scale and in an enterprise, such as Hoang Kim Lien and colleagues (2020), Vo Thi Phuong Thao (2020), Le Viet (2020), and Tran Thi Cam Thanh (2019). According to new institutional sociology theory and research related to the possibility of adopting IFRS, thus, based on the new institutional sociology theory, the author establishes a relationship between company size, economic integration, legal document system, professional organization, and enterprises' intention to adopt IAS/IFRS.

Agency theory

Agency theory focuses on the relationship between business principals and their agents through a contract (Jensen and Meckling, 1976). It also explains how managers try to influence financial statements to achieve their goals and choose accounting policies that benefit their interests when preparing financial statements. Agency theory suggests some variables that the applicability of IFRS in enterprises. Specifically, business size, ownership, leverage, and type of auditing firm are often considered to assess the impact on the ability to adopt IAS/IFRS (Al-Akra et al., 2009).

3. RESEARCH METHODOLOGY

3.1. Research Data

For this study, due to limitations in implementation costs, the sample size was determined on the principle of minimum necessary to ensure the reliability of the study. According to Hair et al. (2006), the minimum sample size for exploratory factor analysis is 50, preferably 100 or more. This study uses 27 observed variables, so the minimum sample size is 50 + 27*5 = 185 observations. The research team conducted a survey using Google Forms at enterprises in Hanoi and received 245 responses. After summarizing and cleaning, 236 qualified questionnaires were included in the analysis.

The study used SPSS 25 software to test the reliability of the scale of variables in the model, analyze exploratory factors, analyze correlations, and test multivariate regression models on factors affecting IFRS adoption.

3.2. Research Model

The proposed research model includes five factors corresponding to 5 hypotheses about the impact of factors on the intention to apply IFRS. The model is based on previous research and related theories.

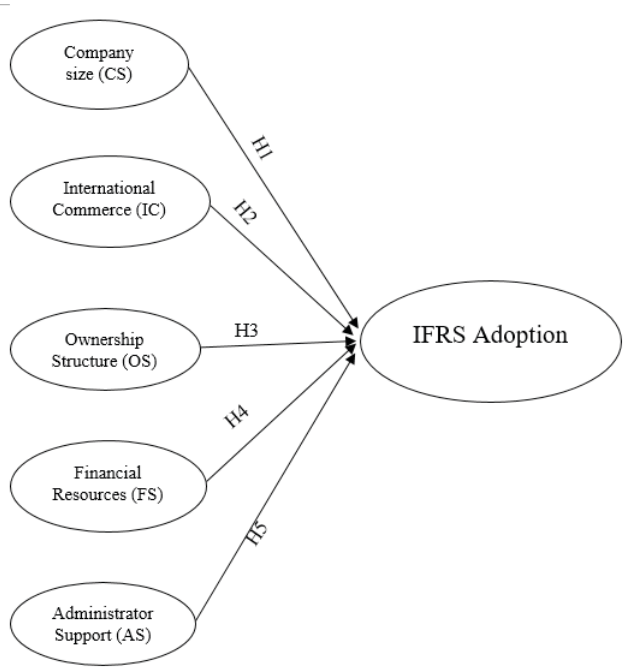


Fig 1. Research Model

Company size

Company size plays a significant role in developing and implementing corporate strategies. Senyigi (2014) conducted his study in Turkey and proved that company size positively and significantly impacts IFRS adoption. That result also helped Uyar et al. (2016) to conduct a study on the factors affecting the adoption of IFRS by small and medium-sized enterprises in Turkey. Sharif (2010) examined accountants' perceptions of the factors affecting the adoption of IFRS in Iraq, such as government policies, capital markets, educational level, professional organization, and company size. The study results indicated that capital markets, educational level, professional organization, and company size impact the adoption of IFRS by companies in that country.

H1: The size of companies in Hanoi has a positive impact on the adoption of IFRS.

International Commerce

Listed companies are increasingly involved in international commerce activities, which is also why companies need to be ready to adopt IFRS. The findings of Senyigit's (2014) study concluded that export companies need to publish transparent financial information so that partners can compare, and the company still has to compete with other companies worldwide. The international commerce factor of enterprises plays an essential role in adopting IFRS. Ha Xuan Thach and Nguyen Ngoc Hiep (2018) focused on analyzing, identifying, and measuring the factors affecting the first conversion of financial statements from

Vietnamese accounting standards to IFRS; the authors argue that five factors affecting the conversion of financial statements from national accounting standards to international accounting standards including economic integration, legal system, cultural environment, management support, and professional qualifications of accountants, of which the most influential factor is economic integration.

H2: The higher the level of international commerce activities, the greater the impact on enterprises' adoption of IFRS.

Ownership Structure

The study by Hellberg and Persson (2012) argues that companies that separate ownership and management rights tend to adopt IFRS so that all information users can understand the reports based on IFRS. Agency theory is also suitable for explaining this result. Guerreiro's (2008) study argues that companies with foreign ownership factors, to avoid using two different accounting systems, will be willing to adopt IFRS to reduce reporting costs, and information on foreign investment situations can be compared.

H3: Enterprises with a foreign ownership structure will have a positive impact on the adoption of IFRS.

Financial Resources

Tarca, Morris, and Moy (2013) examined the relationship between the use of international accounting standards and the financial resources of companies. The study results show that companies with more external financing (the proportion of shares held by outsiders) are more likely to adopt IFRS. The theory of intended behavior suggests that large-scale enterprises have available resources, including the availability of financial resources, which is a factor that plays a role in using this financial resource to allocate for the enterprise to be ready to apply IFRS (according to the studies of Murphy, 1999 and Matonti & Iuliano, 2012).

H4: Enterprises with more invested financial resources will have a positive impact on the adoption of IFRS.

Administrative Support

Rogers (2010) argues that individuals who are pioneers in innovation are agents of change within an organization. Therefore, the attitude of the change agent is essential for adopting innovation (Rogers, 2003). Bananuka et al. (2019) showed that management attitudes are critical to adopting Internet financial reporting in Japanese financial services companies. In a study of managerial attitudes in India and Australia, Bhattacharyya (2014) found that managerial attitudes are positive towards decisions on sustainability reporting. The study by Ha Xuan Thach and Nguyen Ngoc Hiep (2018) also showed that administrative support has an impact on the adoption of IFRS.

H5: The perception and attitude of managers impact the adoption of IFRS.

The scale used in the assessment is a 5-point Likert scale.

Table 1. Scale of variables

Variables	Scale	References
CS	Company size	
CS1	Number of employees	Sharif (2010); Al-Absy & Ismail (2019) Senyigit (2014)
CS2	Value of total assets	Sharif (2010); Al-Absy & Ismail (2019) Senyigit (2014)
CS3	Total revenue	Sharif (2010); Al-Absy & Ismail (2019) Senyigit (2014)
CS4	Liabilities and equity structure	Sharif (2010); Al-Absy & Ismail (2019)
IC	International Commerce	
IC1	Number of foreign administrators on the board of directors	Sharif (2010); Xuan Thach Ha và Ngoc Hiep Nguyen (2018); Tran Hanh Phuong Le (2019)
IC2	The enterprise has plans to list abroad	Tran Hanh Phuong Le (2019)
IC3	The enterprise has activities competing with other companies in the same industry in the world	Senyigit (2014)
IC4	International commerce has export activities with the demand for IFRS	Senyigit (2014); Tran Hanh Phuong Le (2019)
IC5	International commerce has import activities with the demand for IFRS	Senyigit (2014); Tran Hanh Phuong Le (2019)
OS	Ownership Structure	
OS1	The enterprise has foreign owners	Guerreiro (2008) Mantonti & Iuliano (2012)
OS2	The enterprise has branches or subsidiaries abroad	Guerreiro (2008) Mantonti & Iuliano (2012)
OS3	The enterprise has a parent company or head office abroad	Guerreiro (2008) Mantonti & Iuliano (2012)
OS4	The separation of ownership and management rights requires the use of IFRS	Guerreiro (2008) Mantonti & Iuliano (2012)
FR	Financial Resources	
FR1	Enterprises wishing to raise capital at a low cost	Matonti & Iuliano (2012) Tarca, Morris, và Moy (2013)
FR2	Borrowing from foreign financial institutions requires the application of IFRS	Matonti & Iuliano (2012) Tarca, Morris, và Moy (2013)
FR3	The demand for information from foreign banks of the enterprise is large	Matonti & Iuliano (2012) Tarca, Morris, và Moy (2013)
FR4	The demand for information from foreign banks for the enterprise is moderate	Matonti & Iuliano (2012) Tarca, Morris, và Moy (2013)

Variables	Scale	References
AS	Administrative Support	
AS1	The conversion of financial statements to IFRS requires the consensus of senior managers in the enterprise	Xuan Thach Ha và Ngoc Hiep Nguyen (2018)
AS2	The conversion of financial statements to IFRS requires human resource support from the business administrators	
AS3	The conversion of financial statements to IFRS requires financial resource support from business administrators	
AS4	Would you convert the financial statements from VAS to IFRS?	
IFRS	IFRS Adoption	
IFRS1	The enterprise develops a roadmap for the adoption of IFRS	Albaskri (2015); Bananuka et al. (2019)
IFRS2	The enterprise develops a guideline for applying IFRS for a group of standards, each standard	
IFRS3	The enterprise has updated knowledge of IFRS for employees or plans to recruit personnel with experience in preparing and presenting financial statements in accordance with IFRS	
IFRS4	The enterprise has prepared a database for the application of IFRS	Thi Ngoc Diep Nguyen (2020)
IFRS5	The enterprise is ready to apply IFRS due to the characteristics of the enterprise	Thi Phuong Thao Vo (2020)
IFRS6	The enterprise is ready to apply IFRS due to external factors of the enterprise	Thi Phuong Thao Vo (2020)

4. RESEARCH RESULTS & DISCUSSION

4.1. Descriptive statistics analytics

Table 2. Descriptive statistics of survey subjects

Variables		Frequency	Valid percent (%)
Age	22-30 age	127	53.8
	30-40 age	82	34.7
	40-50 age	27	11.4
	Total	236	100.0

Variables		Frequency	Valid percent (%)
Level	College	11	4.7
	University	162	68.6
	Postgraduate	61	25.8
	Intermediate	2	0.8
	Total	236	100.0
Position	Chief Financial Officer	10	4.2
	Chief Accountant (Head of Accounting Department)	43	18.2
	Accountant	117	49.6
	Financial Controller. Audit Committee	6	2.5
	Auditor	27	11.4
	CEO/Director General	6	2.5
	Other	27	11.4
	Total	236	100.0
Years of work experience	Under 5 years	130	55.1
	From 5-10 years	87	36.9
	Over 10 years	19	8.1
	Total	236	100.0
The enterprise belongs to the group of manufacturing enterprises	Yes	132	55.9
	No	104	44.1
	Total	236	100.0
The enterprise undergoes a financial statement audit	Yes	227	96.2
	No	9	3.8
	Total	236	100.0
The company obtained a financial audit report from the Big 4	Yes	59	25.0
	No	177	75.0
	Total	236	100.0

(Source: Analysis results from SPSS 25)

4.2. Reliability verification through Cronbach's Alpha analysis

Assessing the reliability of independent factors through Cronbach's Alpha analysis

Table 3. Cronbach's Alpha Independent Variable Test Table

Item-Total Statistics						
Observation variables	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted	Cronbach's Alpha
CS1	11.13	8.864	0.743	0.567	0.828	0.871
CS2	11.09	9.089	0.721	0.528	0.837	
CS3	10.99	8.834	0.738	0.555	0.830	
CS4	10.83	9.214	0.697	0.493	0.846	
IC1	13.86	16.546	0.654	0.445	0.836	0.860
IC2	13.44	16.316	0.691	0.492	0.826	
IC3	13.47	17.186	0.657	0.455	0.836	
IC4	13.90	16.471	0.616	0.397	0.847	
IC5	13.67	15.407	0.770	0.594	0.805	
OS1	6.26	2.229	0.793	0.642	0.705	0.842
OS2	6.22	2.162	0.706	0.568	0.782	
OS3	6.13	2.234	0.634	0.426	0.854	
FR1	10.06	4.136	0.739	0.561	0.744	0.829
FR2	10.26	4.720	0.603	0.400	0.806	
FR3	10.18	4.524	0.729	0.553	0.754	
FR4	9.81	4.515	0.568	0.346	0.826	
AS1	11.27	4.588	0.636	0.419	0.760	0.810
AS2	11.17	4.280	0.632	0.410	0.760	
AS3	11.22	4.473	0.610	0.389	0.770	
AS4	10.78	4.268	0.635	0.425	0.758	

(Source: Analysis results from SPSS 25)

After removing the OS4 variable, the results of assessing the reliability of the new scales belong to company size, international commerce, ownership structure, financial resources, and administrator support. The authors obtained Cronbach's Alpha coefficients of 0.871, 0.860, 0.842, 0.829, and 0.810, all greater than 0.6, ensuring reliability analysis. All total variable correlation coefficients are greater than 0.3. Therefore, observed variables of the independent factors that have not been eliminated are suitable for further EFA analysis.

Evaluate the reliability of IFRS-dependent variables through Cronbach's Alpha analysis.

Table 4. Test Cronbach's Alpha of the dependent variable

Cronbach's Alpha=0.874					
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
IFRS1	16.50	15.672	0.635	0.428	0.859
IFRS2	16.42	14.857	0.695	0.511	0.849
IFRS3	16.47	15.153	0.759	0.595	0.839
IFRS4	16.48	15.246	0.682	0.501	0.851
IFRS5	16.45	15.057	0.702	0.536	0.848
IFRS6	16.55	15.653	0.591	0.391	0.867

(Source: Analysis results from SPSS 25)

By evaluating the reliability of the factor scales applied in IFRS, the author obtained a Cronbach's Alpha coefficient = 0.874 and the total variable correlation coefficients of 0.635, 0.695, 0.759, 0.682, 0.702, and 0.591, respectively, all greater than 0.3. Therefore, IFRS1, IFRS2, IFRS3, IFRS4, IFRS5, and IFRS6 variables belonging to the IFRS Adoption factor are suitable for inclusion in the next step of EFA analysis. Thus, based on the results of the analysis to assess the reliability of the scales, we can conclude that with 27 variables, including variables of factors included in the analysis, only one variable, OS4, did not meet the requirements, while the remaining 26 variables met the requirements and were ensured in the subsequent analysis.

4.3. Exploratory factor analysis (EFA)

All measurement scales were thoroughly tested for the reliability of their corresponding factors in the model, achieving a score of 0.5 or higher. Using SPSS, the team performed an EFA analysis to confirm the suitability of factors and indicators (Hair I.F., 2014). After running Cronbach's Alpha with 27 observed variables, including independent and dependent variables, the OS4 scale (Separation of ownership and operating rights requiring the use of IFRS) did not meet the requirements and was removed from the model. Then, the research team conducted the first EFA, and all scales met the requirements, with the following results obtained:

Table 5. EFA Results

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy,		0.787
Bartlett's Test of Sphericity	Approx. Chi-Square	2,306.239
	df	190
	Sig.	0.000

	Rotated Component Matrix[a]				
	Component				
	1	2	3	4	5
IC5	0.854				
IC2	0.816				
IC1	0.771				
IC3	0.747				
IC4	0.722				
CS1		0.835			
CS2		0.831			
CS3		0.814			
CS4		0.780			

FR1	0.869		
FR3	0.800		
FR2	0.745		
FR4	0.706		
AS4		0.819	
AS2		0.775	
AS1		0.767	
AS3		0.765	
OS1			0.900
OS2			0.855
OS3			0.815

(Source: Analysis results from SPSS 25)

After rotating the factors, we have five groups of factors. The first group of factors includes observed variables IC5, IC2, IC1, IC3, and IC4, which is the International Commerce level group, denoted IC. The second group of factors includes observed variables CS1, CS2, CS3, and CS4, which is company size, denoted as CS. The third group of factors includes observed variables FR1, FR3, FR2, and FR4, which is financial resources, denoted FR. The fourth group of factors includes observed variables AS4, AS2, AS1, and AS3 is the administrators' support group, denoted AS.

KMO = 0.787 > 0.5, which means the data is consistent. In addition, the Chi-Square statistic of Bartlett's test = 2,306,239 with a significance level (sig Bartlett's Test < 0.05) demonstrates that the observed variables are correlated in the population, which should be used for further analysis. Based on the first EFA, the inspection implementation model and detailed results are as follows:

4.4. Results of checking the impact of factors on IFRS in Financial Statements

Table 6. Results of testing the impact of factors on intention to adopt IFRS

Model	Unstandardized Coefficients		Unstandardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-0.553	0.282		-1.962	0.051
CS	0.170	0.041	0.215	4.095	0.000
IC	0.194	0.039	0.251	4.997	0.000
OS	0.245	0.064	0.187	3.836	0.000
FR	0.340	0.059	0.302	5.765	0.000
AS	0.168	0.056	0.148	2.998	0.003

(Source: Analysis results from SPSS 25)

Results from Table 6 show that the financial resources factor with a standardized Beta of 0.302 has the most significant and positive influence on IFRS application in the financial statements of businesses in Hanoi. This also clearly shows that the IFRS application is linked to finance; when financial resources are not met, it will be challenging to carry out other tasks. With a standardized Beta of 0.251 and Sig. = 0.000 < 0.05, the international commerce level is statistically significant and positively affects IFRS application. The regression result coincides with hypothesis H2. When the factor level of international trade activities is higher (increased by 1 unit), the more significant impact of the businesses and IFRS application increases by 0.251 units. The level of international commerce will demonstrate the position of the foreign enterprise within its business and management activities. Company size, ownership structure, and administrator

support with the standardized beta of 0.215, 0.187, and 0.148, respectively, positively correlate to IFRS application. Combined with the fundamental theory that explains the relationship between managers' attitudes and the ability to adopt IFRS, major obstacles to IFRS adoption will arise if managers do not create conditions.

4.5. Regression analysis

Table 7. Regression analysis results

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	-0.553	0.282		-1.962	0.051		
Average Company Size	0.170	0.041	0.215	4.095	0.000	0.774	1.292
International Commerce	0.194	0.039	0.251	4.997	0.000	0.852	1.174
Average Ownership Structure	0.245	0.064	0.187	3.836	0.000	0.901	1.109
Average Financial Resources	0.340	0.059	0.302	5.765	0.000	0.779	1.284
Average Administrators Support	0.168	0.056	0.148	2.998	0.003	0.884	1.131
Dependent Variable: IFRStb							

(Source: Analysis results from SPSS 25)

The results of analyzing linear regression coefficients show that the value Sig. The T-test of each independent variable is less than 5%. This proves that the five independent factors included in the model are all significant, also known as reaching the 95% confidence level in the model, and all impact the IFRS application factor.

The standardized beta coefficients from Table 7 reveal the relationship between independent factors and the dependent factor (Adopt IFRS) as follows:

Adopt IFRS=0,215*CStb + 0,251*ICtb + 0,187*OStb + 0,302*FRtb + 0,148*AStb + Ei

The regression results show that the variables are positively related to the IFRS Adpot factor of Enterprises in Hanoi, as the Beta Coefficients are all positive.

To be specific, the authors separate each factor for analysis to see its influence on IFRS adoption based on the standardized Beta coefficient, specifically CS with $\beta = 0.215$; IC with $\beta = 0.251$; OS with $\beta = 0.187$; FR with $\beta = 0.302$; and AS with $\beta = 0.148$. The larger the value of any factor's Beta coefficient, the more important its impact on IFRS adoption.

5. CONCLUSION

The research results have provided specific evidence on the factors influencing the intention to adopt International Financial Reporting Standards (IFRS) for businesses in Hanoi. Although the Ministry of Finance and the Vietnam Association of Accountants and Auditors are making very positive efforts to accelerate the international integration process in the future, the identified obstacles will somewhat contribute positively to that process.

Besides that, the research results align with the findings of other studies. For example, Senyigi (2014) conducted his research in Turkey and has proven that the

company scale has a positive and significant impact on the implementation of IFRS; the study of Guerreiro (2008) also states that companies with revenue from international trade activities will adopt IFRS. In addition, Murphy's (1999) research shows that the availability of financial resources plays an important role in the allocation of financial resources for companies willing to adopt IFRS. Bananuka and colleagues' research (2018) demonstrates that managers' attitudes are crucial in implementing financial reporting on the Internet in financial service companies.

However, alongside the research, we acknowledge some limitations, such as the small sample size and the insufficient coverage of all businesses. Therefore, in the future, the research team will continue to expand the survey sample, which may reveal differences among different groups of businesses based on their scale, industry, and field. For the future, the application of International Financial Reporting Standards (IFRS) is an essential requirement, so the research team has tried to analyze and verify the impact of factors on the application of IFRS.

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IMPACT OF GLOBAL ECONOMIC TRENDS ON FINANCIAL MARKET DEVELOPMENT IN A TRANSITION ECONOMY: THE CASE OF VIETNAM

Pham Thu Huong[a*], Dao Anh Tuan[a]

[a]Hanoi University of Mining and Geology, Hanoi, Vietnam

[*]Corresponding author: phamthuhuong@humg.edu.vn

Abstract: *This study examines the multifaceted impact of global economic trends on financial market development in Vietnam, a transition economy. The research investigates how Vietnam's evolution from a centrally planned to a market-oriented economy interacts with international economic dynamics. Key focus areas include interest rate fluctuations, exchange rate volatility, foreign direct investment (FDI) flows, global demand shifts, technological advancements, and green finance initiatives. The study finds that Vietnam's financial markets are significantly influenced by global interest rate changes, with the central bank adjusting rates to maintain economic stability. Exchange rate management by the State Bank of Vietnam reflects the economy's sensitivity to global currency movements. FDI, reaching $28.85 billion in 2023, plays a crucial role in market development but also exposes Vietnam to global economic vulnerabilities. The research also highlights the importance of fintech and green finance in shaping Vietnam's financial landscape. This study contributes to understanding how emerging economies navigate global economic pressures while pursuing domestic financial market development.*

Keywords*: Financial market development, Transition economies, Global economic trends, Vietnam.*

1. INTRODUCTION

1.1. Background on Vietnam's transition economy

Vietnam's journey from a centrally planned to a market-oriented economy began in 1986 with the introduction of the Đổi Mới (Renovation) reforms. This marked a pivotal moment in Vietnam's economic history, initiating a process of gradual liberalization, privatization, and integration into the global economy (Vuong, 2014). The transition has been characterized by a series of economic reforms aimed at dismantling the command economy structure while carefully introducing market mechanisms.

The renovation reforms encompassed several key areas:

- Agricultural reform, moving from collective farming to household-based production;

- Price liberalization, allowing market forces to determine prices for most goods and services;

- State-owned enterprise (SOE) reform, including partial privatization and increased autonomy;

- Opening to foreign investment and trade;

- Financial sector reform, including the establishment of a two-tier banking system;

These reforms have led to remarkable economic growth, with Vietnam's GDP growing at an average annual rate of 6.5% between 1986 and 2019 (World Bank, 2021). The country has transformed from one of the world's poorest nations to a lower middle-income country, significantly reducing poverty and improving living standards for its population.

1.2. Importance of financial market development in transition economies

Financial market development plays a crucial role in the economic transformation of transition economies. Efficient financial markets facilitate capital allocation, risk management, and economic growth by:

- Mobilizing savings and channeling them into productive investments

- Providing mechanisms for risk sharing and diversification

- Facilitating trade and commerce through payment systems

- Enhancing corporate governance through market discipline

- Supporting entrepreneurship and innovation by providing access to capital

In Vietnam, developing its financial markets has been integral to supporting economic reforms and fostering private sector growth (Vuong, 2018). Vietnam's evolution of its financial sector has been closely intertwined with its broader economic transition, reflecting the challenges and opportunities inherent in moving from a planned to a market-oriented system.

1.3. Research objectives and significance

This study aims to:

Analyze the impact of global economic trends on Vietnam's financial market development, focusing on key areas such as banking, stock markets, and emerging fintech sectors.

Examine the interplay between international influences and domestic factors in shaping Vietnam's financial sector, considering the country's unique political, economic, and cultural context.

Assess the challenges and opportunities global economic integration presents for Vietnam's financial markets, including regulatory issues, market efficiency, and financial inclusion.

Evaluate the effectiveness of Vietnam's gradual and managed approach to financial market development in the context of global economic pressures.

Draw lessons from Vietnam's experience that may apply to other transition economies navigating financial market development in an increasingly interconnected global economy.

The significance of this research lies in its contribution to understanding how transition economies navigate global economic forces while developing their financial markets. It offers insights for:

Policymakers in transition economies seeking to balance global integration with domestic market stability

Investors interested in emerging market dynamics and opportunities in transitioning financial sectors

Researchers studying the intersection of global economic trends, transition economics, and financial market development

International organizations involved in supporting economic development and financial sector reform in transition economies

Focusing on Vietnam's unique experience, this study contributes to the broader literature on financial market development in transition economies and offers a nuanced perspective on the challenges and opportunities presented by global economic integration.

2. LITERATURE REVIEW

2.1. Transition economies and financial market development

The literature on transition economies and financial market development provides a crucial context for understanding Vietnam's experience. Svejnar (2002) offers a comprehensive overview of the transition process in Central and Eastern European countries, highlighting the importance of institutional reforms and market liberalization in fostering economic growth and financial sector development.

Key themes in the literature include:

The sequencing of reforms: Roland (2000) argues that the order and pace of reforms are crucial in determining the success of the transition process. This is particularly relevant to financial market development, where premature liberalization without adequate institutional safeguards can lead to instability.

The role of institutions: Acemoglu et al. (2005) emphasize the importance of institutional quality in economic development. In financial markets, strong institutions are crucial for investor protection, contract enforcement, and overall market stability.

Banking sector reform: Bonin et al. (2005) examine privatization and foreign bank entry in transition economies, finding that these processes generally improve bank performance and efficiency.

Stock market development: Claessens et al. (2000) analyze the development of stock markets in transition economies, noting the challenges of creating liquid and efficient markets in environments with weak legal and institutional frameworks.

Vietnam's case: Fforde (2019) provides a detailed account of the country's transition from plan to market, highlighting the complexities of economic reform in a one-party state. The authors note that Vietnam's approach has been characterized by gradualism and pragmatism, which have influenced the pace and nature of its financial market development.

2.2. Global economic trends and their impact on emerging markets

The literature on global economic trends and their impact on emerging markets is vast and multifaceted. Key areas relevant to Vietnam's experience include:

Foreign Direct Investment (FDI): Borensztein et al. (1998) demonstrate the positive impact of FDI on economic growth in developing countries, particularly when the host country has a minimum threshold of human capital. In Vietnam's context, Su et al. (2019) examine the impact of FDI and trade openness on economic growth, finding positive correlations and noting institutional quality's importance in mediating these effects.

Trade liberalization: Sachs & Warner (1995) argue that open economies tend to converge faster to higher income levels. For Vietnam, Nguyen & Le (2019) analyze the impact of trade liberalization on economic growth and income distribution, finding overall positive effects but also noting increased inequality.

Global financial crises: The literature extensively covers the impact of global financial crises on emerging markets. Didier et al. (2012) examine how emerging economies fared during the 2008-2009 global financial crisis, noting improved resilience compared to previous crises but also highlighting ongoing vulnerabilities.

Technological disruption: Goldstein et al. (2019) discuss the impact of fintech on financial services in emerging markets, highlighting both opportunities for financial inclusion and challenges for regulators.

2.3. Vietnam's economic reforms and financial sector development

The literature specific to Vietnam's economic reforms and financial sector development provides crucial insights into the country's unique experience:

Banking sector reform: Nguyen et al. (2016) analyze the efficiency of Vietnam's banking sector following reforms, noting improvements but also ongoing challenges related to non-performing loans and state ownership.

Stock market development: Vo (2019) examines the development of Vietnam's stock market, highlighting its rapid growth but also identifying issues related to market efficiency and corporate governance.

Financial inclusion: Le et al. (2019) investigate the determinants of financial inclusion in Vietnam, emphasizing the role of digital financial services in expanding access to financial services.

Policy approach: Vuong (2018) provides a comprehensive overview of Vietnam's financial economy from 1986 to 2016, highlighting the government's gradual and cautious approach to financial sector reform and global integration.

This literature review sets the stage for our analysis by providing a theoretical and empirical foundation for understanding the complex interplay between global economic trends and financial market development in Vietnam's transition economy context.

3. THEORETICAL FRAMEWORK

3.1. Economic transition theory

Economic transition theory provides the overarching framework for understanding Vietnam's journey from a centrally planned to a market-oriented economy. Key theoretical contributions in this area include:

Dual-track approach: Roland (2000) proposes a dual-track approach to economic transition, in which market mechanisms are introduced alongside existing planned economy structures. This theory is particularly relevant to Vietnam's gradual reform process.

Institutional change theory: North (1990) emphasizes the role of institutions in economic development. This theory highlights the importance of developing market-supporting institutions alongside economic liberalization in transition economies.

Evolutionary theory of economic change: Nelson & Winter (1982) propose an evolutionary perspective on economic transformation, helpful in understanding the gradual and sometimes experimental nature of Vietnam's economic reforms.

These theories help explain Vietnam's approach to economic transition, characterized by gradual reforms, experimentation, and the coexistence of

market and non-market elements in the economy.

3.2. Financial market development models

Various models of financial market development provide a theoretical basis for analyzing Vietnam's experience:

Bank-based vs. market-based systems: Allen & Gale (2000) discuss the relative merits of bank-based and market-based financial systems. Vietnam's approach has elements of both, with a strong emphasis on banking sector development alongside gradual stock market growth.

Financial liberalization theory: McKinnon (1973) and Shaw (1973) argue for the benefits of financial liberalization in developing economies. However, the Asian Financial Crisis in 1997 - 1998 led to a more nuanced view, emphasizing the importance of sequencing and institutional development in the liberalization process.

Financial Development and Economic Growth: Levine (2005) provides a comprehensive review of the theoretical and empirical literature on the finance-growth nexus, which is crucial for understanding the importance of financial market development in Vietnam's economic transition.

3.3. Global economic integration and its effects on transition economies

Theories of global economic integration help frame the analysis of how international trends have impacted Vietnam's financial market development:

FDI spillover effects: Blomström & Kokko (1998) discuss the potential for technology and knowledge spillovers from foreign direct investment, which is relevant to understanding the impact of FDI on Vietnam's financial sector.

Trade openness and growth: Frankel & Romer (1999) provide theoretical and empirical support for the positive impact of trade openness on economic growth, which has implications for financial market development.

Global value chains: Gereffi et al. (2005) propose a framework for understanding how firms and countries integrate into the global economy. This framework is useful for analyzing Vietnam's increasing participation in global trade and its implications for financial market development.

Financial globalization: Kose et al. (2009) review the theoretical and empirical literature on financial globalization, discussing the potential benefits and risks for emerging economies.

This theoretical framework provides the foundation for analyzing how global economic trends have influenced Vietnam's financial market development within its unique transitional context. It allows us to interpret Vietnam's experience through multiple theoretical lenses, considering both the general principles of economic transition and financial development and the specific challenges and opportunities presented by global economic integration.

4. GLOBAL ECONOMIC INFLUENCES ON VIETNAM'S FINANCIAL MARKETS

4.1. Interest Rate Fluctuations

Global economic trends significantly affect interest rates, influencing Vietnam's financial market dynamics. Vietnam's central bank has had to raise interest rates to maintain economic stability in response to rising global inflation and tightening monetary policies

from major economies. This has led to tighter liquidity conditions and increased business borrowing costs, making access to capital more challenging, particularly in sectors reliant on corporate bonds. In the context of rapidly rising inflation, countries have had to accelerate the pace of tightening fiscal and monetary policies. According to the US Council on Foreign Relations (2023), global monetary policy shifted towards tightening in the second quarter of 2022. This move by central banks has strongly impacted the global financial markets, including Vietnam.

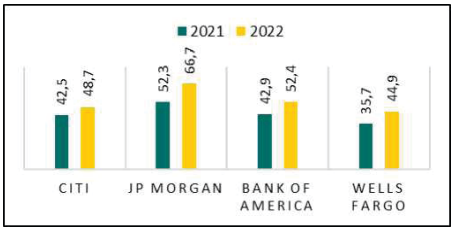


Fig 1. Net interest income of major banks in the US (billion USD)

Although the domestic economy in 2022 achieved the highest growth rate since 2011 (8.02%), with the Consumer Price Index (CPI) controlled at 3.15% (lower than the government's target of about 4%), Vietnam's economy still faced many significant difficulties and challenges such as: (i) risks and challenges from external factors still exist and have increasingly clear negative impacts; (ii) public investment disbursement, the 2022-2023 Recovery Program, and national target programs remain slow despite improvements; (iii) inflationary pressures, exchange rates, and interest rates increased, posing major challenges in 2022 and 2023; (iv) non-performing loans are increasing within forecast and control range; (v) some drivers of economic growth such as exports, industrial production, consumption, etc., showed signs of slowing down in the last months of the year as business conditions deteriorated and global demand declined sharply.

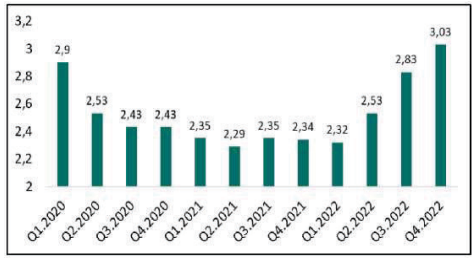


Fig 2. Average Net Interest Margin (NIM) of US banks (Q1.2020-Q4.2022) (%/year)

On the other hand, the rising interest rate environment has also led to several issues within the global banking industry. Higher borrowing costs have caused many businesses and individuals to adjust their business, investment, and consumption plans, thereby reducing the demand for bank credit. Additionally, the challenging economic situation and rising interest rates have also led to higher non-performing loan risks, forcing banks to increase their credit risk provisions (data from S&P shows that all 19 US banks that have released their Q4 2022 results reported an increase in risk provisions compared to the same period in 2021).

4.2. Exchange Rate Volatility

Vietnam's financial market is susceptible to exchange rate fluctuations, especially the exchange rate between the Vietnamese Dong (VND) and the US Dollar (USD). These fluctuations can have numerous impacts on the economy and financial market.

Effects of a Weak Domestic Currency:

Increased Export Competitiveness: When the domestic currency is weak compared to foreign currencies, Vietnam's export goods

become cheaper relative to competitors, helping to improve competitiveness and boost exports.

Increased Import Costs: However, a weak domestic currency also increases the cost of importing goods and services, narrowing profit margins for businesses dependent on foreign goods.

Response of the State Bank:

Foreign Exchange Market Intervention: In response to adverse exchange rate fluctuations, the State Bank of Vietnam has proactively intervened in the foreign exchange market to stabilize the Vietnamese Dong and control inflationary pressures.

Use of Monetary Policy Tools: Specifically, the State Bank has used tools such as issuing bills, regulating liquidity, and interbank market interest rates to stabilize the market in the face of rapidly rising exchange rates.

Readiness for Foreign Currency Intervention: When necessary, the State Bank will use foreign exchange reserves to ensure the exchange rate meets set targets.

Under pressure from the strong USD, the USD/VND exchange rate has recently been repeatedly hitting new highs in the banking market, the free market, and even the central exchange rate set by the State Bank. The State Bank announced a new record central exchange rate of 24,260 VND/USD. Compared to the beginning of 2023, this rate has increased by 394 dong, equivalent to a 1.65% increase. The USD/VND exchange rate has risen sharply in the banking system. The exchange rate at Vietcombank set new record highs for about ten consecutive sessions, with the selling price on April 19 recorded at 25,473 VND/USD, a total increase of 1,053 VND compared to the end of last year, equivalent to a 4.31% increase. In the free market, the USD/VND exchange rate also set a new record high: 25,680 dong (buying) and 25,760 dong (selling), an increase of about 4% compared to the beginning of the year (State Bank of Vietnam, 2023).

4.3. Foreign Direct Investment (FDI)

Vietnam's foreign direct investment (FDI) landscape in 2023 showcased remarkable growth, with inflows reaching $36.6 billion, a 32.1% year-on-year increase, underscored by 3,188 newly licensed projects - a 57% rise from 2022. This surge reflects Vietnam's growing appeal to international investors, with the manufacturing and processing sector leading the charge, accounting for 69.3% of total registered capital ($14 billion). Real estate and finance sectors followed, attracting $1.94 billion and $1.54 billion, respectively (General Statistics Office of Vietnam, 2024). The influx of FDI has catalyzed economic development, creating millions of jobs, facilitating technology transfer through multinational corporations, and diversifying export markets. However, this FDI-driven growth is challenging. Vietnam's increasing reliance on foreign capital exposes it to global economic volatility. At the same time, concerns persist about the quality of some investments, particularly regarding their long-term economic value and environmental impact. As Vietnam continues to position itself as an attractive investment destination, balancing the benefits of FDI with sustainable economic development and reducing dependency risks remains a critical challenge for policymakers.

4.4. Global Demand and Supply Chain Dynamics

The demand for Vietnamese goods is closely linked to global economic conditions. Economic slowdowns in key markets can lead to decreased export demand, impacting local business revenue. Conversely, periods of global growth can enhance demand for Vietnamese products, providing opportunities for market expansion. The ongoing shifts in global supply chains, particularly post-COVID-19, have also prompted Vietnamese firms to adapt their strategies to maintain competitiveness.

4.5. Technological Advancements and Digital Transformation

The global digitalization and technological innovation trend has spurred growth in Vietnam's fintech sector. This sector is rapidly evolving, driven by changing consumer behaviors and the need for more efficient financial services. However, regulatory frameworks are still catching up, and there is a pressing need for improved regulations to support this growth while ensuring financial stability.

Digital transformation continues to be emphasized, with a focus on AI applications. Many banking operations have been fully digitized, allowing customers to perform 100% of transactions through digital channels. Digital payment methods continue to grow strongly. The number of payment transactions via Internet and mobile banking channels grew by 54.77% and 59.86% in 2023, with value growth of 6.5% and 12.73%, respectively. The fastest growth rate belongs to payments via QR code channels, with growth in transaction volume and value reaching 242.46% and 157.2%, respectively, in 2023. Notably, the cross-border payment system via QR Code between Vietnam, Thailand, and Cambodia was connected in 2023.

4.6. Green Finance Initiatives

Vietnam is increasingly focusing on green finance as part of its commitment to sustainable development. The global push for sustainability has led to the development of green financial products like green bonds and sustainable investment funds. This trend aligns with global sustainability goals and attracts international capital, further integrating Vietnam into the global financial system.

The trend of developing green finance and green banking is spreading. The demand for investment in green financial products is very high from insurance companies and fund management companies, helping the green bond market to have much room for development. Green credit accounts for 4.5% of the total outstanding loans of the entire economy, with 47 credit institutions participating, of which green credit balances are mainly concentrated in renewable energy, clean energy (accounting for nearly 45%), and green agriculture (over 30%).

In August 2023, the State Securities Commission collaborated with the IFC to launch the Greenhouse Gas Emissions Reporting Handbook. As a result, 44% of Vietnamese enterprises have started implementing part of ESG, 80% of enterprises plan to identify/implement ESG commitments, and 36% are in the planning stage of ESG for the next 2-4 years. Besides, 96% of listed companies identify ESG implementation as an important sustainable goal, helping to orient development for the future.

5. CONCLUSION

In conclusion, this study demonstrates the profound and multifaceted impact of global economic trends on Vietnam's financial market development as it transitions from a centrally planned to a market-oriented economy. The research reveals that Vietnam's financial markets are highly responsive to international economic dynamics, particularly in interest rates, exchange rates, and foreign direct investment. The central bank's interventions in interest rates and currency markets highlight the delicate balance Vietnam must maintain between fostering economic growth and ensuring financial stability in the face of global pressures.

The significant influx of FDI, reaching $28.85 billion in 2023, underscores Vietnam's growing integration into the global economy while exposing its vulnerabilities to international economic fluctuations. Furthermore, the emergence of fintech and green finance initiatives in Vietnam's financial landscape reflects the country's adaptability to global technological and sustainability trends.

This research contributes valuable insights into how emerging economies like Vietnam navigate the complex interplay between domestic financial market development and global economic forces. It underscores the need for flexible and adaptive policies that respond to international economic shifts while pursuing sustainable domestic growth. As Vietnam continues its economic transition, the lessons drawn from this study may prove instrumental for policymakers, investors, and researchers in understanding and anticipating the challenges and opportunities ahead in the evolving global economic landscape.

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THE IMPACT OF INFORMATION TECHNOLOGY ON INTERNAL AUDITING IN VIETNAMESE COMMERCIAL BANKS

Do Thi Huong[a*], Nguyen Thi Mai Huong[b], Nguyen Tien Hung[c]

[a]Industrial University of Ho Chi Minh City;
Ho Chi Minh University of Banking, HCM City, Vietnam

[b]Ho Chi Minh University of Banking, HCM City Vietnam

[c]HaNoi University of Mining and Geology, Hanoi, Vietnam

**Corresponding author: huongdt@hub.edu.vn*

Abstract: *According to the "3 lines of defense" model, internal audit is a third line of defense responsible for anti-fraud activities in the enterprise risk management system. It identifies gaps in the audit system and applies corrective measures to close those gaps for direct reporting. The productivity of the auditor, as well as the audit functions, can be improved by using automated techniques. In this paper, the approach followed through this research using qualitative research methods to collect, synthesize, and summarize results obtained from previous studies; we will focus on the impact of information technology on internal auditing support banking transactions. The most important questions we will discuss are: (i) Understand the Role of Information Technology in Internal auditing; (ii) Analyze the impacts of information technology (IT) on internal auditing (IA) in Vietnamese commercial banks.*

Keywords*: Information technology, Digital transformation, Internal audit, Commercial banks.*

1. INTRODUCTION

The Fourth Industrial Revolution (Industry 4.0) has had a strong impact on many fields, especially the finance and banking sectors; Vietnamese commercial banks have been actively integrating advanced technologies such as Artificial Intelligence (AI), Machine Learning (ML), Cloud Computing, Big Data, and the Internet of Things (IoT) into their operations. These technologies are used to evaluate and classify customers, make disbursement decisions, and assist customers more efficiently. Banks can provide faster and more efficient services by simplifying processes and procedures and reducing transaction times. Additionally, the collaboration between commercial banks and Fintech companies has been crucial in upgrading operational methods and processes and offering advanced products and services. This partnership is helping banks transition to new business models more adaptable to the digital age. The integration of technology allows banks to conduct their business in a more automated and intelligent manner. This enhances their ability to deliver products and services on digital platforms and improves their capability to effectively leverage data for better decision-making and customer service (Bui & Pham, 2022).

With a population of over 98 million people and an average age of 33.3 years, Vietnam presents a highly promising market for digital transformation in the banking sector. The country's high smartphone penetration, with approximately 93.5 million

smartphone subscribers and 73.5% of adults using smartphones, creates an ideal environment for adopting digital banking services (Vietnamese News Agency, 2022).

The European Confederation of Institutes of Internal Auditing (ECIIA) report suggests that by 2027, disruptive technologies like AI could amplify existing risks and introduce new digital risks. Digital transformation tends to change the nature of existing risks and create a new type of risk: digital risk. Therefore, a bank must deploy a strong and secure system to prevent fraud. IA has the function of advising, developing plans, assessing risks, reviewing organizational and cultural accounts, assessing adversarial technology risks through innovative system visions, and preparing intuitive and dynamic reports (Deloitte, 2018).

The article synthesizes the role and impact of IT in IA and focuses on the banking sector. The results of this research will provide a foundation for the relationship between IT and IA in the operations of Vietnamese commercial banks.

2. LITERATURE REVIEW

2.1. Internal auditing

Auditing is a control method that includes a set of procedures that the auditor uses to examine the works and judge the integrity of implementing the rules and instructions. IA is an independent activity that works in various assurance services and advisory activities and is designed to improve and add value to operations in organizations. Internal audit helps the organization achieve its goals. In recent years, IA has undergone changes that have led to expanding its scope of participation and added value, further affirmed by the Institute's definition of IA.

IA has developed a widely accepted definition: "Internal Audit is an independent, objective consulting and assurance activity designed to add value and improve an organization's operations. It helps organizations accomplish their goals by providing a systematic, disciplined approach to evaluate and improve the effectiveness of risk management, control, and governance processes" (IIA, 2017).

The role of IA in the organization is as an independent observer to ensure the company's operations comply with national legal regulations, business ethics, and company operating regulations. This department is responsible for detecting errors in the enterprise's business operations, acting as a consultant, and oriented to the board of directors and the board of directors on risk control. Besides, by analyzing, checking, and monitoring the operating processes of departments in the business apparatus, they also help business owners improve weaknesses in the management and corporate governance system and provide advice to help the company operate more productively and effectively. IA is one of the consulting activities based on independence and objectivity, aiming to improve organizational operations, add value to the organization (Mocanu and Ciurea, 2019), and provide many services. Organizations need assurance services, consulting for senior management and stakeholders such as investors and government agencies, and helping them properly understand opportunities and tasks (IIA, 2020). With the development of technology, business expansion, and the

development of regulations governing the auditing profession, the role of IA has shifted significantly from its traditional function of preventing fraud and protecting the assets of the auditing profession. Organizations to perform other related functions. To preserve institutions by adding value to them and evaluating their performance and organization (Hazaea et al., 2020).

Furthermore, the role of IA expanded to include consulting, developing plans, assessing risks, reviewing organizational and cultural accounts, and assessing the risks of adversarial technology. This can be done by developing an innovative system vision and preparing visual and dynamic reports (Deloitte, 2018). That is why the American Institute of Internal Auditors has promoted the profession of certified internal auditor, made it professional and advanced, and created systems, rules, guidelines, and regulations - issue international standards (norms) for control, auditing, and internal auditors.

2.2. Role of Information Technology in Internal auditing

Information technology (IT) is a set of tools and processes used to collect, process, and store information. Programming, storage, retrieval, analysis, system monitoring, and data transformation are among the most essential tools in information technology. Information technology also includes communications and automation. Madhar & Almaktoomi (2022): "IT is a set of tools and processes used to collect, process, and store information. Programming, storage, retrieval, analysis, system monitoring, and data conversion are among the most important tools in information technology. Information technology also includes communications and automation."

Digital technology is a further development of information technology, allowing faster data processing and large capacity transmission at lower cost. This breakthrough development in technology has allowed for comprehensive and comprehensive digital transformation, something that was not possible before. Digital technology can be considered in two aspects: hardware and software construction. Specifically, building application software with multimedia, social networks, e-commerce platforms, online shopping, and payment services; building hardware from mobile devices and automation systems to storing and processing information data, Big Data, Cloud Computing, etc. According to Schwertner (2017), digital transformation is a business change. Changing business models based on technology applications enhances competitive advantage and increases revenue and operational efficiency. According to Lugovsky (2021), for banks, digital transformation is the transition to digital customer services through the Internet environment and a change in culture, organization, and business management activities through the application of modern technologies. So, IT plays a significant role in achieving the effectiveness and efficiency of operations. Information technology helps to provide information in a timely manner and increases the accuracy of information. It also works to improve and facilitate additional information analysis and reduce the risk surrounding control procedures.

Around the world, banks are increasing their technology budgets, and technology costs have increased over the years (Greer

& ctg, 2019). In Vietnam, according to (Nguyen. D. T et al., 2021), spending on technology has a positive impact on the net interest income ratio. Domestic commercial banks have deployed many advanced technologies in banking operations, such as AI, ML, Cloud Computing, Big Data, and IoT, to evaluate, classify customers, and decide on disbursement or help simplify processes and procedures and shorten transaction time. The development of digital technology is gradually changing traditional forms of banking service provision. In addition, commercial banks cooperate with Fintechs to upgrade processes and operations, provide advanced products and services, help banks transform into new business models, and integrate technology in an automated and intelligent direction to help banks conduct business and provide products and services quickly on digital platforms and exploit data effectively (Bui & Pham, 2022). New opportunities always come with new risks, and banks must establish effective risk management methods.

Using technology is one of the important fields of accounting and auditing information system research; technology has gained increasing importance in all fields in recent times (Rajhans & Rajesh 2014). Accordingly, research in this field has evolved over time by developing concepts for studying new factors, which can provide a better explanation for the phenomenon of technology adoption and use. Various studies have indicated that a motive for using information technology is a desire to keep pace with the development. Thus, one of the axes that the study has touched upon is the factors affecting the use of information technology in audit processes; the study has also identified the theories examining the relationships that affect the behavior of audit technology adoption. It has been noted that various theories can be individual and organized, as well as organizational and explanatory. These theories are as follows: the unified theory of acceptance and use of technology (UTAUT), two proposed models for successful adoption of computer-assisted audit techniques (CAATs), the proposed model for identifying a level of the use of computer-assisted audit techniques (CAATs) and the modified unified theory of acceptance and use of technology (UTAUT2) in addition to Individual -Technology, Organization, and Environment (I-TOE) Framework as well as the unified technology readiness and cultural, technological, organizational and environmental model (UTR-CTOE Model).

