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TÒA SOẠN
SỐ 58 LÊ VĂN HIỀN, Q. BẮC TỪ LIÊM - HÀ NỘI

Điện thoại: 024.32191967
E-mail: tapchinctckt@hvtc.edu.vn
Website: https://tapchitckt.hvtc.edu.vn/
https://tapchitckt.hvtc.edu.vn/?language=en-US

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APPLYING THE HOLT-WINTERS MODEL TO FORECAST STATE BUDGET REVENUE IN CAU GIAY DISTRICT, HANOI

Assoc.Prof.PhD. Truong Thi Thuy* - PhD.Truong Thi Thu Ha**

Abstract: ***This paper applies the Holt-Winters exponential smoothing model to forecast the quarterly state budget revenue of Cau Giay Tax Department for 2025. Using time-series data from Q1/2020 to Q1/2025 and employing IBM SPSS software, the study evaluates forecast accuracy through MAPE and other model fit statistics. The results show a MAPE of 12.636% and R^2 of 0.791, indicating that the multiplicative Holt-Winters model provides a reliable short-term forecast. These findings can serve as a scientific basis for improving budget planning at the local level.***

• Keywords: *state budget revenue forecast, exponential smoothing, holt-winters, SPSS.*

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1. Introduction

The estimation of state budget revenue (SBR) represents a critical initial step in the budget formulation process, serving as a strategic guideline for resource allocation, fiscal discipline, and policy planning across government levels. An accurate forecast of budget revenue enables regulatory authorities to manage public finances more proactively and minimize discrepancies between projected and actual revenue.

However, in many localities, the current forecasting practices remain heavily reliant on subjective experience, qualitative methods, or manually constructed simulations. Such approaches often lack scientific rigor and fail to adequately capture the dynamics of economic and policy-related fluctuations, resulting in limited forecasting accuracy.

Globally, numerous countries have adopted advanced quantitative models such as time series methods and statistical analysis software to enhance forecasting precision. Among these, the Holt-Winters model, an extension of exponential smoothing techniques, is widely recognized for its effectiveness in handling data exhibiting both trend and seasonal variations.

Motivated by the need to improve the reliability of SBR forecasts, this study applies the multiplicative Holt-Winters model to forecast quarterly revenue for Cau Giay District, Hanoi. Utilizing quarterly budget revenue data from Q1 2020 to Q1 2025, the study employs SPSS software to evaluate the model's fit and forecasting performance. The findings aim to provide a scientifically grounded tool to support more accurate budget planning for local tax authorities.

2. Research methodology

2.1. Literature review

Exponential Smoothing is a popular time series forecasting technique, particularly effective for data with linear characteristics and short cycles. Among its variations, the Holt-Winters model is a suitable choice for time series data that simultaneously exhibits trend and seasonality.

The Holt-Winters model has two main forms:

Additive form: Applied to data where the seasonal amplitude remains relatively stable over time.

Multiplicative form: Suitable for data where the seasonal amplitude varies with the scale of the time series - this is the model used in this study.

Exponential smoothing is a type of linear model that can capture linear characteristics in a time series. One of the fundamental ideas behind exponential smoothing models is to generate future values as weighted averages of past values, where more recent observations are given higher

** Academy of Finance; email: truongthithuy@hvtc.edu.vn*
*** Cau Giay district Tax Team; email: truonghahvtc@gmail.com*

weights than observations further in the past. By forming forecasts based on weighted averages, we are using a "smoothing" method. The term "exponential" comes from the fact that exponential smoothing models not only assign decreasing weights over time but do so in an exponential fashion. To apply exponential smoothing models, there are three widely adopted forms for different time series. Simple exponential smoothing (Type I) is used when a time series has no trend and no seasonality. Suppose we have a time series Yt , measured at time points t=1,...,T. The simple exponential smoothing model is defined by the recursive formula as follows:

$$\hat{Y}t+1= \alpha Yt+ (1-\alpha)\hat{Y}t \quad (1)$$

Where Y^t+1 is the forecast value at time t+1, α is the smoothing constant, Yt is the actual data value at time t, and Y^t is the forecast value at time t.