In the digital age, internal auditors have new jobs, ensuring the reliability of computer networks and large data processing (Almomani & Alebbini (2021). IA is performed based on risk orientation, and in business activities, IT plays an inseparable role in all operations. Therefore, IT risks are indispensable when assessing a business's operational risks. According to Article 2, the IIA's Global Technology Audit Guide (GTAG) (IIA, 2017) clearly states: "The Chief Internal Auditor (CAE) needs to be able to assess IT governance capabilities and structures in handling Manage data for businesses and improve the efficiency of IT operations. Studies have shown that IT governance will lead to improved business performance as well as better alignment between IT systems and business operations in achieving strategic goals. The use of IT in auditing also needs to be compatible with the bank's digital transformation strategy to

bring high efficiency to the work of internal auditors because, according to Oluoch (2022), when researching 42 commercial banks Commercially in Kenya, the use of IT in internally audit is essential as it improves audit efficiency and effectiveness in organizations. The study also recommends using CAAT applications in internal audit activities to achieve greater efficiency. Omer Ali and Nashat Majeed (2017), this study talks about the role of IT in terms of ways and means of auditing indirectly in the accounting profession and directly in the auditing profession that complements the accounting profession. It also talks about the audit profession as a social profession that serves the community. In addition, the variables and influences that affect the audit profession include (i) IT helps to develop the audit profession and reduce problems; (ii) IT works to reduce the audit expectations gap through methods that help increase the size of audit samples; (iii) IT is working to reduce audit risks through data processing and electronic auditing; (iv) IT reduces the cost of auditing by reducing the size of the audit team.

Therefore, IT plays a vital role in auditing, as it improves the analytical review process by studying the most critical standards. The analytical review has developed as a result of the development of IT and the use of electronic evidence, as it works to prevent distortions in financial statements. So, IT significantly impacts the efficiency of IA and improves the control methods in the IA.

2.3. The impact of Information Technology on Internal Auditing in bank.

Some studies have illustrated the impact of IT on the responsibilities and tasks of IA processes, which have changed due to the effects of the emergence of information technology as well as the transformation of information systems from paper documents into electronic transactions (Abu-Ahmed; 2007, Musa, 2008; Salehi & Husini, 2010; Moorthy et al., 2011; Honselaar, 2012). Internal Auditors use different methods to collect and analyze data, detect fraud, evaluate internal control systems, control e-commerce, and monitor operations (Glover and Romney, 1998). Technology features greatly influence technology acceptance in the IA profession by influencing system usage, perceived usefulness, and perceived ease of use (Kim & Nieschwietz, 2009). Most results of previous studies have indicated that the level of computer-assisted audit techniques is still in the early stages; these techniques are mostly limited and simple. In addition, the results have shown that the electronic techniques used mainly by the IA are electronic worksheets, progressing programs and electronic spreadsheets (Janvrin, 2008; Ismail & Abidin, 2009; Adeyemi et al., 2014; Lotto, 2014; Smidt et al., 2014; Pedrosa, 2015; Abou-El-Sood et al., 2015; Omonuk & Oni, 2015; Wu et al., 2016; Cangemi, 2016). On the other hand, the results of some studies have indicated that internal auditors use efficiently advanced computer-assisted audit techniques, and they have illustrated that information technology auditors play a role in achieving the efficiency of the use of IT (Debreceny et al., 2005; Salehi & Husini, 2010; Honselaar, 2012).

Other researchers have indicated that the role of information technology audit consultants has increased to achieve the efficiency of the use of technology in the audit process within the organization. Thus. The auditors specialized in information technology play an essential role in achieving the efficiency of using

information technology (Salehi & Husini, 2010; Moorthy et al., 2011; Honselaar, 2012; Al-Kasswna, 2023). In addition, the level of the use of audit technology varies among the different economic sectors, and there is a variation in the use of audit technology within the same economic sector. For example, in the Jordanian banking sector field of study, different levels of using audit technology exist within the same sector; some banks expand the use and application of information technology and financial technology; other banks are still in a nascent stage of this technology; other banks are reluctant to expand the use of financial technology (Adeyemi; 2005., al et Debreceny .et al., 2014; Smidt et al., 2014) due to the difficulty of dealing with data volume. Some researchers believe that automating the audit process is an urgent need because it is challenging to deal with big data volume using traditional audit methods, especially after the electronic operation of data has increased within business organizations' processes, and electronic and digital business has grown. Other researchers have indicated that auditing around the computer method has mostly been terminated because this method is not available in most accounting systems operating the data electronically.

Proper handling of resources, maintenance of records, and effective communication through IT technology are very important to ensure the completeness of the audit process and benefit the auditors (Moorthy et al., 2011). Salehi and Husini (2011) found in their study that IT causes significant changes in internal auditing, increasing IA quality. IT helps auditing by improving the quality of various aspects of IA. The study also found that IT makes auditors spend less time checking the content and accuracy of office account calculations. Deribe & Regasa (2014) studied 15 Ethiopian Commercial Banks and found that information technology is one of the factors affecting IA. This means that the IA of commercial banks using IT will improve internal audit quality.

According to Oluoch (2022), in a study of 42 commercial banks in Kenya, the use of IT in internal auditing is important because it improves the performance and efficiency of audits in organizations. The study found that the use of IT in commercial banks has increased integrity, reduced cases of fraud during audits, helped in making strategic decisions that reduced fraud in banks, and reduced the cost and time of performing internal audit processes. The findings also showed that the audit process is efficient, transparent, and accurate through the use of blockchain, cybersecurity, big data, and data analytics technology. The study also shows that the cost of purchasing, deploying, and updating CAAT applications is quite high, so many units are still considering it. However, the author recommends using CAAT applications in internal audit activities to achieve higher efficiency. Banks in Oman, especially the National Bank of Oman, provide customer services using information technology. Banking services based on information technology help banks increase customer satisfaction because of high quality and ensure the safety of banking transactions. The research results show that information technology positively affects IA and customers' views on banking transactions.

The banks are also reconsidering the competencies, agendas, and management.

In addition, the Board and its committees need to re-evaluate the quality of internal controls and internal auditing discussions. Working to determine if the board of directors committees can reach senior management and obtain correct information in many areas, such as the impact of new technologies, potential risks, risk limits, etc. They conduct annual evaluations of the internal control, compliance, and internal audit functions of the Board of Directors. The Board of Directors guides Board committees to obtain external evaluations of the compliance and internal audit functions. This review is in internal audit and compliance areas such as status, capacity, technology, policy, training, and communications. The development of IT in banks and especially its application in IA can improve the effectiveness of audit work. During the audit, internal auditors can examine data sets more quickly, look for patterns, and discover new relationships between data points that are currently overlooked, which can provide ways to explore them further (IIA, 2017). In Vietnam, in a study of joint stock enterprises in Hanoi, Tran & Nguyen, (2023) also stated that information technology helps internal auditors shorten work time and complete their work more effectively and accurately. The study will further analyze the impact of IT on internal auditing in Vietnamese joint stock commercial banks in the next section.

3. RESULTS AND DISCUSSION

3.1. The level of information technology use of Vietnamese joint stock commercial banks.

The banking sector, one of Vietnam's most important economic sectors, has witnessed significant growth in IT use and applications, particularly in financial technology. So, IT-based banking services help banks increase customer satisfaction, as they are of high quality and ensure the safety of banking transactions. It has become an indispensable factor in all organization's and enterprises' business activities and development strategies. Especially in the banking and finance sector, IT systems are increasingly integrated into all business activities, operations, management, and administration, becoming the core element of financial institutions. Consequently, the use of IT shall be accompanied by the development of internal control and audit procedures.

In the enterprise risk management system based on the "3 layers of defense" model, experts recommend that a modern corporate governance model be applied according to international practices. The IA and risk management department belong to 2 different layers of defense, with internal auditing belonging to the 3rd layer of defense with activities to ensure independent inspection and audit of the 1st layer of defense (business departments) and 2nd (risk management), reporting directly to the Board of Directors on the effectiveness of risk management and control activities. Vietnam has made a significant step forward in building the banking corporate governance structure when Circular No.13/2018 of the State Bank of Vietnam, issued on May 18, 2018, and Circular No.40/2018 of the State Bank of Vietnam, issued on December 28, 2018, and focuses on the requirement to build for yourself a model of 3 lines of defense in the organization of commercial banks, to control and prevent risks in the process of

conducting business activities. The position of IA is placed in the third line of defense, which shows that the role of IA in the management activities of commercial banks and foreign bank branches has been focused on. On January 22, 2019, the Government issued Decree No. 05/2019, which regulates internal auditing and came into effect on April 1, 2019, with the main content regulating methods of implementing IA: "risk-oriented" audit method, prioritizing focusing resources to audit units, departments, and processes that are assessed to have high levels of risk. The contents of this Decree are aimed at international practices on IA, enhancing information transparency, efficiency and effectiveness in corporate governance. Decree No.05/2019, issued by the Government on internal auditing, does not define this activity. However, the birth of Decree is an opportunity for businesses to realize the importance of implementing IA in their organizations: "IA is an indispensable part and plays an extremely important role." in the management activities of organizations and businesses today. As the business environment becomes increasingly complex and global, there is an increased need to raise governance awareness and stakeholder expectations. The challenges for the IA industry become more difficult.".

Vietnamese commercial banks have prioritized the synchronous development of IT within their operations; however, the level of investment and implementation varies among different banks. In the Readiness Index ranking for the development and application of information and communication technology (ICT Index) among banks in Vietnam (Table 2), joint stock commercial banks consistently occupy leading positions. The ongoing advancements in technological activities within these banks will significantly impact the scope of work and the application of technology in internal auditing processes.

Table 2. 10 banks with the highest ICT-Index in 2022

Bank	Technical infrastructure index	Human resources Index	Internal application index	Online Banking Services Index	ICT Index	Rating
Nam A Bank	0.8561	0.3095	0.8628	0.9501	**0.7446**	1
Techcombank	0.5847	1.0000	0.6434	0.6424	**0.7176**	2
TP Bank	0.7978	0.5242	0.6380	0.8985	**0.7146**	3
BIDV	0.6226	0.1857	0.9878	1.0000	**0.6990**	4
Sacombank	0.7337	0.4934	0.8394	0.7058	**0.6956**	5
VP Bank	0.6079	0.2780	1.0000	0.8389	**0.6812**	6
MB Bank	0.4888	0.8307	0.7450	0.6027	**0.6668**	7
Vietinbank	0.6161	0.0592	0.9474	0.9661	**0.6472**	8
Vietcombank	0.6135	0.1290	0.8481	0.8481	**0.6168**	9
HDbank	0.5809	0.4886	0.6663	0.7085	**0.6111**	10

(Source: Vietnam ICT Index 2022)

3.2. The impact of the use of Information Technology on internal auditing of Vietnamese joint stock commercial banks.

Some studies related to this issue have also shown the significant impacts of IT on IA at commercial banks, and this will be the motivation for joint stock commercial banks to pay more attention to information technology issues in internal auditing. The impact of IT on IA at Vietnamese commercial banks is that the application of technology in auditing activities not only requires the application of technology to perform audits but also requires the integration of this technology with the bank's risk management and business operations software to support IA to extract data, collect audit evidence or t remote internal auditing whenever . When interviewing many experts in rcial banks and auditing companies n et al., 2021) some comments nade: The data storage and file ement systems are not complete nchronized to be able to manage ntrol remotely; Many banks still lack nd software to support auditing while tic transactions at banks account for jority, which is one of the significant es for internal auditors, especially in ting risk-oriented IA.

tly, IT promotes capacity building of IA amese joint stock commercial banks

According to Mr. Tien Thanh, Senior Manager of IT Risk Management Consulting Services, PwC Vietnam, "For the Internal Audit (IA), the Bank's last line of defense, independently assessing IT risks and conducting audits and checks in high-risk areas is an important component that needs to be performed regularly. However, the specialized nature and specific skills

required to conduct IT audits are placing demands on the Bank's IT IA, such as standardizing processes, improving the quantity and quality of human resources, thereby effectively applying IT applications to IT IA activities." According to Ms. Nguyen Phi Lan, Deputy General Director and head of the Risk Management Department at PwC Vietnam, "Regarding technology application, the Internal Audit Information Technology department needs to be invested in and trained to use automated tools and techniques (ATTs) effectively. Automated tools and techniques in auditing are processes that support auditing through automated methods and procedures, helping to supplement or replace manual or repetitive tasks."

Dang (2022) pointed out that commercial banks need to raise awareness of all bank staff in general and internal auditors in particular, making them understand the importance of the digital revolution to the banking industry. Encourage internal auditors to study and improve their professional qualifications and scientific and technological skills to adapt to new requirements. In addition, the quantity and quality of IT audit personnel are of concern for banks. According to Circular No.13/2018 requirements of the State Bank of Vietnam - Regulations on the internal control system of commercial banks and foreign bank branches, most Vietnamese banks have at least one IT internal auditing specialist. However, the number of IT auditors should align with the Bank's scale and operations in the context of increasing IT risks. Banks must focus on the role and responsibilities of IT auditors, the size and structure of the IT internal auditing department, and the knowledge and skills of the IT auditors. Along with that, building an IT internal auditing team needs to have a suitable roadmap for finding, training, and maintaining resources in the context of a market shortage of this human resource.

Secondly, IT helps ensure independence and objectivity for IA of Vietnamese joint stock commercial banks

Circular No.13/2018 of the State Bank of Vietnam has provided more specific and detailed regulations on the level of independence and objectivity of internal auditing in banks and is consistent with international practices. Internal auditing ensures that it is the third line of independent protection in the internal control system, performing the internal auditing function as Basel prescribes. The objectivity of internal auditing is reflected in the internal auditing report. It must be carefully analyzed and based on collected data and information, or internal auditors must be honest and have the right and obligation to report to competent authorities on issues related to objectivity in performing internal auditing. Applying information technology by joint stock commercial banks will help internal auditors perform tasks automatically, achieving objective analysis and increasing work efficiency. In the study of Doan & Le (2023), it is suggested that in the near future, Vietnamese commercial banks can apply intelligent contracts on the Blockchain platform to implement control points in operations and risk management. For internal auditing, auditors in remote monitoring can set up smart contracts to detect credit risk warning thresholds such as indicators of overdue debt, bad debt, problematic credit loans, etc. In operational risk management, key risk indicators (KRIs) will be continuously updated, highly authentic, and traceable, such as money transfer transactions, customer identification, fraud, etc.

Thirdly, IT improves the performance of IA of Vietnamese joint stock commercial banks

Lai et al. (2023) identified factors affecting the effectiveness of internal auditing in enterprises in the digital transformation period. The study showed that the application of IT is one of the two factors that have the most significant impact on the effectiveness of internal auditing. The study shows that applying IT helps improve the effectiveness of internal auditing. Internal auditing using technology will help shorten the time and reduce costs.

With the strong development of information technology today, banks are providing more and more digital services, which will increase the workload of internal auditing. Hence, the synchronization of information technology is an urgent requirement.

In accordance with Circular No.13/2018 of the State Bank of Vietnam, most Vietnamese banks have at least one staff member specializing in IT internal auditing. IT audit collects and evaluates evidence to determine that an IT system has been designed to maintain data integrity, protect assets, enable the organization's objectives to be achieved effectively, and use resources optimally. The overall aim of an IT audit is to evaluate the IT system of the audited organization to determine the timeliness, accuracy, completeness, and reliability of information output, as well as ensure the confidentiality, integrity, availability, and reliability of data, as well as compliance with legal requirements and relevant regulations. Nguyen & Doan (2021) conducted a case study at two banks: the Vietnam Joint Stock Commercial Bank for Investment and Development (BIDV) and the Military Commercial Joint Stock Bank (MB) in IT audit activities. Assessing IT audit activities, it can be seen that commercial banks have achieved some initial results specifically: IT audit activities have received close attention from the Board of Directors, and units in the entire system; The audit system and process have been built and increasingly improved; The IT audit team has been formed and increasingly improved in terms of capacity and qualifications; IT audit has contributed to improving the quality of risk management and the quality of operations at the bank. Besides the advantages, there are still difficulties and shortcomings, such as The audit scope is too broad, making it difficult to determine the focus and may miss risks. Banks are often confused when choosing methods and tools to assess risks. The IT field frequently changes in technology and system architecture, causing auditing activities to change constantly, causing pressure on time and effort, and reducing management efficiency. The IT audit human resources are still lacking and weak.

That assessment is similar to Nguyen's research results. Nguyen et al., (2021) currently the level of technology application in internal auditing activities of Vietnamese commercial banks is still low. Internal auditing lacks application tools and information technology systems to support effective internal auditing activities. Internal auditing is not currently equipped with application software to help manage audits to be performed consistently and ensure quality, nor is there a monitoring system to warn of early signs of abnormalities in some high-risk departments of the bank. Auditing activities still need to be performed entirely manually, without applying modern technologies, partly because the bank's information technology system cannot meet the requirements if the activities are digitized, and partly because applying advanced technologies encounters problems with investment capital.

Fourthly, IT improves the quality of IA of Vietnamese joint stock commercial banks

The role of IA must meet the increasing expectations of the Board of Directors and the Board of Supervisors of the bank to help the bank cope with risks, seize opportunities in compliance with legal regulations, and provide adequate information to support the decision-making process of the Board of Directors. The role of IA needs to change in quality and quantity, from being just an "auditor" with the role of ensuring independent assessment to make proposals and recommendations to becoming a "trusted advisor" with the role of consulting and creating value through enhancing the value of IA activities, focusing on achieving compliance goals, efficiency and economy for banking activities (Nguyen et al., 2021). Therefore, banks can meet international standards on IA and keep up with the roadmap for Basel II implementation in Vietnam. With the practical benefits that digital transformation brings to the internal auditing industry in banking, such as optimizing work efficiency, creating a better working environment, and storing data securely, the banking industry needs a strategy to develop internal auditing human resources. A good IA team not only helps banks detect risks in a timely manner but also provides honest and objective information and confirms the correctness, compliance with the law, effectiveness, and efficiency in mechanisms, policies, business processes, and banking operations, thereby helping to make appropriate and effective management and operation decisions. A strategy with a long-term vision and a systematic human resource development roadmap is a prerequisite for successfully implementing effective human resources work in line with the industry's general goals and orientations. Researchers also suggest some modern technologies applied in internal auditing: Computer-assisted audit technique (CAAT); Data analysis; Robotics Process Automation (RPA); Big data, artificial intelligence (AI), Blockchain, Robotics Process Automation... Automated tools and techniques allow IT auditors to increase personal productivity as well as the productivity of the audit team, improve the quality of audit results and fraud investigations, support design testing procedures or operational testing at checkpoints that do not have clear audit trails, or have large datasets and sample sizes.

4. LIMITATIONS

This current study was limited to the following: Understand the role of IT in IA and studies on the impact towards the benefits of IT on IA in Vietnam Joint Stock Commercial Banks from Circular No.13/2018 of the State Bank of Vietnam issued. However, the use of IT in IA operations is considered to be somewhat acceptable. It is. It is different from the progress in its use in providing banking services. In the future, studies can conduct quantitative research to clarify the comments made in this study, such as Measuring the extent to which information technology is used in auditing processes (planning, implementing control tests and basic tests, preparing the audit report, and implementing analytical procedures and detailed tests); or Factors affecting the level of use of information technology tools in auditing processes according to different organizational characteristics (the degree of automation of information systems, according to different auditing methods, according to the different method of data operation, the presence of internal auditors specialized in technology).

5. CONCLUSIONS

The study has shown that information technology impacts auditing in Vietnamese

joint stock commercial banks, especially in the current digital transformation period. To effectively implement the digital transformation strategy, joint stock commercial banks need the attention, support, and investment of state management agencies, especially the Government and the State Bank. Perfecting the legal framework related to the operation and development of the digital transformation strategy of the banking industry. The legal corridor must ensure an entire ecosystem (State management agency - bank - customer - related third party). Commercial banks must actively change their business model towards multi-channel integration and financial technology innovation, aiming to build a comprehensive ecosystem for banks to apply modern business models, shorten operational processes, and streamline personnel. Thereby helping banks save costs, increase convenience in banking operations, and move towards innovation in customer experience. New technologies such as AI, continuous auditing, Blockchain, Robotics Process Automation, etc., should be studied and applied in banks to increase analytical capacity, risk warning, and bring higher efficiency to internal auditing activities. Investing in technology in this area of activity may increase initial costs for banks but will bring overall benefits in the long term. Building an IT internal auditing team also needs a suitable roadmap for finding, training, and maintaining resources in conditions where the market is lacking in this human resource.

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OTHER ISSUES

MINING IN ROMANIA. RESEARCH EXPERIMENTS AND FIELD INVESTIGATIONS

Susana Arad[a*], Victor Arad[b]

[a]University of Petrosani, 20 Universitatii str., Romania

[b]Romania Academy of Science, Bucharest, Romania

**Susana Arad: susanaarad@yahoo.com*

Abstract: *In Romania, various mineral deposits - gold, copper, lead, zinc, manganese, iron, and salt - were mined from ancient times. Archaeological evidence suggests that mining has taken place in Romania for thousands of years. Romania is known as a country with great potential in the field of mineral resources, especially crude oil, natural gas, salt, gold, silver, and ferrous and non-ferrous metals. Historically, the extractive industry in Romania has often been at the forefront of the development of this industry in Europe, offering new methods of identifying and evaluating mineral and oil resources, methods that later proved to be of major importance throughout the world. In the paper, we approach a presentation of gold, silver, and copper mining in the Apuseni Mountains. Our paper shows coal mining in general and coal mining in Valea Jiului Coal Basin has our attention in particular.*

Keywords: *mining in Romania, gold exploitation, cupper mining, coal mining, salt mining.*

1. INTRODUCTION. MINING OVERVIEW IN ROMANIA

In Romania, various mineral deposits – gold, copper, lead, zinc, manganese, iron, and salt – were mined in ancient times. Archaeological evidence suggests that mining has occurred in Romania for thousands of years. Romania is a country with great potential in mineral resources, especially crude oil, natural gas, salt, gold, silver, and ferrous and non-ferrous metals. Historically, the extractive industry in Romania has often been at the forefront of the development of this industry in Europe, offering new methods of identifying and evaluating mineral and oil resources, methods that later proved to be of major importance throughout the world.

Ore production became better organized, in Roman times, with diversification processing techniques. Romania has more than 20 billion tons of in-situ mineral resources that have not been extracted (source ANRM-National Agency of Mineral Resources): non-ferrous ores, 2.21 billion tons, ferrous ores, 58.6 million tons, salt 16.96 billion tons, non-metalliferous 292.8 million tons, sand and gravel 456.9 million tons, other ornamental rocks 34.5 million tons, of which 6.39 million tons are marble, Coal mining currently provides 20-22% of Romania's electricity power needs.

In the last 150 years, were collected data on mineral deposits and mining potential for Romania. All areas of interest were covered. Furthermore, several minerals have been identified for the first time in the fields in our country, such as the element tellurium, discovered in gold ore deposits in the Metalliferous Mountains.

More than 80 minerals are extracted from underground and open pit operations: from igneous, metamorphic, and sedimentary rocks, to salt, coal, aluminium, rare metals, copper, and uranium. The open pit, open cast, and underground mines are spread over the entire territory of Romania and most

of them have been in operation for many years.

In the paper, we approach a presentation of gold, silver, and copper mining in the Apuseni Mountains. We show some aspects of the Mining in the Maramures and Bucovina Regions as well as uranium history. Coal mining in general is presented and coal mining in Valea Jiului has our attention in special.

2. MILESTONES OF MINING ACTIVITIES IN ROMANIA

• The first documentary attestation of mining in Romania was at Roşia Montană - Alburnus Major and dates from 131 AD. Romania still holds some of the largest gold reserves in Europe.

• The first mine in Valea Jiului Coal Basin was opened in 1840, in 1989, 50,000 miners still worked in 15 mines. Almost the entire industry in the area was directly and indirectly related to the mining operations.

• In 1990, almost a million people worked in the mining sector and related horizontal industries in the five mining areas of Romania: Valea Jiului- Deva-Ghelari-Teliuc, Targu Jiu-Rovinari-Motru, Maramureş - Baia Mare, Moldova, and Muntenia; more than 650,000 employees were laid off between 1995 and 2007 when 556 mines were closed.

• In 1997, as part of the restructuring process of the national energy producer system, approximately 20,000 miners from the National Company of Bituminous Coal Valea Jiului, the largest mining company in Romania, were laid off at their request.

• The restructuring programs led to the loss of over 40,000 jobs out of the over 50,000 existing in the mining industry.

• At Rosia Poieni we have our country's largest disseminated deposit of copper and gold. The copper reserves represent more than 65% of the total copper in Romania.

• At Roşia Montană, the extraction of gold from the veins deposit of the Cârnic Mountain area took place from 1746 -1749. After 1796 the mine became a concession for private individuals and would operate until after the revolution of 1848 when the government took over the mining activity.

• The most important centre of gold and silver mining was formed at the end of the 19th Century in this Brad area. The Brad area was one of the largest gold producers in Europe. The production obtained, between 1884 -1911, being of 27,918,520 kg of gold.

• In 1912, the highest annual production will be obtained, 2002,350 kg of gold, of which 936,324 kg of native gold.

• During the First World War, production decreased, reaching 610,934 kg of gold in 1918.

• In the area of the Apuseni Mountains, gold-silver ores have been exploited, either by the state or by private individuals, individually or in mining associations, in the Zlatna area; Topliţa; Băita – Crăciuneşti; Abrud; Baia de Cris, Almaş, Baia de Aries, Hărtăgani and Certej.

• On some rivers of the Apuseni Mountains, in Banat, on the Nera river, mainly, but also in Moldova: the Bistriţa and Moldova rivers and Muntenia region (Olt, Topolog, Lotru, Ialomiţa rivers), gold was extracted from the alluvial sand.

3. ENERGY SECTOR. COAL MINING

In 2022, the Government of Romania adopted Emergency Ordinance No.

108/2022 on the decarbonization of the energy sector, an ordinance that was approved by Lega no. 334/2022. The Ordinance establishes the legal framework regarding the decarbonization of the energy sector, sets the deadline for the cessation of lignite and coal-based electricity production, the decommissioning schedule of the total installed capacity based on lignite and coal, and the schedule for the closure of lignite quarries and coal mines. (Arad, 2010b)

Romania's electricity production was approximately 62 TWh in 2006 at an installed capacity of 17,630 MW. Romania's natural resource reserves according to 2007 estimates:

- crude oil: 74 million tons (72 million toe). Annual production: 5.2 million tons;
- natural gas: 185 billion cubic meters (159 million toe). Annual production: 12 billion cubic meters;
- coal: 755 million tons (422 million toe). Annual production: 3 million tons;
- lignite: 1490 million tons (276 million toe). Annual production: 32 million tons;
- uranium: the existing ore reserves ensure the demand for uranium until the level of 2017 for the operation of two nuclear units at the Cernavodă Plant.

Of the electricity produced by primary agents, in 2017, coal represented 16% of all energy source production of, 14,070 thousand tons. For 2024, it is estimated to produce a quantity of electricity of 7,100,000 MWh and a coal production of 14,070 thousand tons.

Coal is both the largest source of electricity generation and the largest single source of CO^2 emissions, creating a unique challenge in transitioning to low-carbon energy systems. Coal supplies just over a third of global electricity generation, and until newer technologies are available will continue to play a crucial role in industries such as iron and steel. (Arad, 2010b)

The International Energy Agency IEA's Net Zero Emissions Scenario by 2050 envisions that all unabated coal generation ends by 2040. To get on track with Net Zero Scenario by 2050, an annual average reduction of emissions from coal-fired power plants of around 8% is needed through to 2030. To have a place as a cleaner energy source in the decades to come, governments and the coal industry need to develop and deploy less polluting and more efficient technologies, including but not limited to Carbon Capture Utilisation and Storage. Since its first publication in 2011, the IEA's annual Coal Report has served as the global benchmark for the medium-term forecast of coal supply, demand, and trade. Its analysis also covers costs, prices, and mining projects at regional and country levels by coal grade. Given coal's impact on energy supply and CO^2 emissions, it is a piece of indispensable information for those following energy and climate issues. (Arad, 2010b)

The global coal consumption, 2000-2025, is shown in Fig. 1, IEA (2022), Global coal consumption, 2000-2025, IEA, Paris. The European Union holds only around 3% of the global energy reserves and resources. The situation of national primary energy resources sees in Table 1. As at the global level, reserves and resources of coal and lignite are most significant: together they account for 94 % of the EU's remaining potential.

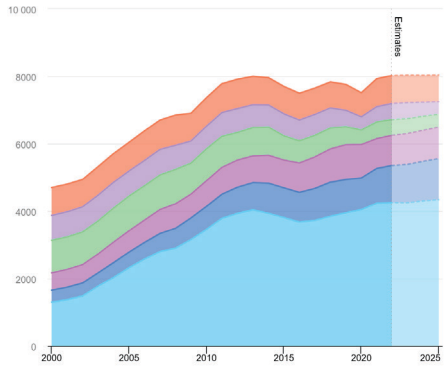


Fig. 1. Global coal consumption, 2000-2025 (IEA, 2022)

Key figures on the State of the Energy Union:

- The EU's net greenhouse gas emissions decreased by around 3% in 2022, reaching a reduction of 32.5% compared to 1990 levels;
- The EU drastically reduced its dependence on external fossil fuel: phasing out coal imports; reducing oil imports by 90%; reducing gas imports from 155 billion cubic meters (bcm) in 2021 to around 80 bcm in 2022 and to an estimated 40-45 bcm in 2023.

Table 1. The situation of national primary energy resources

Fossile fuel	Reserves						Yearly estimated output
	Reserves		Exploitable under concession		Within new perimeters		
	Million tons*	Million. tep	Million tons*	Million tep	Million tons*	Million. tep	Million tons*
Hard coal	755	422	105	38,8			3,3
Lignite	1490	276	445	82,4	1045	133	32
Crude Oil	74	72	n.a	n.a	n.a	n.a	5,2
Natural Gaz	185	159	n.a	n.a	n.a	n.a	12,5
Nuclear energy	n.a	n.a	n.a	n.a	n.a	n.a	n.a

*natural gas exclusively expressed in billion cubic meters

3.1. Oltenia Energy Complex S.A.

The company "Oltenia Energy Complex SA" has as its object of activity the production of electric and thermal energy based on lignite and extraction and preparation of lignite. The Oltenia Energy Complex SA company was established by the provisions of the Decision of the Government of Romania in 2011 regarding some measures to reorganize electricity producers under the Ministry of Economy, Energy, and Business Environment through the establishment of the commercial company, Oltenia Energy Complex S.A., through the merger of companies: the Complexul Energetic Craiova S.A. Complexul Energetic Rovinari S.A., Complexul Energetic Turceni S.A. and the National Society of Lignite Oltenia S.A. (Arad, 2013)

The European Commission has made public the restructuring plan of the Oltenia Energy Complex. In 2023, Oltenia Energy Complex S.A. produced a quantity of electricity of 6,685,170 MWh and delivered an amount of 6,060,051 MWh to the system. It is one of the most important players in the energy market in Romania, able to provide 30% of the energy consumption given in the National Energy System SEN. Coal production in 2023 was 13,307.3 thousand tons of coal. For the year 2024, the production estimation of the amount of electricity is about 7,100,000 MWh and a production of coal of 14,070 thousand tons is estimated.

Closure and preservation of production capacities (energy groups) as follows:

Group no. 7 Turceni - block in conservation starting from 01.06.2023. It is available to the System Operator until 31.12.2025 when it will be withdrawn from operation by the

Government's Emergency Ordinance, GEO 19/2023.

Group no. 3 Rovinari - closed on 01.06.2023, the block being withdrawn from operation by GEO 19/2023.

3.2. Valea Jiului Energy Complex S.A.

The Valea Jiului Energy Complex, CEVJ-SA is a part of the economic operators in the field of units in the portfolio of the Ministry of Energy, with an installed capacity of 150 MW. It is the largest electricity producer in Hunedoara County using bituminous coal, Figure 2. (Arad, 2008)

The purpose of the company is the production, supply, and sale of coal-based electricity, the production, dispatch, transport, distribution, and supply of thermal energy, and the carrying out of geological research activities to the discovery of coal reserves. The exploitation of coal deposits, and maintenance of this, can operate integrated to become a main actor in the regional plan by exploiting with maximum efficiency the potential that Romania has in the field. Electricity is produced within the Paroşeni Electrocentrale Branch and is supported, mainly by the coal resulting from the extractive activity of 4 mines which are still active, from the Valea Jiului region, namely Lonea, Livezeni, Vulcan, and Lupeni Mines. Between January and October 4, 2023, the mining activity was managed by the Hunedoara Energy Complex. From October 5, 2023, the mining activity was taken over by S.C Valea Jiului Energy Complex (CEVJ), according to the order of the Ministry of Energy no. 1227/2023.

According to the annual general exploitation programs, the amount of coal extracted for the safety of the deposit in 2023 was 128,369 tons of coal, of which 128,871 tons were made, which represents a percentage of 100.4%. Suitable to the General Program for Exploitation of Mining branches within S.C. CEVJ., the amount of coal planned to be extracted to secure the deposit in 2024 is 122,000 tons, which represents an amount of 439,054 Gcal.



Fig 2. The Valea Jiului Energy Complex

The closure plan of coal mines that are already included in the closure program authorized by the European Commission pursuant to Council Decision 2010/787 of 10 December 2010 on state aid to facilitate the closure of non-competitive coal mines, will be subject to re-notification by the European Commission for changing the closing dates and extending the state aid granting period.

4. COPPER MINING IN THE APUSENI MOUNTAINS

Roşia Poieni is the largest surface exploitation of copper. The copper deposit at Roşia Poieni is estimated at 900,000 tons of copper. The chosen technological process must also allow for silver recovery as well. Copper Mining in the Apuseni Mountains by implementing the Roşia Poieni open pit, the largest surface exploitation of copper, which produces ore from which 5,000 tons of copper can be extracted per year and is operated by the state company CupruMin SA, Fig. 3.



Fig 3. Roşia Poieni Copper Mining Complex

The copper reserves represent more than 65% of the total amount of copper in Romania. At Ro ia Poieni we have the largest disseminated deposit of copper and gold in our country. The copper deposit has formed a vertical body with a height of 1200 m and an elliptical horizontal section with 600 m and 800 m dimensions. The copper minerals are contained in andesitic rocks and subsidiarily in sedimentary rocks, the mineral particles being finely dispersed throughout the structure of the deposit. The useful part of the deposit is made up of copper minerals, including over 1 billion tons of ore with a content of 0.36% Cu and 1.8% S. The Roşia Poieni Copper Mining Complex was established in 1977. The open pit began in 1978 in the Abrud -Bucium area and copper production started in 1983. The deposit is administratively located in Lupşa commune territory, Alba County.

CupruMin SA Abrud is a company with full state capital under the Ministry of Economy, with headquarters in Abrud. The main object of activity is the extraction of non-ferrous metal ores from the Roşia Poieni quarry, the preparation by grinding-flotation in the own plant, and the commercialization of the cuprous concentrate. CupruMin S.A. Abrud was established in 2002, by the separation from the National Company MINVEST Deva, and is the successor of the Roşia Poieni Copper Mining Complex, established in 1977.

The exploitation of the deposit from the Roşia Poieni is carried out in the quarry, on steps, descending with a step height of 15m, by drilling with Φ250mm drilling machines, shooting with explosives, loading with excavators, front loaders on tires, and transporting with dump trucks. Drilling methods are applied.

The mining mass extracted from the quarry will be loaded with electric excavator's type EKG 4.6 to 8 m3, front loaders type Caterpillar with a bucket of 12.5 m3, in tippers of 55 and 110 t type DAC and 91 t type KOMAKTSU and Caterpillar, which are directed as follows:

- tailings (discovered) at Cuibarului and Geamăna dumps;
- the ore is transported to the gyratory crusher KKD 1500/180, and after crushing the crushed ore is transported to the Dealul Piciorului preparation plant with a relay of conveyor belts with L=2440 m and width l=1.4 m.

There are 2 grinding-flotation lines in operation at the preparation plant, each line, having an annual processing capacity of approximately 2,000,000 t/year:

- crushing the ore extracted from the quarry from the size 0 - 1.200 mm to 0 - 300 mm in the rotary crusher type KKD – 1500/180;
- the transport of the crushed ore to the storage of the preparation plant utilizing a relay of main belts with a total length of 2,440 mm provided at the unloading end with a "Stoker" type unloading installation;

• wet grinding of the ore in two stages (semi-autogenous mill Φ 8,500 x 3,800 mm and ball mill Φ 5,200 x 8,000 mm) and its classification in batteries of hydro cyclones Φ 500 mm at a fineness of 75 ˜ 80% class -0.074 mm;

• selective flotation of the copper ore in two modernized preparation lines equipped with 17 m3 flotation cells, followed by two re-flotations of the primary concentrate (or 3 as needed). The first two re - flotations are carried out in pneumo-mechanical cells of 5.7 m^3 and the third re-flotation can be carried out in mechanical cells of 2.8 m^3 (if this is the case in terms of the quality of the copper concentrate obtained, i.e. content between 18 ÷ 20% Cu. The dosed flotation reagents are lime, collector reagents, and foaming reagents.

5. GOLD EXTRACTION IN ROMANIA

Romania has some of Europe's most important gold deposits, whose exploitation dates back to prehistoric times. The gold mineralization is distributed in three distinct areas:

• The famous "Golden Quadrangle" is located in the Apuseni Mountains.

• Baia Mare area - both being intensively exploited in the past and with possibilities of partial resumption of exploitation even today.

• The central area of the Southern Carpathians in the Lotrului Mountains.

There are three approved licenses to operate and seven exploration licenses for gold and silver, according to the data of the ANRM:

• Roşia Montană, Alba county operated by Roşia Montană Gold Corporation S.A.,

• Certej, Hunedoara county operated by Deva Gold S.A.,

• Rovina Mining Project operated by SAMAX Romania S.R.L.

Notes the two licenses are on hold: 1). The license to operate for Roşia Montană Gold Corporation S.A. has been suspended since the introduction of the town of Roşia Montană into the UNESCO heritage site in 2021; 2). The license to operate for Deva Gold S.A.- Certej was suspended by the intervention of the NGO Mining Watch Romania.

5.1. Rosia Montana Gold exploitation

The gold and silver deposits from Roşia Montană are located at the "Golden Quadrangle" in the Metalliferous Mountains - Apuseni Mountains. The gold and silver deposits from Roşia Montană are located in the Southern Apuseni Mountains, in the central-eastern part of the Metaliferi Mountains, Alba county, the Roşia-Bucium metallogenetic district. (Arad, 2000)

The first documentary attestation of mining in Romania was at Roşia Montană - Alburnus Maior dates from 131 AD, see Figure 4. Gold Extraction in Romania began during the Roman Empire. The extraction of gold from the veins deposit of the Rosia Montana, Cârnic area occurred from 1746 -1749.

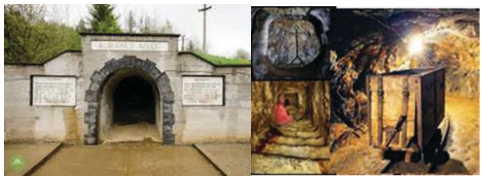


Fig 4. Gold exploitation from Rosia Montana

Gold was exploited in the Rosia Montana open pit and waste was deposited in Tailings Pond Rosia Montana. The old installations used in gold extraction from Rosia Montana are presented in Figure 5.

The auro-argentiferous deposit from Roşia Montană consists of vein structures and "volburs" or stockworks, respectively lenticular masses of breccia, cemented with metallic and gangue minerals. The ore from Roşia Montană is the biggest deposit from Romania which apart from gold, also contains significant amounts of silver. The chosen technological process must also allow for silver recovery as well.



Fig 5. Old installation in gold extraction

The Roşia Montană Mining Project could take Romania to first place among the top gold producers in the European Union. The project is operated by Roşia Montană Gold Corporation - RMGC, a joint venture between the Canadian company Gabriel Resources 76% and the Romanian state, through the company Minvest Deva 24%, Figure 6. The exploration works of the company Roşia Montană Gold Corporation (RMGC) led to the outline of a geological resource of 313.5 tons of gold from which 247.5 tons of gold are to be extracted.



Fig 6. Rosia Montana mining Project

5.2. SAMAX Romania S.R.L

This company was established in 1999 by a team of Romanian geologists after accumulating over 15 years of experience managing geological research projects.

SAMAX Romania SRL has over 25 years of experience in geological exploration and research in Romania, in exploration licenses in the Gutâi Mountains (Maramureş), Gurghiu (Harghita), the Apuseni Mountains (Alba and Hunedoara) and the Banat Mountains (Caraş Severin) which covered approximately 1,060 km^2, being the largest holder of geological research licenses from 2000-2010. As a result of the special results obtained following the geological research within the Prospecting Permit and later the Rovina Exploration License between the years 2004-2012, the entire activity of the company is focused on this project completed with the identification of three copper deposits with the content of gold, economically exploitable. On May 27, 2015, the Rovina Exploitation License was signed at the National Agency of Minerals Resources ANRM headquarters with no. 18174/27.05.2015 and on November 9, 2018, the Government of Romania approved the Rovina Exploitation License by Government Decision, a decision published in the Official Gazette of Romania no. 970 of November 16, 2018.

The Rovina Mining Project aims to exploit over 35 years the three deposits discovered by SAMAX from north to south: Rovina-Remetea, Câlnic, and Valea Gârzii-Cireşata. The first two deposits will be exploited in the open pit (in the first 17 years) and the third underground (in the 18-35 years of exploitation). S.C. SAMAX Romania SRL also undertook extensive exploration work within the Rovina Brad perimeter. The exploration work was focused on the research

of the Rovina, Câlnic, and Cireşata porphyry copper-gold deposits. The measured and indicated resources for the Rovina deposit are 271 million tons with grades of 0.46 g/ton gold and 0.21% copper.

For the implementation of the Rovina Mining Project, SAMAX started already in 2019, after obtaining the Mining License, and the approval and authorization procedures for the start of mining works. In the process of approving and authorizing the Rovina mining project, SAMAX faced a series of problems related mainly to the non-correlation of the legislative framework for the field of mining activity, non-correlation between the normative acts (Mining Law, Environmental Protection Law, Territorial Planning Law) and with the bureaucracy of public authorities.

The European Union adopted the Act on Critical Raw Materials on 7 December 2023. This act represents a significant step to ensure a sustainable supply of essential raw materials, enabling Europe to achieve its climate and digital goals for 2030. As copper is considered a strategic material and critical by the EU, SAMAX believes that the Rovina mining project qualifies under this law, given that the copper resources in these deposits are important.

The extracted ore will be processed in a simple flotation process (without using cyanide). The tailings from the preparation plant will be filtered and deposited in a dry state by dumping together with the tailings from the quarries and underground, thus eliminating the construction of classic settling ponds. This will allow a progressive ecological restoration of landfills compared to the classical option of environmental restoration at the end of exploitation.

To support the economic aspects of the project and continue the operation even in the most unfavorable economic periods, it will probably be necessary to process the entire amount of ore, avoiding sterilizing any amount of the existing mineral resources.

5.3. Certej, Hunedoara – Deva Gold S.A.

Gold mining activities have been carried out in this area for several hundred years. There are some sporadic indications from the Medieval period regarding these mining activities. Large-scale mining extraction began in the 17th Century. Mining started in the Săcărâmb area, a historical site as early as 1745. Systematic exploration and extraction activities began after 1832 leading to the expansion of mining areas throughout the Certej perimeter.

The program Deva Gold has carried on since 2000 to research the Certej deposit has led to the identification of a geological resource of 85.6 tons of gold, of which 2.6 tons of gold are in the waste dumps of old mining operations. Exploration works led to an increase of recoverable gold reserves by 4 times compared to the volume estimated before 2000.

In 2006, a series of versions for the open pit was designed. The chosen design was based on the chemical composition and the metallurgical tests. This design has generated the minimum operating costs and comprises 4 distinct mineralogical domains. The activities proposed for the exploitation of Certej will consist of a conventional open pit and will take place for 15 years. The surface area used exclusively for the mining project is 300.5 ha, 65.87%, and the surface used for the perimeter protection area of the objective is 155.7 ha, respectively 34.13%. The Certej perimeter related to Exploration License no. 435/1999, carried out geological research (prospecting and exploration) to support the Certej mining project.

The following activities are required:

- Continuation of the re-approval procedures of the mining project, "Exploitation of gold-silver ores from the Certej perimeter, Hunedoara county";
- Drilling for geological research to increase the degree of knowledge of the Certej gold-silver deposit and metallurgical tests;
- Continuation of the procedures for obtaining the environmental consent, to complete the documentation necessary to issue the authorization to start the works for the mining project "Exploitation of limestone from the Banpotoc quarry, Vărmaga perimeter, Hunedoara county";
- It is necessary to initiate a new Zonal Urban Plan for the "Project for exploitation of gold-silver ores from the Certej perimeter, Hunedoara county".

6. SALT EXPLOITATION IN ROMANIA

The exploitation of salt in Romania is done through the state company National Company of Salt Salrom SNS S.A which has 7 branches.

The main activity of Salrom-SNS S.A is the exploitation of salt and other non-metalliferous products from the perimeters for which it holds the exploitation license, as well as the preparation for sale, both on the domestic market and on the foreign market, of a varied range of products. The National Company of Salt Salrom SNS S.A. was established in 1997 by Government Decision No. 767/1997 as a result of the reorganization of the former Autonomous Administration of Salt.

The company carries out its activity through the headquarters in Bucharest, within 7 branches without legal personality as follows: Ramnicu Valcea Salt Mine, Valcea County, Slanic Prahova Salt Mine, Prahova County, Ocna Dej Salt Mine, Cluj County, Ocna Mures Salt Mine, Alba County, Targu Ocna Salt Mine, Bacau County, Praid Salt Mine, Harghita county and Cacica Salt Mine, Suceava county. (Arad, 2008; Arad, 2015)

Salt is extracted by dry method at Salt mines Ocna Dej, Praid, and Slanic Prahova. At the Salt mine Târgu Ocna, Fig. 7 and Ocnele Mari, Fig. 8, salt is extracted by dry method and wet method by dissolution. At the Salt Mine from Ocna Mure□ and Cacica, Fig. 9, salt is extracted by solution. (Arad, 2004) At Ocnele Mari Salt Mine, the exploitation of salt in solution began in Field I in the 1960 - 1961 period. In Field I, the salt was extracted by wells until 1973, when the activity was stopped. Within the Targu Ocna Salt Mine, the salt deposit is exploited in 25 wells, 6 in the eastern field and 19 in the western field. (Arad, 2010).

The exploitation of salt at Cacica Salt Mine was carried out for the first time from the salty springs, a fact documented in 1787. Salt exploitation can be achieved through dry methods or dissolution. At Slanic Prahova Salt Mine Salt is extracted by dry method, Figure 10. (Arad, 2015)



Fig 7. Targu Ocna Salt Mine



Fig 8. Ocnele Mari Salt Mine



Fig 9. Ocna Mures and Cacica Salt Mines



Fig 10. Slanic Prahova Salt Mine

Dry methods used in salt mining in Romania are:

- Operation in large trapezoidal chamber has long been a modern method, which consists of underground exploitation at certain depths, by digging horizontal opening galleries from the access bridge and extracting (vertically), from which it is dug downed (descending) by successive cuts in large operating chambers, that have different sizes, but which can reach 50-60 m deep, 30-40 m. The method was used in Targu Ocna, Slănic Prahova, and Ocna Mures. (Arad, 2009).

- Mining with small rooms and square pillars consists of small room operation, transport possibilities and total mechanization, high efficiency, no large losses in much lower piling and ceiling control possibilities, and risk avoidance. The method also allows transport by strip, which has been used most lately. It is practiced as a unique method at Ocnă Dej, Slănic Prahova, or combined at Ocnele Mari, Targu Ocna, and Praid. (Todorescu, 1986).

The secondary activity consists of the provision of tourist services and agreements intended for natural persons, etc.

The main directions of the proposed investments at the level of the National Salt Company Salrom - S.A. are:

- Investments in the modernization and efficiency of production;
- Investments for the protection of the environment and deposits;
- Investments in health and safety at work;
- Investments to maintain existing production capacities;
- Investments for the development of new products/ new services/ new business lines/ new perimeters.

Salt Extraction in Romania has the following milestones:

- In our country, salt extraction started in the time of the Dacians, before the Romans. After the Roman conquest, the exploration was done with the same interest as the exploration of gold or silver;
- The most important salt deposits in Romania are the following: Slănic Prahova, Ocnele Mari, Praid, Târgu Ocna, Cacica, Ocna Mureş, Ocna Dej;
- Five of these seven deposits are currently in operation and hold more than 12 billion tons of total geological reserves of rock salt, a quantity that can satisfy Romania's needs for several hundred years;
- Salrom is the only salt producer in Romania;
- The salt production in Transylvania grew constantly throughout the 19th century and until the First World War, reaching 134,800 t in 1900 and 210,900 t in 1912. The industrial consumption of salt had a substantial increase in the first decade of the 20th century;
- The salt will be extracted, mainly, from Praid, Ocna Mureş, and Ocna Dej. The other extraction sites like Ocna Sibiu, Turda, Ocna Şugatag, Rona, and Coşciu were gradually reducing their activity. It should be mentioned that Salina Cacica at the beginning of the 20th century produced 5,000 t of salt/year;
- Currently, Romania's salt production is around 2 million tons, while in 1989 (before the Romanian Revolution) it was 5 million tons.

7. CONCLUSIONS

The paper is generally based on studies and research undertaken in the mining sector from Romanian, especially salt mines, coal mines, and gold exploitation. We especially analyzed the Targu Ocna salt mine, Ocna Dej, Ocna Mures, Ocnele Mari, and Slanic Prahova. We aimed to support salt extraction operators in resolving situations on the edge of technological risks impacting the environment. (Arad, 2000).

The evolution of the structure of the Petrosani Depression, which is located in Valea Jiului Coal Basin, after the deposition of the Neogene sedimentary complex, took place in several tectonic phases, which led to the current configuration of the basin, a difficult structure, and hard conditions where many accidents in the coal exploitation, took place.

Based on natural factors, the deposit was classified in the III class of geological complexity, considering the degree of tectonization and non-uniformity in the development of the strata.

Fundamentally, solving the coal industry's problems will require appropriate statistical measures and accurate information. To this end, the use of intensity-based measures standards for safety improvement must be adjusted to include quantity-based safety targets

In the IT era, digitization of the mining industry is a challenge for innovation and modernization. Many papers were an opportunity to present our digital solutions in researching mining areas. (Arad, 2010a; Arad, 2007).

At the Slanic Prahova Salt Mine, we aimed to ensure the design of a large cavern, salt mining under safety conditions, support for construction and long-term cavern support systems, and soil stability in the mining area surface. (Arad, 2009; Arad, 2010a)

The design of the structural elements: rooms, floors, and pillars, as well as the forecast of the instability phenomena, are closely related to the geomechanical and technological knowledge of the salt rocks. In this respect, analytical models and numerical simulations were used. (Arad, 2000)

Based on studies undertaken, from 2004-2015 the areas of Salt mining in danger of sinking have been monitored through topographic and sonic measurements; at the same time, we predicted the evolution of these areas which was analyzed through mathematical methods based on geomechanical studies. (Arad, 2007, Arad, 2010, Arad, 2015)

Therefore, based on analytical models a forecast of the medium- and long-term phenomena was achieved. (Arad, 2006)

We analyzed for a long period of rocks coming from the Certej perimeter range within class A, according to all their determined characteristics, and may be used for the surface mining constructions and terrestrial communication road that be carried out in the Certej mining perimeter. Our research team studied and observed also Rosia Montana gold exploitation for many years.

Coal is a vital energy source because it produces electricity and is an essential fuel in steel production and other industrial activities. Coal is both the largest source of electricity generation and the largest single source of CO^2 emissions, creating a unique challenge in transitioning to low-carbon energy systems. Coal supplies just over a third of global electricity generation, and until newer technologies are available it will continue to play a crucial role in industries such as iron and steel. The exploitation of coal deposits, and maintenance of this, can operate integrated to become a main actor in the regional plan by exploiting with maximum efficiency the potential that Romania has in the field. (Arad, V., 2008) Therefore, Romania has a significant investment potential to achieve operations exploration and re-evaluation of the perimeters that have already been analyzed.

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THE ROLE OF THE INDONESIAN COAL MARKET FOR VIETNAM: PAST, PRESENT AND FUTURE

Dong Thi Bich[a*], Nguyen Thi Hoai Nga[a], Le Dinh Chieu[a]

[a]Hanoi University of Mining and Geology, Hanoi, Vietnam

**Corresponding author: dongthibich.humg@gmail.com*

Abstract: *With huge coal reserves, Indonesia is one of the world's largest coal-producing and exporting nations (Indonesia ranks 3rd in coal production and 1st in coal export). Coal of Indonesia plays an important role in balancing energy and fuel prices in Asian countries, including Vietnam. In about a decade, from 2014 to 2023, Vietnam imported more than 100 million tons of coal from Indonesia, especially in 2023, when Vietnam imported approximately 20 million tons, accounting for 37.6 percent of Vietnam's total coal imports. Using statistical data and traditional analysis methods, this article clearly shows the importance of the Indonesian coal market to Vietnam. Analysis results show that Indonesian coal has been used in Vietnam since the first years Vietnam imported this product and will continue to import coal from Indonesia in the coming time because of the suitability of both Indonesian coal and the Indonesian coal market to Vietnam.*

Keywords*: Vietnamese Coal, Indonesian Coal, Vietnam's coal imports, Indonesia's coal exports.*

1. INTRODUCTION

Coal is a finite, non-renewable mineral resource and an input material for many important economic sectors such as electricity, nitrogen, fertilizer, chemicals, etc. Vietnam is making many efforts to develop renewable energy, but in the future, coal will still play a dominant role in Vietnam's energy balance. This assertion is based on Vietnam's actual annual coal consumption (increasing from 33 million tons in 2014 to approximately 59 million tons in 2023 and Vietnam's forecast coal consumption by 2030 from 124 - 127 million tons. From 2014 to the present, the Vietnamese coal industry has exploited an average of about 40 million tons annually. With such output, the coal shortage is becoming increasingly severe. In this situation, starting in 2013, Vietnam has been searching for imported coal sources to meet the growing coal demand of the economy (Phan Ngo Tong Hung, 2017). In 2014, Vietnam imported over 3 million tons of coal, which gradually increased moderately; by 2023, the imported coal volume was over 51 million tons (General Department of Vietnam Customs). Regarding coal sources, up to now, Vietnam has imported coal from 23 countries, of which Indonesia is in the group of countries with the largest market share of coal exports to Vietnam. Also, during this period, many research projects on Vietnam's coal imports, including research on Indonesian coal, were conducted. The authors of these studies are leading experts in the Vietnamese coal industry, such as Nguyen Thanh Son, Phan Ngo Tong Hung, Nguyen Canh Nam... and some works by the author of this article. The issue of coal imports from Indonesia is mentioned from many different perspectives, from quantity and coal quality to coal price and lessons learned for Vietnam when importing coal from Indonesia. However, no research project has provided in-depth discussions reflecting the role of Indonesian coal in Vietnam. In this article, we have

analyzed and summarized information on the characteristics of the Indonesian coal industry, the situation of Vietnam's coal imports, and Vietnam's coal demand in the future, and clarified the role of the Indonesian coal industry for Vietnam in the past, present, and future. Hence, strategic proposals can be made to ensure harmony of interests in coal import-export relations between the two countries.

2. RESEARCH METHOD

In this research, the authors used a process with the following steps:



Fig 1. Research process

Secondary data was collected and selected through domestic and foreign research projects, statistical reports of Vietnam Customs, statistical reports of PwC, etc., and some legal documents from Indonesia and Vietnam. Data was processed using descriptive statistics and time series analysis methods.

3. RESEARCH RESULTS

3.1. Characteristics of the Indonesia's coal industry

Indonesia is one of the countries with the largest coal reserves in the world. It has 34,869 million tons of coal, accounting for 3.2 percent of world coal reserves and 7.6 percent of coal reserves in the Asia Pacific region-updated data as of 31 December 2020 (Energy Institute, 2024).

Indonesia's coal resources and production are mainly distributed over only four provinces out of 34: East Kalimantan, South Sumatera, South Kalimantan, and Central Kalimantan. Kutai, Tarakan, and Barito coal basins located in East Kalimantan have medium-quality coal (calorific value between 5100-6100 kcal/kg), while the Central and South Sumatera Basins have low-quality coal reserves (calorific value <5100kcal/kg) (Adiatma et all, 2018).



Fig 2. Distribution of coal basins in Indonesia

(Source: Rosyid, F. A., & Adachi, T, 2016)

Indonesia's coal resources and production are mainly distributed over only four provinces out of 34: East Kalimantan, South Sumatera, South Kalimantan, and Central Kalimantan. Kutai, Tarakan, and Barito coal basins located in East Kalimantan have medium-quality coal (calorific value between 5100-6100 kcal/kg), while the Central and South Sumatera Basins have low-quality coal reserves (calorific value <5100kcal/kg) (Adiatma et all, 2018).

Table 1. Top 10 countries in Coal reserves, production, export

TT	Reserves (2020)			Production(2023)			Export (2023)		
	Country	Millions of tons	World share	Country	Millions of tons	World share	Country	EJ	World share
1	US	248,941	23.2%	China	4,710.0	51.8%	Indonesia	10.00	**28.2%**
2	Russia	162,166	5.1%	India	1,010.9	11.1%	Australia	9.00	25.4%
3	Australia	150,227	14.0%	Indonesia	775.2	8.5%	Russia	5.39	15.2%
4	China	143,197	13.3%	US	526.5	5.8%	US	2.47	7.0%
5	India	111,052	10.3%	Australia	455.8	5.0%	Mongolia	1.96	5.5%
6	Germany	35,900	3.3%	Russia	432.5	4.8%	South Africa	1.74	4.9%
7	Indonesia	34,869	3.2%	South Africa	228.5	2.5%	Colombia	1.59	4.5%
8	Ukraine	34,375	3.2%	Kazakhstan	116.4	1.3%	Canada	0.99	2.8%
9	Poland	28,395	2.6%	Germany	102.3	1.1%	China	0.31	0.9%

(Source: Collect from Statistical Review of World Energy 2024)

Regarding coal production, Indonesia is the third country in the world and has had stable growth for many years. Indonesia continuously records increases in coal production, with an average increase in the period 2013-2023 of 5.1 percent per year (Energy Institute, 2024), except for the years 2020-2021, with the decline in domestic and global coal demand when the COVID-19 pandemic broke out, which led to coal producers decision to cut production and reduce investment. Although the coal output decreased, the amount in 2020 was still 563.7 million tons. In 2021, coal output increased to 614 million tons due to significant increases in demand and prices. In 2022, the coal production target was set at 663 million tons. Initially, Indonesian coal mining companies were expected to have difficulty achieving this target as their production plans were disrupted by coal export restrictions imposed by the government in January 2022, which aimed to solve the problem of a lack of domestic coal supply for power plants. However, coal production reached 687.4 million tons in 2022, exceeding the target due to strong global demand and sanctions on Russian coal exports to tighten the coal market in 2022. (PwC, 2023). In 2023, after China and India, coal production reached

775.2 million tons, accounting for 8.5 percent of the world's coal production. (Energy Institute, 2024)

Regarding coal exports, Indonesia has always been the world's largest coal exporter. In 2023, the country exported 508.2 million tons of coal (Indonesia's exports reached an all-time high in 2024), equivalent to 65.5 percent of coal production. Indonesia's coal exports are increasing due to huge coal reserves and large coal production, as well as Indonesia's coal export policy. The Indonesian coal market size is expected to grow at a CAGR of 7 percent during the forecast period of 2023-2029. (Indonesia Coal Market, 2023).

Most of Indonesia's coal exports are low-quality and medium-quality (less than 5,100 kcal/kg and between 5,100 and 6,100 kcal/kg calorific value, respectively). The relatively low price is due to a combination of lower-quality coal and cheap labor (Indonesia Investment, 2018).

Indonesia's coal exports are under the DMO policy (Domestic Market Obligation). DMO stipulates a minimum percentage for domestic coal consumption, which is announced by the Indonesian Ministry of Energy and Mineral Resources (MEMR) each year. Therefore, the Indonesian Government uses DMO to ensure the continuity and sustainability of coal supply in the domestic market.

MoEMR Decree No. 267.K/MB.01/MEM.B/2022 dated 21st November 2022 regarding the "Coal Domestic Market Obligation" ("KepMen 267/2022") is the latest announced decision. This decision aims to monitor the implementation of coal export regulations, meet domestic coal needs, manage revenue from coal export, etc. The main points related to coal export policy are as follows:

Firstly, the minimum ratio for domestic coal consumption is 25 percent, which means coal mining companies are allowed to export a maximum of 75 percent of coal produced during the year only.

Secondly, there is a penalty for coal mining companies that do not complete the DMO plan with money. If they do not pay the fine according to regulations, depending on the late payment time, the following can be applied: Prohibit coal exports for a maximum period of 30 days. After 30 days of non-payment, all production activities will be temporarily suspended for a maximum of 60 days. After 60 days of incomplete suspension, IUP/IUPK will be revoked, or CcoW (Coal Contract of Work) will be terminated.

For export coal price: Indonesia instructs mining companies to determine export coal prices based on standard coal price HBA and the specific quality of each type of exported coal. According to Article 17 PerMen 7/2017 dated 11th January 2017 of the Minister of Natural Resources and Energy of Indonesia, for term coal delivery contracts, long-term coal selling price is determined based on the average standard price of the previous three months, specific calculation formula:

+ 50% HBA in the month of contract signing,

+ 30% HBA one month before signing the contract,

+ 20% HBA two months before signing the contract.

In addition, since 2014 Indonesia has planned port clusters to serve coal exports with 14 ports as follows: 4 ports in East Kalimantan (in the Balikpapan; Adang; Berau; and Maloy Bay areas); 3 ports in South Kalimantan (Tobaneo/Pulau laut

ports; Sungai Danau; Batu Licin); 1 port in East Java (Lampung-Tarahan); 6 ports in Sumatra (Tanjung Api Api port; Bengkulu port; Jambi bay; Riau bay; Padang port; Aceh Selatan port). Since then, Indonesia has had specific regulations related to coal export through the above ports. For example, Coal export must go through main ports; coal transshipment must be carried out around main ports, main coal ports must have specific addresses, etc. (Cecilia Quiambao, 2014).

With huge coal resources, large mining capacity, and a clear coal export policy, Indonesia has been and will continue to be a major coal exporter in the world.

3.2. Vietnam's coal consumption and imports

+ Vietnam's coal consumption

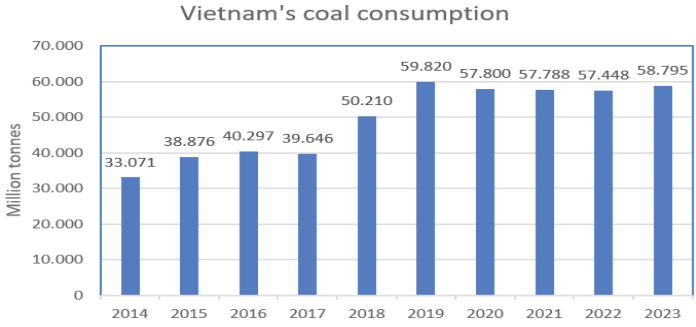


Fig 3. Vietnam's coal consumption in the period 2014-2023

(Source: Annual summary report of Vinacomin and Dong Bac Corporation)

Vietnam's domestic coal consumption has increased rapidly from 33 million tons in 2014 to approximately 59 million tons in 2023, an average annual increase of 7.1 percent, of which coal is mainly used for electricity production at a high rate of growth and accounting for a high proportion (over 70%) of total coal consumption.

+ Vietnam's coal imports

Table 2. Vietnam's coal imports from 2020 to the end of May 2024

Unit: tons

Year	2020	2021	2022	2023	T1.2024	T2.2024	T3.2024	T4.2024	T5.2024
Total	***54.811.643***	***36.376.375***	***31.704.485***	***51.158.858***	***5.077.771***	***4.175.670***	***5.433.113***	5.895.665	6.497.023
Among them:									
Australia	20.339.182	15.601.636	16.905.891	19.889.709	1.277.736	1.910.239	1.078.395	1300.111	1.428.148
Indonesia	16.848.470	14.750.619	10.306.930	19.257.469	1.584.199	1.653.304	2.144.800	2.591.925	3.399.238
Russia	7.614.999	3.588.815	2.223.929	4.375.526	587.667	325.414	509.166	553492	500.862
China	269.856	506.233	647.699	341.768	20.605	43.433	38.462	64194	101.744
Other Country	9.739.136	1.929.072	1.620.036	7.294.386	1.607.564	243.280	1.662.290	1.385.943	1.067.031

(Source: General Department of Vietnam Customs)

The amount of Vietnamese coal imported from Indonesia is increasing. In 2021 and 2022, coal imported from this country decreased due to the impact of the Covid 19 epidemic. In 2023, coal imports from this country increased, nearly double that of 2022. In the first five months of 2024, coal imported from Indonesia reached approximately 11.4 million tons, and Indonesia became Vietnam's most significant coal import source.

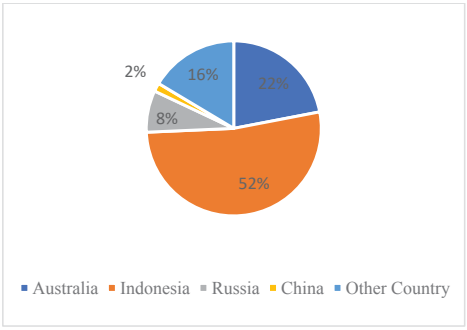


Fig 4. Vietnam's coal import proportion by country in May 2024

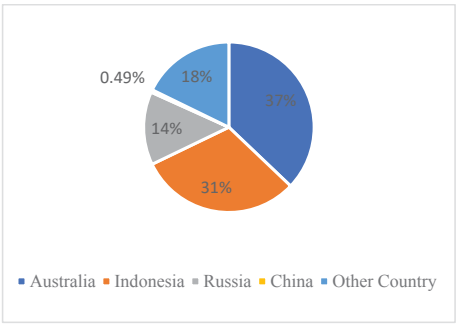


Fig 5. Vietnam's coal import proportion by country in 2020

+ Vietnam's coal demand forecast for 2045

Table 3. Forecast of Vietnam's coal demand to 2045

Unit: Thousand tons

TT	Scenario	2025	2030	2035	2040	2045
I	BASE SCENARIO					
1	Electricity	62.790	91.970	83.940	72.527	42.889
2	Final energy	30.481	30.748	27.808	22.862	16.152
3	Non-energy	1.359	1.653	3.012	6.437	14.262
	Total domestic demand	**94.629**	**124.371**	**114.760**	**101.826**	**73.303**
II	HIGH SCENARIO					
1	Electricity	64.268	92.889	85.142	73.615	43.223
2	Final energy	31.406	32.429	29.811	24.883	17.914
3	Non-energy	1.835	2.232	3.716	7.293	15.304
	Total domestic demand	97.509	127.550	118.669	105.791	76.441

(Source: Nguyen Canh Nam, 2023)

Demand for primary energy, including coal, will continue to increase, peaking in 2030-2035. Then, it will gradually decrease because many coal-fired power plants will stop operating after 2035, which is consistent with the energy industry development roadmap. It is forecasted that Vietnam's coal demand will range from 94 to 97 million tons in 2025 and increase to a peak of about 125 to 127 million tons in 2030. By 2045, coal

demand will decrease to 73 to 76 million tons annually (Nguyen Canh Nam, 2023).

Based on resources, reserves, geological conditions, and mine exploitation technology, it is expected that the ability to exploit coal (raw) will increase in the period from now to 2030, reaching 48 to 55 million tons per year, then gradually decrease to about 51 - 52 million tons in the period 2035 - 2045. To meet the demand for coal to serve the economy's production, Vietnam is expected to import about 51 - 83 million tons in the period 2025 - 2035 and gradually reduce to about 32 - 35 million tons in 2045.

Table 4. Forecast of Vietnam's coal import demand to 2045

Unit: Thousand tons

TT	Scenario	2025	2030	2035	2040	2045
I	BASE SCENARIO					
1	Domestic production	45.829	46.073	42.264	42.021	44.581
A	Serving exports	2.270	2.127	2.024	1.891	4.135
B	Serving domestics	43.559	43.946	40.240	40.130	40.446
2	Total domestic demand	94.629	124.371	114.760	101.826	73.303
3	**Demand for coal import [(1)-(2)]**	**51.070**	**80.425**	**74.520**	**61.696**	**32.857**
II	HIGH SCENARIO					
1	Domestic production	45.829	46.073	42.264	42.021	44.581
A	Serving exports	2.270	2.127	2.024	1.891	4.135
B	Serving domestics	43.559	43.946	40.240	40.130	40.446
2	Total domestic demand	97.509	127.550	118.669	105.791	76.441
3	**Demand for coal import [(1)-(2)]**	**53.950**	**83.604**	**78.429**	**65.661**	**35.995**

(Source: Nguyen Canh Nam, 2023)

4. DISCUSSION

In this study, we examine the characteristics of the Indonesian coal industry and the situation of coal consumption and import in Vietnam. Therefore, we discuss the advantages of the Indonesian coal industry and the orientation of coal imports in Vietnam.

About the advantages of the Indonesian coal industry

Indonesia has large coal reserves, high production capacity, and the highest coal export rate in the region and the world. Indonesia's coal resources are in a favorable geographical location and easy to transport because the coal transportation

system is invested in and operates well. Indonesian coal has high calorific value, low fly ash level, and coal diversity. It allows blending with higher calorific value coal to produce ones with a desired calorific value that can still comply with environmental emission standards and is suitable for electricity production. Indonesian coal prices are lower than other countries, and coal trading policies and processes are quick and flexible. Indonesia's coal export policy is quite clear. Indonesia also focuses on exporting coal to Asian countries because it realizes the increasing demand for coal and the convenience of transporting coal.

Regarding Vietnam's coal import orientation

With the two coal import scenarios given in Table 4, it can be seen that the imported coal volume will follow the high scenario or possibly higher. Because the imported coal volume in 2023 had already reached over 51 million tons. Vietnam imports coal mainly for electricity production. Therefore, coal from Indonesia has suitable quality and price; in the future, Indonesian coal will be the most appropriate coal source for Vietnam. Negotiating and signing a coal purchase contract with Indonesia will be more favorable because the cooperation between Vietnam and Indonesia has been going on for a long time (2014); the two sides have a clear understanding of the market, the terms of the contract, the pricing mechanism and many other related issues. The good political and economic relationship between Vietnam and Indonesia is an important basis for long-term and stable cooperation in coal import activities.

5. CONCLUSION AND RECOMMENDATIONS

The above analysis shows that Indonesian coal has played and will play a critical role in Vietnam's energy balance. To have long-term cooperation and ensure the harmony of interests of the parties involved, Vietnam needs to conduct certain studies and adjustments to have a stable source of imported coal to meet the increasing demand for coal consumption. In addition, on the Indonesian side, Vietnam also expects this country to have a stable coal export policy with transparent and quickly updated related information. To move towards the harmony of interests and establish a sustainable relationship for coal import and export activities between the two countries, the group of authors has some recommendations as follows:

On the Indonesian side: (1) Create conditions for Indonesian businesses to sign stable and long-term coal supply contracts with Vietnamese partners. Stability in coal supply contracts includes stability in type, quality, quantity, and price. (2) Provide complete and timely information about coal trading enterprises to limit risks for the Vietnamese side in case the Indonesian Government revokes business licenses of enterprises due to violations or incapable enterprises of coal export activities. (3) When issuing a temporary coal export prohibition according to the DMO regulations, consider allowing exports for coal contracts that have already been signed between Vietnamese enterprises and coal exporting enterprises from Indonesia, limiting damage for coal exporting enterprises on the Indonesian side and importing enterprises on the Vietnamese side.

On the Vietnamese side: (1) Promote foreign economic activities with Indonesia by creating legal frameworks for supply and demand businesses to cooperate officially and sustainably. (2) Select coal export partners from Indonesia with long-standing mineral business activities and practical export activities. This limits risks from coal imports and avoids negative effects on foreign economic relations between the two countries. (3) Negotiate coal import contracts with Indonesian businesses with attention to terms related to Indonesia's coal export policy, such as DMO regulations, changes in coal export price calculation methods, etc. (4) Train personnel with in-depth expertise in the field of coal import and export and knowledge-about the regulations of the Indonesian coal market. This helps both sides build appropriate import-export contracts, ensuring harmony of interests and easy resolution when disputes arise.

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DEWATERING THE CUA-ONG FINE COAL (VIETNAM) USING THE ADVANCE FILTRATION TECHNOLOGY

Pham Thanh Hai[a*]

[a]*Hanoi University of Mining and Geology, Ha Noi, Vietnam*

**Coressponding author: phamthanhhai@humg.edu.vn*

Abstract: *Cua-Ong coal-washing plant produces much coal for domestic demand and export. After washing, one of the products is fine coal, which is used for thermal power plants. This type of coal has 20-25% of residual moisture content after filtration. This issue leads to difficulties in storage, transportation, and direct utilization. To improve the dewatering efficiency after filtration, fine coal is chosen for the study. The result shows the effect of solid volume fraction and filter cake height on the residual moisture content using conventional pressure filtration (CPF) and steam pressure filtration (SPF). The optimal operational parameters are suggested. Furthermore, some tests with the whole circle steam pressure filtration are conducted to show the residual moisture content reduced to 12%.*

Keywords: *fine coal, Cua-Ong coal washing plant, steam pressure filtration, conventional pressure filtration, filtration operational parameters.*

1. INTRODUCTION

Coal plays an important role in the economy and the development of Vietnam. The demand for coal for the domestic market has increased steadily every year. In five years, domestic coal demand has risen from 18 million tons (in 2007) to 24.8 million tons (in 2012). According to the master plan for coal industry development in Vietnam 2020, with perspective 2030, the total coal will get up to 60 million tons in 2020, 65-70 million tons in 2025, and 65-75 million tons in 2030. According to the balance of supply and demand, if the power plants put into operation on schedule under the master plan VII (National Master Plan For Power Development - Vietnam Government), Vietnam will need 62-72 million tons of coal, in which coal for power need 42-72 million tons, coal for other industries need 20-22 million tons. Vietnam has to import energy coal with the amount from 10-12 million tons in 2020 (Le, 2011). The supply and demand of coal are predicted for 2030, as shown in Figure 1. According to the latest National Master Plan For Power Development - Vietnam Government (Power Master Plan VIII), the coal-fired power plants still account for 30,127 MW (20% of the total capacity of power plants) with the policy of urgently completing projects already adjusted Power Master Plan VII and under construction. Therefore, it can be seen that the demand for coal power is still high, and it is necessary to prepare enough of this fuel source to ensure the country‘s energy security.

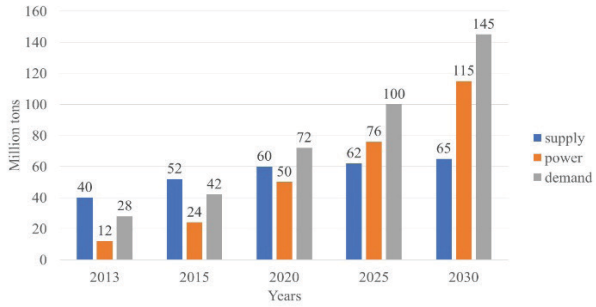


Fig 1. The predicted supply and demand of coal until 2030

Vietnam is one of the most important producers of anthracite. Currency available data show that the coal reserves in Vietnam are about 49.8 billion tons. Coals reserve are classified into a few categories (according to the Vietnam standard): measured and indicated reserves (categories A, B, and C_1) is 33 %, inferred 39 %, and prognostic resource (B) is 28 %. Vietnam has many types of coal, such as anthracite (already mined), bituminous, sub-bituminous coal, lignite coal, and peat coal. Coal is located along Vietnam such as Quangninh, Red River Delta, Mekong River Delta, etc. (Figure 2).

The most important coal basin in Viet Nam is Quang Ninh. Quang Ninh is in the northeast part of the country with an area of about 5900 km^2. Coalfields are located near the coast, so it is convenient for transportation. Coal has been exploited from 1839 to today. Figure 2 shows the main coal deposit in the Quang Ninh basin. Otherwise, the major coal mines around Campha, where supply run-of-mine coal (ROM coal) for the Cua-Ong Coal Washing Plant.

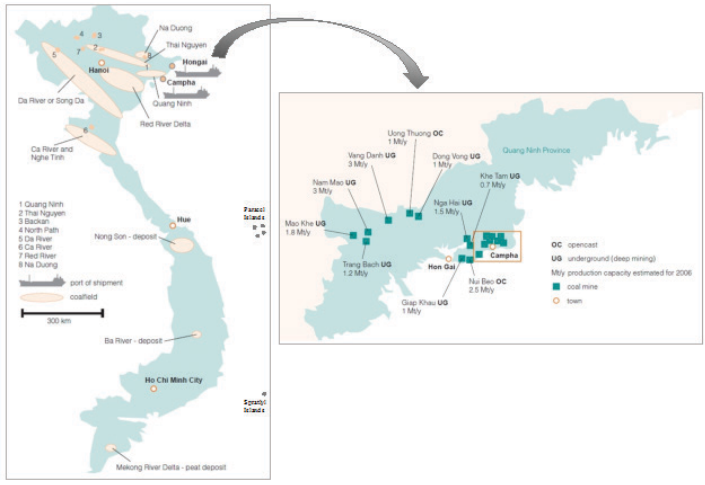


Fig 2. The distribution of coal reserves in Vietnam and Quang Ninh province (Mijal, 2018) (Baruya, 2009) (Bui & Drebenstedt, 2004) (Wolfgang Ritschel, 2007).

Cua-Ong Coal-Washing Plant (CCWP) is operated by Vietnam National Coal-Mineral Industries Holding Corporation Limited and is in northern Vietnam's Quang Ninh coal basin. The plant began operating in 1924 by French and washing anthracite coal to produce coal with different size ranges and ash content. After washing by Jigging, Dense Medium Cyclone, coal is separated into various sizes such as 0.5-6 mm, 6-15 mm, 15-35 mm, 35-50 mm, and 50-100 mm. A large amount of fine coal, below 0.5 mm fine coal is dewatering by thickening before going to filtration by high-pressure filters. In the Vietnamese coal industry, coal is usually prepared before consumption. There are two stages of preparation. The first is that two implement the ROM coal pre-treatment system by hand-sorting, screening, grinding, and blending. In the second stage, coal is upgraded in the preparation plant. In Quang Ninh, there are three big plants: the Cua Ong coal-washing plant, the Nam Cau Trang coal-washing plant, and the Vang Danh coal-washing plant. The former is the most significant plant, with more than 10 million tons annually. The CCWP includes two modules (Factory 1 and 2) with many methods for enrichment like Jigs, spiral separators, cyclones, and dense medium separators. The products are diverse in types and quality, such as clean coal below 6mm, 6-15 mm, 15-35 mm, and 35–50 mm, with an ash content of 5–6 % and moisture content of 6 %. For fine coal products, the ash content can reach 8-45 %; the moisture content is from 8 to 11.5 %. The quality of coal is achieved by separation technologies in Factories 1 and 2. The screen can quickly reduce the residual moisture content of coarse coal products. Fine coal from two factories is collected and sent to the dewatering sub-plant. The flowsheet for this factory is shown in Figure 3. The Chinese built the Dewatering sub-plant (the Environment sub-plant) in 2010. The annual capacity is up to one million tons annually, with products designed with residual moisture content of 20-22% after filtration and reduced to 10% after thermal drying. The plant has three hyperbaric filters of 90 tons/hour, three air compressors of 2.52 m^3/minute, nine air compressors of 40 m^3/minute, three disk feeders with conveyor belts, and other transportation equipment. Before the dewatering stage, below 1 mm fine coal is pumped to thickener with flocculant aid. A significant amount of water is separated. The remaining water with fine coal is pumped to the filter. After filtration, fine coal is transported to the thermal rotary drum dryer. The residual moisture content of fine coal is expected to be reduced to 10 %. However, the actual production shows the residual moisture content after filtration and drying is 25 and 15 %, respectively. This issue affects the quality of products, is challenging to transport, increases production costs (due to remaining water in products not reused), and environmental pollution.

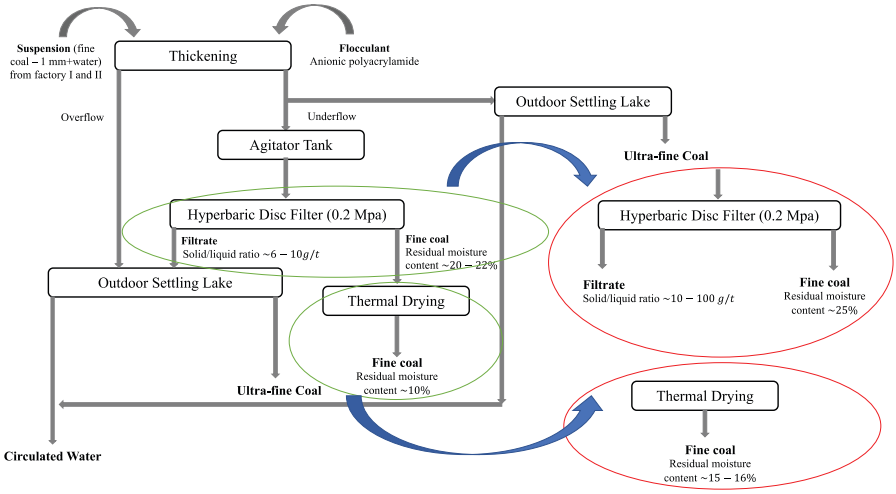


Fig 3. The flowsheet of the Dewatering sub-plant, Cua-Ong coal Washing plant.

It can be said that the filtration process is currently inefficient in achieving the desired product with low moisture of the coal, making it suitable for mixing with other good quality coal before sending it to power stations, other domestic consumers, and export or storage. The residual moisture content of dewatered fine coals is still higher (20-22 %) in some periods up to 25 %, which makes them too difficult to mix with other coals. Otherwise, water in filter cake cannot be recycled and reused, leading to higher overall production costs, transport costs, and reduced product value. This type of coal was selected as the primary research material for the above production situations.

The most popular technology to filter coal is vacuum filtration and pressure filtration. While vacuum filtration is an unreasonable and outdated technology, high-pressure filtration causes some trouble with fine and ultra-fine coal contaminated by clay. This issue leads to the inefficiency of dewatering by filtration. Steam pressure filtration is known as the new countermeasure to reduce the water remaining in fine coal slurry and improve the dewatering efficiency. This article shows the test results on the lab-scale conventional and steam pressure filtration in specific types of coal. The research work contributes to academic values and solves current problems based on the technology site.

2. BASIC PRINCIPLES

The filtration process can be divided into three main phases: cake formation, mechanical displacement, and drying. (Rushton, A.S.W., & Holdich, 2015).

The slurry is fed and distributed over the filter cloth for the first steps. The pressure gradient for filtration is applied. These forces are compressed air, vacuum, or even gravity, as well as centrifugal pressure. Filtrate begins to pass through the filter medium, and the filter cake grows. At this period, the resistance of the system increases gradually. The cake formation phase finishes when the pores of the filter cake are filled with the

mother liquid, but no more water is on the surface of the filter cake. When the cake is exposed directly to driving de-watering forces, the water is pushed out of the pores of the filter cake. The difference between conventional and steam pressure filtration is in the mechanical displacement phase. Figure 4.

For conventional filtration, compressed air is applied to penetrate the pores. The mother liquid drains when the pressure difference between the upper and lower sides exceeds the capillary entry pressure. The model of capillaries describes the mechanical displacement of a liquid out of a porous system. The displacement in pores with different sizes has different velocities. The larger the pore, the faster the flow becomes. The air breaks through the gas flow in the largest pore, resulting in higher gas consumption. The mechanical displacement in smaller pores is decelerated after the breakthrough of air. This phase also finishes when the airflow through the filter cake and the system achieves a dynamic equilibrium. For steam pressure filtration, steam pressure is applied, and it first comes into contact with the cold surface of the filter cake. Superheated (Svarovsky, 2001) or saturated steam is used to replace the air pressure in conventional pressure filtration (Sparks, 2016) (Anlauf, 2019) (Bott & Langeloh, 1996) (Bott, Langeloh, & Meck, 2002), as also mentioned in the research of Esser and Peuker (Esser & Peuker, 2020 (a)) (Esser & Peuker, 2020 (b)). No air is permitted in this system because air can not condense. Condensation of steam creates a displacement front (Peuker & Stahl, 2001) (Gerl S. , 1997). Steam intrudes the filter cake and condenses continuously during advancing. The displacement front moves down through the filter cake system and starts pushing the filtrate out of the filter cake.

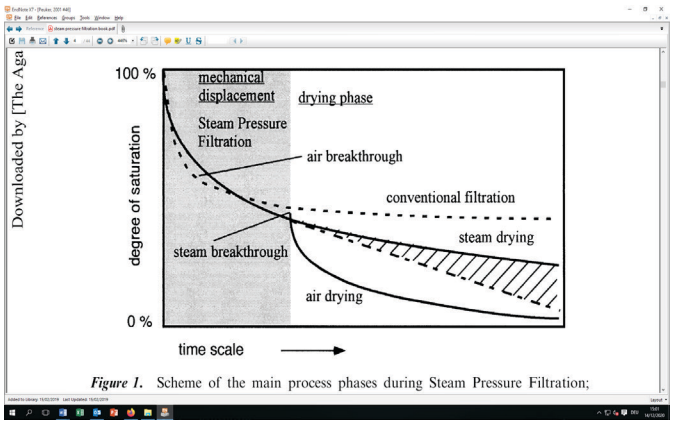


Fig 4. The diagram describes the main process phases during conventional and steam pressure filtration. (Peuker & Stahl, 2001)

The next step, the drying phase of CPF, uses compressed air. The residual moisture content does not reduce as much. While the successive phase in steam pressure filtration shows excellent advantages and can be applied in two ways. The first one is the application of pressurized air after the breakthrough of steam. This method is more effective, rapid, and economical. The remaining water on the filter cake

is evaporated due to the stored latent heat. The air treatment after the steam breakthrough is the optimal process to reduce the moisture to the maximum extent. The second way is to maintain the saturated or superheated steam during the second and third phases. Steam pressure filtration should be operated when washing and extracting the volatile component in the filter cake and the residual moisture content. (Esser & Peuker, 2020 (a)) (Esser & Peuker, 2020 (b)) (Peuker & Stahl, 2001).

3. SAMPLES AND RESEARCH METHODOLOGY

3.1. Coal sample

The test material is anthracite coal sampled from the Cua Ong Coal Washing plant. This material is collected from feed suspension before thickening and drying afterward. Suspension for all tests laboratory is coal powder and distilled water to re-slurry. Types of coal are insoluble in the water at all temperatures. Anthracite is not explosive; the amount of sulfur (S) content and volatile matter are small. The burning temperature is 350-400 ^{o}C. In the outdoor temperature, coal can not burn on its own under the sunlight. The amount of clay in fine coal is small, around 0.5-1 %. The density of coal is typically around 1400-1550 kg/m^3. This value can be changed to 1250 kg/m^3 and 1200 kg/m^3 in the 20 and 40-50 % moisture content, respectively. The coal sample used for research is low-quality coal with an ash content of around 35 %, and the measured density (dry state) is 1497 kg/m^3. The calculated density in the laboratory is used for all calculations in this research. The particle size distribution of coal powder is measured by laser diffraction, which is shown in Table 1 and Figure 5.

Table 1. Coal particles properties

Unit: µm

x_{10}	x_{16}	x_{50}	x_{80}	x_{90}	x_{97}
2.03	2.94	11.78	62.85	119.84	210.52

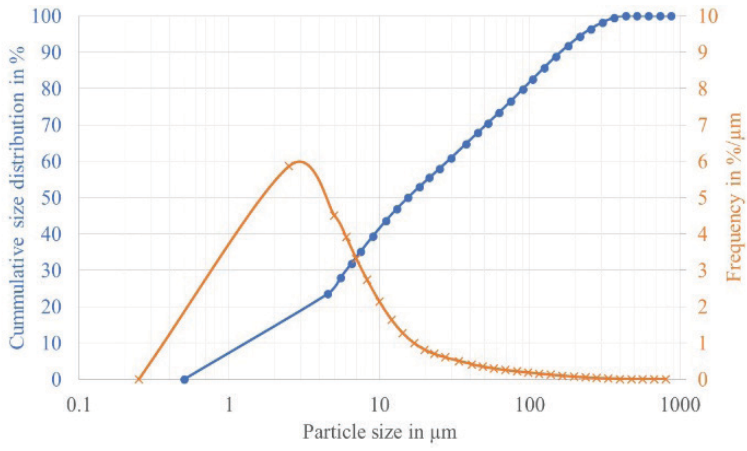


Fig 5. The particle size distribution of fine coal

The median particle size $x_{50,3}$ is 11.78 µm; the particle size distribution of materials has a span $(x_{90}-x_{10})/x_{50}$ of 10. The coal sample shows a broader distribution. The below 10 µm particle size accounts for 45 %, and 90 % of particles are below 0.125 mm. This amount of very fine particles in coal samples is significant. This issue may be the main reason for poor dewatering, as can be shown in the next part.

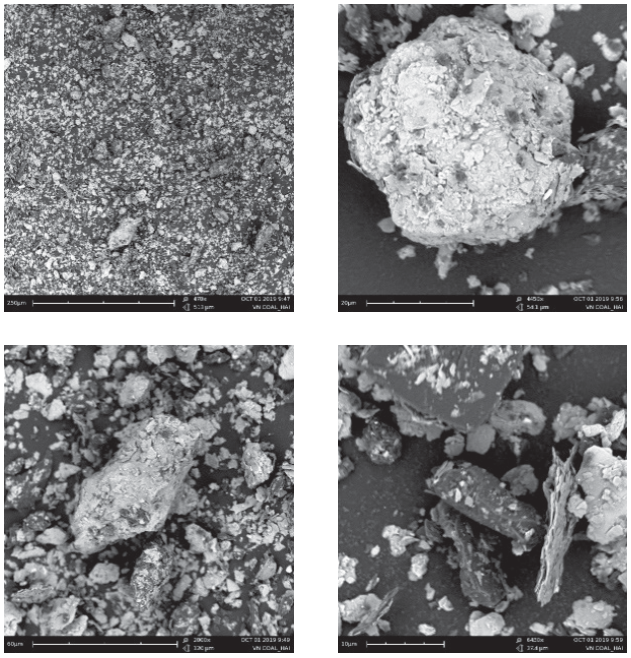


Fig 6. SEM images for coal particles.

By the SEM technique, the images for the irregular shape of big coal particles and the flake shape of fine and ultra-fine particles are also shown in Figure 6.

3.2. Method

3.2.1. Conventional filtration rig

The filtration rig is built according to VDI 2762-2 (VDI2762, 2010). Gas-driven filtration experiments were conducted in a stainless-steel pressure filter Nutsche with an area of 19.64 cm^2, as shown in Figure 7 (on the left side). The filter medium has support from a perforated medium sheet with a large open cross-section area. A cake formation unit connected Nutsche long tube and filter medium support unit. By disassembling this unit, the filter cake can be removed easily. Otherwise, the device possesses a quick connection for the lid and is equipped with a valve to regulate the pressure and a pressure gauge. The lid has a sight glass to look inside and attached light. The filtrate quantity is measured using a scale connected to a computer. (VDI2762, 2010).

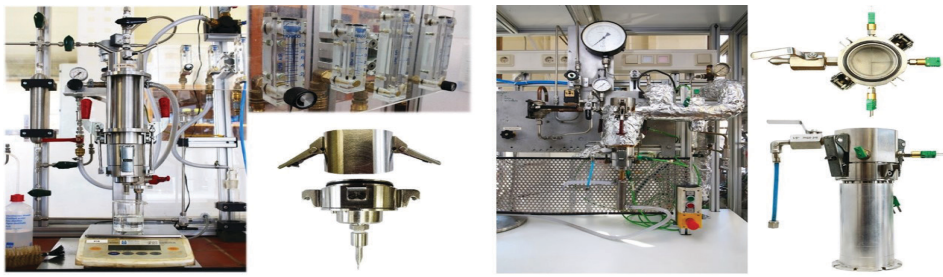


Fig 7. Images for the Conventional filtration apparatus and Steam pressure filtration apparatus

3.2.2. Steam pressure filtration

The steam pressure filtration rig (Figure 7 - the right image) was built based on the standard Nutsche with the same length tube and cake formation unit, which has been described above. The different things are the compressed air and compressed saturated steam from the steam source to supply to Nutsche. The evaporator provides the steam. This steam and the entrained water from the evaporator are separated. The steam can be a little superheated if the temperature of the pipes is higher than the steam temperature. Styrofoam covers the tube, the cake formation unit, and all pipes to avoid heat transfer into the ambient environment. An oil heater heats Nutsche and cake formation unit to approximately 160 oC. A thermocouple is installed to control and maintain the temperature stable. Four thermocouples remain in the cake formation unit, built to measure each layer's temperature profile of filter cake during filtration. The thermocouple contact with the cake formation unit to measure the filter medium's temperature and filtrate's temperature (Esser & Peuker, 2020 (a)).

3.2.3. Test procedure

The feed suspensions were prepared as follows: solid is dispersed in distilled water at room temperature (approximately 20 oC) and is stirred until well mixed. The amount of water depends on the mass of the solid and the amount of solid volume fraction for tests. After that, the slurry is poured into the Nutsche, and the top cover is closed. The compressed air is applied. The filtrate flows through, and particles are built on filter cloth (SK 006). This step will be finished when the saturation of the filter cake reaches 1. It is observed through the light glass until no water surface on the filter cake. As soon as the saturation reaches 1, the air is vented. The electronic scale recorded the filtrate mass during filtration. The collected filtrate is recorded by Diadem software. This result is used to calculate specific resistance cake. (VDI2762, 2010). The second stage is the mechanical displacement phase. Depending on the kind of filtration, the compressed air or the saturated steam is applied.

Compressed air, regulated by a valve and pressure gauge, is applied for conventional pressure filtration to push water out from pores. The test ends when no water flows through the filter cake (the end of the mechanical displacement phase).

The steam outlet and magnetite valve are opened for steam pressure filtration to allow the steam to enter the Nutsche. After

the instant time (1 or 2 seconds), the steam outlet is closed, and steam starts to displace water from the pores. Tests were conducted until the steam broke through the filter cake, which was observed by the temperature of the filter cloth thermocouple. The steam flux is stopped by closing the magnetic valve. Afterward, the residual moisture content of the filter cake was measured.

The filter cake is quickly removed from the cake formation unit to dry. The filter cake is dried at 50 oC (± 5 oC) until the constant weight. The amount of water remaining in the filter cake is also expressed by the residual moisture content in mass % (which is denoted M). This parameter is defined as:

$$M = \frac{\text{the mass of wet filter cake-the mass of dry filter cake - the mass of wet filter cake}}{\text{the mass of wet filter cake}} \times 100\% \quad (1)$$

Based on the mechanical of two kinds of filtration, it is unnecessary to survey the drying phase deeply because the dewatering efficiency in the mechanical displacement phase would be a precursor to reducing the moisture further in the successive phases. The result only focuses on the efficiency of the mechanical mechanism of filtration.

4. RESULT AND DISCUSSION

4.1. The efficiency of filtration in the variety of volume fraction

The solid volume fraction of initial suspension plays a vital role in dewatering efficiency. It is related to the stratification of particles as well as the structure of filter cake. By changing the liquid mass in fixed 30 grams of coal, the volume fraction has changed from 0.05 to 0.4. Tests were conducted in 1-1 bar (1 bar for cake formation, 1 bar de-liquoring), 1-3 bar (1 bar for cake formation, 3 bar de-liquoring), 3-3 bar (3 bar for cake formation, 3 bar de-liquoring) of pressure difference. The result of the filter cake after conventional pressure and steam pressure filtering are shown in Figure 8.

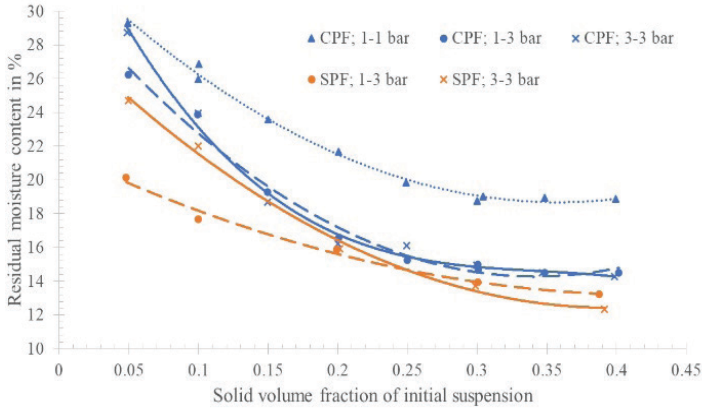


Fig 8. The residual of filter cake using SPF and CPF in various solid volume fractions; the mass of coal: 30 grams.