When a trend exists in the time series, the Holt's exponential smoothing model (Type II) can be used. Holt's method requires estimating the current slope and level, and therefore uses two smoothing constants for each estimation formula. These two smoothing constants help calculate the estimated values of the level and slope, which change over time as new observations are incorporated.

$$\hat{Y}t+p= Lt+ pTt \quad (2)$$

$$Lt= \alpha Yt+ (1-\alpha)(Lt-1+ Tt-1) \quad (3)$$

$$Tt= \beta(Lt-Lt-1) + (1-\beta) Tt-1 \quad (4)$$

Where Y^t+p is the forecast value at p periods after time t, Lt is the estimated value of the level at the current time, Tt is the estimated value of the slope at the current time, α is the smoothing constant for the level (0<α<1), and β is the smoothing constant for the slope, i.e., the trend (0<β<1).

In Equation (3), the current level (Lt) is calculated by taking a weighted average of two estimated values: one estimate is the current observed value (Yt), and the second estimate is the sum of the previous period's trend value (Tt−1) and the previous period's estimated level value (Lt−1). Equation (2) shows that the forecast value p periods into the future (Y^t+p) is calculated by multiplying the current estimated trend value (Tt) by the number of future periods to forecast (p), and then adding this product to the current estimated level value (Lt).

Holt-Winters is an exponential smoothing method used to forecast time series that exhibit both trend and seasonality (Type III). This method has two versions: Multiplicative Holt-Winters and Additive Holt-Winters.

The four equations in the recursive scheme of the Multiplicative Holt-Winters method are as follows:

$$\hat{Y}t+p= (Lt+ pTt)St-s+p \quad (5)$$

$$Lt= \alpha Yt/St-s+ (1-\alpha) (Lt-1+ Tt-1) \quad (6)$$

$$Tt= \beta(Lt-Lt-1) + (1-\beta)Tt-1 \quad (7)$$

$$St= \gamma Yt/Lt+ (1-\gamma)St-s \quad (8)$$

Where Y^t+p is the forecast value at p periods after time t, Lt is the estimated value of the level at the current time, Tt is the estimated value of the trend at the current time, St is the estimated value of the seasonal component, α is the smoothing constant for the level (0<α<1), β is the smoothing constant for the trend (0<β<1), γ is the smoothing constant for estimating seasonality (0<γ<1), and s is the seasonal length.

If γ equals 0, it means there is no seasonal component in the time series, and the Holt-Winters method becomes the Holt method. If both γ and β equal 0, the model becomes the simple exponential smoothing method. Thus, the Holt-Winters method is the most general model among the three exponential smoothing models. In the multiplicative version of the Holt-Winters method, the seasonality estimate is performed using a seasonal index and is calculated by Equation (8). Equation (8) shows that the current seasonal component, St, is equal to γ multiplied by the seasonal index estimated by the quantity Yt/Lt plus (1−γ) multiplied by the seasonal component at the previous time point, St−s.

2.2. Research methodology

2.2.1. Research data

The study utilizes secondary data on quarterly state budget revenue collected from the Tax Department of Cau Giay District, Hanoi for the period spanning Q1 2020 to Q1 2025. The dataset was obtained from the district's internal tax administration system, which serves as an official repository of local fiscal records.

Prior to model implementation, the data underwent cleaning, normalization, and preprocessing using Microsoft Excel to ensure consistency, completeness, and accuracy. After standardization, the dataset was input into the forecasting model for analysis. The structured time series data formed the basis for applying the Holt-Winters multiplicative exponential smoothing model, facilitating accurate and reproducible revenue projections.

2.2.2. Analytical methods

The study applies the Winters' Multiplicative Exponential Smoothing model, a variant of time series forecasting methods capable of capturing both trend and seasonal components in the data. This model is particularly suited for datasets where seasonal variations are proportional to the overall level of the series.