It can be seen that by increasing the volume fraction, the residual moisture content is reduced. Usually, when the solid volume fraction of feed suspension increases, the filter cake becomes more homogeneous. The uniformity of the size of capillaries inside the structure of the filter cake led to the water flowing simultaneously out from every position. The result is that using the SPF is more efficient than using CPF. The result also shows a slightly lower value of residual moisture content when using steam pressure filtration compared to conventional pressure filtration. The mechanism of steam pressure filtration causes this lower value. While the water prefers pushing out of the filter cake from the large pores (also from large capillaries) when using CPF, the mother liquid in both large and small capillaries flows easily without any obstacle as well as the negative effect of the finger ring phenomenon when using SPF.

It can be said that when the solid volume concentration of the slurry in the filter reaches 30-40 %, the moisture content of the filter cake does not change, with values ranging from 14-16 % (for both CPF and SPF). A different result is when the tests are conducted with a pressure difference (1-1 bar using CPF). Moisture values are around 20-30 %. This issue can be explained in terms of the capillary entry pressure theory. The requirement pressure for mechanical displacement must be higher than the capillary entry pressure (which has the magnitude depending on the structure of the filter cake, particle size, particle size distribution, and characterization of solid and liquid). It can be concluded that for the coal in the Cua-Ong area, the optimal sludge concentration should be 30-40 %, with the pressure difference being as large as 1 bar.

4.2. The efficiency of filtration in the variety of filter cake height

The second test is the effect of filter cake height on the amount of water remaining. This parameter is essential for scale-up and directly relates to the filter equipment's performance. Choosing the right filter cake height has a technical meaning and brings higher economic efficiency and productivity. The amount of solid change depends on the various heights of the filter cake. The pressure difference is similar to the above tests. The volume fraction of the initial suspension is fixed to survey the effect of the height of the filter cake on crack formation. Because of the limitation of the filtration rig, the filter cake's maximal height is 25 mm. The result is shown in Figure 9.

In general, the effect of filter cake height on deliquoring efficiency is unclear. Looking at Figure 9It can be seen that when the filter cake increases from 3 to 22 mm, the moisture content increases by about a maximum of 2 % of the value (in some specific tests, the residual moisture contents are unchanged). This stability is because the filter cake thickness does not affect the capillary entry pressure. Although the operational parameter height of the filter cake has less affected the dewatering efficiency, the filtration equipment capacity is greatly affected. The reason is that the filter cake will need a longer time in the equipment for the mother liquid inside the filter cake to have enough time to flow out. Therefore, to choose the optimal parameters in this case, it is necessary to consider the relationship between filter cake height, filter pressure, and filter area.

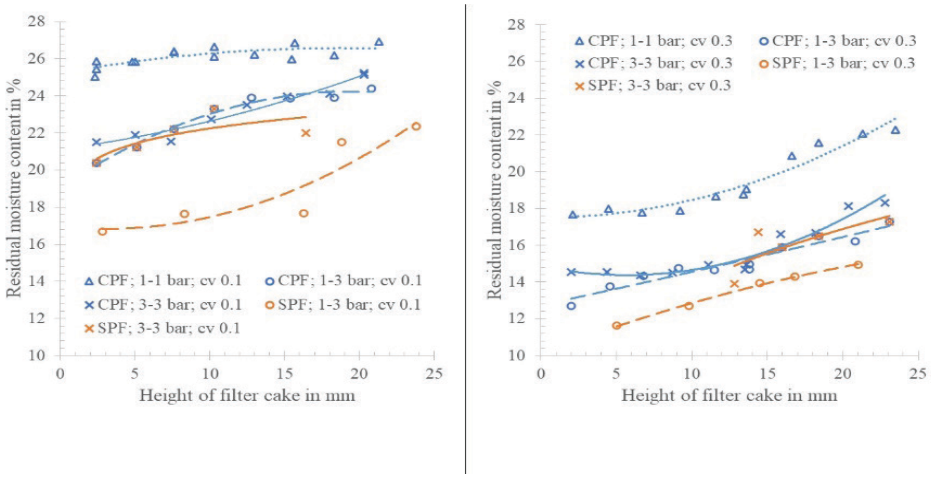


Fig 9. The residual moisture content of filter cake using CPF and SPF in a variety of filter cake heights; volume fractions of 0.1 and 0.3

One thing that can be noticed is that in the same survey condition, the result using SPF always has about 4 % less moisture content than the result using CPF. This consequence demonstrates the advantageous technical aspect of SPF in dewatering the second phase of filtration.

4.3. Test for steam pressure filtration, including drying phase

The purpose of these tests is to show the outstanding efficiency in dewatering using SPF. Applying steam pressure filtration on the mechanical displacement phase pushes the water out of small and large pores. Much water is removed, and the residual moisture content is more minor. Moreover, during the deliquoring phase, the filter cake and the remaining mother liquor are heated due to the heat convection and conduction of condensate water. When applied, air pressure leads to evaporation, resulting in further moisture loss. The result can be seen in Figure 10 and Figure 11. These tests were conducted in 3-3-3 bar of pressure differences, 150 seconds of drying time. For the tests of the effect of solid volume fraction, the mass of the solid is 30 grams (equivalent to approximately 15 mm of filter cake height); the solid volume fraction changes from 0.05 to 0.4. For the filter cake height effect tests, the solid volume fraction of suspension is fixed at 0.1 and 0.3. The change filter cake height is modified by the mass of coal in suspension. Most tests are conducted on equipment with the same area of 19.64 cm^2.

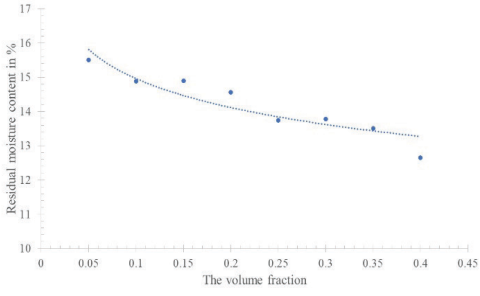


Fig 10. The residual moisture content of filter cake with the test of different volume fractions during steam pressure filtration after the drying phase

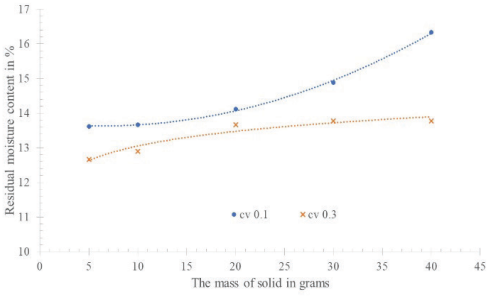


Fig 11. The residual moisture content with the test of different filter cake heights during steam pressure filtration after the drying phase

Experimental results show that when using SPF, including the 3rd phase of filtration (drying phase), the residual moisture content of the material is significantly reduced. For the 15 mm filter cake and the 40% solid volume concentration, the moisture content of the filter cake is reduced to approximately 12 %. For the survey cases of changing filter cake thickness and slurry concentrations of 10 and 30 %, the final material moisture content fluctuated between 12-16 %. Those results show superior efficiency compared to the CPF result (the practical values are about 22-25 % moisture content).

However, it is also necessary to recognize that the experimental results in this section are only at the preliminary assessment level. It is essential to conduct a deep study of drying time and drying pressure to select the optimal parameters. In addition, the performance comparisons mentioned above should be carried out at the same scale (laboratory scale). Another issue is the prospect of applying SPF to dewater ultra-fine coal in the Cua Ong area. Using steam pressure filters has technical advantages but may not be economically viable, mainly when applied to coal dewatering. The authors also recommend that more specific assessments be made on this aspect in the future.

5. CONCLUSION AND OUTLOOK

5.1. Conclusion

Refined coal is one of the products used in the coal-washing process at the Cua Ong Coal Washing Plant. A large amount of this material needs to be dewatered before being transported, stored, mixed, or used directly. The residual moisture content of coal after filtration is still high. To improve the process, it is necessary to have a deep understanding of filtration and the application of advanced technologies in production.

Fine coal from the CCWP has dominant fine and ultra-fine sizes and a broad particle size distribution. It is collected in the pipes before thickening to avoid the presence of flocculant.

Experiments were conducted to study the influence of some technological parameters (filter cake height and solids volume concentration of the feed slurry) on the dewatering efficiency of CPF and SPF. The results show that the dewatering efficiency increases by increasing the solid volume fraction. The filter cake thickness does not affect the material moisture much but affects the filter's capacity. The choice of this optimal parameter should be considered in terms of its relationship with applied pressure and filter area.

The preliminary test of coal dewatering using SPF for a whole filtration cycle was conducted. The experimental results show that the final moisture content of the coal was reduced to approximately 12 %.

5.2. Outlook

The further steps of this research should be focused on: (1) Sufficient studies are needed on the optimal operating parameters when using SPF; (2) Implement testing this coal on a pilot scale; (3) Detailed economic evaluations are necessary when applied to Cua Ong fine coal; (4) Carrying on further tests on other materials in order to confirm the superiority of this new device.

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FACTORS DETERMINING THE DIGITAL COMPETENCY OF WORKERS IN THE COAL MINING ENTERPRISES OF VINACOMIN

Hung Nguyen Tien[a*], Nguyet Pham Thi[a], Chung Pham Thanh[b]

[a] Hanoi University of Mining and Geology, Hanoi, Vietnam

[b] Thanh Hoa City People's Committee, Vietnam

** Corresponding author: nguyentienhung@humg.edu.vn*

Abstract: *The study aims to explore the factors that determine the basic digital literacy of employees at current coal mining enterprises. Exploratory factor analysis (EFA) was used for survey information collected from 699 employees working at a number of coal mining enterprises under Vinacomin, showing that five factors have a statistically significant impact on digital literacy, including: 1. Basic and advanced digital literacy in general in life; 2. Learning about and with technology; choosing appropriate technology; 3. Processing and managing information about the digital economy; 4. Communication and cooperation about the digital economy; 5. Legal and digital ethics. The ANOVA analysis results show a difference in digital competence between the group with IT majors at the university level and other groups. There is a difference in digital competence between the department level and other groups. However, no difference in digital capacity was found between the directors and employees. The policy recommendation is that Vinacomin needs to have a policy to enhance digital capacity for employees in conjunction with Vinacomin's digital transformation program, particularly in the country. In particular, training for leaders (directors) should be enhanced to improve acceptance of new technologies, supporting the digital transformation process of Vinacomin and enterprises.*

Keywords: *Digital capacity, Vinacomin, workers, coal mining enterprises.*

1. INTRODUCTION

The rapid and widespread development of technology worldwide has required all citizens to be universal in (i) knowing how to use new technology and (ii) knowing how to interact with each other in the digital environment. Integrating these essential competencies in each individual is called digital literacy (Medlock Paul, Spires, & Kerkhoff, 2017). In today's digital age, digital literacy includes a series of new, necessary, and universal essential competencies for each "digital citizen" (eLD, 2015; Jenkins, 2006). That is why digital literacy is also understood as "digital literacy".

Related academic studies have shown a lot of evidence and reasons for the importance of digital competence at both the individual and broader levels, such as good digital competence will help individuals participate in the digital society safely and effectively, without being left behind; participate effectively in the labor market; digital competence is one of the necessary competencies of a modern citizen (Hamilton, 2015; Vidosavljevic & Vidosavljević, 2019); digital competence ensures that young people are not shocked and survive in the digital age (Tran et al, 2020);… The world is also lacking human resources for the digital economy (PwC, 2021); improving digital

competence has been and is a common concern at both the societal level (Hamilton, 2015);

research on digital competencies in Vietnam is still quite modest (Nguyen Tan & Marquet, 2019; PwC, 2021; Santos & Serpa, 2017; Tran et al., 2020). Some findings on measuring and assessing competencies and related competencies are not suitable for Vietnam's conditions (Nguyen Tan & Marquet, 2019); Vietnam still has a significant gap in digital skills development (PwC, 2021): Digital citizenship competencies of Vietnamese adolescents and young people still have many shortcomings (Vinh, Quang, & Lan, 2020); The digital competency assessment model for Vietnam is still preliminary (Nguyen Tan & Marquet, 2018)...

Meanwhile, the Party, State, and ministries (CPV, 2019) (Government, 2020; Prime Minister, 2020a, 2020b, 2021 2022a, 2022b) have proactive policies and strategies to develop infrastructure and promote innovation to meet the requirements of national development in the new period, improve the quality of social labor resources and more broadly, the capacity of each citizen according to human resource development strategies associated with national digital transformation (MIC, 2020).

The overview shows that there are still many research gaps on digital capacity in Vietnam that can serve as a scientific basis and support related policy mechanisms and human resource training and development in the coming time.

In the above context, the study aims to explore the factors determining the digital capacity of employees in Vinacomin's coal mining enterprises as the country enters the digital age.

2. THEORETICAL BASIS AND RESEARCH MODEL

From the above research overview, the research team uses theory and proposes a quantitative model for the study as follows:

- The theoretical basis, or the original theory of the process of accumulating competence in general (Kaba & Ramaiah, 2020) and digital literacy, is based on the basic principles of research on models for digital literacy that have been done before (Deursen & Van Dijk, 2009; Janssen et al., 2013a; Martin & Grudziecki, 2006; Murray & Perez, 2014; Vodă, Cautisanu, Grădinaru, Tănăsescu, & Moraes, 2022) ;

- The analytical framework is based on the perspectives and research results of Janssen and colleagues (Janssen et al., 2013a; Jisc, 2014; Murray & Perez, 2014; Pérez & Murray, 2010) and has been adjusted by the research team (Figure 1). The specific diagram below is based on the diagram (Janssen et al., 2013b) of the dimensions or 11 components of digital competence in accordance with the multi-dimensional definition of digital competence.

Figure 1 is a proposed research model with scales according to areas or aspects of digital competence. The aspects or 11 components of digital competence (independent variables) reflect digital competence (dependent variable M). This simulation is used to design the questionnaire for the survey and design the scale. Specifically:

+ Scale (M): This scale measures the level of "Smooth, systematic use demonstrates self-confidence". This quantity reflects an individual's proficiency or numerical ability.

+ Scales of component competencies: This scale is coded under letters (A, B, C, D, E, F, G, H, I, K, L). This dimension measures the component competencies (or domains)

on the dimensions according to Janssen et al. (Janssen et al., 2013a) and is coded under letters (A, B, C, D, E, F, G, H, I, K, L). The scales include (A) General functional knowledge and skills; (B) Use in daily life; (C) Advanced and specialized abilities to work and express creativity; (D) Communicate and collaborate through technology; (E) Process and manage information; (F) Privacy and security; (G) Legal and ethical perspectives; (H) Have a balanced attitude towards technology; (I) Understand and be aware of the role of ICT in society; (K) Learn about and with digital technologies; (L) Ability to analyze decisions about appropriate digital technologies ; (M) Seamless use demonstrating self-efficacy.

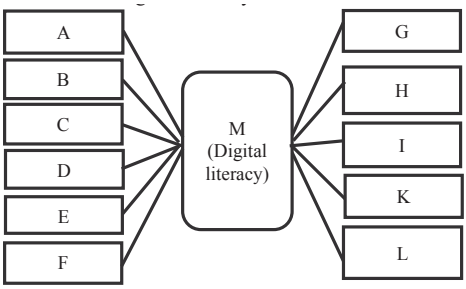


Fig 1. Proposed model for digital competence research [Modified from "Digital building blocks of digital competence) (Janssen et al., 2013b; Vodă et al., 2022)]

3. RESEARCH METHODS

3.1. Information collection and data processing

Information was collected using a sociological survey questionnaire (5-level Likert scale); Information was collected from 699 people working at units and agencies through direct interviews and online surveys; SPSS23 software was used to process or run tests of research hypotheses with the collected data.

3.2. Econometric model

The authors used:

(+) Exploratory factor analysis (EFA). Procedures include: descriptive statistics; assessment of scale reliability according to Cronbach's Alpha index; exploratory factor analysis; multivariate regression analysis...,

(+) Testing mean differences according to individual characteristics: independent sample T-test and one-way analysis of variance (One-way ANOVA), in-depth ANOVA testing (Post Hoc => Tukey)...

In which, the variables measuring component competencies (competency areas) and numerical competency variables are measured by the behavioral scale (Behaviorly Anched Rating, Scale, abbreviated as BARS) divided into 5 levels (likert Scale); Demographic variables will also be included in the testing model appropriately according to the requirements of the study and inheriting previous studies.

The variables in the econometric model (formula [1]) , as stated, the study is expected to estimate the impact of the factors "are specific competence areas" (component competences) according to the independent variables (A, B, C, D, E, F, G, H, I, K, L) on digital competence according to the dependent variable "Variable M". The hypothesis is that the demographic variables, financial socialization variables (with socialization agents) have a statistically significant relationship with the score on digital literacy:

$$f(M\,i) = \beta\,0 + \beta\,1A\,i + \beta\,2B\,i + \beta\,3C\,i + \beta\,4D\,i + \beta\,5E\,i + \beta\,4F\,i + \beta\,5G\,i + \beta\,6\,H\,i + \beta\,7I\,i + \beta\,8K\,i + \beta\,9L\,i + \varepsilon \quad [1]$$

In there:

+ Dependent variable (M): as mentioned above represents "Seamless use demonstrating self-efficacy". This quantity reflects an individual's proficiency or digital competence.

+ Independent variables. As mentioned above (A, B, C, D, E, F, G, H, I, K, L), reflect the component competencies or domains on the aspects according to the perspective of Janssen and colleagues (Janssen et al., 2013a) and also reflect the multi-dimensionality of the concept of digital competencies.

- Demographic factors (gender, age, income, education, occupation, etc.) are considered as control variables that affect the level of digital literacy due to different characteristics according to the life cycle of each individual. ANOVA analysis is used to assess the differences in digital literacy between groups or within these factor groups.

3.3. Research questions

The research questions are the hypotheses for model testing including:

(i) Factors A, B, C, D, E, F, G, H, I, K, L (in that order: + General functional knowledge and skills; + Use in daily life; + Advanced and specialized abilities to work and express creativity; + Communicate and collaborate through technological means; + Process and manage information; + Privacy and security; + Legal and ethical perspectives; + Have a balanced attitude towards technology: + Understanding and awareness of the role of ICT in society; + Learning about and with digital technologies; + Ability to analyze decisions about appropriate digital technologies) that positively impact the individual's digital competence?

(ii) Are there differences in digital literacy across demographic groups?

4. RESEARCH RESULTS

4.1. Overview of the research sample

The authors sent questionnaires to 750 people and received 699 responses who were working in coal mining enterprises (response rate 93%). The sample size of 699 observations were workers working in coal mining enterprises. The survey was collected from some northern provinces and cities (Quang Ninh, Thai Nguyen...).

4.2. Results of assessment and reliability testing of the scale

The results of the assessment and reliability testing of the scale using Cronbach's Alpha are shown in Table 1. According to the digital competency research model, 12 scales were used (11 for independent variables and 1 for dependent variables).

Table 1. Scale reliability and scale quality

Meaning of scale	Number of observed variables	Cronbach's Alpha coefficient (required>0.6)
A - General knowledge and functional skills	4	0.809
B- Use in everyday life	4	0. 892
C- Specialized and advanced competence for work and creative expression	4	0.909
D- Technology-mediated communication and collaboration	4	0.862
E-Information processing and management.	4	0.886

Meaning of scale	Number of observed variables	Cronbach's Alpha coefficient (required>0.6)
F- Privacy and security	4	0.685
G- Legal and ethical aspects	4	0.608
H- Have a balanced attitude towards technology	4	0.749
I- Understanding and awareness of the role of ICT in society	4	0.935
K- Learning about and with digital technologies.	4	0.768
L- Informed decisions on appropriate digital technologies	4	0.775
M- Seamless use demonstrating self-efficacy.	4	0.888

The results of testing and evaluating the reliability of the scale using Cronbach's Alpha coefficients for groups of 32 observed variables belonging to factor groups (independent variables) and 4 variables assessing work motivation (dependent variables/M) all met the requirements: Cronbach's Alpha coefficients reached from 0.608 to 0.935 and the total correlation coefficients of all independent variables and dependent variables were all suitable, at least reaching 0.323 (required to be greater than 0.3), the Cronbach's Alpha coefficients in the column if the variable was eliminated were all smaller than the Cronbach's Alpha coefficient. Therefore, all the above observed variables were retained for exploratory factor analysis (EFA).

4.3. Exploratory factor analysis- EFA

4.3.1. Factor analysis - Scale of factors determining digital competence

The results of exploratory factor analysis are presented in Table 2. KMO and Bartlett's tests show: Sig.=0.000 (sig.<0.05, significance level 5%); KMO coefficient is 0.921 (between 0.5 and 1). This result shows that the observed variables in the population are correlated with each other and factor analysis (EFA) is appropriate.

With the principal component extraction method, the Varimax rotation method allows to extract 6 factors from 32 observed variables that meet the requirement of loading factor >0.50 and cumulative extracted variance of 70.307% (meeting the requirement >50%), that is, these 6 factors explain 70.307% of the variation in the data and correspond to Initial Eigenvalues from 1.016 to 13.664 (meeting the requirement >1).

Table 2. Results of exploratory factor analysis (EFA) - Scale of factors determining digital competence

Observation variable code	1	2	3	4	5	6
B4	.863					
A4	.846					
B3	.810					
C4	.768					

Observation variable code	1	2	3	4	5	6
C3	.760					
A3	.713					
F3	.596					
F4	.578					
H2		.699				
K3		.687				
K4		.672				
H4		.654				
L1		.651				
H3		.619				
L2		.595				
L4		.582				
K2		.540				
G2			.820			
G1			.784			
H1			.727			
F1			.622			
E1			.620			
E4				.791		
E3				.779		
E2				.751		
D1					.795	
D3					.673	
D2					.573	
D4					.530	
F2						.668
G4						.662
G3						.561
Eigenvalues	13,664	2,878	2.114	1,632	1,194	1,016
Initial Eigenvalues (%) 70.307						

KMO and Bartlett's Test 0.921 Sig = 0.000

4.3.2. Correlation analysis

The results of the correlation analysis are shown in Table 3. According to the hypothesis, the independent variables x_1, x_2, x_3, x_4, x_5, x_6 are expected to have a correlation with the dependent variable (M), so these variables can be included in the regression model to explain the variable "digital literacy".

Before regression analysis, Pearson correlation analysis, shows that x_1, x_2, x_4, x_5, x_6 has a statistically significant correlation of 5% with "numerical ability" (sig<5%). Except for x_3 which has no correlation. Therefore, we perform linear regression with variables x_1, x_2, x_4, x_5, x_6 .

Table 3. Variable names by competency area or competency component number

Variable names according to competency area or competency component number	Variable	Variable form
Basic and advanced digital skills in general and finance, digital banking in life	x_1	Independence
Learn about and with technology; choose the right technology	x_2	Independence
Basic ability to process, manage information effectively, privately, securely with a balanced attitude towards technology …	x_3	Independence
Processing and managing information on digital economy, digital banking and finance	x_4	Independence
Communication and cooperation on digital economy, digital banking and finance	x_5	Independence
Law and ethics of digital technology	x_6	Independence
Use seamlessly, systematically and confidently (digital literacy)	M	Dependent

4.3.3. Multiple linear regression analysis

The research team used multiple linear regression to test the impact of many quantitative independent variables on a quantitative dependent variable in the research model: factors determining digital competence or digital literacy level (Digital_literacy). To test the conformity between the factors (independent variables) and the dependent variable which is digital competence according to the equation as formula number [2]:

$$\text{Digital}_{\text{literacy}} = \beta_0 + \sum_{i=1}^{n} \beta_i x_i + \varepsilon \quad [2]$$

In which Digital_literacy is the dependent variable; and the independent variables include the variables: x_1, x_2, x_3, x_4, x_5, x_6.

Examining which of the factors x_1, x_2, x_3, x_4, x_5, x_6 actually impacts their level of digital literacy in life or the level of "Consistent, systematic use of self-confidence related to numbers" (Digital_literacy) directly will be done using a linear regression equation (formula number [3]).

$$\text{Digital\_literacy} = \beta_0 + \sum_{1}^{6} \beta_i x_i + \varepsilon \quad [3]$$

4.3.4. Model fit testing

- Model explanatory power: From the "Model Summary" table, the adjusted R2 is 0.580, thus, 58.% of the variation in numerical proficiency (Number Competency) is explained by the model's independent variables.

- Model fit: The results in the ANOVA table with Sig < 0.01 can be concluded that the model is suitable for the actual data. In other words, the independent variables are linearly correlated with the dependent variable and the statistical confidence level is 99%.

4.3.5. Multicollinearity test

The maximum value of the variance inflation factor (VIF) is 1.000 (less than 10), indicating that the independent variables x_1, x_2, x_4, x_5, x_6 are not closely related to each other, so there is no multicollinearity phenomenon. Therefore, the relationship between the independent variables does not affect the explanatory results of the regression model.

4.3.6. Test for constant residual variance

The Spearman test results show that sig > 5%. Therefore, the variables x_1, x_2, x_4, x_5, x_6, have NO change in residual variance.

4.3.7. Testing research hypotheses

From the statistical table analyzing the regression coefficients (Table 4), it shows that the five independent variables x_1, x_2, x_4, x_5, x_6 have a positive impact on the variable depends on numerical ability because the standardized regression coefficients of these variables are all positive and statistically significant (Sig.<0.05). Thus, the hypotheses x_1, x_2, x_4, x_5, x_6 are all accepted at 95% confidence level.

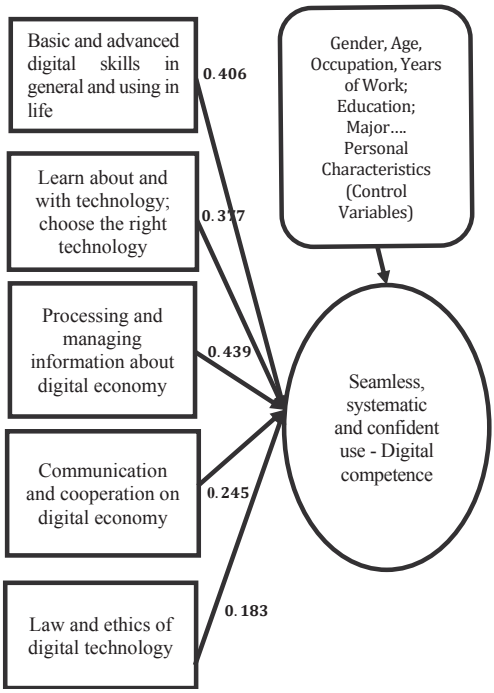


Fig 2. Research results model

Thus, the research results model is shown in Figure 2. Through regression model tests, the statistically significant variables include: x_1, x_2, x_4, x_5, x_6 , and these variables have an influence and impact on the level of digital literacy according to the regression model (formula number [4])

$$\text{Digit Literacy} = -6.221e^{-17} + 0.406x_1 + 0.377x_2 + 0.439x_4 + 0.254x_5 + 0.183x_6 \quad [4]$$

4.4. Discussion of regression results

(i) Unstandardized regression coefficients: According to variables x_1, x_2, x_4, x_5, x_6 are described in the table below:

Variable X_1: has a regression coefficient of + 0.406 and is positively related to Digital literacy. When X_1 increases by 1 point then their digital capabilities increase add 0.406 points (corresponding to an unstandardized correlation coefficient of 0.406)

Variable X_2: has a regression coefficient of 0.377 and is negatively related to Digital Literacy. When the factor "X_2" increases by 1 point, their digital ability increases by 0.377 (corresponding to an unstandardized correlation coefficient of 0.377)

Variable X_4: has a regression coefficient of 0.439 and is negatively related to Digital Literacy. When the factor "X_4" increases by 1 point, digital literacy increases by 0.439 points (corresponding to an unstandardized correlation coefficient of 0.439).

Variable X_5: has a regression coefficient of 0.245 and is negatively related to Digital Literacy. When the factor "X_5" increases by 1 point, digital literacy increases by 0.245 points (corresponding to an unstandardized correlation coefficient of 0.245).

Variable X_6: has a regression coefficient of 0.183 and is negatively related to Digital Literacy. When the factor "X_6" increases by 1 point, digital literacy increases by 0.439 points (corresponding to an unstandardized correlation coefficient of 0.183).

Table 4. Statistical analysis of regression coefficients

(*Coefficients* [a])

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	-6.221E-17	.050		.000	1,000	-.098	.098					
	X1	.406	.050	.406	8,110	.000	.307	.504	.406	.536	.406	1,000	1,000
	X2	.377	.050	.377	7,539	.000	.278	.476	.377	.508	.377	1,000	1,000
	X4	.439	.050	.439	8,775	.000	.340	.538	.439	.566	.439	1,000	1,000
	X5	.245	.050	.245	4,897	.000	.146	.344	.245	.358	.245	1,000	1,000
	X6	.183	.050	.183	3,652	.000	.084	.281	.183	.275	.183	1,000	1,000

a. Dependent Variable: Digital Literacy

ii) Standardized regression coefficient: This coefficient reflects the position of influence of the independent variable digital literacy. Table 5 shows the standardized regression coefficients that can be converted to percentage form.

Table 5. Contribution of variables affecting digital capabilities

Independent variable	Absolute value	%
X_4	0.439	26.61%
X_1	0.406	24.61%
X_2	0.377	22.85%
X_5	0.245	14.85%
X_6	0.183	11.09%
Total	1.65	100%

Variable X_4 contributes 26.61%, followed by variable X_1 (24.61%) followed by variable X_2 (22.85%); next is X_5 (14.85%); finally variable X_6 (11.09%). The order of impact from strong to weak on digital capacity is variables x_4, x_1, x_2, x_5, x_6.

Conclusions through the tests can be concluded that: the factors determining the numerical capacity of workers are in order of importance; x_4, x_1, x_2, x_5, x_6.

4.5. Test for mean differences in numerical ability according to control variables .

Two-way ANOVA analysis (two way anova with SPSS) with control variables (Gend, Inst. HO_Br, Digit_ECO_Trai, Digit_BK_Trai, Age, Job_ex, Major, Job_Pos, IT_Train): Levene's Test has sig =.087>5%; ANOVA analysis shows:

- There is no difference in digital capacity among factors such as: gender, headquarters or other, digital economic training, age, years of work; forms of IT training (sig values > 5%);

- There is a difference in Digital Literacy between factors such as: major at university level (Major); Job position (Job_Pos) (sig < 5%). Looking at these groups:

+ With the differences within each group, the results of Post Hoc Tests show that: In

the job position group (Job_Pos), only the Department_Level group and employees have differences in digital literacy (with sig = 0.001 <5%); While there is no difference between the Board of Directors group and other groups.

+ In the group of majors studied at university level (Major,), only the group of majors studying IT (with sig = 0.009 <5%) is different from the other groups in terms of digital literacy.

5. CONCLUSION AND RECOMMENDATIONS

5.1. Conclusion

The study explored the factors affecting the basic digital literacy of employees currently working in some mining enterprises under Vinacomin. Exploratory factor analysis (EFA) was used for survey information collected from 699 employees, showing that 05 factors or 05 component competency areas (including factors: Basic and advanced digital skills in general and use in life; Learning about technology; Choosing appropriate technology; Processing and managing information about the digital economy; Processing and managing information about the digital economy; Communication and cooperation about the digital economy; Legal and ethical issues about digital technology) have a statistically significant impact on individual digital literacy. ANOVA analysis also showed that there was only a difference in digital literacy among those who had studied IT at the university level; There was a difference in digital literacy between department level and others. There is no difference in digital competency between directors and other levels.

5.2. Recommendations

From the above quantitative research results associated with the development orientation or digital transformation of the country in general and of Vinacomin in particular, the author has some related recommendations as follows:

- There needs to be a national-scale program to improve essential digital competencies for workers in a way that is included in all programs at all levels of education. As the quantitative research results above show, the digital competencies of workers (even those working for organizations and businesses) are pretty low and depend on basic knowledge and skills related to digital competencies. The study did not find a statistically significant impact of the “advanced competencies” areas (Basic and advanced digital competencies in general used in life; Learning about and with technology; Choosing appropriate technology; Processing and managing information about the digital economy; Communication and cooperation about the digital economy; Legal and ethical aspects of digital technology). The lack of convergence in the EFA test also shows that the factors affecting digital competencies are cross-cutting and combined in accordance with its multi-faceted nature.

- There needs to be a separate training program for digital competencies. The above quantitative analysis also did not find a number of other necessary knowledge and skill areas (as expected in the 11 factors) that have a statistically significant impact on digital competencies. Considering this issue regarding developing multi-faceted

digital competencies for employees, it is understood that learning and accessing these new competency areas have not been introduced and developed systematically. In fact, most employees in organizations do not understand digital transformation issues relatively well. Therefore, comprehensive, multi-faceted, and systematic education or training is necessary;

- Strengthen training for leaders (directors) to improve acceptance of new technologies, supporting the digital transformation process at Vinacomin. Analysis of differences (ANOVA) shows that there is no difference in digital capacity between directors and other employees, but only a difference in the department-level group. This suggests that there should be accelerated training programs to improve digital capacity for directors and deputy directors of organizations to ensure that this level absorbs new technologies and improves in the behavior of accepting new technologies, thereby supporting the digital transformation process in organizations and businesses;

- Strengthening extensive training for workers on digital applications for life. In reality, digital concepts are still relatively unfamiliar to Vietnamese people and workers, even in Vietnamese organizations and businesses. Analysis of differences (ANOVA) shows that there is a difference between the group of workers trained in IT and the rest; however, no statistically significant difference was found between the group of workers with economic majors and the rest.... In reality, this also shows that there are still many gaps in digital capacity among workers in organizations compared to the trends and orientations of digital transformation in general and in the economic sector in Vietnam today.

Thanks

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THE STRUCTURE OF VIETNAM'S COMMODITY EXPORTS IN THE PERIOD 2010-2023: CURRENT SITUATION AND SOLUTIONS

Do Duc Anh[a*], Nguyen Cong Hoang[b]

[a]Hanoi University of Mining and Geology, Hanoi, Vietnam.

[b]The Customs Control and Supervision Department, The General Department of Vietnam Customs, Hanoi, Vietnam.

**Corresponding author: doducanh@humg.edu.vn[a]*

Abstract: *Sustainable economic growth is an important global goal for every country, and Vietnam is no exception. Besides attracting more FDI, promoting exports is also an important key to economic growth in the global context. Export development positively impacts the national economy by increasing foreign currency, stabilizing exchange rates, controlling inflation, and creating spillover effects to promote production for local firms. In Vietnam, in recent years, export activities have experienced many changes in export value and number of items, especially after the post-COVID-19 period. Therefore, studying the changes in the structure of Vietnam's commodity exports is important. With specific analysis data, our research shows that the export activities of FDI enterprises account for a much more significant proportion than that of domestic enterprises in Vietnam in recent years; processed industrial products are the most exported goods, followed by products belonging to agriculture, forestry, and seafood fisheries. Several recommendations for developing Vietnam's export activities more sustainably are proposed based on the study's results.*

Keywords: *Export, Export structure, Vietnam.*

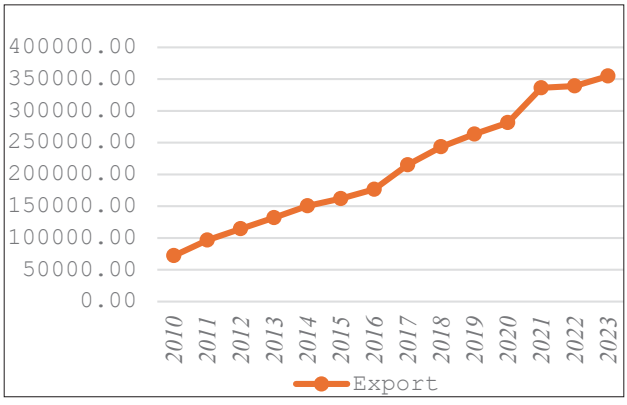
1. INTRODUCTION

In the context of international integration, freedom and commercialization have become prominent trends in the development of society. Therefore, the terms internationalization in general and export in particular have become the keys for countries to promote economic growth. Export is an international business activity, which is also the basis for creating the main source of capital for import, increasing foreign currency revenue, developing other related economic sectors, expanding the consumer market, helping domestic production activities grow stably, and accessing international markets more efficiently, reducing unemployment rates (Almodóvar et al., 2014; Trang, 2023; Haini et al., 2023). Besides, increased exports will enhance national income, improve living standards, and promote economic growth (Massell, 1970; Dung, 2023). Having transitioned from a nation of siege and embargo in the 1990s, by 2020, Vietnam had established economic, trade, and investment cooperation relations with more than 230 countries and territories. The country signed over 90 bilateral trade agreements, 12 multilateral trade agreements, nearly 60 investment promotion and protection agreements, and

54 double taxation avoidance agreements. Vietnam is one of the countries participating in many FTAs in the world (Than et al., 2022). Therefore, in recent years, Vietnam's export activities have been continuously expanded in terms of quantity, quality, industries, and fields. Specifically, according to data from the General Statistics Office (GSO) and the General Department of Vietnam Customs (GDC), the country's total export turnover in the period 2013-2023 reached nearly 3,000 billion USD (GSO, 2024; GDC, 2024; NIF, 2022) and contributed nearly 20% to its GDP in 2022 (Dung, 2023; GSO, 2024) (Figure 1).

In addition, the export activities of foreign enterprises in Vietnam have also grown significantly in recent years (Anwar and Nguyen, 2011; N. T. Hai, 2016; Do et al., 2022). Specifically, the export value of foreign firms in 2001 reached 45.2% of total export turnover, which increased to 71.4% in 2018, and by 2023 it was 73.1% (Do et al., 2022; GSO, 2024). These results show that the export activities of foreign firms in Vietnam are dominant. From there, foreign firms' export activities also promote the rapid growth of Vietnam's export activities in general and domestic enterprises in particular (Do et al., 2022).

The importance of exports to GDP growth has been confirmed in many previous studies (Massell, 1970; Ahmad, et al., 2017; Fosu 1990). Therefore, studying the change in Vietnam's export structure is especially important. Export structure is a combination of export constituents expressed both qualitatively and quantitatively. They are closely related and affect each other in space and time, in certain socio-economic conditions, in accordance with the determined export target (L. T. Hai, 2023). Despite this, many studies have confirmed the importance of studying the export structure. However, in Vietnam, research is still limited in space and time. Therefore, our study has theoretical and practical significance.



Source: Author's synthesis

Fig 1. Vietnam's export value from 2010 to 2023 (USD million)

2. LITERATURE REVIEW

Export activities in general and the structure of commodity exports in particular have been studied from many different aspects, specifically:

Hoekman and Djankov (1997) studied the changes in the export structure of some Central and Eastern European countries. The study results showed that the change in the export structure is an important key to promoting export growth and economic growth. This activity can help improve the productive capacity of those countries and, at the same time, help domestic enterprises benefit from the positive effects of export expansion activities. Besides, based on the export structure of these countries, this study indicated that importing machinery and attracting FDI are essential tools to change a country's export structure. Through these activities, host countries will significantly improve their domestic economies.

On the same topic, Chiang and Masson (1988) studied the factors affecting the change in the export structure of some Asian countries. These authors also confirmed that most of the changes in export structure bring positive results. Besides, government policies greatly influence a country's export structure change. Government policies have both positive and negative impacts on enterprises' export activities. In addition, the standards of goods in the import market also significantly affect the growth of export activities of other countries. Therefore, to increase export activities, countries must cooperate firmly based on trade agreements to remove some barriers to international trade.

Similarly, Mayer and Wood (2001) used regression equations to study the export structure of some South Asian countries. This study shows that the export activities of South Asian countries focus on labor-intensive goods. The reason is that labor is cheap here, and natural resources are poor, so enterprises (including domestic and FDI enterprises) only focus on producing labor-intensive goods. In addition, the economies of these countries also slowly develop; at the same time, poor infrastructure and low quality of labor are also some of the reasons hindering export growth. Based on the research results found, the article also proposes solutions for the Governments of these countries to build a more open macro economy, remove tariff barriers, attract investment, promote export growth, and improve the structure of export goods in a positive direction.

Zhou and Fan (2023) analyzed the factors that changed China's export structure. Besides agreeing that export expansion has a positive impact on economic growth, this paper also indicated that the increase in the export proportion seems to reduce the export stability of goods due to the change in the elasticity of import demand of international investors; exporting firms can reduce the impact of export structure on the export stability of goods by increasing the technical complexity of exported products, improving the degree of trade freedom and signing free trade agreements (FTAs) with importing firms; the export proportion hurts the export stability of services; and the development of intra-industry trade (IIT) in services and the digitalization of services can reduce the impact of export structure on service export stability. Finally, the authors confirmed

that a country's export structure constantly changes. Zhu, Yu, and He (2020)and found that regions exporting more sophisticated products tend to have lower levels of income inequality. Here, we extend the literature by stressing that regional income inequality is shaped not only by export product structure but also by export destination structure. We further scale down our analysis to the intra-regional level, and examine urban-rural inequality within a region. Few have related urban-rural inequality to export upgrading and a region's export product/destination structures. Hence, we contribute to the current literature by examining how regional export product/destination structures have shaped income inequality in general and urban-rural inequality in particular. Based on China's export data and income survey data, we show that export upgrading only contributes to the reduction of income inequality in China's urban areas. Urban-rural inequality tends to be more severe in regions that have more complex export product/destination structures, due to the concentration of export activities in urban areas and to some barriers that inhibits the flow of input factors (e.g. capital and labor also conducted a similar study. The authors pointed out the limitations in China's export activities, including the fact that the structure of goods in the export system is not balanced, and the quality of exported goods is still limited. As such, exports do not have a positive impact on the economic growth of that country. Based on the results, the article also proposes some solutions to overcome the above-mentioned limitations. In general, the topic of export structure has been of interest to many researchers around the world. However, the results found are also different due to different input factors.

In Vietnam, this topic attracts more researchers, for example:

Tarp, Roland-Holst, and Rand (2003) used the Social Accounting Matrix – SAM to study the change in Vietnam's export structure after the economic reform in 1986. The authors show that export activities have grown rapidly since Vietnam's economic reforms. This activity also helps the Vietnamese economy change rapidly compared to other countries in the region. However, Vietnam's export activities currently depend heavily on heavy industrial products. In addition, the change in export structure is also significantly affected by social infrastructure. Moreover, at that time, the proportion of agricultural products exported also accounted for a significant proportion compared to other items. Based on the results, the study proposes solutions to improve social infrastructure and the quality of human resources in Vietnam to attract more FDI, promote the change of export structure, and promote faster economic growth.

Than et al. (2022) analyzed Vietnam's export situation from 1986 to 2021. The authors confirmed the importance of export activities to economic growth in Vietnam. They not only help Vietnam earn more foreign currency, increase employment, reduce unemployment, and bring new management skills, but they also help domestic enterprises access international markets more easily. In addition, the study pointed out the strengths and weaknesses of Vietnam's export structure. The authors emphasized that before 2010, export activities mainly focused on raw products, thereby reducing domestic economic efficiency. However, after 2012, the proportion of Vietnam's raw exports decreased significantly and focused

on processed and manufactured industrial products, ensuring sustainable economic growth. Moreover, the export activities of foreign enterprises have accounted for a substantial proportion of Vietnam's total export value in recent years. If this situation continues for too long, it will affect the sustainability of the Vietnamese economy. Based on the results, the authors also propose several solutions for enterprises and the Vietnamese government to develop export activities sustainably.

Similarly, the article by Minh Ha (2022) also revealed that for sustainable export development, Vietnam's export structure in the coming time needs to be more diversified in terms of goods and find new markets. Furthermore, the article also pointed out that processed industrial goods currently account for a large proportion, mainly electronic components and garments. Therefore, for sustainable export growth, the Vietnamese government needs to develop new policies and measures to promote the export of agricultural, forestry, and fishery products. In addition, the government also needs to reduce export taxes for domestic enterprises to balance the export proportion of domestic and foreign enterprises. Some similar results are also found in the article by Hong Le and Tuan (2023) and Hai (2023). These studies agree that Vietnam's export structure changes over time.

Do et al. (2022) studied the impact of FDI enterprises on Vietnam's exports using the VECM model. The findings indicated that the total export value has increased significantly in recent years, and along with that, the export activities of FDI enterprises account for a significant proportion of Vietnam's export activities. In addition, in the short term, the export activities of FDI enterprises have a positive impact on that of domestic enterprises. Besides, it also helps domestic firms access international markets more easily. Similar results were also found in the study of Nguyen (2016).

In short, the study of commodity export structure attracts the attention of many researchers worldwide. However, the results are also different because these studies were conducted in different time and space conditions.

3. METHOD AND DATA

With the research objectives presented above, the paper uses the comparative method to analyze the collected data. This is the oldest and most popular method. It involves the comparison of quantified indicators and economic phenomena that exhibit similar content and nature. This process aims to determine these indicator's trends and levels of fluctuation. Then, the paper analyzes the export structure based on the following criteria:

- According to the export subject, there are two export activities in Vietnam: those conducted by domestic firms (Xdf) and those by foreign firms (Xff). This analysis will reveal the trend changes and types of enterprises that account for a large proportion of the country's export activities. Based on the findings, the paper will propose solutions to the Vietnamese government and related entities to promote the effectiveness of these enterprises' export activities.

- Regarding the export market, Vietnamese goods are exported to various regions, including Asia, the EU, America, Africa, and other areas. Analyzing these markets helps identify the largest destination for Vietnamese exports, the characteristics of that market, and the types of goods that are exported to that market. Moreover, the study also reveals new export trends in these markets. Based on the analysis, the paper suggests solutions to assist businesses in better aligning their exported goods with market standards. In addition, the paper also proposes recommendations for the Vietnamese government to implement foreign policies that facilitate market access for Vietnamese enterprises.

- Regarding commodity export groups, Vietnamese export items can be divided into four groups: Manufacturing and Processing Industry (MPI), goods in the Agriculture – Forestry – Seafood Fisheries (AFS), goods in the Fuel – Minerals (FM), and other goods. The paper examines the structure of exported goods, identifying which types of goods are most frequently exported and the trend associated with them during the analysis period. Besides that, the study will investigate the characteristics of exported goods and the standards required for their acceptance in the international markets. Based on the findings, the paper recommends solutions for businesses to improve product quality, ensuring compliance with the requirements of import organizations.

This study used data collected from the World Bank, General Statistics Office (GSO), and General Department of Vietnam Customs (GDC) from 2010 to 2023.

4. RESULT AND DISCUSSION

4.1. Research result

After collecting data from the World Bank, the General Statistics Office (GSO), and the General Department of Vietnam Customs (GDC) from 2010 to 2023, analysis was conducted to determine the proportion of each component in Vietnam's export structure. The results of these calculations are presented in the subsequent section:

a. Vietnam's Export Structure by Enterprises

Table 1 and Figure 2 show that Vietnam's total export value has grown rapidly and steadily increased over the years from 2010 to 2023. Along with that, the export activities of foreign firms grow faster rate than that of domestic firms. Therefore, the export proportion of foreign firms is much more dominant than domestic firms. The findings show that the export activities of foreign firms greatly influence Vietnam's export activities. Meanwhile, the growth rate of domestic enterprises is slower. The above results are consistent with previous studies of Ngoc Huyen and Bang (2021) and Do et al. (2022); this status is also common in developing countries like Vietnam. These countries are trying to attract more FDI and promote their commodity export to foster economic growth. Notably, most FDI enterprises are export-oriented; therefore, the export proportion of FDI enterprises is more significant than that of domestic enterprises in developing countries.

b. Vietnam's Export Structure by Market

Vietnamese goods are predominantly exported to countries in the Asian region, with China representing the largest market,

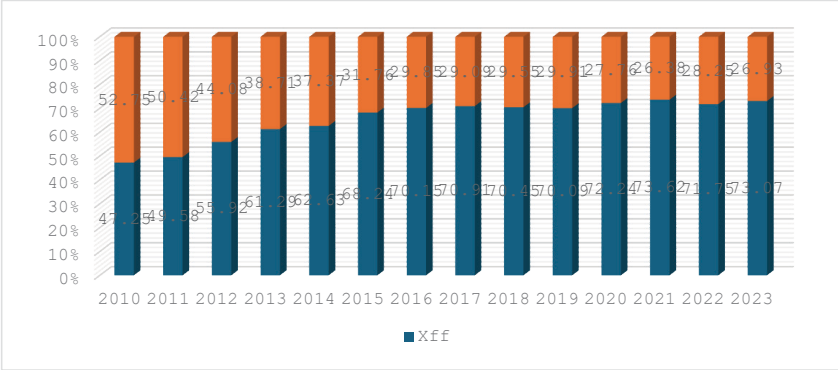
accounting for over 40% of Vietnam's total export turnover (MOIT, 2024). This result can be attributed to the recent bilateral trade agreements signed between Vietnam and China, which have facilitated the rapid growth in import and export activities between the two countries.

Next is the American market, especially the US market, the second largest after the Chinese market for Vietnamese goods. Since the normalization of relations between Vietnam and the United States in the early 1990s of the last century, trade activities between the two countries have also proliferated. Besides, Vietnam's exports to European countries remained stable at 15 to 20% of total export turnover in the study period. Finally, the African market and other regions account for a very small proportion of Vietnam's total export turnover (Table 2 and Figure 3). This result is because Vietnam's export goods mainly serve developed countries. Additionally, Vietnam is considered a factory for FDI enterprises, so the destination of these goods is also a major global market. Therefore, the African market is not a favorite destination for Vietnamese goods.

Table 1. The Export value of Enterprises in Vietnam from 2010 to 2023

Năm	X (USD million)	Xff		Xdf	
		Value (USD million)	Rate (%)	Value (USD million)	Rate (%)
2010	72236.67	34128.92	47.25	38107.75	52.75
2011	96663.17	47921.13	49.58	48742.04	50.42
2012	114529.17	64040.13	55.92	50489.04	44.08
2013	132032.85	80923.81	61.29	51109.04	38.71
2014	150477.02	94238.21	62.63	56238.81	37.37
2015	162016.74	110556.64	68.24	51460.10	31.76
2016	176580.79	123874.42	70.15	52706.37	29.85
2017	215118.61	152549.09	70.91	62569.52	29.09
2018	243483.12	171533.04	70.45	71950.08	29.55
2019	263451.28	184652.11	70.09	78799.17	29.91
2020	281507.33	203372.28	72.24	78135.05	27.76
2021	336254.12	247542.42	73.62	88711.70	26.38
2022	339122.53	243304.23	71.75	95818.30	28.25
2023	354722.18	259190.21	73.07	95531.97	26.93

Source: Author's synthesis



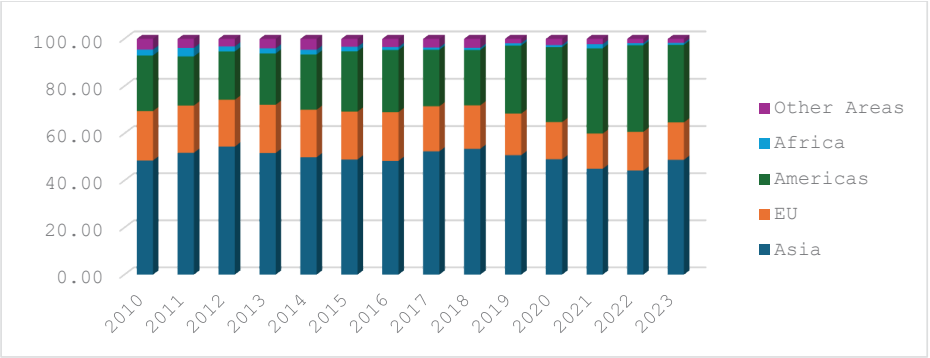
Source: Author's synthesis

Fig 2. Chart of Vietnam's Export structure by Enterprises from 2010 to 2023

Table 2. Vietnam's Export structure by Market from 2010 to 2023

Năm	X (USD million)	Asia		EU		Americas		Africa		Other areas	
		Value (USD million)	Rate (%)	Value (USD million)	Rate (%)	Value (USD million)	Rate (%)	Value (USD million)	Rate (%)	Value (USD million)	Rate (%)
2010	72236.67	35079.54	48.56	15093.37	20.89	16988.76	23.52	1797.03	2.49	3277.97	4.54
2011	96663.17	50105.62	51.84	19307.54	19.97	20078.32	20.77	3486.28	3.61	3685.41	3.81
2012	114529.17	62368.33	54.46	22669.39	19.79	23379.02	20.41	2446.02	2.14	3666.41	3.20
2013	132032.85	68321.44	51.75	26922.32	20.39	28644.29	21.69	2848.93	2.16	5295.87	4.01
2014	150477.02	75160.55	49.95	30217.47	20.08	35138.31	23.35	3062.41	2.04	6898.28	4.58
2015	162016.74	79344.45	48.97	32874.53	20.29	41236.86	25.45	3148.93	1.94	5411.97	3.34
2016	176580.79	85441.03	48.39	36438.15	20.64	46365.28	26.26	2215.21	1.25	6121.12	3.47
2017	215118.61	112782.16	52.43	41029.36	19.07	51326.37	23.86	2142.37	1.00	7838.35	3.64
2018	243483.12	130281.52	53.51	44771.23	18.39	56925.21	23.38	2263.32	0.93	9241.84	3.80
2019	263451.28	133821.37	50.80	46413.26	17.62	75712.06	28.74	2582.62	0.98	4921.97	1.87
2020	281507.33	138213.26	49.10	44213.27	15.71	89211.13	31.69	2512.57	0.89	7357.10	2.61
2021	336254.12	151492.13	45.05	50137.27	14.91	121034.76	36.00	6101.23	1.81	7488.73	2.23
2022	339122.53	150238.13	44.30	55498.76	16.37	124203.17	36.62	2974.29	0.88	6208.18	1.83
2023	354722.18	173213.28	48.83	56267.32	15.86	116147.21	32.74	3015.18	0.85	6079.19	1.71

Source: Author's synthesis



Source: Author's synthesis

Fig 3. Chart of Vietnam's Export structure by Market from 2010 to 2023

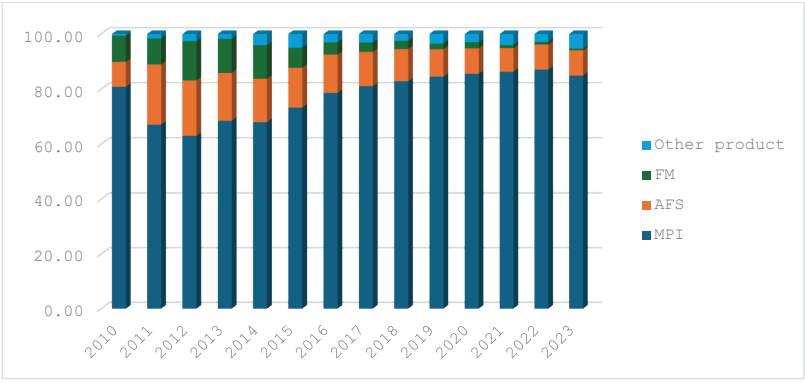
c. Vietnam's Export Structure by Products

Table 3 and Figure 4 indicate that Vietnam's largest export group consists of goods in the MPI group. This group has accounted for over 80% of Vietnam's total export value in recent years, demonstrating its stability. Notably, these products are also the main products manufactured by foreign firms operating in Vietnam. Because Vietnam has cheap labor and good infrastructure, foreign investors are fond of coming to this country to invest and do business. Vietnam's second-largest export items are goods in the agricultural, forestry, and fishery products group, and the largest markets are China, Japan, the United States, and Indonesia. Although these groups of goods have recently increased in value, the growth rate is still average compared to other Vietnam's export items, so their proportion has mostly stayed the same in recent times. Next are raw materials and minerals; these products have decreased sharply in the study period. Specifically, in the structure of Vietnam's export goods, this item accounted for more than 14% in 2012 but dropped to less than 1% by the end of 2023. This situation is also consistent with the development orientation of the Vietnamese government, with the policy of limiting the export of minerals and raw materials. Finally, the value of the remaining items accounts for a relatively small proportion (less than 5%) in the structure of Vietnam's export goods. The structure of Vietnam's export items from 2010 to 2023 did not fluctuate much. Vietnam's main exports were still processed industrial goods, while raw materials from minerals accounted for a tiny proportion. This situation is consistent with the conditions of a developing country like Vietnam.

Table 3. Vietnam's Export structure by Product type from 2010 to 2023

Năm	X (USD million)	MPI		AFS		FM		Other products	
		Value (USD million)	Rate (%)	Value (USD million)	Rate (%)	Value (USD million)	Rate (%)	Value (USD million)	Rate (%)
2010	72236.67	58383.61	80.82	6541.37	9.06	6825.26	9.45	486.43	0.67
2011	96663.17	64837.42	67.08	21136.28	21.87	9102.17	9.42	1587.30	1.64
2012	114529.17	72187.38	63.03	23046.58	20.12	16340.14	14.27	2955.07	2.58
2013	132032.85	90387.48	68.46	22981.81	17.41	16301.34	12.35	2362.22	1.79
2014	150477.02	102301.73	67.98	23728.57	15.77	18371.53	12.21	6075.19	4.04
2015	162016.74	118721.49	73.28	23381.37	14.43	11728.63	7.24	8185.25	5.05
2016	176580.79	138823.13	78.62	24531.58	13.89	7803.75	4.42	5422.33	3.07
2017	215118.61	174321.57	81.04	26826.28	12.47	7302.43	3.39	6668.33	3.10
2018	243483.12	201723.16	82.85	28392.73	11.66	7218.62	2.96	6148.61	2.53
2019	263451.28	222651.53	84.51	26152.63	9.93	5342.82	2.03	9304.30	3.53
2020	281507.33	240812.37	85.54	25934.62	9.21	6271.48	2.23	8488.86	3.02
2021	336254.12	290132.23	86.28	28819.31	8.57	3672.17	1.09	13630.41	4.05
2022	339122.53	295310.57	87.08	30812.25	9.09	3357.13	0.99	9642.58	2.84
2023	354722.18	301145.27	84.90	32529.27	9.17	2170.18	0.61	18877.46	5.32

Source: Author's synthesis



Source: Author's synthesis

Fig 4. Chart of Vietnam's Export structure by Product type from 2010 to 2023

4.2. Discussion

From the analysis results presented in Section 4.1, we have the following comments:

In Vietnam, foreign firms' export activities account for a large proportion of the total. The main export items are products of the processing industry.

Besides, Vietnam's largest export market is the Asian market, followed by America and Europe. The remaining regions account for a very small proportion of Vietnam's overall export activities.

To ensure the sustainable development of these export activities and enhance their contribution to Vietnam's economic growth, the authors propose some solutions as follows:

- Recommendations for the Vietnam's Government

Promote a structural shift in commodity export, focusing on the strengths of products from the processing industry, which will serve the country's industrialization and modernization process.

It is important to create conditions for domestic enterprises to boost exports by removing tariff barriers and balancing the export activities of domestic and foreign enterprises in Vietnam.

The State needs to promote cooperation with other countries by signing trade agreements so that domestic enterprises can access more markets. It should also focus on developing markets for key export goods with high value and high competitiveness. In addition, Vietnam's government must focus on promoting trade promotion and export promotion activities for key markets.

The State needs to improve mechanisms and policies and create a favorable environment for export activities. It should also promote negotiations and signing new agreements, commitments, trade links, and FTAs.

The State needs to grasp the production situation, difficulties, and obstacles in the consumption of AFS products; promptly inform and warn about new regulations of the export market, especially the Chinese market; focus on solving technical barriers, negotiating to expand markets (expanding recognition of production areas, types of products, and exporting enterprises) to EU countries, the Eurasian Economic Union, the United States, Brazil… and exporting agricultural products to other potential markets.

The government needs to continue refining the legal framework to attract more quality FDI capital, which would improve the country's infrastructure and, at the same time, help domestic enterprises enjoy more benefits from FDI.

At the same time, the State should focus on developing infrastructure and supporting services to boost AFS exports: step up the construction of technical infrastructure to foster the development of export transport services; improving the investment and business environment to facilitate and support enterprises to overcome difficulties; expanding the service market to support and enhance the access of enterprises to financial services; encouraging and supporting vocational training and technical worker training activities for export producing enterprises; enhancing export marketing awareness.

- Recommendations for Enterprises

Domestic firms also need to focus on improving the quality of export goods to meet the standards and regulations of import markets and more effectively use the advantages brought by FTAs.

Vietnam's firms must actively build and develop brand identities for AFS export products. Brand building is a "survival" factor for Vietnamese AFS products. Therefore, firms producing, processing, and exporting AFS products must be proactive in gathering information and understanding the significant role and scope of branding. Utilizing various media platforms, including the Internet, television, newspapers, and journals will help firms effectively promote their brands and improve the competitiveness of AFS products in the international market.

Domestic firms must also proactively develop marketing strategies to promote their brands internationally. Enterprises can collaborate with travel companies to organize eco-tours and introduce Vietnamese AFS products to foreign tourists. Enterprises should participate in fairs, exhibitions, and international trade promotion events to enhance their images and brands. E-commerce applications are especially essential in promoting brands and products.

Since the EVFTA Agreement came into effect on August 1th, 2020, import taxes have been eliminated, creating an opportunity for Vietnamese enterprises to enhance their commodity exports to the EU market. However, for agricultural products to successfully penetrate this market, they must comply with strict technical standards, traceability, packaging, and design requirements. Thus, Vietnam's enterprises are required to invest in enhancing product quality, ensuring food hygiene and safety, and advancing processing technology.

The authors believe that Vietnam's export activities will develop more stably and sustainably if the above-proposed solutions are applied synchronously.

5. CONCLUSION

In the context of globalization, countries are interested in export promotion activities. For export activities to develop sustainably, it is necessary to understand the characteristics of that country's export activities. This research has investigated Vietnam's export structure from 2010 to 2023 in 3 aspects: export subjects, export markets, and commodity export structure. The findings reveal that Vietnam's export structure heavily relies on foreign enterprises' exports, with the main export items belonging to the processing industry, and the largest export markets are China and the United States. Finally, the paper proposed some solutions for the government and enterprises to develop Vietnam's export activities sustainably.

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SOLUTIONS TO ENHANCE THE COMPETITIVENESS OF THE NGHI SON ECONOMIC ZONE IN THANH HOA PROVINCE IN THE CONTEXT OF INTERNATIONAL INTEGRATION

Nguyen Tien Hieu[a], Le Minh Thong[b*]

[a]Management Board of Nghi Son Economic Zone, Thanh Hoa Province, Vietnam.

[b]Hanoi University of Mining and Geology, Hanoi, Vietnam.

**Corresponding author: leminhthong@humg.edu.vn*

Abstract: *In the context of deepening international integration, especially Vietnam's participation in the new-generation Free Trade Agreement (FTA), enhancing competitiveness has become a crucial issue for domestic economic zones. Nghi Son Economic Zone (EZ) in Thanh Hoa is one of the nation's key economic zones. Although it has achieved certain successes in attracting investment in recent years, an assessment of its competitiveness reveals some limitations that need to be completed. This paper proposes solutions to enhance the competitiveness of the Nghi Son Economic Zone in the current context.*

Keywords: *Economic Zone, Competitiveness, Nghi Son.*

1. THE CONTEXT OF VIETNAM'S ECONOMIC INTEGRATION AND CURRENT ECONOMIC ZONES

International economic integration is a major policy of the Party and a critical component throughout the renovation process. Therefore, comprehensive international economic integration has become a significant motivation to promote economic growth and create a combined strength to enhance competitiveness and assert Vietnam's position. Vietnam has proactively and actively participated in multilateral and regional economic institutions, such as joining the Association of Southeast Asian Nations (ASEAN) in 1995, being a founding member of the Asia-Europe Meeting (ASEM) in 1998, becoming a member of the Asia-Pacific Economic Cooperation (APEC), and particularly joining the World Trade Organization (WTO) in 2007, marking comprehensive integration into the global economy.

To date, Vietnam has established diplomatic relations with approximately 180 countries worldwide, expanded trade relations by exporting goods to over 230 markets of countries and territories, and signed nearly 100 bilateral trade agreements. Over 60 agreements encourage and protect investments, about 70 agreements avoid double taxation, and many bilateral cultural cooperation agreements with countries and international organizations. (Bộ Tài chính, 2017). International economic integration has fundamentally had a positive and long-term impact, contributing to the successful implementation of the country's economic development goals in recent years. International economic integration has promoted bilateral trade value growth between Vietnam and its partners, facilitated the attraction of FDI and ODA capital for national economic development, and continuously increased export turnover, contributing significantly to GDP growth. By expanding cooperation with countries in the

region and the world, Vietnam has absorbed new science and technology and advanced management in various fields, such as economy, technology, culture, and society, contributing to increased labor productivity and enhanced competitiveness in production and business activities. Besides, international integration has also trained Vietnam to have a team of human resources with professional and management capabilities; international economic integration has also made Vietnam pay attention to social security issues and poverty reduction.

Economic zones can be referred to in various terms and are understood as areas with separate economic spaces with especially favorable investment and business environments for investors, with defined geographical boundaries established according to the conditions, order, and procedures specified by the host country. The main characteristics of successful economic zones relate to the ability to provide high-quality infrastructure, a skilled workforce, and transparent support services (Vương Đình Huệ, 2014; Thân Trọng Thụy and Phạm Xuân Hậu, 2012). Additionally, streamlined legal enforcement, simplified business establishment rules, customs management, administrative management, and other special approval forms are quickly implemented (Zeng, D. Z., 2010; Wahyuni, S., & SA, E. A., 2010). The economic zone model is associated with experimenting with new policy mechanisms to improve the investment environment of many countries worldwide. Economic zones are seen as a tool for developing trade capacity to promote rapid economic growth by using tax and business incentives to attract foreign investment and technology. Currently, economic zones are built as multi-sector, multi-field zones with all types of economies, including industrial production, trade, services, tourism, etc. With the support of budget capital and special incentive policies, attracting many domestic and foreign investment sources, the development process of economic zones will achieve positive results, contributing to accelerating industrialization - modernization, and infrastructure development (Chikatisrinu, 2013).

Over more than 20 years of development, since the Chu Lai Open Economic Zone was established in 2003, the country now has 19 coastal Economic Zones (EZs), with 11 of them located in the North Central and Central Coastal regions. These EZs have attracted 254 foreign investment projects with a total registered capital of 42 billion USD and 1,079 domestic investment projects with a total investment of approximately 805.2 trillion VND. In total, about 60.4 thousand hectares of land have been developed by investors for infrastructure, production facilities, and business operations. The economic structure of many coastal provinces and cities has shifted significantly from agriculture and handicrafts to services (with a focus on tourism and resort services). The labor structure in these coastal provinces and cities has also shifted from agriculture and fisheries to services and industry (Đình Tăng, n.d.).

In the context of the development of the Industrial Revolution 4.0 and current globalization, input factors such as cheap labor and abundant resources are no longer Vietnam's strengths, requiring economic zones to be planned and built with new development orientations, suitable models

aiming to attract large-scale, modern technology, sustainable projects to enhance competitiveness.

2. CURRENT COMPETITIVENESS OF NGHI SON ECONOMIC ZONE

Nghi Son Economic Zone (Nghi Son EZ) is located in the southern part of Thanh Hoa province on the country's North-South transportation axis, 200 km south of Hanoi. It connects the North with the central, Northwest, and South regions and with the markets of southern Laos and Northeastern Thailand. Nghi Son EZ has a deep-water seaport that has been planned to build a port cluster for 50,000 DWT ships to dock.

The goal is to develop into a multi-sector, multi-field economic zone focusing on heavy industry and basic industries such as petrochemical refining, high-grade steel rolling, ship repair and building, thermal power, building materials industry, consumer goods production, processing and export, associated with the efficient exploitation of Nghi Son port. With this development orientation, the EZ truly becomes the destination for large-scale projects.

By the end of 2020, Nghi Son EZ had 138 active or registered projects. Domestic enterprise projects accounted for a large proportion (93.2%). Foreign projects were very modest (9 projects accounting for 6.98%). However, FDI projects in Nghi Son EZ accounted for up to 73.68% of total investment capital in the EZ. (Bộ Kế hoạch và Đầu Tư, 2020)

Table 1. Types of Enterprises Investing in Nghi Son EZ

No.	Type of Enterprise	Number of Projects	Ratio (%)	Registered Investment Capital	Ratio of Investment Capital (%)
1	FDI Enterprises (billion USD)	9	6,98	12,03	73,68
2	Vietnamese Enterprise (billion VND) Include:	129	93,02	96.701,36	26,32
	Joint Stock Companies	62	44,93		
	Limited Liability Companies	58	42,03		
	Groups	3	2,17		
	Other types	6	4,35		
3	Total (billion VND)		100,00	367407,9	100

Source: (Ban QLKKT Nghi Sơn, 2015)

Practically, large projects in the EZ account for 34,7% in number and 98% in investment scale. This is significant because, in Vietnam, the proportion of large enterprises is only 2,98% (VCCI 2014), with 97% being small and medium enterprises, mainly operating in the tourism, service, and processing sectors. These enterprises only account for a very small proportion of total registered investment capital in the EZ. This shows the large-scale and attractive preferential policies for large-scale enterprises.

Table 2. Scale of Enterprises Investing in Nghi Son EZ

No.	Scale	Vietnam Enterprise			FDI Enterprise		
		Number of Enterprises	Registered investment capital (billion VND)	Ratio (%)	Number of Enterprises	Registered investment capital (billion VND)	Ratio (%)
1	Large enterprise (over 100 billion)	39	94744,85	97,98	9	12,0314	100
2	Medium-sized enterprise (20-100 billion)	35	1451,01	1,50	0	0	0
3	Small Enterprise (under 20 billion)	55	505,50	0,52	0	0	0
	Total	129	96701,36	100	9	12,0314	100

Source: (Ban QLKKT Nghi Sơn, 2016)

To attract investment from enterprises, the management board of the EZ has determined to implement measures to reduce input costs for enterprises. Mainly, focus on core content suitable for enterprises to reduce costs, such as establishing a Land Clearance Steering Committee, promoting the strength of the political system, and mass organizations in mobilizing people to relocate and resettle. Nghi Son EZ has received attention from the Government and central ministries, prioritizing capital to invest in essential infrastructure works such as water supply, wastewater treatment, synchronous investment in electricity supply systems, and communication according to approved planning; the transportation system has also been quickly completed to meet the production and business needs of enterprises; the seaport system is gradually being completed.

From 2011-2015, 2,682 billion VND from the state budget was allocated to implement 41 projects, including 13 projects transitioning from the previous period and 28 new projects; from 2016-2020, 9.842 billion VND was allocated from the state budget to implement 33 projects, including 18 projects transitioning from the previous period and 15 new projects. The total capital supported by the central government from the establishment to the end of 2020 is 13.549 billion VND.

Table 3. Infrastructure Investment Projects in Nghi Son EZ 2015-2020

Criteria	Unit	Accumulated until 2015	Period 2016 – 2020	Accumulated until 2020
Total Projects	Projects	13	23	36
Total Registered Investment Capital	Billion VND	13.545	12.396	25.941
Total Implemented Investment Capital	Billion VND	6.214	3.869	10.083

Source: (Ban QLKKT Nghi Sơn, 2015)

In addition, the social infrastructure of the Economic Zone (EZ) has also received attention from investors. The province has directed the planning and investment call. It has allocated approximately 300 hectares of land for service investments, which has largely met the housing needs of workers in the EZ. The local government has also invested in healthcare stations and schools from preschool to secondary education.

To fully exploit Nghi Son's natural advantages and encourage investment projects, the government has issued special incentive policies applicable to all EZs in general and Nghi Son EZ in Thanh Hoa province in particular. Major banks such as VietinBank, Vietcombank, Agribank, etc., have opened branches and transaction offices in Nghi Son EZ to meet the financial transaction needs of businesses and residents. Service and tourism projects are rapidly increasing in the EZ.

Despite these achievements, Nghi Son EZ still faces several limitations and issues that need to be addressed:

Firstly, FDI projects in Nghi Son EZ have uneven and unstable capital scales. Most FDI projects in Nghi Son EZ are small-scale, focusing on sectors like industrial production, construction materials, consumer goods production, and resource exploitation. Most of these projects have small investment capital, with FDI mainly concentrated in the Nghi Son Oil Refinery project.

Secondly, the structure of FDI attraction in Nghi Son EZ is still imbalanced. The ratio of implemented capital to registered capital during the 2011-2013 period in Nghi Son EZ was 29.7%. However, this ratio mainly depends on the capital allocated to the Nghi Son Oil Refinery project. Other projects have a slow implementation pace, with some not being implemented. Additionally, there is a lack of attraction for auxiliary, high-tech, and post-refining industries. The progress of some projects after receiving investment certificates is slow; the financial capacity of some domestic investors is weak, and they cannot arrange capital for project implementation.

Agriculture, forestry, fisheries, high-tech industries, and processing industries have also failed to attract foreign investors, which could affect the province's overall economic restructuring.

The imbalance in the structure of FDI attraction in Nghi Son EZ is also reflected in the imbalance of investment partners. Foreign investors in Nghi Son EZ mainly come from Asian countries like China, Taiwan, and Japan.

Thirdly, the investment and business environment is not very attractive, and clean land is lacking. Most investors' projects in Nghi Son EZ are initiated from land clearance work.

Land compensation and clearance work are still facing many difficulties and delays. The land clearance work for infrastructure and investor projects has not been properly prioritized, with long clearance times; land allocation and approval beyond authority in some communes are quite common; illegal construction that obstructs construction has increased but has not been promptly addressed. Most infrastructure investment projects in Nghi Son EZ are delayed due to land issues; infrastructure is still lacking and does not meet requirements; mobilizing capital for infrastructure investment is challenging. Investment calls for infrastructure through PPP, BOT, and BT forms are still limited.

Some planning schemes do not meet quality requirements, have limited vision, are unsuitable for development needs, and

still have many plots of land unsuitable for industry, with a shortage of land for services. The rate of filling planning for functional areas in the EZ is slow compared to the plan; planning and construction management still have many shortcomings.

Fourthly, training high-skilled local human resources is challenging, and some companies' recruitment processes have not coordinated well with the Management Board and local government, leading to insufficient job creation for land-acquired residents, particularly those aged 40 and over, and slow implementation of service projects.

Fifthly, public service products and welfare facilities in Nghi Son EZ do not meet the needs of investors and workers. Nghi Son EZ has not invested in welfare facilities such as worker housing, kindergartens, preschools, health centers, cultural houses, etc. The infrastructure for electricity and water is inadequate, and the centralized wastewater treatment system has not been invested.

Sixthly, security and order in Nghi Son EZ have complex developments affecting the investment and business environment; strikes and work stoppages have occurred in some foreign-invested enterprises.

Seventhly, there are limitations in administrative procedures. Coordination between the Management Board, provincial agencies, and local authorities is not specific, overlapping, and often delayed, affecting the completion of procedures for investors.

Eighthly, there are limitations in the suitability of support policies to investors' needs. Some investment attraction policies issued by the province have not attracted investor interest, such as policies supporting the construction of markets, supermarkets, and commercial centers, policies supporting the production and business of export goods, policies encouraging the development of small and medium industries, etc.

3. SOLUTIONS TO ENHANCE THE COMPETITIVENESS OF NGHI SON ECONOMIC ZONE

Firstly, continue to prioritize administrative reform as a key task, creating a significant shift in discipline, awareness, responsibility, service spirit, professional competence, and social knowledge of the staff. Strongly apply IT achievements in directing, managing, and handling work documents; build a "service-oriented" administration, focusing on people and businesses as the center and action goal.

Secondly, effectively mobilize and use various sources of capital (central budget, provincial budget, PPP, ODA, direct investment from businesses, etc.) to focus on infrastructure construction in the EZ. Initially, some key projects, such as dredging the entrance channel to Nghi Son port, investing in main traffic routes, and improving green areas along the roads, should be implemented.

Thirdly, work closely with Nghi Son town and the districts of Nong Cong and Nhu Thanh to address land clearance and resettlement obstacles to expedite project implementation.

*Fourth*ly, continue to innovate and improve the quality of investment promotion work in a practical, focused, and targeted manner; focus on potential and strong markets and partners; prioritize local investment promotion; maximize opportunities from the shift of investment capital from China to Southeast Asian countries due to the US-China trade war. Regularly review and supervise the implementation of investment projects; decisively revoke projects that cannot be implemented; deliberately delay

or wasteland; and reallocate to capable investors by the law.

Fifthly, urgently develop and submit the functional area planning schemes for approval according to the adjusted and expanded general planning of Nghi Son EZ approved by the Prime Minister to attract investment. Prioritize planning industrial zones and urban areas, ensuring that the planning process is linked with urban development and is modern, green, clean, beautiful, and environmentally friendly. Work closely with local authorities to manage planning, prevent encroachment and illegal construction, and mark out planning boundaries for transportation routes.

Sixth, effectively implement the logistics service development project in Thanh Hoa province until 2025, with a vision to 2030, according to Decision No. 2119/QD-UBND dated June 9, 2020, by the provincial People's Committee, ensuring coordinated transportation between seaports, airports, and cargo transport hubs, and logistics centers. Build policies to attract goods from businesses in Thanh Hoa and surrounding regions to export through Nghi Son port. Quickly invest in completing Nghi Son port to become a type 1A port and build a type I regional logistics center in Nghi Son EZ.

Seventhly, it focuses on promoting the socialization of human resource development and creating favorable conditions and policies to encourage businesses from all economic sectors to invest in training, upgrading, vocational education, and human resource development. It pays attention to career transition and job creation for local workers directly affected by projects. It improves the quality of workers' living standards.

4. CONCLUSION AND RECOMMENDATIONS

The development process of Nghi Son EZ has achieved many encouraging results, but it still faces significant challenges. The competitiveness of the EZ remains low, leading to low operational productivity. Although the number of investing enterprises is high and the amount of investment capital is substantial, the economic effectiveness has not met expectations. In the context of fierce competition among EZs and industrial zones domestically, within Southeast Asia, and globally, to attract investment capital shifting from China, enhancing the competitiveness of Nghi Son EZ and addressing existing issues is becoming increasingly urgent.

To enhance its competitiveness, Nghi Son EZ needs to implement its own solutions and involve the government and relevant ministries in effectively planning the development of EZs in Vietnam, including Nghi Son EZ, and properly defining development strategies for each stage. These will be important bases for developing plans and enhancing Nghi Son EZ's competitiveness.

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CURRENT SITUATION AND SOLUTIONS FOR PUBLIC INVESTMENT IN HO CHI MINH CITY DURING THE PERIOD 2016-2022

Nguyen Duc Tan[a,b]*

[a]Huu Nghi University of Technology and Management, Hanoi, Vietnam.

[b]Ph.D. Candidate, Hanoi University of Mining and Geology, Hanoi, Vietnam.

**Corresponding author: nguyentan.fdi@gmail.com*

Abstract: *Public investment is a state investment activity that plays a vital role in the nation's socio-economic development. Public investment aims to create socio-economic infrastructure projects and invest in education, healthcare, culture, and society to improve people's living standards. Public investment in national defense and security also contributes to ensuring national security and defense. Public investment is a fundamental economic method that promotes practical and rapid socio-economic growth. However, public investment has not yet met the socio-economic development needs, has not ensured uniformity, and has not fully utilized the available resources. Public investment activities have not been truly effective. The management and disbursement of public investment funds during implementation have not complied with the prescribed principles. This paper will assess the current state of public investment in Ho Chi Minh City to propose solutions for public investment issues in the city today.*

Keywords: *Public investment, Ho Chi Minh City.*

1. BASIC ISSUES REGARDING PUBLIC INVESTMENT

1.1. Public Investment and Public Investment Projects

According to Public Investment Law No. 39/2019/QH14, public investment is the activity of the State in programs, projects, and other public investment objects as stipulated by this Law. Public investment is a process by which the government or public organizations use public investment capital for the community and national socio-economic development, including the construction of infrastructure such as transportation facilities, educational institutions, hospitals, parks, water supply and drainage systems, national defense, and security works, and other public investment projects. A public investment project is an investment project that uses part or all of the public investment capital according to Clause 13, Article 4 of Public Investment Law No. 39/2019/QH14.

1.2. Public Investment Capital

Public Investment Law No. 39/2019/QH14 stipulates that public investment capital includes state budget capital and lawful revenue sources of state agencies and public service units allocated for investment according to the law. The state budget capital is the primary source of public investment capital, including central budget capital for central budget-funded development investment, local budget capital for local budget-funded development investment, and central budget capital supplemented with specific objectives for localities as allocated by the central budget for local investment in public investment programs and projects. Additionally, there is credit capital that can be mobilized from domestic and international

credit organizations for public investment and capital mobilized from organizations and individuals domestically and internationally for public investment through public-private partnership (PPP) investment.

1.3. Forms of Public Investment

Direct investment: The state directly invests in programs and projects through public investment capital. Indirect investment: The state invests through state-owned enterprises and state investment funds. Support investment: The state supports capital, finance, mechanisms, and policies for organizations and individuals investing in programs and projects.

1.4. Classification of Public Investment Projects

Public investment projects are classified according to the following criteria: By the nature of the public investment project, including pure public investment projects and support public investment projects. The objectives of the public investment project include public investment projects for economic development, public investment projects for social development, public investment projects for national security and defense, and environmental projects. By the scale of the public investment project, including large, medium, and small public investment projects (according to groups A, B, and C). The source of capital for the public investment project includes public investment projects using state budget capital, public investment projects using local budget capital, public investment projects using support capital, and public investment projects using mobilized capital.

1.5. Role of Public Investment Projects

Public investment from the state budget plays a role in promoting economic growth, creating infrastructure development projects, transforming the economic structure, orienting, and promoting socio-economic development investment. Public investment improves people's living standards, stabilizes and reduces the gap between rich and poor, and reduces societal inequality and injustice. Public investment contributes to the development of education, healthcare, culture, and society and improves living standards. Public investment is important in ensuring and continuously strengthening national defense and security.

2. CURRENT STATE OF PUBLIC INVESTMENT IN HO CHI MINH CITY

2.1. Central Government Budget

Table 2.1. Public Investment Plan for the Period 2016-2022

Unit: Billion VND

No	Year	2016	2017	2018	2019	2020	2021	2022	Total
1	Central Budget	184,7	3282,1	843,0	1969,5	3153,6	211,9	1768,6	11413,5
2	ODA from Central	1202	4138	2864	1000	5045	2780,1	711	17740,1
3	Total Central Budget	1386,7	7420,2	3707	2969,5	8198,5	2992	2479,6	29153,6
4	Disbursement	1386,7	4951,5	2727	2941,5	4993	1041,1		18040,8
5	Disbursement Rate (%)	100%	66,73%	73,56%	99,06%	60,90%	34,80%	< 30%	61,88%

Source: *Report on the assessment of the implementation of the medium-term public investment plan for the period 2016-2020 in Ho Chi Minh City*

The total public investment plan of the city fluctuates significantly over the years. In 2016-2022, the total public investment budget from the central government was over VND 29 trillion dong. The disbursement rate of the central government budget in the years 2016-2019 was quite good, with some years nearly reaching 100% disbursement, such as in 2016 and 2019. However, in subsequent years, due to the impact of the COVID-19 pandemic, the disbursement rate of the city was very low, such as in 2021, where disbursement only reached 34.8% of the total budget plan of VND 2.992 billion. On average, during the entire period, the disbursement rate of the central government's public investment budget for the city was nearly 62%.

2.2. Ho Chi Minh City Budget

Table 2.2. Public Investment Plan of Ho Chi Minh City for the Period 2016-2022

Unit: Billion VND

No	Year	2016	2017	2018	2019	2020	2021	2022	Total
1	Invested by the City People's Council	22872	25146	36165	29002	36812	32263	34984	217244
2	Plan by the City People's Committee	23184,7	24487,2	30669,4	23318,8	36812,4	29271	29464	197207,6
3	Plan/Invest Ratio	101,4%	97,4%	84,8%	80,4%	100,0%	90,7%	84,2%	90,8%
4	Disbursement by the State Treasury	20562,2	22536,6	23444,6	22481,3	30149,7	18680	28703,7	166558,3
5	Disbursement/Plan Ratio	88,7%	92,0%	76,4%	96,4%	81,9%	63,8%	97,4%	84,5%
6	Disbursement/DT Ratio	89,9%	89,6%	64,8%	77,5%	81,9%	57,9%	82,1%	76,7%

Source: *Report on the assessment of the implementation of the medium-term public investment plan for the period 2016-2020 in Ho Chi Minh City*

Besides the central budget, Ho Chi Minh City annually allocates a significant portion of its budget for public investment. On average, the city's budget for public investment is about VND 25,000 to 30,000 billion per year. During the period from 2016 to 2022, the total city budget for public investment, according to the plan of the City People's Committee, was nearly VND 200,000 billion. Generally, the disbursement rate of the city's budget is higher than that of the central budget. The average disbursement rate compared to the estimate for the entire period was 76.7%, while the disbursement rate compared to the plan was 84.5%.

Overall, the picture of public investment in 2016-2022 does not meet the expectations of a city as large as Ho Chi Minh City. Various reasons contribute to this, including slow compensation, land clearance for projects, issues with investment procedures, including adjustments, and slow disbursement of ODA projects due to procedural hurdles (design

time, estimation, implementation, adjustment of investment content, tax procedures, environmental procedures, etc.).

3. PUBLIC INVESTMENT OUTCOMES USING THE CITY BUDGET

3.1. Transportation

During this period, the city has completed and put into exploitation many transportation projects, contributing to reducing traffic congestion in various areas, such as Tan Son Nhat International Airport and Cat Lai Port. Several major transportation projects, such as My Thuy Interchange, An Suong Interchange, and Truong Son-Tan Son Nhat-Binh Loi-Outer Ring Road Interchange, have been completed. The city has also invested in technology for managing traffic operations, such as installing cameras, electronic traffic information boards, traffic light systems, enhancing traffic regulation, and improving public transport systems. Additionally, the city has developed proposals for the development of transportation infrastructure and plans to improve public transport in combination with controlling the use of personal vehicles.

3.2. Health and Population

The city has implemented numerous projects to upgrade facilities to improve medical treatment conditions, investing in high-tech equipment for patient care. New hospitals, such as Cu Chi General Hospital, Hoc Mon General Hospital, Thu Duc General Hospital, and the new campus of Pham Ngoc Thach University of Medicine, have been constructed. Various programs have been launched to improve the city's healthcare human resources quality. Upgrades and renovations have been made to district-level general hospitals and health centers. By the end of 2020, the city had achieved 42 hospital beds per 10,000 people, per the resolution of the 10th Ho Chi Minh City Party Congress (2015-2020 term).

3.3. Education and Vocational Training

The city has also implemented several initiatives and programs aimed at comprehensive innovation and improving the quality of its education workforce to meet international standards. Many notable projects have been completed, such as the construction of Tan Tao Secondary School, Dong Thanh Secondary School, and Nguyen Hue Primary School, among others. The city has also built vocational training centers, such as the general technical education and vocational training center in Binh Chanh District, Vinh Loc B Secondary School, An Thoi Dong Secondary School, Tan Tuc High School, Hiep Thanh Secondary School, etc. By the end of 2020, the city had achieved 292 classrooms per 10,000 population (the target set by the 10th Ho Chi Minh City Party Congress was 300 classrooms per 10,000 population).

3.4. Culture and Sports

The city aims to build a healthy, modern, and civilized cultural and sports environment worthy of being the country's largest cultural and sports center. Many cultural and sports projects have been completed and put into use, such as the statue of Ho Chi Minh and Ton Duc Thang, the memorial stele for Saigon commandos who sacrificed during the 1968 Tet Offensive at Independence Palace, the restoration of Giac Vien Pagoda, the restoration of Hanh Phu Shrine, the construction of the Ho Chi Minh statue, the restoration of the Nhan Huong Pavilion in Saigon Zoo, the construction of Hung

Dao Theater, the relocation of the circus to Gia Dinh Park, the installation of clock and electronic scoreboard systems for swimming and diving competitions at Phu Tho Swimming Club, and the installation of lighting systems at Thong Nhat Sports Center and the renovation and expansion of the Southern Women's Museum.

3.5. Irrigation and Flood Control

The city has completed 22 irrigation projects with a total length of 8.284 km, dredged 37 canals with a total length of 28.075 km, and invested in drainage systems on 63 roads, achieving 85.9% of the planned length (171.795 km/200 km). The city has also implemented 54 drainage projects. The project to address tidal flooding combined with climate change has achieved over 70% of the workload. Additionally, the city has started construction on two projects on the bank of the Saigon River. The Xom Cui Canal dredging and Ba Lon Canal investment projects have started. The improvement of the Thu Dao, Ong Be, and Thay Tieu water drainage axes, the Song Kinh sluice, and the Tham Luong-Cho Dem canal branch have been undertaken.

3.6. Environment

One wastewater treatment plant, Tham Luong-Ben Cat, with a capacity of 131,000 m^3/day, has been completed. The construction of the Nhieu Loc-Thi Nghe wastewater treatment plant with a capacity of 480,000 m^3/day is underway. The second phase of the Binh Hung wastewater treatment plant is under construction, along with several other city wastewater treatment stations. The total treated wastewater volume is 3,162,000/3,076,000 m^3/day (as per Decision No. 1942/QD-TTg dated October 29, 2014, by the Prime Minister on the drainage and wastewater treatment planning for residential areas and industrial zones in the Dong Nai River basin until 2030), achieving 10.28%.

3.7. Public Sector Activities and Public Service Units

The city has implemented organizational and administrative restructuring plans to create a streamlined, efficient government apparatus. Forty-five projects with a total investment of 3,774,952 billion VND have been executed to serve state management agencies, public service units, political organizations, and socio-political organizations. Administrative reforms in the city have been effectively carried out.

3.8. National Defense and Security

The city has also undertaken several projects in the fields of national defense and security.

- **Defense Investment:** Construction of a shooting range for the Command Headquarters, repair and upgrade of Gia Dinh Regiment barracks (phase 2), construction of new ammunition warehouses in Cu Chi district, construction of the Border Guard Station at Nha Rong Port, and construction of the Hai Doi 2 barracks.

- **Security Investment:** Construction of police headquarters in Districts 6, 7, Tan Phu, and Binh Chanh. Repairs to Chi Hoa Prison. Upgrades and additions to firefighting and rescue equipment for the City Fire and Rescue Police Department. Investment in multipurpose automated firefighting vehicles, demolition equipment, and specialized hazardous environmental incident response vehicles.

4. EXISTING ISSUES AND LIMITATIONS

Public investment in Ho Chi Minh City has achieved many commendable results but still faces several issues and limitations. Public investment lacks coordination and is spread too thinly, failing to meet the city's socio-economic development needs. Investment efficiency is low, with many resources wasted. Monitoring and oversight of public investment lack a clear plan and roadmap. Land compensation and clearance work is challenging. Investors' project management capabilities and problem-solving skills during project implementation are inadequate. ODA and donor management have many shortcomings. Tendering regulations are complex, unclear, and non-transparent. The capabilities of domestic and international contractors and consultants do not meet requirements. Many projects in urban areas face difficulties due to high population density, outdated customs, and traditional residential practices. There are obstacles to implementing the Public Investment Law. Coordination in public investment disbursement is limited, and investors do not prioritize timely finalization of accounts.

5. PROPOSED SOLUTIONS

To enhance the efficiency of public investment, the following solutions are recommended:

Improving Institutions, Policies, and Legal Frameworks:

- Compile and evaluate practical issues regarding institutions, policies, and laws related to public investment.

- Recommend that competent authorities issue new regulations or amend existing ones to improve the effectiveness of public investment law implementation in Ho Chi Minh City.

Efficient Use of Public Investment Capital:

- Develop public investment capital allocation plans based on principles, criteria, and norms.

- Enhance measures for practicing thrift and preventing waste at all stages of the investment process to ensure concentrated investment and avoid scattered and dispersed investments. This should align with socio-economic development goals and comply with the Public Investment Law and relevant regulations.

o Review the disbursement progress of public investment capital for each project, prioritize completed projects, ensure timely disbursement, and recover advance capital. Flexibly manage funds by reallocating capital from projects with slow disbursement to those with good disbursement progress. Focus on critical areas and complete ongoing projects.

Speeding Up Compensation and Site Clearance:

- Regularly review, monitor, and inspect project implementation to expedite compensation and site clearance.

- Publicize compensation prices, support policies, and resettlement arrangements transparently and legally to ensure fairness and accuracy.

- Enhance communication, persuasion, and mobilization efforts to help households affected by site clearance understand, agree with, and comply with state policies, thus facilitating their relocation and quickly stabilizing their lives while protecting their legitimate rights.

Monitoring and Supervising Project Implementation:

- Require investors to register detailed project implementation schedules with relevant departments and districts.

- Establish monitoring teams to regularly follow up, inspect, and report project progress to competent authorities. Take corrective actions against contractors who do not meet requirements or violate contract terms, and terminate contracts with incompetent contractors who violate legal regulations.

Enhancing the Quality of Project Investment Procedures:

- Provide timely guidance to resolve issues related to project procedures at each stage, such as project approval and adjustment approval.

- Minimize project changes and adjustments, strengthen public investment planning, and improve public investment management and administration efficiency.

- Address delays in implementing projects approved for investment by authorities and promptly present necessary adjustments for approval.

Strengthening State Management in Public Investment Activities:

- Assign city leaders responsibility for monitoring project progress and addressing investment procedure, bidding, construction, land, and capital disbursement issues.

- Provide timely responses, guidance, and resolutions to difficulties encountered in public investment activities.

- Enhance monitoring and evaluation of public investment programs and projects. Promote community supervision to allow citizens and organizations to contribute to public investment activities.

Reforming Administrative Procedures in Public Investment Management:

- Continue to reform administrative procedures related to public investment and increase IT application in managing and administering the city's public investment plan.

- Develop IT programs, review and propose a synchronized implementation, and integrate existing programs at the city and central ministry levels.

Mobilizing Funds to Promote Public Investment:

- Utilize Ho Chi Minh City's special mechanisms and policies to mobilize legal funds for public investment.

- Promote socialization in public investment sectors and proactively seek and propose investors for feasible projects.

- Flexibly and diversely implement payment models for investors, such as public-private partnerships (PPPs), and limit the Build-Transfer (BT) model.

6. CONCLUSION

Public investment is a crucial activity that creates infrastructure for socio-economic development and serves as a foundation for industrialization and modernization. This paper has focused on analyzing the current state, identifying limitations, and proposing solutions for public investment in Ho Chi Minh City to meet investment needs and foster socio-economic growth.

However, public investment is a specialized and complex economic management activity constantly evolving within an incomplete and inconsistent legal and policy environment. Mobilizing and utilizing resources for public investment

remains challenging. Therefore, Ho Chi Minh City must maintain flexibility in its administration and management to achieve socio-economic development goals and the medium-term public investment plan for the 2021-2025 period.

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SOME EMERGING ISSUES AND SOLUTIONS FOR THE DEVELOPMENT OF THE PRIVATE SECTOR IN THE UPCOMING PERIOD

Phan Huy Duong[a,*]

[a]*Thanh Dong University, HaiDuong, Vietnam*

** Corresponding author: duongphqlkt@gmail.com*

Abstract: *As part of the socialist-oriented market economy, the private sector in our country is increasingly contributing to national construction and development. Implementing the Party's orientation to make the private sector a truly significant driving force for the economy, it is crucial to continue renewing the mindset and creating a favorable environment for the private sector to grow stronger.*

Keywords: *Private sector, individuals, small owners, private ownership, non-state sector.*

1. CURRENT SITUATION OF THE DEVELOPMENT OF THE PRIVATE SECTOR IN VIETNAM

The private sector has experienced robust development. From 2010 to 2021, over 100,000 new businesses were established on average each year, with annual registered capital totaling over 500 trillion VND. Notably, from 2018 to 2022, more than 130,000 new businesses were established yearly, with annual new registered capital of over 150 trillion.

Regarding labor scale, the proportion of non-state enterprises with less than ten employees in 2020 contributed 77.8% of the total number of operating enterprises, representing a significant growth compared to 61.5% in 2010. In contrast, the foreign-invested enterprise sector only accounted for 1.2%, while state-owned enterprises comprised merely 0.02%. The number of non-state enterprises employing from ten to 199 employees accounted for 17.9%, a sharp decrease from 33.2% in 2010. There was no improvement in the proportion of non-state enterprises with over 200 employees; the proportion was even lower than in 2010. The number of non-state enterprises with a workforce of 200 to 299 employees represented 0.3%, a decline from 0.6% in 2010, whereas those with more than 300 employees accounted for only 0.4%, down from 0.8% in 2010.