The forecasting procedure is implemented using SPSS software, with the objective of projecting state budget revenue (SBR) for the remaining quarters of 2025

The use of the multiplicative Holt-Winters model provides a systematic and statistically grounded approach to predicting short-term fiscal inflows, especially where seasonal patterns recur over fixed periods.

The accuracy and performance of the forecasting model are evaluated using standard statistical indicators, including:

MAPE (Mean Absolute Percentage Error): Measures the average absolute percentage difference between the forecasted and actual values. A lower MAPE indicates higher forecasting precision.

R-squared (R^2): Represents the coefficient of determination, reflecting the proportion of variance in the observed data explained by the model. Higher R^2 values indicate a better fit between the model and the actual data.

2.3. Research tools

The estimation and evaluation of the model were carried out using SPSS software, in combination with Microsoft Excel for input data processing and results presentation. SPSS was chosen for its built-in support for exponential smoothing models, as well as its ability to visually present forecasting results in a clear and interpretable manner.

3. Research findings

State budget revenue collected through the centralized tax administration system from Q1 2020 to Q1 2025

Table 1. State budget revenue from Q1 2020 to Q1 2025 (Billion VND)

Period	2020	2021	2022	2023	2024	2025
Quarter 1	1288	1548	1860	1606	2320	2845
Quarter 2	710	1009	1211	1110	1672	
Quarter 3	1151	740	1092	1158	1393	
Quarter 4	1498	1704	1484	1657	2185	

Here's the English translation of the provided text:

Using the Exponential Smoothing - Winter's forecast model, a short-term forecasting model, we've projected quarterly revenue on a local scale. This model considers the impact of both seasonality and trends in tax collection activities (tax payment deadlines for various tax types), yielding relatively accurate quarterly revenue figures. The necessary data for this model includes actual quarterly revenue from Q1 2020 to Q1 2025 to forecast revenue for the remaining quarters of 2025. An evaluation of the forecasting results from the Winter's Exponential Smoothing model against actual revenue from Q3 2024 to Q1 2025 reveals that, despite some upward/ downward discrepancies in quarterly forecasts compared to actual collection due to government tax exemption, reduction, and extension policies, the overall domestic revenue forecast using the Exponential Smoothing - Winter's model in SPSS software is 6,817 billion VND. Meanwhile, the actual domestic revenue for Q3, Q4 2024, and Q1 2025 totaled 6,392 billion VND, which is 31 billion VND higher than the forecast, representing a difference of 0.46%. This indicates that the Exponential Smoothing - Winter's model provides relatively accurate forecasts for domestic revenue collection within the province, specifically as follows:

Unit: Billion VND

No.	Quarter	Forecast using Hold - Winter Model	Actual Domestic Revenue Collection	Difference (+;-)
(1)	(2)	(3)	(4)	(5)=(4)-(3)
	Tổng cộng	**6392**	**6423**	**31**
1	Quarter III/2024	1499	1393	-106
2	Quarter IV/2024	2266	2185	-81
3	Quarter I/2025	2627	2845	218

The research data comprises quarterly state budget revenue (NSNN) for the Cau Giay District Tax Team from Q1 2020 to Q1 2025. The revenue data shows a gradual upward trend over time and exhibits clear seasonality among quarters - particularly in Q1 and Q4 each year, which typically coincide with tax finalization deadlines or policy adjustments. The Holt-Winters Multiplicative model was chosen because it's suitable for data displaying both trend and seasonality. The model was built and run using SPSS software. The fit assessment indicators are as follows:

Criterion	Value	Comments
R-squared	0.791	The model explains 79.1% of the variance in the data - a fairly good level.
MAPE	12.636	Relatively low error (<15%) - good accuracy
RMSE	248,4	Mean squared error is consistent with the data scale.
Ljung-Box Q(18)	Sig. = 0.980	Residuals have no autocorrelation - the model is stable.
Số ngoại lệ (Outliers)	0	Clean data, not affected by abnormal values.

Forecasting revenue results through the application of the Exponential Smoothing - Winter's model in SPSS statistical software has established a scientific basis for estimating state budget revenue within the province. This facilitates reasonable revenue management, serving as a foundation for building realistic revenue forecasts and supporting local state budget revenue-expenditure operations. Simultaneously, it addresses the annual recommendations from the State Audit Office regarding the inaccuracy of state budget revenue forecasts. From this, we apply the Exponential Smoothing model to forecast state budget revenue in the upcoming quarters:

Unit: Billion VND

Model		Q2 2025	Q3 2025	Q4 2025
SỐ THU-Model_1	Forecast	1.700	1.600	2.500
	UCL	2.200	2.100	3.100
	LCL	1.200	1.100	1.900

By applying the Exponential Smoothing - Winter's model in SPSS statistical software, we aim to forecast the 2025 domestic revenue collection results. This proactive approach will enhance our ability to manage and build annual budget revenue forecasts, enabling us to promptly implement solutions for mobilizing revenue into the budget. This effort strives to achieve the assigned state budget revenue targets, contributing to the province's economic and social development goals.

4. Result

Forecasting budget revenue plays a pivotal role in the entire state budget estimation process, forming the foundation for setting revenue and expenditure targets that align with actual conditions and socio-economic development orientations. The research findings affirm the feasibility of applying quantitative models in public financial management at the grassroots level, especially in a context where transparency, efficiency, and scientific rigor are increasingly emphasized.

This study applied the Holt-Winters model to forecast state budget revenue at the district level. Empirical results show that the model exhibits a high degree of fit with historical budget revenue data and provides reliable short-term forecasting capabilities. The model helps eliminate subjective factors in estimation and offers a scientific basis to support the budget revenue estimation process.

However, the study also acknowledges some limitations, including a relatively narrow data scope and the exclusion of external influencing factors such as fiscal policies or macroeconomic fluctuations. Therefore, future research should expand the data scale, incorporate socio-economic variables, and compare with other forecasting models to enhance the accuracy and practical applicability of the results.

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THE ROLE OF TAXES LESS SUBSIDIES ON PRODUCTS IN PROMOTING ECONOMIC GROWTH - THE CASE OF VIETNAM

PhD. To Van Tuan*

Abstract: ***This paper examines the role of taxes less subsidies on products (TLS) in fostering economic growth, focusing on Vietnam from 2010 to 2023. As a key fiscal indicator, TLS reflects the net effect of taxation and subsidies on goods and services, thereby shaping incentives and resource allocation. Empirical findings reveal that TLS exerts a negative impact on economic growth, indicating that current fiscal practices may constrain rather than promote development. The study recommends recalibrating tax structures, reducing distortive subsidies, and channeling fiscal resources toward digital infrastructure and innovation. Strengthening tax administration through digitalization and aligning policies with international standards are emphasized as vital steps to ensure sustainable growth in Vietnam's evolving economy.***

• Keywords: *taxes less subsidies on products, economic growth, Vietnam.*

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1. Introduction

Taxes less subsidies on production (TLS) includes taxes payable less subsidies receivable on goods or services produced as outputs including other taxes or subsidies on production such as those payable on the labour, machinery, buildings or other assets used in production. This indicator is expressed in current prices, meaning no adjustment has been made to account for price changes over time. This series is expressed in local currency units. Taxes less subsidies on products represents a fundamental component in the system of national accounts, reflecting the net fiscal burden imposed on goods and services after accounting for both taxation and government support. In essence, this indicator captures the extent to which a government extracts value through indirect taxes-such as value-added tax, excise duties, and import tariffs-while simultaneously offsetting part of this burden by providing subsidies to producers or consumers. By influencing relative prices, production incentives, and household consumption, TLS plays a pivotal role in shaping resource allocation and aggregate demand, thereby affecting economic growth trajectories.