Table 1. The number of enterprises classified by labor scale and enterprise types

	No. of enterprises		Structure (%)	
	2010	2020	2010	2020
Total	279360	684260	100,0	100,0
State enterprises	3283	1963	1,2	0,3
Non-state enterprises	268838	660055	96,2	96,5
FDI enterprises	7254	22242	2,6	3,2
Under 10 employees	173314	540747	62,0	79,0
State enterprises	91	103	0,03	0,02
Non-state enterprises	171938	532276	61,5	77,8
FDI enterprises	1270	8368	0,5	1,2
From 10 - 199 employees	98772	13394	35,4	19,6
State enterprises	1796	1069	0,6	0,2

	No. of enterprises		Structure (%)	
Non-state enterprises	92838	122770	33,2	17,9
FDI enterprises	4138	10125	1,5	1,5
From 200 - 299 employees	2511	3156	0,9	0,5
State enterprises	380	188	0,1	0,03
Non-state enterprises	1678	2058	0,6	0,3
FDI enterprises	453	910	0,2	0,1
Over 300 employees	4778	6393	1,7	0,9
State enterprises	1016	603	0,4	0,1
Non-state enterprises	2369	2951	0,8	0,4
FDI enterprises	1393	2839	0,5	0,4

Source: General Statistics Office of Vietnam

Regarding capital scale, in 2020, the proportion of non-state private enterprises with business capital of less than VND 1 billion represented up to 18.5% of the total number of operating enterprises, an increase from 13.2% in 2010. 51.9% of these enterprises had a capital size ranging from VND 1 billion to less than VND 10 billion, compared to 60.2% in 2010. Meanwhile, the proportions of State-owned enterprises were 0.002% and 0.02%, respectively, while for the FDI enterprise sector, the figures were 0.3% and 0.8%. Only 7% of non-state enterprises had business capital of VND 50 billion or more, an increase from 4.5% in 2010. Overall, private sector enterprises are mainly classified as small and super-small scales.

Table 2. Number of enterprises classified by amount of capital and enterprise types

	No. of enterprises		Structure (%)	
	2010	2020	2010	2020
Total	279360	684260	100,0	100,0
State enterprises	3283	1963	1,2	0,3
Non-state enterprises	268838	660055	96,2	96,5
FDI enterprises	7254	22242	2,6	3,2
Under 1 billion VND	36838	128703	13,2	18,8
State enterprises	35	12	0,0	0,0
Non-state enterprises	36380	126625	13,0	18,5
FDI enterprises	423	2066	0,2	0,3
From 1 - 10 billion VND	170455	360670	61,0	52,7
State enterprises	404	120	0,1	0,0
Non-state enterprises	168310	354839	60,2	51,9
FDI enterprises	1741	5711	0,6	0,8
From 10- 50 billion VND	54676	137114	19,6	20,0
State enterprises	911	371	0,3	0,1
Non-state enterprises	51500	130921	18,4	19,1
FDI enterprises	2265	5822	0,8	0,9
Over 50 billion VND	17391	57773	6,2	8,4
State enterprises	1933	1460	0,7	0,2
Non-state enterprises	12633	47670	4,5	7,0
FDI enterprises	2825	8643	1,0	1,3

Source: Statistical Yearbook

In fact, the private sector significantly contributes to economic development:

First, from 2010 to 2021, the contribution of the non-state economic sector (including the private economy and collective economies) consistently accounted for over 50% of the country's GDP (50.55% in 2019, 50.56% in 2020, and 50.04% in 2021), including the cooperative economic sector. This sector holds the largest share of GDP among the three sectors (state, private, and FDI).

Second, the non-state economic sector (encompassing public, commercial, and non-state service sectors, excluding personal income tax contributions) contributed an increasing proportion to the state budget from 11.7% in 2011 to 18.48% in 2021. In particular, since 2017, the private sector's contribution to the state budget has surpassed that of the state-owned sector (SOEs) and the FDI sector.

Third, the private sector has gradually engaged in links, production networks, and regional and global value chains through vertical linkage with the FDI sector. By 2021, the private sector represented a substantial proportion of the production of several products: 91.27% of sea salt, 88.45% of sugar, 48.69% of NPK fertilizer, 44.64% of cement, 39.21% of cast iron or raw iron; 49.91% of rolled steel. Fourth, private investment in total social investment has consistently risen and surpassed that of both state and FDI sectors, jumping from 44.6% in 2010 to 59.5% in 2021. As a result, despite a decrease in public investment, the overall investment in infrastructure has continued to rise. Notably, during 2010-2022, numerous large infrastructure projects undertaken by the private sector were initiated, completed, and put into operation.

Fifth, private enterprises had relatively stable capital turnover ratios, ranging from 0.7 to 0.78 times between 2010 and 2017. This ratio was lower than that of the FDI sector (0.84 to 1.08 times) but significantly higher than that of state-owned enterprises (0.36 to 0.59 times).

Sixth, the private sector plays an essential role in replacing public investment in the context of reduced public investment sources. During 2010-2021, the highest ratio of public investment to total investment was 36.1% (in 2012), and the lowest was 24.1% (in 2019). However, increasing private and foreign investments have contributed to economic stabilization.

Seventh, the private sector contributes significantly not only to the economy but also to society, particularly in addressing labor and employment issues. In 2010-2021, although the proportion of workers aged 15 and above in the private sector decreased from 86.3% in 2010 to 82.6% in 2021, this sector still employed over 80% of the labor force in the economy. The average growth rate of the labor force in the private sector during 2011-2018 was over 3.6%, with private enterprises recording nearly 5.4%.

2. EMERGING ISSUES AND SOLUTIONS TO THE PRIVATE SECTOR DEVELOPMENT IN VIETNAM

2.1. Emerging issues

First, the private sector development still encounters many obstacles: 1- Despite the political system's improved perception of the private sector, prejudice and discrimination against this sector persist, especially among many officials, civil servants, and even

citizens. There is a lack of unity, and the role of the private sector in the socialist-oriented market economy is not fully understood; 2- Inconsistent and overlapping legal frameworks, mechanisms, and policies hinder the performance of economic entities, especially those in the private sector. Competition policies are ineffective, access to resources is unequal among economic sectors, and policy implementation is inconsistent. Policies on protecting domestic production and combating smuggling and trade fraud are inappropriate and reveal many weaknesses; 3- There exist shortcomings in state management, particularly regarding the ineffective and inefficient enforcement of regulations and policies, as well as a lack of incentives to encourage the private sector's innovation and creation of globally competitive products. Administrative reform has failed to achieve the "3 reductions" goal (namely, reduction of time, costs, and paperwork). Administrative procedures remain cumbersome, duplicative, and overlapping at various stages. Support mechanisms for the private sector are often fragmented, less effective, and sometimes misaligned with the purpose or target groups. Vietnam is one of the countries with relatively high compliance and business costs.

Second, the private sector development still faces many challenges: 1- The number of private economic establishments is increasing rapidly, especially the number of newly established businesses, but the number of those ceasing business activities, dissolving, or going bankrupt is also very high. It takes private businesses, especially those involved in trade and services, much time to improve their quality and effectiveness; 2- Most private businesses are small and medium-sized, with a high proportion falling into the micro category. Regarding the number of employees, in 2017, 74% belonged to the micro category, an increase from 63% in 2010. Fewer than 1% of private enterprises employed 200 people or more, while 30% of FDI enterprises and 7.7-13.4% of state-owned enterprises employed fewer than ten people; 3- The private sector exhibited a high rate of loss-making enterprises, equivalent to the loss rate observed in the FDI sector during 2010-2017 (except for 2010 and 2012). 48-49% of private enterprises reported losses in 2016 and 2017, making the highest rate among all sectors during 2013–2017; 4- The social labor productivity of the private sector is lower than the economy's average.

Third, the private sector's contribution to economic growth is not commensurate with its potential. Its GDP share was unchanged during the period 2010-2021. The average size of domestic private economic units remains modest, with the individual economy accounting for 30% of GDP and private enterprises making up only 9% of GDP. The ability to participate in production networks and regional and global value chains of most private enterprises is still limited. As few as 21% of domestic private enterprises participate in global value chains. The domestic economy (including both private and state-owned enterprises) accounts for only 30% of exports, compared to 70% by the FDI sector.

Fourth, although the average income of employees in the private sector has increased yearly, it is still the lowest among the three sectors. During 2010-2021, it ranged between 3.4 and 7.5 million VND/person/month, equal to 49-82.15% compared to the

state-owned sector and 73-90.1% in the FDI sector.

Fifth, the capacity of the private sector remains limited: 1- Private economic entities lack the necessary resources for innovation and the development of new technologies and production processes. According to the World Bank, Vietnamese enterprises have yet to improve expenditures on research and development significantly. Vietnam ranked 42 out of 134 countries with a score of 3.6/10 in 2008; 27 out of 133 countries with a score of 3.8 in 2010; and 49 out of 138 countries with a score of 3.5 in 2017; 2- The private sector's production capacity and competitiveness in terms of quality and price remain low. Its labor productivity growth rate equals 34% of that in the state-owned sector and 69% in the FDI sector. Scientific and technological capacity is still limited; investment in technological innovation accounts for only about 0.3% of revenue, much lower than other countries such as India (5%) and the Republic of Korea (10%). Vietnamese enterprises have not focused on improving connectivity and competitiveness to engage in regional and global value chains. Only 21% of small and medium-sized enterprises participate in a portion of the global value chain, and 14% successfully establish foreign partnerships.

Sixth, domestic private investment still has many shortcomings and is overshadowed by FDI and public investment. In many industries, including electronics, automobile, and motorcycle manufacturing, FDI enterprises have dominated and competed against domestic private enterprises instead of supporting and leveraging. Moreover, as domestic private enterprises have fewer developmental advantages (such as resources, experience, and development time) than FDI and state-owned enterprises, they are more prone to external factors (such as crises and recessions) as well as the negative impacts of the market economy (such as speculation, pursuit of profit, and group interests).

2.2. Solutions

First, grasp thoroughly the principle that the private sector is an important driving force of the national economy in the Party and State's directions, institutions, mechanisms, and policies and their implementation at all levels and in all branches, sectors, and localities.

Second, it is necessary to create a favorable environment for the development of the private sector in general and private sector enterprises in particular while reviewing and removing barriers to the operation of private enterprises towards minimizing business shutdowns and bankruptcy. Continue to develop infrastructure and increase the private sector's accessibility to resources. Ministries, branches, and localities create favorable conditions for enterprises to participate in implementing public procurement contracts according to the provisions of bidding law on incentives for small-scale bidding packages.

Third, private enterprises should be encouraged to generate jobs and income for workers, especially new labor force participants, in pursuit of inclusive growth. Vietnamese enterprises need to innovate their mindset in the new context. Signing trade agreements forces the Vietnamese not only to comply with the rules of the game but also to accumulate sufficient potential and capacity. Adapting to current conditions is imperative for enterprises. Global thinking

and strengthening links, support, and cooperation between enterprises will help Vietnamese enterprises reach new heights.

Fourth, it is important to seek financial support for newly established enterprises and create an environment for startups. In particular, focus should be placed on enhancing the competitiveness of the nation, enterprises, and sectors. Most enterprises in the private sector, including companies listed on the stock market, are family companies controlled by an individual with a leading role. Therefore, for enterprises to develop sustainably, it is necessary to build a modern management model that is aligned with international principles and standards and focuses on improving their efficiency and competitiveness.

Fifth, create a favorable environment in terms of institutions, science and technology, finance, credit, land access, and fair competition among economic sectors to improve the economy's effectiveness. To compete and engage more deeply in the global supply chain, Vietnamese enterprises need to research and apply new achievements in science and technology, grasp and realize business opportunities, and improve competitiveness in the market. At the same time, the worker's qualifications and skills should be improved to meet the production process requirements in the new context.

Sixth, emphasis should be placed on investment and private investment. It is necessary to attract resources from domestic enterprises and individuals to develop economic infrastructure so that the state economy serves as the mainstay while avoiding public debt and foreign debt traps. Incentives should be offered to fully use the achievements of Industrial Revolution 4.0, focusing on successfully building a digital economy for the digital society./.

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APPLYING THE SWOT MODEL TO PROPOSE DEVELOPMENT SOLUTIONS FOR THE TOURISM INDUSTRY IN HA LONG CITY

Pham Thu Trang[a], Nguyen Thi Tuoi[b], Do Tien Luat[c], Nguyen Lan Hoang Thao[a], Le Thi Thuy Ha[a]

[a]Hanoi University of Mining and Geology, Hanoi, Vietnam

[b]Hung Yen University of Technology and Education, Hung Yen province, Vietnam

[c]People's Committee of Ha Long City, Quang Ninh province, Vietnam

**Corresponding author: phamthutrang@humg.edu.vn*

Abstract: *Ha Long City has great potential for tourism development thanks to its natural and cultural factors, as well as tourism development policies. Applying the SWOT model to analyze strengths, weaknesses, opportunities, and threats, this article proposes specific solutions to develop Ha Long City's tourism industry. These solutions include investing in infrastructure, advancing technology and digital transformation, fostering international cooperation, attracting investment, improving environmental management, and preserving cultural heritage. With effort and proper direction, Ha Long City will continue to assert its position as one of the leading tourist destinations in Vietnam and the broader region.*

Keywords: *SWOT model, tourism, Ha Long City.*

1. INTRODUCTION

Ha Long City is Quang Ninh province's economic, political, cultural, and commercial center. With its stunning natural landscapes and the World Heritage Site of Ha Long Bay, the city aims to make tourism a key economic sector and become a national and international tourism hub by 2030. However, according to many experts and tourists, Ha Long's tourism products are still monotonous, limited in scale, and have yet to fully utilize heritage value.

The SWOT model - an acronym for Strengths, Weaknesses, Opportunities, and Threats provides a framework for analyzing and evaluating strategies by assessing these four elements. This article uses the SWOT model to identify the key strengths, weaknesses, opportunities, and challenges of Ha Long City's tourism industry. This analysis proposes several solutions to develop the tourism industry in line with the city's strategic goals in the new context.

2. SWOT MODEL

The SWOT model, developed by Albert S. Humphrey in the 1960s-1970s, was initially used to analyze management strategies of large organizations and identify best management practices. Over time, the SWOT model has become a widely used tool for strategic analysis in corporate and organizational management, as well as for assessing the internal and external environments of a unit. SWOT stands for Strengths, Weaknesses, Opportunities, and Threats.

Strengths: Internal factors that enhance an organization's competitiveness.

Weaknesses: Internal factors that limit growth.

Opportunities: External factors that support business or organizational growth.

Threats: External factors that could pose risks to the organization.

In tourism development, internal factors that contribute to a city's strengths and weaknesses include its geographical location, ethnic cultures, transportation infrastructure, tourism facilities and products, population and labor force, management skills, safety and security for tourists, and investment. External factors that create opportunities and threats for a city in tourism development include policies, economic growth and regional integration trends, information technology, competition from other attractive destinations, environmental pressures, and social issues (Jayanta Saha & Suman Paul, 2020; Tung L.T., 2020; Amalia Mustika & Michael Khrisna Aditya, 2018).

The SWOT model helps businesses and organizations analyze their internal and external environments, enabling them to develop appropriate strategies, such as product development, market penetration, or short- and long-term development plans. Furthermore, the SWOT model aids in evaluating the current market, identifying new business opportunities, and addressing emerging challenges.

3. CURRENT STATUS OF HA LONG'S TOURISM DEVELOPMENT

Ha Long City has a natural area of 1,119.12 km² and a population of 300,267 people. It is divided into 33 administrative units, including 21 wards and 12 communes (Resolution No. 837/NQ-UBTVQH14, 2019). As a Grade I city directly under the Quang Ninh province, Ha Long has the country's most significant natural area. It has become a unique urban area in terms of landscape terrain and tourism resources. Ha Long is currently an attractive destination for both domestic and international tourists.

From 2016 to 2020, the city welcomed 431 million tourists, of which 168 million were international visitors, accounting for more than 1/3 of the total number of visitors. The total retail sales of goods and services reached 228,242 billion VND, and the total tourism revenue from hotels and restaurants reached 75,404 billion VND. Despite the impact of COVID-19, Ha Long still attracted investment in new tourism products and made a strong recovery in 2023, with 86 million visitors and 19,000 billion VND in revenue (Hoang Quynh, 2023). In the first half of 2024, the city welcomed 52.5 million visitors, 127% of the same period last year, with international visitors reaching 12.4 million, 202% of the same period; total tourism revenue was estimated at 11,588 billion VND, 127% of the same period (Baoquangninh.vn, 2024).

4. SWOT ANALYSIS OF HA LONG CITY'S TOURISM INDUSTRY

4.1. Strengths

S1- Favorable Location: Ha Long City is located in the center of Quang Ninh province, in the economic triangle of Hanoi - Hai Phong - Quang Ninh, and at the hub connecting the economic corridor Guangxi – Mong Cai - Ha Long - Hai Phong, ASEAN - Vietnam - China. With a convenient road traffic system, a long coastline, many large seaports, and proximity to two international airports, Cat Bi and Van Don, Ha Long City easily connects with provinces and cities domestically and internationally, creating favorable conditions for tourism development. (Meey Map, 2023).

***S2- World Heritage Site Ha Long Bay and Unique Natural Landscapes*:** Ha Long Bay, covering an area of 434 km², is famous for its many stunning rock islands, caves, beautiful beaches, unique landscapes, and diverse ecosystems. UNESCO recognized the bay as a World Natural Heritage site three times: in 1994, 2000, and 2023. (Hoang Thu Trang, 2023).

***S3- Unique Ethnic Cultures*:** Ha Long City has 15 ethnic groups with unique cultural traditions and customs. Historical and cultural relics such as Ba Men Temple, Dau Moi Temple, and Cau Vang Shrine reflect the spiritual life of local fishermen. Ha Long Bay also preserves intangible cultural values, including ancient cultures such as Soi Nhu, Cai Beo, and Ha Long, as well as traditional coastal fisherman practices. These cultural assets are valuable for tourism development and attracting visitors (People's Committee of Ha Long City, 2022).

S4- Convenient Transportation and Port Infrastructure: The city benefits from a comprehensive network of highways, including Hanoi-Van Don, Hai Phong-Ha Long, and Ha Long-Van Don, as well as tourist ports like Tuan Chau Port and Ha Long Tourist Port. Van Don International Airport and other modern transportation facilities enhance connectivity and support tourism development. (Meeymap, 2023; Hoàng Quỳnh, 2023).

S5- Extensive Tourism Facilities: Ha Long has made significant investments in tourism infrastructure. The city offers approximately 200 hotels, 440 guesthouses, 187 cruise ships, 500 restaurants, shopping venues, and 504 modern tourist boats, ensuring a wide range of accommodation and dining options. (People's Committee of Ha Long City, 2022).

***S6 - Diverse Tourism Products*:** The city provides a broad spectrum of tourism experiences, from island and ecological tourism to cultural, historical, and community-based activities. Visitors can enjoy luxury cruises, seaplane tours, marine sports, eco-tourism, and vibrant nightlife entertainment. (Pham Quynh, 2024).

S7-Strong Policies and Resources for Tourism Development: Ha Long benefits from robust tourism development resources, including economic, human, scientific, and natural resources. The city maintains high levels of security and order, ensuring a safe and pleasant tourist environment. (People's Committee of Ha Long City, 2022).

4.2. Weaknesses

W1- Unevenly Developed Transportation Infrastructure: Accommodation facilities like hotels, guesthouses, and restaurants are mainly concentrated in the city center. In mountainous commune areas, inter-communal and inter-village roads are degraded and have not been invested in improvement. In addition, public transportation systems are underdeveloped, causing difficulties for economic and tourism development in mountainous areas. (People's Committee of Ha Long City, 2022).

W2- Lack of High-Quality Human Resources*:* The city's current workforce only meets the basic requirements for general types of tourism and ordinary tourists. High-quality labor capable of providing world-class services is still limited. (People's Committee of Ha Long City, 2022).

W3- Products Lack Connectivity and Breakthrough, Cultural Values Fade: Ha Long has not effectively exploited the connection between island and mountainous tourism. Visitors mainly focus on experiencing marine tourism services, ignoring community and ecological tourism products in mountainous areas. Many cultural heritages of ethnic groups are gradually fading. Therefore, Ha Long's tourism industry depends on seasons; the products provided are highly seasonal. (People's Committee of Ha Long City, 2022).

W4- Ineffective Tourism Management: Ha Long City's tourism management still needs to improve, especially in load capacity management and environmental

protection. The amount of waste from tourism exceeds the processing capacity, causing environmental pollution, especially seawater pollution in Ha Long Bay. Overload situations lead to unstable service prices, discrepancies, and lack of transparency, making tourists dissatisfied (Thien Quang, 2022).

W5- Ineffective Tourism Promotion and Digital Transformation: Although tourism promotion and digital transformation in Ha Long's tourism industry have received attention, they need to be more professional and reach a broad audience domestically and internationally. The programs are limited in funding and lack clear identification of target customers, resulting in low effectiveness. (People's Committee of Ha Long City, 2022).

W6- Imbalanced Tourism Development Between Regions and Seasons: Ha Long tourism develops rapidly but lacks focus and a sustainable orientation. Currently, tourism development mainly concentrates on the city center and seasonal island tourism, not fully exploiting tourism resources. Tourists often visit Ha Long in summer, with beaches, resorts, and MICE activities. During other times of the year, the number of visitors decreases, leading to ineffective tourism service business (People's Committee of Ha Long City, 2022).

4.3. Opportunities

O1- Suitable tourism development policies: The State and Quang Ninh province has issued many policies to support tourism development, such as Resolution No. 08-NQ/TW, January 16, 2017, of the Politburo on developing tourism into a spearhead economic sector; Decision 147/QD-TTg, January 22, 2020 approving the Vietnam Tourism Development Strategy to 2030; Resolution No. 837/NQ-UBTVQH14, December 17, 2019 on the reorganization of administrative units at the district and commune levels in Quang Ninh province; Tourism Law No. 09/2017/QH14; and many other decrees and circulars related to cultural heritage conservation, environmental protection, and tourism management. These policies aim to improve service quality and attract tourists.

O2- Economic Development: Vietnam's economy has steadily developed in recent years, making it a bright spot for attracting foreign investment. As per capita income increases, the demand for tourism also rises. Ha Long City has made remarkable progress, with impressive results in attracting investment, revenue, and visitor numbers, becoming a bright spot on the domestic and regional tourism map (Hoang Quynh, 2023).

O3- Ha Long's Tourism Products Align with Global Tourism Trends: Trends such as eco-friendly tourism and community tourism are developing, creating opportunities for Ha Long to develop new tourism products. The growth of international cruise tourism, with five-star ships like Celebrity Millennium and World Dream, aligns with Ha Long's favorable location and port facilities, offering the potential to attract high-spending international tourists.

O4- Information Technology Development: The application of information technology in tourism management and operation is becoming increasingly popular worldwide. Digital applications help the tourism industry reduce costs and allow tourists to easily access Ha Long's tourism services.

O5- Trend of Economic Integration in the Region: ASEAN countries aim to form a common market in which citizens of ASEAN countries are exempt from tourist visas within

the bloc. This would provide an opportunity for Ha Long to promote its image, attract international tourists, and implement tourism linkages.

4.4. Threats

***T1- Fear of Epidemics*:** The COVID-19 pandemic has impacted tourism activities, and the risk of an outbreak requires higher safety measures for tourist destinations.

T2- Climate Change: Climate change affects the living activities and growing processes of many animal species, posing challenges to the protection of natural heritage. Therefore, Ha Long's tourism industry needs to propose solutions and provide timely weather alerts to protect tourists and minimize the impact of climate change on tourism development and local living conditions.

T3- Competition from Other Attractive Destinations: The tourism industry is highly competitive, with numerous destinations for visitors. Ha Long must create attractive and competitive tourism products and services to stand out against other regional and global destinations.

***T4- Environmental Pressure and Social Issues*:** Rapid economic and tourism development will have many impacts on the environment and society. It will affect landscapes, geological structures, environmental pollution, and rapid urban population growth, threatening natural heritage and community cultural values and thereby affecting the image of Ha Long's tourism.

Table 1. SWOT analysis for the tourism industry in Ha Long City

SWOT	Opportunities O1- Suitable tourism development policies O2- Economic Development O3- Ha Long's Tourism Products Align with Global Tourism Trends O4- Information Technology Development O5- Trend of Economic Integration in the Region	Threats T1- Fear of Epidemics T2- Climate Change T3- Competition from Other Attractive Destinations T4- Environmental Pressure and Social Issues:
Strengths S1- Favorable Location S2- World Heritage Site Ha Long Bay and Unique Natural Landscapes S3- Unique Ethnic Cultures S4- Convenient Transportation and Port Infrastructure S5- Extensive Tourism Facilities S6- Diverse Tourism Products S7- Strong Policies and Resources for Tourism Development	- Diversify tourism products to meet the needs of domestic and international visitors. - Expanding Target Customer Markets	- Develop high-end tourism products, eco-friendly tourism in line with customers' privacy needs to reduce the risk of disease transmission and help customers experience a "Green" lifestyle. - Collaborating to Develop Tourism with Other Attractive Destinations to Limit Competition

Weaknesses W1- Unevenly Developed Transportation Infrastructure W2- Lack of High-Quality Human Resources W3- Products Lack Connectivity and Breakthrough, Cultural Values Fade W4- Ineffective Tourism Management W5- Ineffective Tourism Promotion and Digital Transformation W6- Imbalanced Tourism Development Between Regions and Seasons	- Utilize economic development to synchronize infrastructure, expand and develop tourism spaces, connect routes, and tourist spots. - Utilizing Technology to Promote Products to Target Customers and Digital Transformation in Tourism - Preserve and promote cultural values.	- Enhancing environmental management and addressing social issues to reduce pressure from stakeholders on environmental and social matters.

5. SOLUTIONS FOR DEVELOPING HA LONG CITY'S TOURISM INDUSTRY

5.1. Diversifying Tourism Products

Ha Long City must diversify tourism products, ranging from ecological, cultural, historical, and community to high-class resorts, adventure, and sports. Attract investment in high-class tourism products such as resorts, hotels, amusement parks, and golf courses through preferential policies on taxes, land, and administrative procedures. Additionally, support should be given to local tourism businesses to enhance competitiveness and service quality.

5.2. Expanding Target Customer Markets

In addition to exploiting traditional tourist markets such as China, Korea, Japan, France, and Spain, Ha Long City needs to develop tourist markets in emerging, potential, and high-paying markets such as the Middle East, Southeast Asia, Europe, America, Australia, Latin America, and India. The city should also target domestic tourists from provinces such as Hanoi, Hai Phong, Hai Duong, Nghe An, Thanh Hoa, Quang Binh, Da Nang, Hue, Ho Chi Minh City, Can Tho, Long An, Binh Duong, aiming at safe tourism trends associated with eco-tourism, cultural tourism, and historical festivals.

5.3. Collaborating to Develop Tourism with Other Attractive Destinations to Limit Competition

Ha Long City needs to enhance the construction of promotional programs linked to developing tourism with domestic localities such as Hai Phong and Hanoi as well as international markets, especially target markets like China, Korea, Japan, the Middle East, Europe, and Australia. Additionally, Ha Long should create favorable conditions for international tourism investors, businesses, embassies, and consulates to open branches, offices, and cultural and tourism centers in the locality. Collaborations between domestic and international tourism businesses can promote mutual tourist exchanges.

5.4. Building Synchronous Infrastructure

For sustainable tourism development, Ha Long City should focus on investing in developing transportation to connect tourist spots and preserve cultural heritage. The city needs to invest in building a smooth transportation system connecting Ha Long

City with neighboring provinces, upgrading roads connecting heritage sites, and developing tourism infrastructure by region, including investing in ports, expanding tourist spots, renovating infrastructure, building tourism projects, upgrading roads for high-tech agricultural development, and building community accommodation facilities.

5.5. Utilizing Technology to Promote Products to Target Customers and Digital Transformation in Tourism

To attract domestic and international tourists, Ha Long City needs to enhance professional, modern tourism promotion focusing on unique products such as heritage, marine, eco-tourism, and community. Applying digital technology to create intelligent tourism applications offers the best experience for tourists. Additionally, the city should build a professional communication team to optimize mass media and digital platforms to promote Ha Long effectively, positioning it as a safe, attractive, and friendly destination.

Ha Long City should research and apply digital transformation in tourism professionally and efficiently, build a dedicated tourism data center, integrate data with the city's information systems, and call for businesses, organizations, and individuals to participate in digital transformation applications and exchange experiences from successful tourism spots and training personnel to operate, use, and maintain digital technology systems in tourism.

5.6. Preserving and Promoting Cultural Values

To preserve and promote traditional cultural values, Ha Long City must restore folk songs, love duets of fishermen, traditional costumes, festivals, and cuisine, preserve fishing crafts, and create experiential tourism products. For ethnic minority cultures, preserving weaving crafts, traditional costumes, festivals, traditional house architecture, and customs is a top priority. The city should also implement educational programs to teach young generations scripts, folk songs, and folk performances and build mechanisms to support and raise community awareness about preserving and promoting ethnic culture.

5.7. Enhancing Environmental Management and Social Issues

Ha Long City should designate Ha Long Bay as a nature reserve, classify it as a mixed-use area, and rank it as a national park. Additionally, building a strict environmental management and monitoring system will be essential to ensure that tourism activities do not negatively affect the environment and ecosystems. The city should also develop a contribution mechanism from tourism services to invest in environmental protection, green urban planning, and green construction projects, renovate and build additional standard public toilets, build a standard waste collection and treatment system, strengthen propaganda on environmental protection and heritage conservation, raise awareness for the community, businesses, and tourists, encourage residents to participate in environmental protection and sustainable tourism development.

The proposed solutions will help the city increase tourism revenue and attract more tourists by delivering product information directly to customers (5.5) and creating a comfortable experience for tourists (5.4; 5.7). These solutions will also help diversify the customer base and reduce the drawbacks of having tourists concentrated in a season or in the city center (5.1; 5.2; 5.3; 5.6).

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CHALLENGES IN DIGITAL TRANSFORMATION ACTIVITIES OF SMALL AND MEDIUM-SIZED ENTERPRISES IN VIETNAM

Do Duc Anh[a,b,*]; Nguyen Thi Kim Ngan[a]; Do Huu Tung[a]

[a]Hanoi University of Mining and Geology, Hanoi, Vietnam.

[b]School of Management, Wuhan University of Technology, Wuhan, P.R. China, 430070.

**Corresponding author: doducanh@humg.edu.vn*

Abstract: *Digital transformation in enterprises is converting from traditional operating models to digital business models based on new technology applications such as Big Data, Cloud Computing, Artificial Intelligence (AI), etc. This activity will help enterprises improve manufacturing production and working processes, labor productivity, market share, competitiveness, etc. In Vietnam, with the goal of development shortly, this program is considered one of the significant national goals, according to Decision No. 749/QD-TTg dated June 3, 2020, of the Prime Minister approving the "National Digital Transformation Program to 2025, with an orientation towards 2030". During the implementation of the program, in addition to advantages such as support from the Vietnamese Government; the Vietnam Chamber of Commerce and Industry (VCCI), digital transformation activities in enterprises, especially the small and medium enterprises (SMEs) (accounting for 97% of enterprises in Vietnam) is facing some difficulties and barriers. In this article, we have pointed out that the digital transformation activities of SMEs in Vietnam are facing 09 groups of barriers. Based on the results, the authors have proposed some solutions to overcome the above shortcomings, contributing to achieving the successful digital transformation of the Vietnamese government and promoting economic growth.*

Keywords: *Digital transformation, SMEs, Barriers, Vietnam.*

1. INTRODUCTION

Digital transformation in enterprises is converting from traditional operating models to digital business models based on new technology applications such as Big Data, Cloud Computing, Artificial Intelligence (AI), etc., through mobile internet applications, embedded devices, other digital technologies, and other devices used in all stages of production and business activities of enterprises (Budagov and Sukhova, 2020; Diener and Špaček, 2021)as the current key phenomenon of the modern development of many companies, is in process of formation and development. Besides the highest growth rates and wide coverage, the uniqueness of digital transformation lies in integration of large number of disciplines related to strategic and organizational management, digital technology, risk management, etc. Moreover, given the innovative nature of digital transformation key drivers, traditional methods of business management do not always give the necessary result for the successful implementation of digital agenda. The study of cases about passing through the various stages of digital transformation is necessary to understand the success factors and common mistakes towards introducing new digital approaches. This article discusses the practical issues of business digital transformation management

using the case of digital transformation of General Electrics (GE. This program will help enterprises improve products and services, innovate production methods and working processes, increase labor productivity, reduce cost, increase market share, increase competitiveness, and enhance business value (Uchihira and Eimura 2022). According to a study's result by Hackett Group in July 2023, after a comprehensive digital transformation companies in the financial sector can reduce operating costs by more than 40%. In addition, digital transformation also helps enterprises accelerate work operations with a high level of performance that was previously unattainable while applying traditional operating methods. Besides, this activity can help enterprises more easily reach customers and markets (Phuc and Huong 2024). Therefore, businesses' digital transformation activities are necessary in the current context.

In Vietnam, on June 3, 2020, the Prime Minister signed Decision No. 749/QD-TTg on "Approving the National Digital Transformation Program to 2025, with an orientation towards 2030", setting the goal for Vietnam to become a digital nation in which digital transformation for enterprises plays a significant role. Up now, most enterprises have recognized the opportunities and challenges of digital transformation in the substantial spread of the 4.0 revolution and the COVID-19 pandemic (Phuc and Huong 2024). This is no longer a choice but has become an inevitable trend for businesses to stand firm and break through the changes of the times (Kutnjak 2021)where transformation signifies a trend that allows changes in the core business processes and contributes to the development of sustainable business models. Complexity of the business transformation process affects the emergence of certain challenges and problems that need to be overcome on the way to creating innovative business models that will enable the use of full organizational potential. Purpose of this research is to delineate the various difficulties in digital transformation and determine what are the challenges, issues, barriers, and problems that organizations face in the desire to transform business. Paper presents a review of the literature of relevant research bases, where a qualitative and quantitative analysis of the results was made. Results show the frequency of occurrence of certain difficulties in DT within four categories - challenges, issues, barriers and problems, but also the occurrence of difficulties in the inevitable transformation due to the Covid-19 pandemic. It can be said that the pandemic has affected rapid adjustments, but also changes in the business models of organizations and that it has indirectly initiated digital transformation projects within organizations accompanied by various challenges, issues, barriers, and problems." Digital transformation helps enterprises maximize the working capacity of employees because when to the digital transformation process, the enterprise system can automate and maximize the implementation process, reducing production costs while also creating conditions for employees to have more time to improve their expertise, professionalism, and perform other essential tasks (Tuan Anh Nguyen, et al., 2023). This activity also helps managers easily evaluate each employee's work quality through timely reporting data. In addition, with changes in the increasingly diverse and complex needs of the market and customers, digital transformation also helps businesses catch up faster. In Vietnam, by the end of 2022, about 400,000 SMEs have accessed digital transformation guidance documents (Phuc and Huong 2024).

However, besides the advantages of the digital transformation process, which is due to the government's support, many

firms in Vietnam, especially SMEs, are currently facing many difficulties. Therefore, enterprises need to identify and overcome those barriers to effectively transform digitally. While all agree that digital transformation is crucial to the success and survival of all businesses in the present context, no one dares to claim that it is simple. Digital transformation is multifaceted, extremely complex, has many barriers, and large investment capital, and can cause enterprises to encounter many difficulties in operating and controlling activities (Jones, Hutcheson, and Camba, 2021).

For now, there is a clear difference in the progress and expectations of the effectiveness of digital transformation in large-scale enterprises compared to SMEs. In Vietnam, large-scale enterprises have a faster transformation speed and more confidence in digital transformation than SMEs (Ngoc Van, 2022). SMEs with limitations in terms of scale of operation, low capital, and low quality of labor also face many difficulties in digital transformation activities. Therefore, identifying barriers in digital transformation activities in SMEs is extremely necessary because after correctly identifying the barriers that SMEs face in the digital transformation process, policymakers will have a better basis to build appropriate solutions. In addition, the proportion of SMEs accounts for 97% of the total number of enterprises in Vietnam, and they greatly affect the national economy in this country. Moreover, this topic has also attracted the attention of many researchers. However, these studies use data in different time and space conditions, which leads to different results. Therefore, our research will enrich the document library.

2. LITERATURE REVIEW

The topic of digital transformation in businesses has been studied in many different countries, with other approaches, specifically:

Uchihira and Eimura (2022) used in-depth interviews to study the barriers to digital transformation in Japanese enterprises. The results showed that the cooperation of internal and external enterprise stakeholders is essential and is the key to the success of digital transformation. However, there are also barriers that this activity encounters, including lack of information, lack of experience, inappropriate evaluation standards, lack of understanding, and lack of trust from the Board of Directors of the enterprise, which significantly affected digital transformation activities here. This study also recommends that, for digital transformation activities of enterprises in Japan to proceed smoothly, the government of this country needs to develop policies to support enterprises more in the fields of providing capital, building training programs, and providing information to enterprises. Similar results were also confirmed in the studies of Budagov and Sukhova (2020) và Berghaus (2016).

Chanias et al. (2019) studied the barriers to the digital transformation process in enterprises in the financial sector. The authors showed that digital transformation activities have a positive impact on the development of enterprises. The results showed that these enterprises face barriers, including a lack of specific plans, no implementation guidance from state agencies, a lack of attention from business leaders, and a lack of trust in the results. From the results found, the article has proposed several solutions for enterprises to transform digitally more effectively, such as actively seeking new sources of capital and building training programs for employees.

For the government, it is necessary to build more business support programs. Some similar results are also confirmed in the study of Diener and Špaček (2021) banks are facing disruptive innovation that requires adaptation of almost all cooperative processes. Digital transformation in the financial industry is associated with obstacles that seem to hinder smooth implementation of digital approaches. This issue has not been adequately addressed in the current academic literature. The main purpose of this qualitative exploratory study is to identify the main perceived obstacles to digital transformation in both the private and commercial banking sectors from a managerial point of view and to analyse them accordingly. The methodology is based on a methodological approach using a combination of contextual interviews with German board members of banks, inductive content analysis, and the exploration of best-practice approaches. The findings revealed that elements of strategy and management, technology and regulation, customers, and employees receive a high level of attention within the digital transformation. The other main barriers can be found in the areas of market knowledge and products, employee and customer participation, and public benefit. Each main barrier is characterised by several sub-barriers of varying importance for the digital transformation of banks and is described in detail." Schwertner (2017).

In the study by Timchuk and Evloeva (2020) implementation of long-term innovative development plans and programs, transformation of external conditions of investment and construction activities, adaptation of the construction management system to the digital economy. In this regard, management of structural elements of the construction industry and digitalization of the construction industry are crucial. The relevance of the research issue is due to the fact that in modern conditions, the innovative potential of construction companies is a key factor contributing to competitiveness in the market and transition to the digital economy. The object of research is construction companies operating within the market economy. The subject is organizational and economic relations taking shape in the process of development of the construction industry under the digital economy. The authors considered the problems of transition of the construction industry to the digital economy, analyzed the construction industry, and proposed their own definition of the digital economy in the construction industry. The factors that impede the development of the construction industry were described taking into account modern aspects of economic development, which makes it possible to identify areas of construction business management under the digital economy. The competences of an employee of the construction company in the context of the digital transformation of the construction industry were identified. The authors drew conclusions proving the need for the transition of the construction industry to the digital economy" on digital transformation activities in enterprises in the Russian Federation. In addition to confirming the positive impact of digital transformation activities on the development of enterprises and the national economy, the authors identified factors that hinder digital transformation activities, including government policies, enterprise infrastructure, and the level of information security of enterprises. Based on the results found, this study also proposed several solutions to overcome these difficulties in digital transformation activities for the enterprises in this country. Besides, the government needs to develop new policies to remove some legal barriers, invest in information technology infrastructure,

and strictly manage national source data. Enterprises need to transform digitally and synchronously to improve the quality of human resources.

Another study by Matarazzo et al. (2021) pointed out the positive impacts of digital transformation activities for small and medium-sized enterprises in Italy, including increasing labor productivity, optimizing production processes, and improving production quality. However, the digital transformation process of enterprises here also faces some challenges, such as legal barriers, financial resource constraints, and the quality of human resources. Based on the results found, the authors proposed some recommendations to the government on legal corridors, support for access to capital sources, and support for digital transformation training courses for human resources in enterprises in Italy.

Some similar results in enterprises in the education sector were also pointed out by Secundo et al. (2020), and Akour and Alenezi (2022)Most of these studies pointed out that the biggest challenges in digital transformation activities in enterprises are related to the lack of financial resources and human resources to implement them.

In Vietnam, this topic has also attracted the attention of many researchers:

Phuc and Huong (2024) studied the digital transformation activities of SMEs in Vietnam. In addition to supporting enterprises to carry out digital transformation activities actively, this study has shown that, in order for the digital transformation process to be successful, these enterprises go through three stages, including Digitizing the management and business data of the enterprise, Applying digital technology to automate and optimize the business's operating processes, and digitally transforming the entire enterprise to create new value for the enterprise. Along with that, the group of authors also pointed out several challenges in the digital transformation activities of SMEs in Vietnam include the quality of human resources that do not meet the requirements, lack of capital to carry out digital transformation activities, lack of guidance from state agencies, and risks always hidden in digital transformation. Based on the analysis results, the study proposed three groups of solutions: businesses need to build programs to improve the quality of human resources, the government needs to support businesses in accessing capital sources, and information security systems need to increase data security. A similar article by Quyet Nguyen Dinh (2021) pointed out the difficulties in digital transformation activities, such as technological obstacles, a lack of capital, and an absence of enterprise awareness.

A similar research topic by Bui Thi Hue (2023) has shown that digital transformation activities will help these businesses improve their competitiveness and optimize their performance. Along with that, the author has pointed out that legal barriers significantly impact the success of SMEs' digital transformation activities. In addition, SMEs face several other difficulties, such as the businesses themselves not yet determining their own value and not having qualified human resources to carry out digital transformation activities. This is also a common situation that SMEs in Vietnam are facing. The article has proposed a solution to improve the quality of human resources through training courses for businesses to make digital transformation more effective. Similarly, the study by Tuan Anh Nguyen et al. (2023) also pointed out the difficulties that businesses face, such as a lack of capital, human resources to implement, and technological solutions for successful digital transformation. These studies all suggest

that more government support is needed to make the digital transformation activities of SMEs more effective.

Digital transformation activities in enterprises in Vietnam are an inevitable trend, as confirmed by research by Hang Do Thu (2023). This article has shown that digital transformation activities will impact the way of working, management, corporate culture, and the operating environment of enterprises. However, some challenges in digital transformation activities in SMEs in Vietnam were also found, including lack of implementation costs, quality of human resources not meeting requirements, and enterprises' concerns about information disclosure and business secrets after digital transformation. Based on the results, the author has proposed solutions related to the government needing to build more support programs for SMEs and SMEs needing to synchronously implement digital transformation solutions to transform comprehensively and quickly improve operational efficiency. Similarly, research by Song Ha Nguyen (2022) confirmed that, among enterprises surveyed about difficulties in digital transformation activities, up to 61% of enterprises are facing challenges in investment costs and digital technology application: 52.3% of enterprises are facing difficulties in business habits; 45.5% of enterprises lack digital technology infrastructure; 40.4% of enterprises lack information about digital technology; 38.5% of enterprises are facing difficulties with digital solutions; and 32% of enterprises are facing challenges with leadership awareness.

In summary, digital transformation activities in SMEs are of interest to many domestic and foreign researchers. However, the studies take different approaches to time and space, so the results also differ.

3. RESEARCH METHODS

The article uses qualitative and quantitative research methods to assess the current status of digital transformation in SEMs and propose solutions to overcome difficulties in digital transformation activities in SMEs in Vietnam.

Qualitative research methods collect information and data in a 'non-digital' form to obtain detailed information about the research, survey, or investigation subjects - collectively referred to as "research subjects" for in-depth analysis or evaluation. This information is often collected through interviews, direct observations, or focus group discussions using open-ended questions. It is usually applied in cases where the research sample is small and focused. The data used by this method cannot be collected through conventional interview techniques but must be collected through discussion techniques. This is a form of exploratory research, finding new rules and new concepts about a certain problem (Shoshanna Sofaer 2002).

The data used in this article, collected by the author, are secondary data from publications in magazines, seminars, reference books, monographs, domestic and international specialized reports, and data sources from the Ministry of Information and Communications, Vietnam Chamber of Commerce and Industry (VCCI), which have been published as a basis for further analysis.

After that, the author will build a questionnaire on the content of barriers in SMEs' digital transformation activities and send it to SMEs for evaluation and discussion.

The selected contents in the questionnaire to survey the barriers to digital transformation activities in enterprises include:

- Investment cost barriers (R1);

- Corporate culture barriers (R2);

- Human resource barriers (R3);

- Enterprise infrastructure barriers (R4);

- Legal corridor barriers (R5);

- Barriers to the synchronization of digital transformation activities between enterprises (R6);

- Barriers to the orientation of the Board of Directors of the enterprise (R7);

- Barriers from employees (R8);

- Barriers to enterprise confidentiality (R9).

The questions on the above 9 contents are all designed as closed questions (agree, disagree, and other opinions), and there is 1 open question for SMEs to propose opinions.

Survey subjects: SMEs in Vietnam, of which the North has 20 enterprises, the Central region has four enterprises, and the South has six enterprises.

Surveyed positions: From department head level and above at the enterprise.

After collecting the data, the author will process it for the article using the methods of synthesis, induction, deduction, comparison, and analysis.

4. RESULT AND DISCUSSION

4.1. Research result

After building the questionnaire and sending it to businesses for survey, the results received are as follows:

Number of questionnaires sent: 30

Number of valid questionnaires: 27

Number of invalid questionnaires: 03

The results are summarized in the following table:

Table 1. Survey results summary table

	R1	R2	R3	R4	R5	R6	R7	R8	R9
Agree	26	18	23	20	21	24	22	18	25
Disagree	1	6	1	4	2	2	4	5	1
Other Opinion	0	3	3	3	4	1	1	4	1

Source: Author's synthesis

From the data presented in Table 1, the biggest barriers that SMEs are facing are costs - investment capital to serve the digital transformation process (96.3%); barriers related to information security and safety (92.6%); and synchronization in digital transformation activities in enterprises (88.9%). Next are barriers related to the quality of human resources serving the digital transformation process in SMEs (85.2%). The lowest-rated barriers are barriers from changes in corporate culture (66.7%) and employees' reactions (66.7%) in those enterprises. In general, the barriers in the digital transformation process that SMEs face in Vietnam, compiled and confirmed by the group of authors, are all agreed upon and confirmed by SMEs.

In addition to the selected answers, SMEs also proposed some ideas to improve the effectiveness of digital transformation activities as follows:

- The government needs to develop programs to support SMEs in accessing preferential capital sources to serve digital transformation activities, serving the production and business activities of enterprises;

- The Government needs to develop policies to support SMEs in human resource training programs in the new era;

- The government and VCCI need to develop courses to guide and train enterprises in digital transformation activities.

4.2. Discussion

Based on the collected documents and results, the authors make the following observations:

Most SMEs in Vietnam are aware of the importance of digital transformation activities for the survival and development of businesses. At the same time, this is also the trend of the current and future markets. This is also the key to companies' success in the current internationalization context.

SMEs believe that the cost-investment capital to serve digital transformation activities is at a high level and accounts for a large proportion of business costs. It does not bring economic efficiency in the short term.

Regarding the issue of information security barriers for businesses, SMEs are concerned about the insecure information security system after digital transformation. If too much security software is applied, enterprises will incur operating costs and be less flexible in their production and business activities.

The immediate barrier that SMEs face is the barrier of synchronization in the digital transformation activities of businesses in the economy. SMEs realize that the lack of synchronization in digital transformation activities among partners also causes many difficulties for SMEs. Many new expenses arise from there, and businesses are not interested in digital transformation activities.

The next barrier that SMEs face is the issue of human resource quality when operating digital technology after digital transformation. SMEs' human resources have not been trained in depth in digital skills, and while businesses' financial capacity is limited, if the investment is too large, it will affect business efficiency in the short term.

The next barrier that SMEs face is the inconsistency and lack of trust in the benefits of digital transformation by the SMEs' Board of Directors. Then there are the barriers of unclear legal corridors, which also significantly affect businesses' operations. The quality of SMEs' infrastructure has a significant impact on the success of digital transformation activities.