The relevance of analyzing TLS is underscored by its dual function: it constitutes an integral element of gross domestic product (GDP) measurement, and it also serves as a key lever of fiscal policy. An excessive reliance on product taxes without adequate balancing mechanisms can distort market efficiency, suppress investment, and burden households, while insufficient taxation may weaken fiscal sustainability. Conversely, carefully designed subsidies may promote innovation, encourage priority sectors, or cushion vulnerable groups, but they also risk creating dependency and fiscal imbalances if mismanaged. Thus, the interplay between taxation and subsidies directly determines not only short-term economic stability but also long-term growth prospects.

In the context of Vietnam, the examination of TLS carries particular significance. As the country transitions from a resource-driven to a knowledge-based economy, fiscal instruments need to be recalibrated to foster competitiveness, stimulate domestic demand, and align with global trade commitments. Understanding the role of TLS enables policymakers to identify optimal strategies that balance efficiency, equity, and sustainability. This study, therefore, provides both theoretical and empirical insights into how TLS influences economic growth, offering valuable implications for the design of fiscal policies aimed at accelerating Vietnam's development path while ensuring macroeconomic stability.

It may be noted that the exposition proceeds in a carefully sequenced manner. After the opening remarks, a critical synthesis of prior scholarship is provided; thereafter, the construction of the dataset

** Vietnam Maritime University; email: tuantv@vimaru.edu.vn*

and the analytical framework is delineated with precision. In the ensuing section, the evidence is reported and interpreted, yielding results that are discussed in light of the study's objectives. The closing section then articulates policy-oriented recommendations intended to catalyze Vietnam's economic expansion in the forthcoming period.

2. Literature review

The topic of the relationship of taxes to economic growth has attracted the attention of many researchers. Engen & Skinner (1996) exerted that tax reforms were sometimes touted as having strong macroeconomic growth effects. Using three approaches, the authors considered the impact of a major tax reform - a 5 percentage point cut in marginal tax rates - on long-term growth rates. The first approach was to examine the historical record of the U.S. economy to evaluate whether tax cuts had been associated with economic growth. The second was to consider the evidence on taxation and growth for a large sample of countries. And finally, the authors used evidence from microlevel studies of labor supply investment demand, and productivity growth. Empirical results suggested modest effects, on the order of 0.2 to 0.3 percentage point differences in growth rates in response to a major tax reform. Nevertheless, even such small effects could have a large cumulative impact on living standards.

Another notable study, Kim (1998) presented an endogenous growth model comprising of financial, human and physical capital and incorporating major features of a general tax system. Technology and preference parameter values in the model were chosen to fit the actual growth experiences of the United States and a rapidly growing East Asian NIC. Using the calibrated model, the author assessed the role of differences in taxes and other variables in explaining the difference in growth rates. The main findings were: (i) the difference in tax systems across countries explained a significant proportion (around 30%) of the difference in growth rates; (ii) the difference in preferences explained at most 4%; and (iii) differences in labor income tax, debt-equity ratio and inflation could be important in explaining the growth difference. Further, the author evaluated the contribution of the monetary factor to the growth rate gap, and the growth effect of US tax reforms.

Okoth (2023) aimed to investigate the potential effectiveness of tax incentives and subsidies in enhancing economic development and growth among developing economies. This study used secondary data from World Bank, IMF, and OECD reports for a target period of 2010 - 2022 to examine how tax incentives affect economic development in emerging economies with a focus on Indonesia, Kenya, Malaysia, and Türkiye. The researcher performed a panel data regression analysis using the generalized estimating equations approach. The P-value approach used by the researcher assesses the relevance of the study's variables, for which the p-value is set at 0.05. The study obtained positive and significant effects of subsidies on investments and economic growth. Incentives on taxes on production, sales, and transfers and taxes on profits and capital gained registered a non-significant positive effect on investment; however, the effects were insignificant and negative for economic growth.

A discussion on the impact of other kinds of taxes on economic growth, Johansson et al. (2008) investigated the design of tax structures to promote economic growth. It suggested a "tax and growth" ranking of taxes, confirming results from earlier literature but providing a more detailed disaggregation of taxes. Corporate taxes were found to be most harmful for growth, followed by personal income taxes, and then consumption taxes. Recurrent taxes on immovable property appeared to have the least impact. A revenue neutral growth-oriented tax reform would, therefore, be to shift part of the revenue base from income taxes to less distortive taxes such as recurrent taxes on immovable property or consumption. The paper broke new ground by using data on industrial sectors and individual firms to show how redesigning taxation within each of the broad tax categories could in some cases ensure sizeable efficiency gains.

Another evidence of the negative impact of taxes on growth, Tsenes & Thomakos (2017) empirically examined the potential relationship between the size of the government in Greece-as approached by indirect taxes and subsidies-and economic growth. Empirical results suggested that a negative relationship did exist between taxes and growth, confirming a large part of the existing literature. The authors estimated a variety of models that illustrate how and when policymakers could take action in order to boost growth and end the downward spiral in the Greek

economy. Tax-based fiscal action arised as the most efficient strategy, targeting the disposable income of the Greek household by reducing taxation and boosting employment. Most importantly, according to the paper's analysis, the government's budget constraints were not threatened and fiscal prudence was not to be derailed, a prerequisite under the signed memoranda of understanding and bailout programs.

For the tax study literature to assess the state of knowledge about the relationship among taxes, related factors, and economic growth as well as the use of tax incentives to influence business locations, see Buss (2001). Although tax studies have become increasingly sophisticated, especially during the past decade, they have tended to yield conflicting results regarding whether taxes matter. Some studies focus on costs and benefits of tax incentives, but few look to see whether public monies could have been better spent or whether tax incentives were economically justified. Tax studies offer little guidance to policy makers concerned about fine-tuning tax rates or tax offerings and effectively employing tax incentives as economic development tools.

The review of prior scholarship has revealed that investigating the impact of taxes less subsidies on products (TLS) on economic growth is both theoretically justified and empirically relevant. It was further observed that earlier studies often overlooked complementary macroeconomic drivers. To address this empirical gap, the present research deliberately incorporates distinct independent variables-namely foreign direct investment, global trade, and gross fixed capital formation-ensuring conceptual novelty while avoiding redundancy, thereby contributing a more comprehensive framework to the existing literature.

3. Methodology and research data

This study uses annual time series data of Vietnam from 2010 to 2023, including Gross domestic product (billion USD), Foreign direct investment, net inflows (BoP, current billion USD), Global Trade (billion USD), Gross fixed capital formation (current billion USD) and Taxes less subsidies on products (constant billion LCU). The set of data was collected from the World Bank's World Development Indicators to discover the effect of Taxes less subsidies on products on economic growth. Table 1 below reports the description of the variables used in the study.

Table 1. Variables, Measurement and Data Sources

Variables name	Symbols	Variables measurement
Economic growth	GDP	Gross domestic product (current billion US$)
Foreign direct investment	FDI	Foreign direct investment, net inflows (BoP, current billion US$)
Global trade	GT	Sum of Exports and Imports of goods and services (BoP, current billion US$)
Gross fixed capital formation	GFCF	Gross fixed capital formation (current billion US$)
Taxes less subsidies on products	TAX	Taxes less subsidies on products (constant billion LCU)

Source: Authors' summary.

In analyzing the effect of taxes less subsidies on products on Vietnam's economic growth, this study applies Robust Least Squares with M-estimation to ensure reliable inference under data irregularities. The empirical model is specified as:

$$D(GDP_t) = \beta_0 + \beta_1 D(FDI_t) + \beta_2 D(GT_t) + \beta_3 D(GFCF_t) + \beta_4 D(TAX_t) + u_t,$$

Where α_i, β_i, γ_i, δ_i, θ_i are, respectively, the regression coefficients, is the residuals, that have a simultaneous association, and without association with explanatory variables and lags of residuals. Unlike Ordinary Least Squares, which is highly sensitive to outliers, M-estimation minimizes a modified loss function. The Huber function behaves quadratically for small residuals but linearly for large ones, while the Tukey bisquare function progressively down-weights extreme values. These weighting mechanisms reduce the leverage of extraordinary shocks and measurement errors, which are pervasive in transitional economies such as Vietnam. Consequently, parameter estimates derived through M-estimation are both efficient and robust, thereby providing policymakers with credible insights into the fiscal-growth nexus.