They cause SMEs' activities to overlap, businesses' tasks to be unclear, and business efficiency to be reduced in the short term. From there, digital transformation activities in SMEs in Vietnam have not brought about the expected results. As we know, when implementing digital transformation, SMEs must change their organizational structure (build a new business model). In the beginning, SMEs' activities will encounter many difficulties, when businesses have not adapted to the latest operating model. Meanwhile, employees also need to change their working style and improve their digital skills to be able to grasp new technological processes and meet business requirements. For their benefit, SMEs' departments and employees may not fully commit to digital transformation activities. Therefore, the effectiveness of digital transformation activities in many SMEs today is not high. However, because SMEs are not too large in scale, removing these barriers is not too difficult.

From the above situation, the authors propose solutions to help SMEs transform digitally more effectively as follows:

On the business side, SMEs need to develop a clear digital transformation plan and process in all their operations, and in areas such as building adequate financial resources to serve digital transformation activities, building solutions to improve the quality of

human resources to carry out this activity; and choosing a suitable business model in new conditions (especially new business models) and ideal for the potential of the enterprise itself. At the same time, the government needs to build an information system to ensure information security for SMEs after digital transformation. Finally, to achieve success, it is necessary to have the trust of the SMEs' Board of Directors in the effectiveness of digital transformation activities.

On the government side, VCCI needs to develop specific plans for financial resources provided to SMEs to support digital transformation; develop human resource training programs, support solutions, and digital transformation guidance for SMEs; and complete the legal framework on processes, regulations, and mechanisms to support SMEs in digital transformation activities.

5. CONCLUSION

Along with the development trend of the times, digital transformation is an inevitable need of enterprises in Vietnam, especially SMEs. Digital transformation helps

SMEs optimize production and business activities, save costs, and improve production and business efficiency... Besides the advantages, digital transformation activities of SMEs in Vietnam face many obstacles and challenges. In this study, based on the collected data and analysis results, we confirm that digital transformation activities of SMEs in Vietnam are facing nine major groups of barriers: lack of investment capital for digital transformation activities; information security systems for SMEs are not high; the rate of comprehensive digital transformation in SMEs is still low; The quality of human resources for digital transformation activities is still limited; the legal corridor still has many loopholes; SMEs' infrastructure for digital transformation activities is still limited; Lack of confidence of the Board of Directors in the benefits of digital transformation; Changes in corporate culture; and opposition from employees. Based on the analysis results, the article has proposed solutions for SMEs and some ideas for the government and VCCI so that digital transformation activities in SMEs in Vietnam will bring more positive results in the future.

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FACTORS INFLUENCING CONSUMER SATISFACTION WHEN PURCHASING FRESH AGRICULTURAL PRODUCTS VIA E-COMMERCE PLATFORMS

Nguyen Thu Ha[a]*, Pham Duc Quang[a]

[a]Hanoi University of Mining and Geology, Hanoi, Vietnam

**Corresponding author: nguyenthuhaktd@humg.edu.vn*

Abstract: *Online shopping is becoming an increasingly popular trend, with e-commerce emerging as a fitting channel for distributing agricultural products in the current years. Major e-commerce platforms like Sendo, Buudien, Tiki, and Postmart have supported many farmers, cooperatives, and businesses in selling agricultural products online, providing positive shopping experiences for consumers. However, there remain concerns among consumers, particularly when purchasing fresh agricultural products like vegetables and fruits online. This study aims to explore and measure the impact of various factors on customer satisfaction when buying fresh agricultural products through e-commerce platforms. By surveying 200 individuals who have purchased agricultural products online in Hanoi, the collected data was processed using SPSS 20 software through steps like scale reliability analysis, exploratory factor analysis, and linear regression. The research results identified four factors that significantly impact customer satisfaction: Pre-purchase expectations, Information quality, E-commerce platforms, and Customer service. These findings provide valuable insights for individuals and organizations involved in selling agricultural products via e-commerce platforms and offer guidance for improving customer satisfaction and enhancing the effectiveness of online sales of agricultural products, particularly fresh products.*

Keywords*: Agricultural Products, Fresh Produce, E-commerce, Consumer Behavior, Satisfaction.*

1. INTRODUCTION

The business and trade of goods through e-commerce platforms is an inevitable trend, and agricultural products are no exception. On July 21, 2021, the Ministry of Information and Communications approved a program to support agricultural producers in conducting business on e-commerce platforms, aiming to promote the development of a digital economy in agriculture and rural areas (Plan 1034). This program involved the cooperation of relevant agencies from the Ministry of Agriculture and Rural Development (MARD), the Ministry of Industry and Trade, and the People's Committees of provinces and cities across the country. Implementing Plan 1034 has helped various localities boost the consumption of agricultural products through e-commerce platforms such as Hai Duong, Bac Giang, Lang Son, Ha Tinh, Dak Lak, and Dong Thap. Businesses and localities nationwide are actively embracing the wave of bringing agricultural products to e-commerce platforms, with many local agricultural products and specialties finding a sustainable market on online platforms.

However, compared to other products, purchasing agricultural products, especially fresh produce (vegetables, fruits, etc.), through e-commerce platforms still involves

many risks. Consumers cannot see, touch, or directly assess the product as they would with traditional shopping methods; they can only view images of the products via internet-connected devices, making it difficult to distinguish between high- and low-quality products. Additionally, it is not uncommon to find online markets, stores, or individual accounts selling agricultural products under names that guarantee quality, such as "clean," "homegrown," or even labeled as organic, VietGAP, or OCOP products. However, many products do not meet the advertised quality when they reach consumers, eroding their trust in online agricultural purchases. According to the 2023 Vietnam E-commerce Report published by the Department of E-commerce and Digital Economy (Ministry of Industry and Trade), 59% of consumers have not yet purchased fresh agricultural products through e-commerce platforms, with only about 37% having done so. The main reasons include the perceived convenience of buying fresh produce at physical stores (39%) and the difficulty in assessing the quality of online agricultural products (38%). Other concerns include pricing, ordering and payment processes, packaging, preservation, delivery, return policies, and the credibility of suppliers (Cẩm, 2023). These factors can significantly impact consumer trust and the appeal of online agricultural shopping. Therefore, researching the factors influencing consumer satisfaction when purchasing fresh agricultural products online is essential and meaningful for agricultural suppliers, e-commerce platforms, and consumers. The findings can inform appropriate solutions to help e-commerce become a reliable bridge between production and consumption in the agricultural sector.

2. THEORETICAL FRAMEWORK AND RESEARCH MODEL

1.1. Some definitions of satisfaction

Research on Satisfaction is a topic approached and explained by many scholars, so the concept of satisfaction is expressed in various ways. Satisfaction is the sense of fulfillment customers derive from shopping (Oliver, 1999). Satisfaction originates from comparing the outcomes customers receive from a product and their initial expectations (Kotler & Armstrong, 2014). Satisfaction is the perception of customers regarding the goods or services that meet or exceed their expectations during the consumption process (Kotler, 2001). Consumer satisfaction is reflected in their attitude toward the outcome and encompasses the entire shopping process from recognizing needs, seeking information, making choices, purchasing decisions, and post-purchase behavior (Dung & Trang, 2020).

Online shopping is the behavior of consumers purchasing through internet stores or websites using online transactions (Monsuwe et al., 2004). For online shopping services, satisfaction is the overall perception of customers regarding their online shopping experience (Nguyễn Hoàng Phương Thảo, 2012). Satisfaction is the buyer's perception regarding the transaction process with the seller through the online shopping website (Kim et al., 2004). According to Nguyễn et al. (2021), customer satisfaction is critical to the website owner's success. Satisfaction can occur before, during, and after shopping. A website gains market share and profitability if it offers customers a higher product or service level than competitors (Kim et al., 2004).

1.2. Theoretical Models and Studies on Consumer Satisfaction

In satisfaction research, domestic and international authors have widely applied several theoretical models to study consumer satisfaction across various industries. Notable models include:

Oliver's (1980) Expectation-Disconfirmation Model posits that before using a service, customers form expectations about the factors that constitute the quality of the service the provider can deliver. Following the purchase and use of the service, customers then develop their actual perceptions of the service's performance. By comparing their pre-service expectations with the outcomes they experience post-service, customers arrive at their overall satisfaction with the purchasing process.

Customer Satisfaction Index- CSI proposed by Fornell C (1992). The initial variables affecting customer satisfaction in the CSI include Customer expectations regarding products and services, corporate image related to the company's reputation and brand, products and services, and perceived quality. Perceived quality is divided into two types: Perceived quality of the tangible product itself, such as form, material, and aesthetics, and Perceived quality of related services (intangible), such as warranty, after-sales service, product display conditions, user manuals, etc. Perceived value refers to the customer's evaluation and perception of the product or service quality relative to the price paid.

Grönroos' Service Quality Model (1984) identifies that customers' perceptions of service quality are based on three main factors: technical quality (related to what the customer receives), functional quality (related to how the customer gets the product or service, reflecting the company's service delivery process), and corporate image.

The application of theoretical models to studying consumer satisfaction in online shopping can be seen in the research by Myers & Mintu-Wimsatt (2012). The authors suggest that online shopping satisfaction originates from satisfaction with online purchases and customer experiences, which include (1) satisfaction with the quality of website content information and (2) satisfaction with the website's system performance in delivering information (McKinney et al., 2002). Additionally, trust, empathy, access to privacy policies, price awareness, efficiency, personalization, flexibility, ease of tracking, and the website's aesthetics also impact consumer satisfaction (Yomnak, 2005). Lee & Lin (2005) also demonstrated that consumer satisfaction is formed through three stages of the purchasing process: (1) information search to evaluate options before purchasing (information quality, website design, and product variety); (2) during the purchase (transaction capability, responsiveness, security, and payment methods); and (3) after the purchase (delivery and customer service). Furthermore, convenient payment procedures, a diverse range of products and brands, and creating accounts to track payment history and personal information are crucial for sellers to maintain customer satisfaction (Susan Kleinman, 2012). Vũ Huy Thông & Trần Mai Trang (2013) assert that essential factors influencing customer satisfaction in group online shopping include product price, product and brand variety, website information quality, product quality,

and the delivery process. Satisfaction is also influenced by customers' trust in the provider, website characteristics, and perceived benefits customers will receive.

Some foreign scholars have also explored research on satisfaction in online shopping for fresh agricultural products. According to E. Peng Wang et al. (2013), product quality is the core and most crucial factor influencing consumers' choices of fresh agricultural products. In addition to quality, price, packaging, and advertising/promotions also affect customers' perceptions and attitudes when shopping for agricultural products online (A. Chiang, 2021). Research conducted by R. Zhou et al. (2018) shows that 48.8% of respondents are highly concerned with the quality factors of agricultural products, such as product characteristics (sweet, sour, crisp, sticky, etc.), safety (no pesticides, no preservatives), and high nutritional value, while 33.7% of those surveyed lean towards sensory attributes like color, freshness, aroma, size, and unusual signs on the surface of the agricultural products. According to T. Tajidan's (2023) research, freshness is the main factor in customer satisfaction when purchasing online vegetables, fruits, and other produce. Since a certain amount of time is needed from the moment of purchase until the agricultural products are delivered to the consumer, maintaining the freshness of the products is essential. This can be achieved by using preservation technology, such as cold storage and transport vehicles equipped with refrigeration units, to ensure the quality of the produce during delivery. To ensure the quality of agricultural products, timeliness and the length of the distribution time are among the factors influencing purchasing decisions and consumer satisfaction (C. Xie, 2022; G. Guan, 2022; Ringo, 2023). Consumer satisfaction can also be enhanced by providing information services, good packaging, careful selection of fresh products, and promotional programs (Sun, X., 2021). Besides quality, availability, and service quality are decisive factors for customer satisfaction (M. Liu, 2023).

In this study, the research team also applies theoretical models. It builds upon the findings of related scientific works by the authors mentioned above to develop a research model suited to measuring consumer satisfaction when purchasing fresh agricultural products online.

1.3. Research Model

The author proposes a research model based on theoretical models and related studies on the factors influencing satisfaction when purchasing agricultural products through e-commerce platforms. These factors include pre-purchase expectations, information quality, and e-commerce platforms. These factors include *Pre-purchase Expectation, Information Quality, E-commerce Platform, and Customer Service*, along with corresponding research hypotheses:

- ***Expectation impacts satisfaction***

Customer expectations refer to the needs and desires of consumers before they experience a product or service (Olson & Dover, 1979). Customer expectations are what consumers feel a service provider should deliver rather than what they will deliver (Parasuraman et al., 1988). According to Parasuraman, Berry, and Zeithaml (1991), service providers must recognize customer needs to meet expectations, aiming to achieve high levels of customer satisfaction

during the service experience. Managing customer expectations is crucial to ensuring customer satisfaction (Kurtz & Clow, 1992). Expectations are a key determinant in evaluating service quality and consumer satisfaction (Grönroos, 1994; Parasuraman et al., 1985). Consumer expectations are influenced by the sources of information they gather during the purchasing process. Without information, initial expectations about the service will be entirely ambiguous. However, in practice, customers have multiple information sources that shape their expectations throughout the different stages of the decision-making process. These sources include exposure to the service, word of mouth, expert opinions, advertising, media controlled by the business, and prior exposure to competing services (Zeithaml, Berry, and Parasuraman, 1993). During the pre-purchase phase, expectations influence consumer decisions regarding which brand or type of product or service to purchase. During consumption, they may be influenced by the attitude of service employees, other customers, and facilities. In the post-purchase phase, expectations are the basis for evaluating satisfaction (Oliver, 1980). In this study, the author focuses only on pre-purchase consumer expectations. From these observations, the following hypothesis regarding the relationship between pre-purchase expectations and consumer satisfaction is proposed:

H1: Pre-purchase expectations for fresh produce online positively impact customer satisfaction.

➢ ***The quality of information affects customer satisfaction.***

Information seeking is essential when shopping online (Lu et al., 2014). Unlike traditional shopping, online customers usually engage only through websites without directly interacting with the product, leading them to rely heavily on the information they gather to make purchasing decisions. The information on the website, including product details, pricing, warranty policies, and delivery options, is considered the primary source for consumers to make purchasing decisions while also reflecting the commitment of product providers and serving as a basis for post-purchase evaluation (Phan Thi Cam Hong, 2020). Website information sources are often divided into two types: published information and word-of-mouth information (Nghia, 2018). While published information on the website influences consumer expectations and satisfaction, word-of-mouth information feedback and reviews from previous buyers about products, services, and providers significantly affects online purchase intentions. Website information is one of the critical components that facilitates successful online business (Wolfinbarger & Gilly, 2001). Information is considered high quality when customers evaluate it as accurate, reliable, easy to understand, complete, clear, and timely (Barnes & Vidgen, 2002). Additionally, customers can immediately perceive the benefits of the website information without needing consultation from the sales staff, making the shopping process faster and saving customers time (Zeithaml et al., 2002). Therefore, the quality of information in online shopping is closely related to customer satisfaction, leading to the proposed hypothesis about the relationship between information quality and satisfaction:

H2: The quality of information when purchasing fresh produce online positively impacts customer satisfaction.

➢ E-commerce platforms affect satisfaction with online shopping.

E-commerce platforms are considered essential infrastructure for facilitating online shopping (Liu & Arnett, 2000). The factor of e-commerce platforms is discussed in various research literature from the website design perspective, including elements such as interface, content layout, imagery, and aesthetics (Parasuraman, 2005; Gim et al., 2014). Additionally, the quality of an e-commerce platform also depends on access speed and display speed between user clicks (Wolfinbarger & Gilly, 2003). Furthermore, website security is a significant concern for many online shopping consumers. Security is understood as the ability of a website to protect customers' personal information, financial details, and transaction history (Wolfinbarger & Gilly, 2003; Parasuraman, 2005). Many consumers are wary of online shopping due to concerns about safeguarding their personal data and payment accounts (Lee & Turban, 2001). They may face privacy risks if the e-commerce platform management uses customer information for unauthorized purposes (Nyshadham, 2000). Therefore, security is a crucial criterion for evaluating the quality of online shopping services (Zeithaml et al., 2002). Based on these analyses, the hypothesis regarding the relationship between e-commerce platforms and satisfaction is proposed:

H3: E-commerce platforms positively impact customer satisfaction when purchasing fresh produce online.

➢ *Customer service affects satisfaction*

Customer service refers to the support services businesses provide customers before, during, and after purchases to meet their needs and desires. In this study, customer service components include delivery, feedback and attitude of the seller, packaging, product warranty, etc. Among these, delivery issues are the most frequently discussed in online shopping research. Sharma et al. (1999) define delivery as "providing promised goods and services to customers on time." The delivery time is the period required to package the product and transport it from the distribution center to the buyer. It must be carefully calculated before the seller provides shipping information to the customer for each online transaction. Late delivery negatively impacts customer satisfaction with online shopping (Liu et al., 2008). Current studies have found that delivery is crucial to customer satisfaction (Hsu et al., 2014; Khalifa & Liu, 2007; Liu et al., 2008). Additionally, a fundamental weakness of online shopping is that buyers do not interact directly with the product, making it difficult to inspect and evaluate quality until they receive the item (Trang, 2014). Therefore, customers are highly concerned about potential delivery risks such as improper packaging, defective or damaged products, or incorrect delivery items (Thong & Trang, 2013). A common issue in online shopping services is customer complaints about faulty delivered products (Chen & Chang, 2003). On the other hand, customer service is also perceived through the willingness of websites to promptly respond and assist customers (Mai et al., 2019) and the goodwill to address issues occurring during online shopping for customers (Ha,

2018). The hypothesis regarding the impact of customer service on customer satisfaction is proposed as follows:

H4: Customer service has a positive impact on customer satisfaction when purchasing fresh produce online

2. RESEARCH METHODOLOGY

In this study, the author employs both qualitative methods through interviews and quantitative analysis. The survey questionnaire is designed based on a 5-point Likert scale, including 5 factors with 31 observed variables: Pre-purchase Expectations (5 variables), Information Quality (8 variables), E-commerce Platform (7 variables), Customer Service (7 variables), and Customer Satisfaction (4 variables). Data processing is conducted using SPSS 20 statistical software.

Regarding the appropriate sample size, according to Hair et al. (2006), the minimum sample size required should achieve a ratio of observed variables to measurement variables 5:1, meaning that there should be at least five observations for each measurement variable. The research model includes five independent factors and one dependent factor, with 31 observed variables, so the minimum sample size required is 31*5 = 155 samples. The survey process was conducted both online and offline. During the survey, the author distributed 200 questionnaires, and the data collected were cleaned and analyzed, resulting in 178 valid responses, which meets the required sample size for reliable research.

3. RESEARCH RESULTS

➢ *Scale Reliability Testing*

The Cronbach's Alpha coefficient was used to test the reliability of the scales to eliminate observed variables that do not significantly contribute to the concept description before conducting factor analysis. After the first round of testing, one variable from the Information Quality factor and one variable from the Customer Service factor were removed due to a total item correlation coefficient of less than 0.3. The second round of Cronbach's Alpha testing results showed no observed variables were removed from the scales, as all total item correlation coefficients were greater than 0.3. The Cronbach's Alpha coefficients for all 5 factor groups were above 0.6. The scales and dataset are reliable enough for exploratory factor analysis with these results.

Table 1. Cronbach's Alpha Reliability Test

Factor	Number of Variables Removed	Cronbach's Alpha After Variable Removal
KV	1	0,739
CL	2	0,662
NT	0	0,715
DV	1	0,848
HL	0	0,727

➢ *Exploratory Factor Analysis (EFA)*

According to the KMO and Bartlett's Test results, the KMO value is 0.825 (0.5 ≤ KMO ≤ 1), indicating that factor analysis is accepted for the research data. The Bartlett's Test value is 1932 with a statistical significance of sig = 0.000 (<1%). This result implies that the variables are correlated with each other in the population, making applying factor analysis appropriate. The rotated component matrix shows that 23 observed variables from 4 independent factors included in the analysis converge well and are grouped into 4 clusters consistent with

the proposed research model. Therefore, the scales identified in the theoretical research model all meet the required standards, and no scale components need to be removed. Consequently, the proposed factors in the model remain unchanged, preserving the inherent meanings of the concepts. The official research model does not differ from the proposed model. Based on this result, we proceed to the next step, linear regression analysis.

Table 2. The Rotated component matrix results in table

	Component			
	1	2	3	4
DV3	0,847			
DV5	0,844			
DV6	0,827			
DV4	0,818			
DV7	0,763			
DV1	0,743			
NT4		0,864		
NT2		0,835		
NT3		0,817		
NT1		0,796		
NT5		0,751		
NT6		0,715		
NT7		0,694		
CL3			0,744	
CL4			0,741	
CL1			0,713	
CL2			0,696	
CL7			0,671	
CL5			0,613	
KV1				0,658
KV5				0,565
KV2				0,543
KV4				0,513
KMO				,825
Bartlett's test	Approx. Chi-square			1932,693
	Df			253
	Sig.			,000

(Source: Author processed data)

➢ ***Multiple Linear Regression Analysis***

After conducting tests for model fit (with an adjusted R^2 value of 0.636 > 0.5 and the F-test significance of 0.000 < 0.05), as well as tests for model deficiencies (with a Durbin-Watson value of 1.920 within the range of 1.6 - 2.6 and VIF values all less than 2), it is demonstrated that the theoretical model meets the requirements to ensure significance, showing no autocorrelation and no multicollinearity. The constructed linear regression model is appropriate for the dataset. The standardized regression model illustrates the relationship between factors influencing consumer satisfaction when purchasing agricultural products online, as derived from the research results, as follows:

HL = 0,55*DV + 0,074*KV + 0,241*CL + 0,218*NT

The regression equation shows that all factors impact consumer satisfaction (sig. < 0.05, and all β coefficients are positive). Additionally, since β = 0.255 is the largest among all the analyzed factors, 'Customer Service' (CS) has the most significant effect on 'Customer Satisfaction,' followed by 'Information Quality' (IQ) with β = 0.241. 'Online

Platform' also significantly affects consumer satisfaction, particularly the experiences during the purchase process, with a β of 0.218. The research results do not show a significant impact of the 'Expectations' factor on consumer satisfaction when purchasing agricultural products online (β = 0.074).

Table 3. Multiple Linear Regression Results

Model	Unstandardized Coefficients		Std. Coefficients	t	Sig.	Collinearity Statistics	
	B	Std.Error	Beta			Tolerance	VIF
Constant	1,104	,195		4,410	,000		
DV	,256	,043	,255	,980	,033	,602	1,660
KV	,056	,046	,074	1,475	,021	,802	1,247
CL	,247	,076	,241	3,128	,002	,444	1,252
NT	,216	,053	,218	3,563	,000	,617	1,973
		F: 45,186			,000[b]		
R^2: ,676							
Adjusted R^2: ,636							
Durbin-Watson: 1,920							
Dependent Variable: HL							
Independent Variable: Dv, KV, CL, NT							

4. CONCLUSION AND RECOMMENDATIONS

4.1. Conclusion

The research shows that four factors influence consumer behavior when purchasing fresh agricultural products online: (1) Pre-purchase Expectations, (2) Information Quality, (3) E-commerce Platform, and (4) Customer Service. The impact of these factors, from strongest to weakest, is as follows:

First, Customer Service has the strongest impact on customer satisfaction when purchasing fresh agricultural products online. Issues with delivery (such as late deliveries, incorrect addresses, wrong items, or damage to products during transit) can negatively affect customer satisfaction if not addressed. Consumers highly value improvements in packaging to better preserve products during delivery. Also, handling orders, providing feedback, and supporting risk management affect consumers' online shopping experience, particularly for fresh agricultural products.

Second, Information Quality is highly valued by customers, particularly the completeness and accuracy of the information provided by suppliers. This is crucial when purchasing fresh agricultural products online. Product images (such as color, ripeness, and freshness) create the first impression for consumers. Additionally, consumers are concerned with size, weight, nutritional value, and product quality. Significantly, feedback from previous buyers

in the comments section substantially influences the behavior of purchasing fresh agricultural products online.

Third: E-commerce Platform: In online shopping, each website displays products as an online store. However, not all listed products can be shown due to the limited space on electronic device screens, complicating search and purchasing processes. Furthermore, the speed of information processing also impacts the experience of buying fresh agricultural products online. These issues need to be addressed from the perspective of the e-commerce platform to enhance consumer satisfaction in online shopping.

5.2. Recommendation

Based on the research findings, the authors propose several recommendations to help both agricultural product suppliers and e-commerce platform managers enhance the effectiveness of online fresh agricultural product sales as follows:

Firstly, To encourage customers to trust and purchase fresh agricultural products online, e-commerce platform managers need to closely monitor the information provided by product suppliers on their websites, especially regarding product quality. One of the most significant differences between online and traditional shopping is that consumers cannot directly observe or touch the products. Therefore, the description of agricultural products and specialties in e-commerce must be detailed and accurate to bridge the gap between pre-purchase expectations and post-purchase perceptions while also enhancing customer satisfaction.

Secondly, In the online fresh agricultural product business, in addition to developing their marketing programs, e-commerce platforms should seek assistance from government agencies and reputable brand information channels to enhance the influence and credibility of both the product and platform brands. This will help increase consumer awareness and improve the effectiveness of online shopping in general and the online purchase of fresh agricultural products.

Thirdly, Online sellers need to improve the design of their platform interfaces to be simpler and more user-friendly, making it easier for consumers to search for and select products. Entities in the online fresh agricultural product supply chain should collaborate to establish a standardized and effective customer service system, set up appropriate post-sales management mechanisms, and offer safe, convenient, and diverse payment channels for customers.

Fourthly, During the consumption of fresh agricultural products online, priority should be given to processing orders and deliveries accurately and timely, ensuring the correct location and product as customers request. Additionally, promptly addressing risks such as packaging issues to ensure product integrity during transit is crucial.

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HIGHER EDUCATION IN THE CONTEXT OF DIGITAL TRANSFORMATION

Do Huu Tung[a]*

[a]Dai Nam University, Hanoi, Vietnam.

**Corresponding author: dohuutungmdc@yahoo.com*

Abstract: *Currently, digital transformation is bringing significant changes to education and the operations of higher education institutions. Technology development has penetrated higher education institutions, forcing them to face digital transformation in all aspects to adopt new, advanced, and more efficient methods in pursuit of the mission of higher education. While offering many benefits, implementing digital transformation in higher education is not easy due to various obstacles. This article aims to provide an overview of digital transformation in higher education institutions and its challenges by reviewing reliable literature and discussing solutions for a successful digital transformation in these institutions.*

Keywords: *Digital transformation, higher education, digitalization of education, digital transformation of higher education.*

1. INTRODUCTION

In recent years, universities around the world have undergone rapid changes and have been strongly influenced by technological advances and electronic society trends toward digitalization. Major changes in the socio-economic system due to the globalized economy have led to changes in the education system, especially higher education. To ensure business growth and value addition in the context of economic globalization, digital technology has been integrated into organizations to improve product and service offerings. Production and business process innovation and implementation of smart machinery and equipment bring countless benefits in terms of productivity and resource efficiency. Along with new trends and skills required by the labor market, higher education institutions recognize the importance and urgency of training human resources with digital skills to meet the new needs of the labor market. The use of technology in education is a competitive and innovative strategy. Technological developments facilitate access to higher education and the success of online resources used in face-to-face and distance education (Caliari et al., 2017). A distinctive feature of higher education is the training of citizens who are competent and committed to the development of science and technology in their field of work (Martins et al., 2021). Digital technologies based on web tools or social networks promote communication between learners and teachers, mainly because they can be used in our social and daily life (Pinto & Leite, 2020). Higher education institutions have been centers of knowledge creation and diffusion for centuries. However, now, access to information and knowledge is no longer limited to the physical space of educational institutes. Rather, information and knowledge relevant to various subjects can be gained from various platforms, open-source databases and web browsers, applications, and encyclopedias, which enable users to add to their learning process. Although this emerging trend poses various challenges, must be seen as an opportunity rather than a threat to higher education institutions (Valdés & Cerdá Suárez, 2021).

Contemporary higher education institutions have embraced new technologies

and transformed their practices, business models, and operating processes. Digital transformation in higher education institutions involves the development of new, more advanced, and effective methods and practices in pursuit of higher education's mission. Some studies have also confirmed that digital transformation is not merely incorporating technology into business processes. Rather, digital transformation is a process of analyzing the needs and demands of stakeholders and ensuring the provision of education and research services that are in line with the knowledge needs of students. Digital transformation is gradually being implemented in educational institutions across the world, ensuring that students' learning is supported by digital tools (Eden & al., 2019).

Digital transformation in the global education industry confirms the future roadmap for sustainable education management. To achieve a relatively sustainable position, universities must be prepared to adapt to changes with strong impacts caused by the macro environment, and actively incorporate key trends as part of their digital transformation strategy at the same time. Society is constantly changing and developing; education in general and higher education, in particular, must keep up with technology development to train and provide human resources to meet the needs of society in the digital era. Therefore, universities need to have a strategic plan and determine the implementation of specific actions for the digital transformation process. In addition, competition in higher education is increasing, and universities are changing teaching methods that integrate technology to stimulate students' motivation and creativity.

2. DIGITAL TRANSFORMATION IN HIGHER EDUCATION INSTITUTIONS

Nowadays, digital transformation has emerged as one of the top priorities of educational institutes, particularly higher education institutions. Globalization requires universities to respond to changes and world trends in academic standards, academic quality, and research knowledge, as well as fill the knowledge gaps of society. Regularly meeting those changing needs has become a centric emphasis and strategic priority for higher education institutions. By adapting to impactful changes, universities can become more innovative, entrepreneurial, and willing to respect those impactful changes (Mok, 2008). Digital technology in education is a method of creating an innovative educational environment based on digital technology (Markova et al., 2020). Digital transformation becomes more complicated due to several problematic trends, such as rising operational costs, changing educational needs, etc. Such trends increase the possibility of replacement of existing infrastructure and information technology with those more suitable for higher education in a digital world. To survive and maintain a competitive position in the long term, transforming current teaching and learning models is mandatory, with the main goals of improving students' learning environment, increasing operational efficiency, increasing research value, stimulating innovation in education, and enriching traditional pedagogy through cutting-edge educational tools (Jackson, 2019).

Higher education institutions' mission is to develop students' professional skills for a specific career and to equip them to survive in the labor market, both now and in the future. Higher education contributes to job creation, improved quality of life in the workplace, and knowledge and skills

acquisition. Things have changed in the last decade, as it is uncommon for employees to work for the same company throughout their careers (Nikonova & al., 2019). As a result, higher education institutions are tasked with preparing students for continuous learning. Therefore, higher education institutions must focus on developing students' self-study and adaptive skills (Chappell & al., 2020). In this regard, digital transformation can help students complete their studies. Such skills and competencies must be integrated into all modules, courses, and learning environments. Digital technology has played an increasingly important role in higher education approaches, and digital transformation initiatives are central to each country's policies. The main challenges of innovation relate to strengthening the higher education sector and ensuring its quality through internal and external resources, such as quality assurance mechanisms (Lašáková & al., 2017).

Digital transformation has revolutionized business operations in companies, the labor market has largely moved to online platforms, and job opportunities in digital, analytics, and technology have expanded. (Di Gregorio et al., 2019). This effect is also reflected in employability and requires specific knowledge of digital tools. Increasing pressures on sustainability and financial stability, as well as global market competitiveness, have forced higher education to demonstrate the quality of their training and use learning analytics to find solutions to student progress, student experience and satisfaction, teaching quality and innovation, operational efficiency, and institutional rankings (Tsai Y-S & al., 2020).

Technological trends have driven changes in organizations and universities, and they occupy an important place among the institutions facing challenges of digital transformation, as they should lead the cultural shift to adapt. The transition to new ways of implementing operational processes and procedures in organizations leveraging digital tools leads to considering the design and definition of strategic organizational units dedicated to implementing meaningful and valuable technology solutions. However, this will also lead to creating a digital culture aligned with the dynamics of the new technology ecosystem. Many universities are undergoing renewals and structural reviews of their administrative and academic processes. The improvements they make using new technology stand to benefit both the university community and broader society, which are the central reason for the existence of universities. Higher education institutions should propose the following as a general objective: to foster a community attuned to innovation within the university through a digital transformation, where the advancement of technology and emerging trends maximizes collaboration, active learning, research, and creation.

3. DIGITAL TRANSFORMATION CHALLENGES IN HIGHER EDUCATION INSTITUTIONS

The digital transformation of higher education institutions is particularly important in today's technology-driven world. However, to successfully implement digital transformation, universities face many challenges. The key challenges facing digital transformation in higher education institutions can be summarized as follows:

First, human resources: The first obstacle that universities often encounter when implementing digital transformation is human resources that are considered not ready. This involves the university's efforts to provide staff that are fully trained and engaged in the design, as well as provide teachers and students with instructions on the use of technology. One way to overcome

this problem could be collaboration between university stakeholders and information technology consultants willing to help universities transform to digital platforms. At this stage, it is possible to provide at least a basic understanding of the digitalization process in education to all relevant members.

Second, prioritization: Universities tend to focus on urgent matters rather than important ones. They prioritize immediate results and postpone critical investments in building capabilities, which can be time-consuming. It has been asserted that a well-planned digitization process is not being done in a particularly novel way nor with the necessary financial means to implement the plan, which further aggravates the problem. (Rodríguez-Abitia & Bribiesca-Correa, 2021). However, this issue can be dealt with by developing a prioritization plan for digital investments. This roadmap can guide the systematic transformation of the organization sequentially.

Third, human resistance to change: one of the primary obstacles that higher education institutions encounter in adapting to digital transformation is adjusting to new teaching methods and learning settings and models. Thus, resistance to adopting digital transformation can be a significant obstacle. Academic professionals are typically regarded as one of the world's most secure occupations. There is a good chance that changes will be opposed if it threatens job security. Successful institutions inspire their staff to advocate a digital maturity vision. Small pilot projects can give a clear picture of the potential change and eliminate teachers' doubts or uncertainties regarding job security. It is imperative to develop orientations for educational professionals to guide them regarding the positive aspects of technology, thereby reducing the sense of job insecurity.

Fourth, digital technology literacy: The low level of the faculty's digital literacy is also a significant challenge. In the context of higher education institutions, new teaching methods, learning tools, and processes must be adapted. Higher education systems are being pushed to adapt to global development, requiring new teaching and learning paradigms and environments (Trifonov & Shorokhova, 2019). In addition, students' lack of digital skills and competencies (especially for first-year students) are also the most important obstacles to the digital transformation process in higher education institutions.

Fifth, generation gap: Another significant challenge for the successful implementation of digital technology in the higher education system is the generation gap between students considered familiar with digital technologies and (older) lecturers who need to adapt and learn how to use technologies. Therefore, given the generational gap between students and faculty members adopting technology, there is a need to promote policies to support both infrastructure and innovative learning environments to address changing academic trends. The current uncertain environment has prompted organizations around the world to incorporate digital tools and technologies to adapt to changing scenarios. Higher education institutions have not been an exception to such transformation, and thus, they have to transform their operations digitally to maintain the educational delivery to the entire society. With suitable tools and ingenuity, problems can be transformed into opportunities (Chen & Roldan, 2021). Therefore, digital technologies may enhance social connection, collaboration, interaction, and engagement by incorporating new online platforms and programs; a higher number of lecturers, experts, and speakers can be accessed globally. With such sudden adoption of digital technologies and mechanisms, the

need to encourage student engagement and interaction has also increased, which can be easily lost or diminished compared to a face-to-face situation, along with other factors.

4. SOLUTIONS FOR EFFECTIVE DIGITAL TRANSFORMATION IN HIGHER EDUCATION INSTITUTIONS

Today digital transformation is a major trend across all sectors (Ebert & Duarte, 2018), in which the education sector is no exception. Higher education is important for economic and social development (Ratten, 2020; Teixeira et al., 2021). The main goal of education is to ensure students have the skills needed to succeed in the future (Teixeira et al., 2021) and the emotional intelligence to collaborate and build relationships (Mello et al., 2021). event, 2020). Digital transformation in higher education can be considered from different perspectives, namely learning and teaching, governance and management, curriculum, and finally, infrastructure (Alenezi, 2021). Increasing competition among universities, as well as competition from large-scale online courses for students, lecturers, and researchers (Kopp et al., 2019), urges universities to seek new ways of working, transform their business processes as well as the products and services they are providing (Benavides & al., 2020). Universities need to optimize their processes to adapt to a rapidly changing environment. Digital transformation in universities is driven by the need to meet growing labor market demands by ensuring that students have the digital skills needed to excel in a globalized digital environment and meet society's needs by providing accessible and qualified, flexible education with student-centered learning opportunities. The availability of new digital solutions and tools can bring in more engaging and qualified research, forcing universities to keep up with the times.

Strategy, leadership, collaboration, and stakeholder engagement are critical to successful digital transformation and overcoming natural obstacles to change. The availability of appropriate digital tools and platforms for education plays an essential role in the transformation process. According to experts, available financial resources are not an important success factor for digital transformation, but lack of or insufficient financial resources are a serious barrier. The availability of resources within the budget is mentioned as a success factor in the literature. At the same time, high costs and insufficient investments can hinder digital transformation (Kopp et al., 2019). Among student benefits, cost-saving opportunities through digital transformation have been discovered (Benavides & al., 2020).

Digital transformation in higher education institutions is an important step because universities are vital to a supportive labor market in which employees can adapt to the business world that requires essential scientific and technical knowledge and skills such as programming and AI (Teixeira et al., 2021). It is imperative to stand out from the competition and provide flexible student-centered services in the turbulent times in which we live. Higher education institutions transform their processes and operating models by implementing new educational methods through technology. Strategy, motivation and stakeholder engagement are important factors for universities to successfully implement digital transformation. In addition, universities need to update their strategic plans and identify

the implementation of specific actions for digital transformation, such as increasing stakeholder engagement and establishing innovative resources on digital transformation strategies for students.

Curriculum design on digital transformation must also be immediately prepared by universities to be able to survive and succeed against competition in the current context. Digital transformation strategy starts with preparing human resources and a good culture of change, followed by data and technology preparations for transformation. In addition, solutions to deal with the challenges presented above also contribute to the success of the digital transformation process of universities. Solutions that need to be implemented to address the above challenges are as follows:

First, in terms of human resources: With the existing human resources at the unit, on-site training courses on digital competencies should be organized based on the needs of each job position in the organization. At the same time, it is necessary to have preferential policies to attract highly qualified experts (with digital capabilities) and retain talents, continuously develop expertise and create a culture of cooperation. In reality, the movement of highly qualified staff among universities is very large. Therefore, if institutions do not set budgets and preferential conditions for these subjects, the phenomenon of - brain drain is inevitable. Meanwhile, for universities, highly qualified lecturers are one of the factors that create a competitive position and improve training quality, thereby contributing to improving enrollment capacity for universities. Academic staff often spend a lot of time on teaching and research, so they have little time to engage in digital transformation initiatives. Digital transformation initiatives require significant time and resources, including planning, implementation, and ongoing support. Therefore, universities must have policies that encourage them to fully participate in institutions' digital transformation efforts.

Second, in terms of prioritization of important issues, Digital transformation is a complex and multifaceted process that can affect all university functions and requires careful planning and strategic thinking. In fact, universities tend to prioritize immediate issues and delay important decisions on long-term strategic issues. Therefore, universities need to identify digital transformation as an inevitable trend in the current era and an indispensable condition for sustainable development, thereby determining goals and developing specific plans, and implementing roadmaps for each stage. At the same time, after each implementation stage, it is necessary to evaluate the effectiveness as well as remaining problems to promptly have appropriate adjustment plans to ensure the success of the digital transformation process. In addition, digital transformation requires strong leadership and governance to ensure initiatives are aligned with the university's overall strategic goals. This includes setting clear goals, establishing accountability and providing resources, and supporting digital initiatives. Creating a clear and powerful vision that highlights the benefits of digital transformation and engages students, lecturers, and staff is especially important, as digital transformation is a collaborative effort and it is important to involve all stakeholders in the process. Listen to their concerns and ideas to motivate the vision for digital

transformation and ensure it meets the needs of all stakeholders.

Third, in terms of adaptive attitudes towards change, Inertia is a serious barrier to seizing opportunities to implement digital transformation. People may feel comfortable with their current way of doing things and may not feel the need to change. This comfort zone can lead to a lack of motivation to change and adopt new technologies. Specialized faculties may feel comfortable with traditional teaching and research methods as well as staff with existing processes, which makes it difficult to adopt new technologies and digital tools. Therefore, universities need to propagate and disseminate to all officials, lecturers, and workers about the changes brought about by digital transformation. At the same time, deploy a digital transformation plan to each department and faculty to ensure that all employees are provided with complete information related to the digital transformation process. Those who have a poor understanding of technology will feel secure because they will be trained in basic digital technologies to meet job requirements, and that will remove teachers' doubts or uncertainties regarding employment. Thereby, they will have a ready attitude to collaborate with the institution and implement this process to achieve the common goals.

Fourth, in terms of lecturers' and students' digital technology competencies, the success of digital transformation in universities depends greatly on lecturers' and students' skills and knowledge. Therefore, universities need to invest in facilities and technology infrastructure, update new applications in teaching, and regularly train teachers in applying these technologies to their teaching process. Developing teachers' digital competencies not only involves mastering technology but also improving their teaching methods with the appropriate use of pedagogical technology to contribute to student learning improvement. For students, it is necessary to determine the requirements of using technology for first-year, second-year students, etc., to have a plan of training and provide students with instructions so that they can use technology to support their learning needs. These instructions may not need to be given directly but through information on the universities' website or each department's (because each department may have different requirements for using technology) from which students can access and view instructions on their own. Of course, the instructions for using technology must be presented in detail and clearly, so that students can follow them. This process requires universities to provide students, lecturers, and staff with sufficient assistance for the use of technology to avoid technical difficulties or delays and, finally, help them successfully implement digital transformation initiatives.

Fifth, in terms of the generation gap: Regarding this issue, each lecturer must understand at what stage he is teaching students and what specific technology application is used for the subject in order to proactively research and study before classes. It is a fact that there are lecturers who find it difficult to apply technology, so they are reluctant to learn. therefore, they do not apply technology but prefer to do the old traditional methods; they refuse to innovate, which deviates from the institution's digital transformation goals. Or there are lecturers being confused when applying technologies,

causing them to lose points in the eyes of students. In some cases, students even —teach back to teachers□. Solving this problem requires the role of faculties and departments in professional activities, which determine specific technology applications for each subject to convey and share knowledge and assess each lecturer's ability to use technology. In addition, before class, departments must have a meeting on how to implement and have an agreement on outlines, lectures, teaching methods, etc., for each subject and require lecturers teaching the same subject to follow requirements (especially mandatory application of technology for that subject - if any) and there must be monitoring of the implementation process to avoid the situation where some people do and some people do not apply technology in their teaching.

5. CONCLUSION

In the current era, similar to other industries and business organizations, higher education institutions also need to undergo digital transformation to remain relevant to the changing scenarios and trends. Digital transformation can be applied to various aspects of the higher education system, including teaching, learning, and curriculum, facilities, administration, and management. The article presents the context of digital transformation in higher education as well as the obstacles and challenges universities face in implementing digital transformation. It also discusses effective digital transformation solutions for higher education institutions, such as optimizing processes to adapt to a changing environment, strategy, leadership, collaboration, and participation of stakeholders, designing curriculum on digital transformation, and preparing human resources with digital capabilities.

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IMPROVEMENT OF STATE MANAGEMENT OF VIETNAM'S MOBILE TELECOMMUNICATIONS INFRASTRUCTURE IN THE CONTEXT OF DIGITAL TECHNOLOGY DEVELOPMENT

Vinh Nguyen-Quang*

Dainam University, Hanoi, Vietnam

**Corresponding author: vinh.nguyenquang@mobifone.vn*

Abstract: *This article develops criteria relating to the effectiveness, efficiency, and suitability of state management of mobile telecommunications infrastructure in Vietnam and evaluates the current situation based on these criteria in the context of digital technology development during 2018-2023. The result of the evaluation points out several inadequacies existing in state management. Simultaneously, the appropriate solutions are proposed to solve those inadequacies in order to improve the effectiveness, efficiency, and suitability of state management of Vietnam's mobile telecommunications infrastructure in the context of digital technology development.*

Keywords: *state management, mobile telecommunications infrastructure, digital technology development.*

1. LITERATURE REVIEW

Over the past ten years, from 2020 to 2023, especially during the COVID-19 pandemic, the digital transformation process has strongly occurred in every industry and field in Vietnam. Following that trend, telecommunications businesses continuously promote investment in the construction of infrastructure projects to serve their production and business activities. That has significantly contributed to the socio-economic development of each province and the whole country. With the investment in telecommunications infrastructure, especially the introduction of 4G mobile networks into services in 2017, Vietnam significantly increased the telecommunications infrastructure index (TII-Telecommunications Infrastructure Index). In 2020, this index achieved a high level according to the United Nations assessment. (Ministry of Information and Communications, 2021, pp. 21-28)

In reality, telecommunications technology is changing continuously and rapidly, leading to new trends in developing and using services. However, the telecommunications infrastructure in Vietnam is currently not built or managed in synchronic with other economic-technical infrastructure. In particular, the underground technical infrastructure has not been designed for telecommunications cables. The rate of the underground transmission network, outside communications network, and the rate of general use of the Base Transceiver Station (BTS) infrastructure have not achieved the goals. Currently, the general use of mobile network infrastructure is limited due to a lack of synchronization between telecommunications businesses. Furthermore, safety and environmental hygiene are not guaranteed due to (i) the aerial cable system is not hung by cable hanging standards, (ii) the underground outside telecommunications network is mainly developed in urban areas, so the rate of underground transmission in the most provinces across the country is still low, and (iii) unused subscription lines have not been

collected and processed promptly, leading to loss of urban aesthetics.

State management from all levels of government for telecommunications infrastructure in recent times still has specific difficulties, including (i) coordination and cooperation between telecommunications businesses and electricity businesses in undergrounding and refurbishing the cable network is not good; (ii) the cost of undergrounding and refurbishing the cable network requires a tremendous amount of capital to implement, while the state budget does not have funding to support localities and businesses; (iii) enterprises must request funding approval from superior units; (iv) the rate of general infrastructure use among telecommunications businesses is low; (v) the implementation of BTS construction is facing difficulties in several localities; (vi) telecommunications businesses have not proactively propagated and mobilize local people to create consensus from them for the BTS construction; etc. These problems prevent state management from achieving the desired effectiveness, efficiency, and suitability.

2. THEORETICAL BASIS AND RESEARCH METHODS

2.1. Theoretical basis

2.1.1. Overview of mobile telecommunication infrastructure

Clause 18, Article 3 of Law on Telecommunications No. 41/2009/QH12 stipulated: "Telecommunications infrastructure means a combination of telecommunications equipment, transmission lines, networks and works" (National Assembly, 2009). Currently, no legal document defines mobile telecommunications infrastructure. However, the practice of the telecommunications industry shows that mobile telecommunications infrastructure is an important part of the telecommunications infrastructure system, having a role in providing wireless communication services to users.

In this article, the author believes that mobile telecommunications infrastructure combines telecommunications work and equipment built and installed to provide mobile telecommunications services. Mobile telecommunications infrastructure includes two main types: inactive telecommunications technical infrastructure and active telecommunications technical infrastructure. In there:

Inactive telecommunications technical infrastructure includes construction works and equipment that are not capable of transmitting and processing telecommunications signals (i.e., Telecommunications stations, Antenna columns, Cable poles, Underground infrastructure works);

Active telecommunications technical infrastructure includes works and equipment capable of transmitting and processing telecommunications signals (i.e., Switching equipment, Transmission equipment, and Signal processing equipment).

2.1.2. Overview of state management of Vietnam's mobile telecommunications infrastructure in the context of digital technology development

State management is a common term that is now widely used. There are many different views of scientists on the concept of state management, such as:

State management of the national economy is the legal and organized impact of the Government on the national economy's use of domestic and foreign economic resources. It is also possible to effectively

achieve the economic development targets the Government has set in the context of integration and expansion of international exchanges. (Do Hoang Toan and Mai Van Buu, 2005, p. 21)

State management is an organized impact and regulation of the state's power over the socialization and human behaviors to maintain and develop social relationships and legal order to fulfill the functions and tasks of the state in the construction and protection of socialism. State management activities are mainly and primarily carried out by state authorities. Besides, they can be directly carried out by political-social organizations and citizens if delegated and empowered by the state according to the provisions of law. (National Academy of Public Administration, 2020, p. 12)

Currently, the Ministry of Information and Communications has not provided an official definition of state management of mobile telecommunications infrastructure in the context of digital technology development. However, from understanding general concepts of state management and mobile telecommunications infrastructure, this article suggests that State management of mobile telecommunications infrastructure in the context of digital technology development is the enforcement activity of the state by the state authorities to regulate the behaviors and relationships of individuals and organizations in the process of developing mobile telecommunications infrastructure, meeting the requirements of the digital technology development context in particular, and achieving the socio-economic development goals of the country in general.

The Government centralizes state management of mobile telecommunications infrastructure in the context of digital technology development; The Ministry of Information and Communications is responsible to the Government for implementing state management of mobile telecommunications infrastructure in the context of digital technology development; Ministries, ministerial-level authorities, and government authorities within the scope of their tasks and powers are responsible for coordinating with the Ministry of Information and Communications to implement state management of mobile telecommunications infrastructure in the context of digital technology development as assigned by the Government.

The Provincial People's Committee implements the functions of state management and the enforcement of laws in managing investment projects in the construction of mobile telecommunications infrastructure by telecommunications businesses.

2.1.3. Developing criteria to evaluate the effectiveness, efficiency, and suitability of state management of mobile telecommunications infrastructure in the context of digital technology development

Since 1996, the World Bank has annually published the "World Development Report," assessing the governance capacity of countries worldwide. Accordingly, the World Bank has established six indicators to evaluate state governance capacity: Voice and Accountability, Political Stability and Absence of Violence/Terrorism, Government Effectiveness, Regulatory Quality, Rule of Law, and Control of Corruption.

The United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) annually develops the "Asia-Pacific Governance Report," using eight indicators to assess the good governance of countries in the Asia-Pacific region (including Vietnam) as follows: Compliance with legal regulations, Ensuring transparency, Flexible

adaptation to changes, Ensuring direction and consensus, Equality and fairness, Effectiveness and efficiency, Reporting and accountability responsibility, and Ensuring the participation of social entities.

Currently, the system of criteria for evaluating state management of mobile telecommunications infrastructure in the context of digital technology development has not been mentioned in any Vietnamese legal documents or related published studies.

Researchers developed several decent methods to evaluate the state management of a specific area, e.g., Establishing particular criteria to evaluate state management content; Developing criteria to evaluate the effectiveness, efficiency, suitability, fairness, and sustainability of state management; etc.

In this article, to avoid complicating research tools, the suitable criteria and the nature of state management of mobile telecommunications infrastructure in the context of digital technology development are considered, as well as three criteria: effectiveness, efficiency, and suitability. In particular:

+ Criteria for the effectiveness of state management of mobile telecommunications infrastructure in the context of digital technology development:

Evaluating the effectiveness of state management of mobile telecommunications infrastructure in digital technology development involves comparing the achieved results of state management with the criteria. In particular, it assesses the scope and level of state management impact on its subjects (the activities related to developing mobile telecommunications infrastructure by telecommunications businesses). In a narrower sense, it examines the extent of accomplishment of state management on mobile telecommunications infrastructure in the context of digital technology development, including influencing factors. From this research perspective, the effectiveness of state management of mobile telecommunications infrastructure in the context of digital technology development is evaluated through the following criteria:

(1) The level of compliance with laws, policies, and regulations of telecommunications agencies, businesses, and individuals in developing mobile telecommunications infrastructure by telecommunications businesses. Hence, to evaluate this criterion, the article utilizes the following indicators:

Number of violations by units and individuals: The lower the number of violations, the higher the level of compliance with laws, policies, and regulations of telecommunications agencies, businesses, and individuals, and vice versa.

The extent of violations by units and individuals: The lower the extent of violations, the higher the level of compliance with laws, policies, and regulations of telecommunications agencies, businesses, and individuals, and vice versa.

(2) The extent of the correct assurance of all parties involved in developing mobile telecommunications infrastructure by telecommunications businesses, including the State, telecommunications businesses, other relevant entities, and individuals.

+ Criteria for the efficiency of state management of mobile telecommunications infrastructure in the context of digital technology development:

The evaluation of the effectiveness of state management of mobile telecommunications infrastructure in digital technology development primarily involves comparing the outputs (achieved results) with the inputs

of the management process, in other words, measuring how inputs are transformed into outputs. Thereby, the effectiveness of state management of mobile telecommunications infrastructure in the context of digital technology development can be assessed through the following indicators:

(1) The completion rate of planning and development for mobile telecommunications infrastructure (in telecommunications planning and development).

(2) The technological and technical modernity level of the mobile telecommunications infrastructure system.

(3) The level of increased capacity in providing mobile telecommunications services by telecommunications businesses.

(4) The level of increased responsiveness to societal needs of the mobile telecommunications infrastructure system.

+ Criteria for the suitability of state management of mobile telecommunications infrastructure in the context of digital technology development:

The evaluation of the suitability of state management of mobile telecommunications infrastructure in the context of digital technology development is to assess whether this management task is genuinely suitable for the economic and social conditions of the country. Thereby, the suitability of state management of mobile telecommunications infrastructure in the context of digital technology development can be evaluated through the following indicators:

(1) The suitability of the mobile telecommunications infrastructure system with the country's economic and social circumstances.

(2) Sustainability of mobile telecommunications infrastructure system development.

2.2. Research methods

2.2.1. Social survey method

+ The primary data collection for this research was carried out through the method of surveying respondents using a questionnaire system designed on a Likert scale with five levels, where level 5 corresponds to "very satisfied" or "very good" and level 1 corresponds to "very dissatisfied" or "very poor" for each question or criterion given by the questioners.

+ The survey target includes the group of 300 officials, civil servants working at the Ministry of Information and Communications, People's Committees of provinces and cities; and the group of 100 officials, employees working at telecommunications businesses (selected individuals knowledgeable about state management activities regarding the development of mobile telecommunications infrastructure of companies). The total number of survey questionnaires issued was 400, the number of responded questionnaires was 387, and the number of valid questionnaires used for the study was 383 (4 questionnaires were excluded due to incomplete responses).

+ The primary data collection period was conducted from October 2022 to June 2022.

+ The survey focused on evaluating the state management of Vietnam's mobile telecommunications infrastructure in the context of digital technology development from 2018 to 2022.

+ Sample selection for data collection: Based on the research by Hair, Anderson, Tatham, and Black (1998) regarding the expected sample size, the minimum sample

size is five times the total number of observed variables.

+ Primary information processing method: The primary data collected through the survey and investigation process was encoded and analyzed using the statistical analysis software SPSS 26.

0 < Average score < 2.5: Criterion is assessed as weak;

2.5≤ Average score < 3.5: Criterion is assessed as moderate;

3.5 ≤ Average score ≤ 5: Criterion is assessed as good.

(Based on the research "Analysis of research data with SPSS" volume by Hoang Trong and Chu Nguyen Mong Ngoc 1 and 2 by Hoang Trong and Chu Nguyen Mong Ngoc).

2.2.2. Analysis and synthesis method

The research's analysis and synthesis method aims to evaluate information and data and then develop solutions to enhance state management's effectiveness, efficiency, and suitability regarding Vietnam's mobile telecommunications infrastructure in the context of digital technology development.

3. ASSESSING STATE MANAGEMENT OF VIETNAM'S MOBILE TELECOMMUNICATIONS INFRASTRUCTURE IN THE CONTEXT OF DIGITAL TECHNOLOGY DEVELOPMENT

In recent years, with the attention and guidance of the Government, the Ministry of Information and Communications, and local authorities, along with the efforts of telecommunications businesses, state management of mobile telecommunications infrastructure achieved many remarkable results. It has become increasingly suitable and better meets the requirements of digital technology development, contributing to the country's economic and social development. However, some limitations still need to be overcome to align with current and future digital technology developments.

3.1. Assessing the effectiveness

The effectiveness of state management of mobile telecommunications infrastructure in the context of digital technology development was assessed according to the criteria in Table 1.

Table 1. Assessing the effectiveness of state management of Vietnam's mobile telecommunications infrastructure in the context of digital technology development in the period 2018-2023

No	Criteria	Unit	2018	2019	2020	2021	2022	2023
1	Number of state management agencies and units with violations in state management of mobile telecommunications infrastructure	Unit	17	21	13	18	17	15
	- Central level	Unit	2	3	1	2	3	2
	- Provincial and municipal level	Unit	15	18	12	16	14	13
	- Rate of minor violations	%	59	58	69	61	59	60
	- Rate of moderate violations	%	29	33	23	33	29	33
	- Rate of severe violations	%	12	9	8	6	12	7

No	Criteria	Unit	2018	2019	2020	2021	2022	2023
2	The number of officials, civil servants, and employees involved in state management of mobile telecommunications infrastructure who were found to commit violations	Person	34	42	27	36	34	30
	- Central level	Person	4	6	3	4	6	4
	- Provincial and municipal level	Person	30	36	24	32	28	26
	- Rate of minor violations	%	70	64	74	72	68	70
	- Rate of moderate violations	%	24	29	19	22	26	23
	- Rate of severe violations	%	6	7	7	6	6	7
3	The number of telecommunications businesses found to have committed violations in the development of mobile telecommunications infrastructure	Business	5	6	4	5	5	5
	- Rate of minor violations	%	80	67	75	80	100	80
	- Rate of moderate violations	%	20	23	25	20	0	20
	- Rate of severe violations	%	0	0	0	0	0	0
4	The number of violations committed by organizations or individuals in the state management of mobile telecommunications infrastructure that significantly affect the rights of the Government	Violation	10	13	9	9	12	11
	- Rate of violations with minor impact	%	70	77	89	78	83	82
	- Rate of violations with moderate impact	%	30	15	11	11	17	18
	- Rate of violations with severe impact	%	10	8	0	11	0	0
5	The number of violations committed by organizations or individuals in the state management of mobile telecommunications infrastructure that significantly affect the rights of telecommunications businesses	Violation	30	37	41	40	39	35
	- Rate of violations with minor impact	%	47	52	54	28	49	49
	- Rate of violations with moderate impact	%	40	32	34	40	43	37
	- Rate of violations with severe impact	%	13	16	12	12	8	14
6	The number of violations committed by organizations or individuals in the state management of mobile telecommunications infrastructure that significantly affect the rights of customers using mobile telecommunications services	Violation	31	22	27	35	30	26
	- Rate of violations with minor impact	%	65	55	55	60	57	42
	- Rate of violations with moderate impact	%	29	36	41	40	40	46
	- Rate of violations with severe impact	%	6	9	4	0	3	12

Source: Ministry of Information and Communications

The Table 1 shows:

- The number of violations occurring in the state management of mobile telecommunications infrastructure during the research phase is insignificant but still exists, including moderate and severe violations. This indicates that there are still "blind spots" in state management work, so inspection, examination, and supervision must be carried out more forcefully.

Besides, the number of state officials and civil servants discovered to have committed violations in managing mobile telecommunications infrastructure is not significant. Still, there hasn't been a clear sign of a decrease during the research phase, including both moderate and severe violations.

- The number of telecommunications businesses with violations in developing mobile telecommunications infrastructure remains high. The main violations include (i) implementation of construction projects not by approved designs, (ii) construction projects causing adverse impacts on environmental landscapes, and (iii) some projects employing technologies not truly suitable for the current and near-future trends of modern digital technology development.

- Indicators 4, 5, and 6 reflect the criteria for ensuring the rights of all parties involved in developing mobile telecommunications infrastructure by telecommunications businesses. They primarily show that the violations mainly affect the rights of telecommunications businesses, especially their financial issues.

3.2. Assessing the efficiency

From 2018 to 2023, state management of mobile telecommunications infrastructure increasingly achieved economic and social efficiency, demonstrated through indicators such as increased capacity for providing mobile telecommunications services by telecommunications businesses and the enhancement of meeting societal needs for mobile telecommunications infrastructure, etc.

Table 2. Assessing the efficiency of state management of Vietnam's mobile telecommunications infrastructure in the context of digital technology development in the period 2018-2023

No	Criteria	Unit	2018	2019	2020	2021	2022	2023
1	The implementation rate of mobile telecommunications infrastructure development plans (nationwide)	%	81	84	83	78	82	86
2	The completion rate of mobile telecommunications infrastructure development plans by provinces and cities	%	72	73	71	67	75	78
3	The average implementation rate of the development plan of one province or city	%	67	70	68	66	71	73
4	The proportion of new mobile telecommunications infrastructure investments (by businesses) incorporating modern technology and techniques	%	88	92	93	93	96	97
5	Indicators assessing the increase in capacity for providing mobile telecommunications services by telecommunications businesses		-	-	-	-	-	-
	- Increasing the number of customers	Customer	5,1	5,7	6,3	7,7	7,9	8,3

No	Criteria	Unit	2018	2019	2020	2021	2022	2023
	- Mobile telecommunications coverage	%	87	88	90	92	93	95
	- Network availability	%	99,5	99,8	99,9	99,8	99,5	99,9
	- Number of network incidents	Time	12	9	9	6	8	5
	- The success rate of established calls	%	99,5	99,6	99,9	99,5	99,8	99,6
	- The rate of incorrectly billed calls	%	0,01	0,05	0,02	0,01	0,005	0,002
6	The rate of meeting the demand for mobile telecommunication services of organizations and businesses	%	95	97	98	99,5	99,8	99,9
7	The rate of meeting the demand for mobile telecommunication services of the population	%	97	98	99	99,6	99,8	99,9

Source: Ministry of Information and Communications

Recently, the implementation rate of the national mobile telecommunications infrastructure development plan and that of the provinces and municipal cities was relatively high. The quality of mobile telecommunication service provision nationwide has been and is being enhanced. The penetration rate of smartphones, internet, and mobile data usage is increasing. The fundamental mobile telecommunications infrastructure meets Party and State authorities' directive and managerial work requirements at all levels, as well as the citizens' communication and entertainment needs. The mobile telecommunications infrastructure also gradually fulfills its role as an essential economic and technical infrastructure of the digital government, digital economy, and digital society, serving the country's digital transformation process.

However, in many mountainous, remote, and border areas, mobile telecommunication service infrastructure fails to meet citizens' needs thoroughly. Communication in these areas encounters many difficulties due to weak or nonexistent mobile signals, so people must move to higher or more convenient locations to catch signals. Additionally, transactions, purchases, and payments are challenging due to a lack of internet connection or weak mobile signals. People also face difficulties accessing information and entertainment and limited interaction and connection with the outside community. The main reasons for such difficulties include (i) the complex and rugged terrain, along with sparse population distribution leading to difficulties in mobile telecommunication infrastructure investment, (ii) high investment costs but low economic efficiency due to a small number of users, (iii) lack of supportive policies and incentives for telecommunication companies investing in these areas.

Although mobile telecommunications coverage nationwide is extensive, there are still "bottlenecks" in bandwidth, leading to slow connections. Hence, to meet the high expectations of state agencies regarding connection standards and achieve targets regarding speed, bandwidth, and coverage, additional support is needed for businesses to develop better bandwidth mechanisms, especially for network providers and businesses deploying applications on these networks to develop better applications.

3.3. Assessing the suitability

For this criterion, the article utilized primary data from social survey method for evaluation. Specifically:

Table 3. Results of the social survey on the suitability of state management of mobile telecommunications infrastructure in the context of digital technology development

No	The evaluation items	Number of samples	Mean score	Standard deviation
1	The suitability of the mobile telecommunications infrastructure system with the economic situation of the country	383	3,74 (Good)	0,585
2	The suitability of the mobile telecommunications infrastructure system with the social context of the country	383	3,84 (Good)	0,620
3	The mobile telecommunications infrastructure system brings high investment efficiency, reflected through the profitability ratio, payback period, etc., of investment projects of the telecommunications businesses	383	3,79 (Good)	0,611
4	The prices of mobile telecommunication services are becoming increasingly reasonable, aligning with the affordability of the population	383	3,61 (Good)	0,603
5	The mobile telecommunications infrastructure system ensures wide coverage, meeting the usage needs of people in all areas, especially in rural and remote areas	383	3,42 (Average)	0,588
6	The mobile telecommunications infrastructure system plays an important role in improving the quality of life for the people	383	3,81 (Good)	0,593
7	The mobile telecommunications infrastructure system ensures safety for users and protects users' personal data	383	3,32 (Average)	0,636
8	The development of the mobile telecommunications infrastructure system minimizes environmental impact by maximizing energy efficiency, reducing electronic waste, etc.	383	3,67 (Good)	0,617
9	The mobile telecommunications infrastructure system has the capability to adapt to rapid technological advancements, ensuring scalability and upgradability for the future	383	3,72 (Good)	0,660

Source: Processing primary data using SPSS

Table 3 shows that 7 out of 9 criteria were rated as good with a relatively high average score, while only 02 criteria were rated as average. This indicates that the suitability of state management of mobile telecommunications infrastructure in the context of digital technology development in Vietnam has been evaluated relatively highly. However, attention should be paid to the criteria rated as average to find appropriate solutions to enhance the suitability of state management of mobile telecommunications infrastructure. These criteria include mobile telecommunications coverage and cybersecurity assurance.

Conclusion: From 2018 to 2023, the effectiveness, efficiency, and suitability of state management of mobile telecommunications infrastructure in Vietnam in the context of digital technology development generally improved year by year. However, there are still limitations, reflected in criteria that have not been satisfactorily met, as analyzed earlier.

4. PROPOSAL TO ENHANCE THE EFFECTIVENESS, EFFICIENCY, AND SUITABILITY OF STATE MANAGEMENT OF VIETNAM'S MOBILE TELECOMMUNICATIONS INFRASTRUCTURE IN THE CONTEXT OF DIGITAL TECHNOLOGY DEVELOPMENT

The analysis results indicate that four fundamental limitations have not yet ensured the effectiveness, efficiency, and suitability of the state management of Vietnam's mobile telecommunications infrastructure in digital technology development. Therefore, this article proposes four corresponding solution groups to address these limitations as follows:

- Solutions to limit violations in state management of mobile telecommunications infrastructure include:

+ Regulations on state management of mobile telecommunications infrastructure are updated and supplemented to be suitable for practical development and ensured to be consistent with other legal documents. The process, procedures for licensing, and management of mobile telecommunications infrastructure's construction, installation, and operation activities need to be improved. At the same time, the responsibilities of agencies, organizations, and individuals in state management of mobile telecommunications infrastructure are defined clearly.

+ Enhancing inspection and supervision through the regular organization of inspections and checks on state management activities of mobile telecommunications infrastructure. This enables timely detection and strict handling of legal violations in the state management of mobile telecommunications infrastructure.

+ Applying science and technology to state management of mobile telecommunications infrastructure, such as automatic monitoring systems, data management systems, etc., along with utilizing advanced technologies to detect and prevent legal violations in the state management of mobile telecommunications infrastructure.

- Solutions to limit violations of telecommunication businesses in the construction and operation of mobile telecommunications infrastructure involve:

+ Awareness of legal compliance among telecommunication businesses is raised through propaganda activities and legal education for officials and employees of telecommunication businesses about relevant regulations related to the construction and operation of mobile telecommunications infrastructure. The conferences and seminars to exchange information and experiences between state management agencies and telecommunication businesses regarding the construction and operation of mobile telecommunications infrastructure are established.

+ Enhancing inspection and supervision of compliance with regulations of telecommunication businesses in the construction and operation of mobile telecommunications infrastructure to timely detect and strictly handle legal violations caused by telecommunication businesses. In addition, it is necessary to increase inspections of internal control procedures established by telecommunication businesses, ensuring compliance with regulations in the construction and operation of mobile telecommunications infrastructure.

+ Functional agencies need to create favorable conditions for telecommunication businesses to carry out construction and operation activities of mobile telecommunications infrastructure by regulations (e.g., shortening the time and simplifying administrative procedures related to licensing, appraisal, and approval for telecommunication businesses to construct and operate mobile telecommunications infrastructure; applying online administrative procedure to facilitate telecommunication

businesses in submitting documents, querying information, and receiving results).

- Solutions to support telecommunication businesses for better bandwidth development, especially in rural, remote, and mountainous areas:

+ The National Assembly and the Government should complete and promulgate legal policies on developing telecommunications infrastructure, particularly in rural, remote, and mountainous regions. In this context, preferential policies regarding taxes, fees, and tariffs for telecommunication businesses investing in developing telecommunications infrastructure in rural, remote, and mountainous areas are focused.

+ The Government and the Ministry of Information and Communications need to establish appropriate support mechanisms for telecommunication businesses to raise investment capital for the development of telecommunications infrastructure in rural, remote, and mountainous areas (e.g., providing preferential credit to telecommunication businesses investing in developing telecommunications infrastructure in rural, remote, and mountainous regions; supporting telecommunication businesses in loans from international credit institutions; developing investment funds for the development of telecommunications infrastructure in rural, remote, and mountainous areas).

- Solutions to ensure user safety and protect the personal data of users of mobile telecommunications services:

+ The Ministry of Information and Communications should have clear regulations on the responsibilities of relevant parties in ensuring the safety of users and protecting the personal data of users who use mobile telecommunications services. The deterrent effect of laws on cybersecurity violations and personal data breaches also needs to be enhanced.

+ The Ministry of Information and Communications should require telecommunication businesses to implement measures to ensure the safety of users and protect their data. Violations of cybersecurity and personal data breaches are strictly handled.

+ Furthermore, the Ministry of Information and Communications should enhance international cooperation in cybersecurity and personal data protection and share experiences among countries to ensure the safety of users and protect the personal data of users who use mobile telecommunications services.

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THE EFFECTS OF PERCEIVED RESPECT ON VOICE BEHAVIOR OF LECTURERS IN HIGHER EDUCATION INSTITUTIONS: THE MEDIATING ROLE OF VOICE SELF-EFFICACY

Le Thi Thu Huong[a*], Pham Thi Bich Ngoc[b], Nguyen Canh Nam[c]

[a]Hanoi University of Mining and Geology, Hanoi, Vietnam

[b]National Economics University, Hanoi, Vietnam

[c]Vietnam Energy Association, Hanoi, Vietnam

**Corresponding author: lethithuhuong@humg.edu.vn*

Abstract: *This study investigates the effects of perceived respect on the voice behavior of lecturers in higher education institutions in Vietnam. Results from a survey of 424 university lecturers indicate that perceived respect is positively associated with lecturers' voice behavior. Voice self-efficacy partially mediates the relationship between perceived respect and lecturers' voice behavior. This research contributes to the literature by providing evidence of voice self-efficacy as a key construct in the underlying mechanism influencing the relationship between perceived respect and lecturers' voice behavior. Based on the findings, the authors propose actionable insights for universities seeking to enhance perceived respect, voice self-efficacy, and lecturers' voice behavior.*

Keywords: *employee voice behavior, perceived respect, voice self-efficacy.*

1. INTRODUCTION

Researchers have recognized the numerous benefits of voice behavior and explored its antecedents from various perspectives (Han et al., 2024). Based on reviews of research on employee voice behavior, numerous studies have identified groups of factors that influence this behavior, such as individual characteristics (Han et al., 2024; Morrison, 2023); attitudes and emotions (Morrison, 2023); leaders' style, behavior, and personality (Morrison, 2023; Mori et al., 2022); relational and contextual factors (Morrison, 2023; Mori et al., 2022; Han et al., 2024). Kwon and Farndale (2020) further highlighted micro-level individual antecedents of voice, meso-level organizational moderators or mediators of voice, and macro-level contextual factors. Morrison (2023) pointed out that her 2014 review revealed a paucity of studies on relational or contextual antecedents to voice beyond the effects of leadership style, a situation that has changed significantly. Although there are few studies on respect for voice, Ng et al. (2021a) analyzed that employees who believe their coworkers respect them experience stronger control beliefs and a more positive mood, increasing their motivation to voice. This suggests that research on the influence of respect on employee voice behavior remains limited and requires further expansion.

Respect is among the most important social cues that employees receive from their work environment, as it validates their worth

and fulfills universal human needs (Rogers & Ashforth, 2017). These cues become even more important for highly educated individuals, who tend to emphasize respect. Quaquebeke et al. (2009) conducted two large online surveys among predominantly academically educated employees in Germany, generating a general ranking of work values. The findings demonstrated that various facets of respect were clearly prioritized within employees' personal value rankings. Lecturers in higher education institutions, who hold advanced academic qualifications, are highly regarded in Vietnam, a country where education is a national priority. Therefore, we suggest that respect may influence the voice behavior of lecturers in higher education institutions in Vietnam.

Ng et al. (2021a) highlighted that their study advances voice research by offering a social-relational perspective on the drivers of voice, a theoretical approach that is seldom considered within the current paradigm largely focused on personality traits, job conditions, and organizational characteristics. One overlooked yet important social-relational antecedent of voice is received respect. Their core premise is that when employees believe they are respected by coworkers, they experience psychological changes to their control beliefs (representing "can-do" proactive motivation) and positive mood (representing "energized-to" proactive motivation), which then motivate voice. The work of Ng et al. (2021a) is considered a significant advancement in studying the effects of respect on employee voice behavior. However, this study distinguishes itself from Ng et al. (2021a) and contributes to the literature on voice research in several key ways. First, we identified that perceived respect has a direct effect on employee voice behavior—a relationship that Ng et al. (2021a) did not examine. Second, we uncovered that employee voice behavior is partially motivated by voice self-efficacy rather than proactive motivations. Third, we adopted Van Dyne et al.'s (2003) scale of prosocial voice, whereas Ng et al. (2021a) utilized the scale developed by Maynes and Podsakoff (2014). Furthermore, using Van Dyne et al.'s (2003) scale of prosocial voice, we adjusted the items to reflect the important characteristics of discretionary behavior, specifically its proactive and voluntary nature.

2. CONCEPTUAL BACKGROUND AND HYPOTHESIS

2.1. Employee voice behavior (EVB)

Although the notion of employee voice can be seen as going back more than two centuries (Mowbray et al., 2015), Hirschman's (1970) Exit–Voice–Loyalty theory is consistently cited as the root stem of the field because no one before him had given serious consideration to the idea (Kaufman, 2013). Consequently, Kaufman (2013) stated that Hirschman deserves credit for being the first to develop a formal theory of voice, a recognition that remains valid today. Farrell (1983), building upon Hirschman's (1970) model and the contributions of Kolarska and Aldrich (1980) as well as Rusbult, Zembrodt, and Gunn (1982), further contributed to the field by introducing "Neglect" as a fourth dimension. This dimension, along with Exit, Voice, and

Loyalty, constitutes distinct responses to employee dissatisfaction. Mowbray et al. (2015) asserted that Farrell (1983) was the first to apply Hirschman's (1970) model to the context of employees. Based on a comprehensive review of the employee voice research, Mori et al. (2022) indicated that the majority of recent voice scholars consider the formal definition and operational measure provided by Van Dyne and LePine (1998) as the foundational starting point for voice research in organizational behavior literature (Morrison, 2011; Mowbray, Wilkinson, & Tse, 2015; Wilkinson, Barry, & Morrison, 2020). In fact, Van Dyne and LePine (1998) built on the theory developed by Van Dyne, Cummings, and Parks (1995) to assess the construct and predictive validity of two forms of extra-role behavior proposed in their typology: helping and voice.

Despite the fact that there are various classifications of voice, they consistently include at least one type of voice as a form of extra-role behavior. This is likely the voice behavior with the greatest potential benefits for organizations. In this study, we adopted Van Dyne et al.'s (2003) definition and scale of prosocial voice. According to Van Dyne et al. (2003), ProSocial Voice is defined as the expression of work-related ideas, information, or opinions based on cooperative motives. This particular type of voice behavior is intentional, proactive, and other-oriented, with its primary focus on benefiting others, such as the organization.

2.2. Perceived respect (PR)

Researchers have defined respect in a number of dramatically varying ways (Grover, 2014). "Respect is the imputed worth accorded to one person by one or more others" (Spears et al., 2006: 179). Rogers and Ashforth (2017) acknowledge that they share the same idea as some prior studies that respect falls into two basic categories: generalized respect and particularized respect, although these studies use different terms to refer to respect. These prior studies include van Quaquebeke, Henrich, and Eckloff (2007) and Grover (2014), who follow Darwall (1977) in utilizing "recognition" and "appraisal" respect, while Lalljee, Laham, and Tam (2007) distinguish between "unconditional" and "achieved" respect (Rogers and Ashforth, 2017).

Using Tajfel & Turner's (1979) social identity theory (SIT) as a theoretical framework, Tyler & Blader (2000) proposed the group engagement model (GEM). The GEM serves as a framework for understanding individuals' engagement in their groups, with respect being a key component of the model. "Respect indicates people's feelings about their status within their group" (Tyler & Blader, 2000: 15). Respect reflects status evaluations that are linked to group membership. Blader & Tyler (2000) differentiate between respect for one's work and respect for one as a person. In this study, we adopt Tyler and Blader's (2000) concept of respect for one's work, along with the GEM, to explain the effects of perceived respect on employee voice behavior. This type of respect is similar to the previously discussed concepts of respect, including "particularized" respect (as perceived by the recipient), "appraisal" respect, and "achieved" respect.

2.3. Voice self-efficacy

"Perceived self-efficacy refers to beliefs in one's capabilities to mobilize the motivation, cognitive resources, and courses of action needed to meet given situational demands" (Wood & Bandura, 1989:408). Bundra (1988) argued that human competency requires both skills and self-belief in one's capability to use those skills well. He highlighted the difference between possessing skills and using them effectively and consistently in difficult situations. Bandra also emphasized that success depended not only on skills but on strong self-belief in one's ability to control events and achieve desired goals. Perceived self-efficacy, self-efficacy beliefs, and expectations of personal efficacy are alternative terms used to describe the concept of self-efficacy (Bandura, 1977, 1978, 1988, 1997, 2001, 2006). In his 1977 work, Bandura differentiated outcome and efficacy expectations, stating that "An outcome expectancy is defined as a person's estimate that a given behavior will lead to certain outcomes. An efficacy expectation is the conviction that one can successfully execute the behavior required to produce the outcomes" (p.193).

In the context of voice, Janssen and Gao (2015) defined voice self-efficacy beliefs as confidence in one's ability to provide meaningful concerns, opinions, and suggestions that can make a difference and benefit the organization's functioning and outcomes. Yan (2022) defined voice self-efficacy as the degree of self-assurance employees have in speaking up at work. However, voice behavior encompasses not only speaking up but also speaking out (Liu et al., 2010), and the content of voice includes ideas, information (such as facts and other relevant details), that help address work-related problems (Dyne et al., 2003; Detert & Burris, 2007). Thus, the concept of voice self-efficacy applied in this study is primarily adopted by Janssen and Gao (2015) and is defined as the degree of confidence in one's ability to provide meaningful information, concerns, opinions, ideas, and suggestions that can benefit the organization.

2.4. Direct effects of perceived respect on employee voice behavior

As mentioned above, in this study, we adopted Tyler and Blader's (2000) concept of respect for one's work, along with the GEM, to explain the effects of perceived respect on employee voice behavior. Tyler and Blader (2000) assert that groups serve as important sources of positive identity information for their members, and that this function is linked to group members' motivation to engage in cooperative behavior. The authors point out that respect is an important source of identity information. Furthermore, there are several processes by which this linkage may occur. The GEM by Tyler and Blader (2000) shows that people may engage in cooperative behavior because they believe themselves to be members of high-status groups, believe that they are high-status members of the groups to which they belong, or both. This represents a more passive, maintenance-oriented process, whereby individuals strive to maintain their current positive identities through cooperative behavior. Specifically, a maintenance-oriented process indicates that individuals find themselves receiving

positive identity information and internalizing the goals of the organization as their own. Consequently, they are intrinsically motivated to engage in cooperative behaviors because they want the organization to succeed and to maintain their level of status. In contrast, if they receive negative identity information from the group, they may either work against the group or experience a diminished role of the group in their self-definition. That is, individuals may lower their level of identification with the group as a means of maintaining their favorable self-images, or they may seek to join another group.

Two types of cooperative behaviors in the GEM include mandatory behavior and discretionary behavior (Tyler and Blader, 2000). The authors demonstrated through testing the GEM that respect for one's work, which reflects judgments regarding one's status within the organization, serves as a useful predictor of all cooperative behaviors. As mentioned above, employee voice behavior is a form of discretionary behavior, which is a type of cooperative behavior. Some empirical evidence supports the prediction that perceived respect has positive effects on employee voice behavior. Ng, Hsu, and Parker (2021) showed that employees' received respect predicted their other-rated voice through their positive mood, and Ellemers et al. (2011) observed reliable direct relationships between perceived respect and willingness to invest. Therefore, it is reasonable to hypothesize:

H1: Perceived respect has positive effects on employee voice behavior.

2.5. The mediating role of voice self-efficacy

Voice behavior is a type of challenging and promotive behavior characterized by the constructive expression of challenges with the intent to improve, rather than merely criticize the situation. Although voice can be considered a form of organizational citizenship, it has the potential to damage relationships and is thus more challenging than purely affiliative in nature (Dyne et al., 1995). Challenging-promotive voice behavior demands specific expertise and cognitive abilities to detect and diagnose potential work-related problems and to develop suggestions for solutions and improvements. Additionally, it requires social and communication skills to present concerns, opinions, and ideas persuasively and effectively within the work group (Janssen and Gao, 2015), along with substantial individual effort.

Perceived self-efficacy plays a pivotal role in the causal structure of social cognitive theory, as efficacy beliefs influence not only adaptation and change directly but also impact other determinants (Bandura, 1997). These beliefs shape the challenges individuals choose to undertake, the amount of effort they are willing to invest, the persistence they exhibit in the face of obstacles and setbacks, and whether they view failures as motivating or demoralizing (Bandura, 2001). The stronger individuals believe in their capabilities, the greater and more persistent their efforts become. When faced with difficulties, people who have self-doubts about their capabilities often reduce their efforts, settle for mediocre solutions,

or give up altogether. In contrast, those who have a strong belief in their capabilities exert greater effort to master the challenge (Bandura, 1988). Thus, drawing on self-efficacy theory, we argue that voice self-efficacy may affect employee voice behavior.

Several empirical studies support this argument. For instance, Parker, Williams, and Turner (2006) demonstrated that proactive personality is significantly associated with proactive work behavior through role breadth self-efficacy and flexible role orientation. Parker (1998) defined Role Breadth Self-Efficacy (RBSE) as the degree to which individuals are confident in their ability to perform a broader and more proactive role beyond traditional technical requirements. Although the components of an expanded role may vary across different jobs and organizations, certain generic competencies can be identified. Key among these competencies are the ability to be proactive, use one's initiative, and possess interpersonal skills, such as verbal communication skills. Some items used to measure RBSE capture the essence of self-efficacy (Parker, 1998, p. 839; Parker, Williams, & Turner, 2006, p. 651). Given that employee voice behavior is a form of proactive behavior and that at least 5 out of 12 items used to measure proactive work behavior reflect the construct of employee voice behavior (Williams & Turner, 2006, p. 650), it is reasonable to infer that self-efficacy impacts voice behavior. Janssen and Gao (2015) found that self-efficacy beliefs for voice significantly moderated the indirect relationship between supervisory responsiveness and voice behavior by influencing the path from supervisory responsiveness to self-perceived status. Additionally, Ng and Lucianetti (2021) demonstrated that voice self-efficacy beliefs are positively associated with employee voice behavior.

Additionally, drawing on Bandura's (1977) self-efficacy theory, expectations of personal efficacy derive from four primary sources of information: performance accomplishments, vicarious experiences, verbal persuasion, and physiological states. In particular, Grover (2014) noted that Blader and Tyler's (2000) concept of respect for one's work is a type of "appraisal" respect. Further, Grover (2014) emphasized that "In organizations, appraisal respect is the approbation from work performance" (p. 35). Therefore, perceived respect can be understood as a cue reflecting an individual's experience of performance accomplishments, which directly ties into Bandura's concept of mastery. Bandura (2006) argued that the most effective way to foster a strong sense of efficacy is through mastery experiences, as success builds efficacy, while failure, particularly in the early stages, can undermine it. Given the theoretical alignment between perceived respect, mastery experiences, and efficacy, we posit that perceived respect can shape an employee's voice self-efficacy.

Based on the comprehensive theoretical framework and the empirical evidence as discussed above, we propose the following hypotheses:

H2: Perceived respect is positively related to voice self-efficacy

H3: Voice self-efficacy is positively related to employee voice behavior.

H4: Voice self-efficacy mediates the relationship between perceived respect and employee voice behavior.

Following the literature review and theoretical foundation presented above, the research model outlined in Figure 1 is proposed.

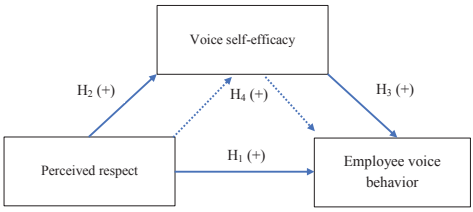


Fig 1. Research model

3. METHODOLOGY

3.1. Sampling and data collection method

With a population of approximately 80,000 university lecturers in Vietnam, the research team used convenience and purposive sampling methods to collect data through a questionnaire-based survey. The targeted participants were lecturers currently working at universities, primarily in Northern Vietnam. Data were collected by distributing a Microsoft Form link to the respondents. The research team managed the survey process to ensure no data was duplicated through these methods.

3.2. Sample characteristics

424 out of the 450 collected questionnaires were eligible for analysis. Table 1 shows the profile of the respondents.

Table 1. Sample Characteristics

Nr.	Characteristics	Frequency	Percentage (%)
1	Total, of which:	424	100
2	Gender		
-	Male	153	36
-	Female	271	64
3	Age (23-69)		
-	<30	19	4
-	30 - <40	165	39
-	40 - <50	235	55
-	>=50	5	1
4	Seniority (1-35)		
-	<10	62	15
-	10 - <20	250	59
-	20 - <30	106	25
-	>=30	6	1
5	Qualification		
-	Bachelor's degree	15	4
-	Master's degree	230	54
-	Doctorate/PhD	167	39
-	Postdoctoral	12	3
6	Management position		
-	University-level management	14	3
-	Faculty-level management	62	15
-	Department-level management	81	19
-	No management responsibilities	267	63

(Source: Results of the survey conducted in 2024)

3.3. Measurements of constructs

Prosocial voice: We adapted Dyne, Ang, and Botero's (2003) five-item prosocial voice scale. In the original items, we replaced 'This employee' with 'I' (and adjusted the corresponding possessive adjectives) to reflect the behavior from the

actor's perspective. Importantly, we added the adverbs 'proactively' and 'voluntarily' to the end of each item to distinctly highlight the discretionary nature, which is a key characteristic of this voice behavior. These items (see Table 2) were assessed on a 5-point Likert scale ranging from 1 (completely disagree) to 5 (completely agree).

Perceived respect: Perceived respect was measured using a six-item scale adapted from Blader and Tyler (2009). A sample item is, "How much do your colleagues respect your work?" Respondents rated their answers on a 5-point Likert scale, ranging from 1 (not at all) to 5 (a great deal).

Voice self-efficacy: We adopted the approach utilized by Yan, Th. T. et al. (2022) to measure voice self-efficacy. Participants were asked to select the appropriate response to fill in the blanks for each provided item. Their responses were based on their confidence in engaging in the behaviors listed in Dyne, Ang, and Botero's (2003) five-item prosocial voice scale, using a 5-point Likert scale ranging from 1 ('not at all confident') to 5 ('very confident'). A sample item is: "I ... express solutions to problems with the cooperative motive of benefiting the organization proactively and voluntarily."

3.4. Results of reliability and validity testing

We used SMARTPLS 3 to carry out the PLS-SEM algorithm for analyzing the reflective measurement model.

First, an Outer Loadings test was conducted to examine indicator reliability. The results showed that most indicators in the research model had outer loadings greater than 0.7, with the exception of the PR6 item, which was below 0.7. Consequently, the PR6 item was removed from the PR indicators, and the remaining items ensured high indicator reliability (Hair et al., 2016). The results of the Outer Loadings test (after extracting the PR6 item) are presented in Table 2.

Next, Cronbach's Alpha and Composite Reliability tests were performed to evaluate the reliability of the measurement. The test results showed that all variables (after extracting the PR6 item) in the research model achieved reliability greater than 0.7. Therefore, the measurements of the variables in the research model ensured high reliability (DeVellis, 2012; Bagozzi & Yi, 1988). The results of the Cronbach's Alpha and Composite Reliability tests are shown in Table 3.

Test 2. Results of the Outer Loadings test

Items	Code	Outer loadings
Employee voice behavior		
I express solutions to problems with the cooperative motive of benefiting the organization, proactively and voluntarily.	EVB1	0,838
I develop and make recommendations concerning issues that affect the organization, proactively and voluntarily.	EVB2	0,874
I communicate my opinions about work issues even if others disagree, proactively and voluntarily.	EVB3	0,791
I speak up with ideas for new projects that might benefit the organization, proactively and voluntarily.	EVB4	0,860

Items	Code	Outer loadings
I suggest ideas for change, based on constructive concern for the organization, proactively and voluntarily.	EVB5	0,844
Perceived respect		
How much do colleagues respect the work you do?	PR1	0,743
How much do colleagues respect your work-related ideas?	PR2	0,844
How much do colleagues think highly of the quality of your work?	PR3	0,857
How much do colleagues appreciate your unique contributions on the job?	PR4	0,826
How much do colleagues think that you have valuable insights and ideas?	PR5	0,841
Voice self-efficacy		
I ... express solutions to problems with the cooperative motive of benefiting the organization, proactively and voluntarily.	VSE1	0,866
I ... develop and make recommendations concerning issues that affect the organization, proactively and voluntarily.	VSE2	0,876
I ... communicate my opinions about work issues even if others disagree, proactively and voluntarily.	VSE3	0,841
I ... speak up with ideas for new projects that might benefit the organization, proactively and voluntarily.	VSE4	0,894
I ... suggest ideas for change, based on constructive concern for the organization, proactively and voluntarily.	VSE5	0,881

(Source: Results of the survey conducted in 2024)

Table 3. Results of Construct Reliability and Validity test

Constructs	Code	Nr of items	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
Employee voice behavior	EVB	5	0,897	0,924	0,708
Perceived respect	PR	5	0,881	0,913	0,678
Voice self-efficacy	VSE	5	0,921	0,940	0,760

(Source: Results of the survey conducted in 2024)

Subsequently, an Average Variance Extracted (AVE) test was conducted to determine convergent validity. The AVE for EVB, PR, and VSE were 0.708, 0.678, and 0.760, respectively, meeting the requirement of being greater than 0.5 (Hair et al., 2016). The results of the AVE test are displayed in Table 3.

Finally, the Heterotrait-Monotrait Ratio (HTMT) test was carried out to evaluate discriminant validity. The results showed that the HTMT values between all variables were below 0.9, thus meeting the discriminant validity requirement (Hair et al., 2016). The results of the HTMT test are reported in Table 4.

Table 4. Results of HTMT and Collinearity Statistics (Inner VIF Values)

Variables	HTMT			Inner VIF Values		
	EVB	**PR**	**VSE**	**EVB**	**PR**	**VSE**
EVB						
PR	0,578			1,512		1,000
VSE	0,678	0,630		1,626		

(Source: Results of the survey conducted in 2024)

4. FINDINGS

We utilized SMARTPLS 3 to evaluate the structural model.

To assess multicollinearity among the independent variables, Collinearity Statistics were performed. The results indicated that all inner VIF values were below 3. Therefore, multicollinearity did not occur among the independent variables in the model (Hair et al., 2019). The results of Collinearity Statistics (Inner VIF Values) are indicated in Table 4.

To test all hypotheses, bootstrapping (n=5000) was applied to assess the path coefficients, indirect effect. The hypotheses were tested in a structural model that included control variables such as gender, seniority, qualification, and management position (abbreviated as manager). There were insignificant relationships between control variables and EVB. The results of hypotheses tests are presented in Table 6.

Table 6. Results of Hypotheses Tests

Hypotheses	Path description	β	T-values	P-values	Conclusion
H1	PR → EVB	0.244	5.377	0.000	Accepted
H2	PR → VSE	0.574	14.195	0.000	Accepted
H3	VSE → EVB	0.476	8.769	0.000	Accepted
H4	PR → VSE → EVB	0.273	7.038	0.000	Accepted

R^2 =0.421, AdjR^2=0.413 (p<0,001)

(Source: Results of the survey conducted in 2024)

The findings in Table 6 showed a positive relationship between perceived respect and employee voice behavior (β = 0.244, t = 5.377, p < 0.001), supporting hypothesis 1. Perceived respect was found to be positively associated with voice self-efficacy (β = 0,574, t = 14.195, p < 0.001), supporting hypothesis 2. As expected in hypothesis 3, voice self-efficacy had a positive influence on employee voice behavior (β = 0.476, t = 8,769, p < 0.001). Finally, hypothesis 4 was supported by evidence demonstrating the mediating role of voice self-efficacy in the relationship between perceived respect and employee voice behavior (β = 0.273, t = 7.038, p < 0.001).

5. DISCUSSION

The goal of this study was to examine whether perceived respect plays a role in motivating the voice behavior of lecturers in higher education institutions, who possess high professional qualifications and highly value respect from others. Drawing on the group engagement model and self-efficacy theory, our study found that perceived respect influences the voice behavior of lecturers in higher education institutions in Vietnam, with voice self-efficacy serving as a partial mediator in this relationship. This influence encompasses not only an indirect effect but also a direct effect on behavior. When lecturers perceive greater respect from their colleagues in the workplace, they are more likely to exhibit prosocial voice behavior. The indirect effect through voice self-efficacy indicates that when lecturers feel respected, they gain greater confidence in voicing their opinions, which subsequently leads to increased participation in prosocial voice behavior. These findings provide evidence supporting prior research that demonstrates a positive relationship between respect and discretionary behavior (Blader and Tyler, 2000), constructive voice (Ng et al,, 2021), willingness to invest (Ellemers et al., 2012), and voice self-efficacy beliefs, which are positively associated with employee voice behavior (Janssen and Gao, 2015; Ng and Lucianetti, 2021).

Our study provides additional insight into relational antecedents of voice behavior, such as perceived respect, within the context of higher education institutions in Vietnam, addressing the scarcity of research on these factors (Morrison, 2014, 2023; (Ng et al,, 2021). We incorporated both the mediating mechanism and the direct effect in our model to explain prosocial voice behavior. Together, these factors perceived respect and voice self-efficacy account for 41.3% of the variance in lecturers' prosocial voice behavior. Furthermore, we showed the adaptation of Van Dyne et al.'s prosocial voice scale to better reflect the discretionary nature of this behavior and contributed to construct validation in alignment with the recommendations put forth by Van Dyne et al. (2003). Additionally, we provide further evidence supporting the approach of Yan, Th. T. et al. (2022) in utilizing the voice self-efficacy measure as appropriate.

As noted, individuals are more likely to engage in cooperative behavior when they feel respected by other members of their group (Blader and Tyler, 2000). Therefore, it is essential for authorities in higher education institutions in Vietnam, in particular, and in organizations in general, to create environments where employees' needs for respect are adequately addressed. Organizations should recognize employees' contributions in various ways and in a timely manner, allowing them to feel valued by colleagues, especially supervisors and the organization itself. Additionally, in essence, respect must be 'earned' through demonstrated competence (Ng et al,, 2021); thus, providing opportunities for employees to enhance their competencies and improve their skills is essential.

Voice self-efficacy plays a crucial role in motivating voice behavior, making its

development essential. There are several effective methods for enhancing voice self-efficacy. According to Bandura (2006), individuals' beliefs in their own efficacy can be developed through four mechanisms: mastery experiences, social modeling, social persuasion, and reliance on their physical and emotional states to assess their efficacy. Organizations can benefit from emphasizing skill development among employees specifically for voice-related activities. Specific training and development programs should equip employees with the knowledge and skills necessary to identify irregularities and issues during task execution and to articulate their concerns, opinions, and suggestions regarding these problems (Janssen & Gao, 2015). This approach fosters mastery experiences, one of the four mechanisms for improving voice self-efficacy. Furthermore, authorities should serve as effective social models in engaging in voice behavior and provide appropriate social persuasion to employees, while also fostering a positive voice climate within the organization.

Although this study has provided certain practical and theoretical contributions as discussed above, there are some limitations. With a sample size of 424 lecturers, the findings may not fully represent all lecturers in higher education institutions in Vietnam, despite the research team's efforts to survey lecturers from these universities in different geographical areas. Furthermore, the measurement scale used to assess the variables in the research model is a perceptual scale, which may be influenced heavily by respondents' subjective opinions. Future studies could expand the sample size and consider additional intermediate variables and moderating variables in the current research model.

6. CONCLUSION

This study draws from the group engagement model and self-efficacy theory to demonstrate that when lecturers perceive respect from their colleagues, they experience increased voice self-efficacy, which motivates prosocial voice behavior. The present findings are important for higher education institutions, where most employees hold advanced academic qualifications and are highly regarded in Vietnam, which prioritizes education. In this context, respect from others is particularly valued. To benefit from employees' prosocial voice, managers need to focus on solutions that enhance employees' perceived respect, thereby increasing their voice self-efficacy, which, in turn, will promote prosocial voice behavior within the organization.

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