4. Empirical results

Table 2 below presents the descriptive statistics of all variables used in this study, it shows that GDP, FDI, GT, GFCF and TAX are all normally distributed according to Jarque-Bera test.

Table 2. Descriptive summary

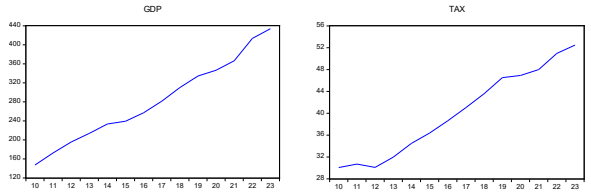
	GDP	FDI	TRADE	GFCF	TAX
Mean	281.7943	12.84843	439.8486	85.26027	40.13124
Median	269.2248	13.35000	411.7333	81.39736	39.83487
Maximum	433.8577	18.50000	756.2398	130.6247	52.49138
Minimum	147.2012	7.430000	167.7260	51.75547	30.06885
Std. Dev.	88.68967	3.886651	192.7983	27.08389	8.027244

	GDP	FDI	TRADE	GFCF	TAX
Skewness	0.222447	-0.083354	0.261189	0.308763	0.094256
Kurtosis	1.966331	1.530226	1.799449	1.788964	1.574018
Jarque-Bera	0.738734	1.276350	0.999950	1.077968	1.206894
Probability	0.691172	0.528256	0.606546	0.583341	0.546923
Sum	3945.120	179.8780	6157.880	1193.644	561.8374
Sum Sq. Dev.	102256.1	196.3787	483225.4	9535.980	837.6765
Observations	14	14	14	14	14

Source: Summarized by the author

The visualization of macroeconomic indicators such as Gross Domestic Product (GDP) and Taxes less subsidies on products (TLS) for Vietnam during the period 2010-2023 serves as an essential analytical tool to provide both descriptive insights and preliminary interpretations of economic dynamics as in Figure 1. By illustrating these variables through graphical representation, it becomes possible to capture long-term patterns, highlight cyclical fluctuations, and detect structural shifts that may not be immediately evident in raw numerical data. A preliminary inspection of the graphs reveals a steadily upward trajectory of GDP, reflecting the country's sustained growth momentum driven by industrialization, international integration, and domestic demand expansion. In parallel, TLS also exhibits a general increase over the same period, albeit with more visible variations that mirror adjustments in fiscal policy, changes in tax structures, and subsidy reforms. The co-movement of these two indicators suggests a close linkage between Vietnam's growth process and the role of fiscal instruments, thereby justifying deeper econometric analysis in subsequent stages of the study.

Figure 1. Line graph of GDP and TAX during the period of 2010-2023



Source: Executed by the author

Research variables are tested the stationary property before being put into estimation procedure. The Augmented Dickey-Fuller (ADF) test reveals that all time series are non-station, however they all become station thanks to first-order differencing. The estimated Robust Least Squares with M-estimation result for first-order differencing varialbes is shown in the Table 3.

Table 3. Regression estimation with dependence variable of D(GDP)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
D(FDI)	7.239440	0.888644	8.146612	0.0000
D(GT)	-0.044443	0.024041	-1.848639	0.0645
D(GFCF)	2.444207	0.416001	5.875487	0.0000
D(TAX)	-1.703950	0.817653	-2.083952	0.0372
C	7.427533	1.397537	5.314729	0.0000

Source: Summarized by the author

Table 3 indicates that, the empirical results of the relationship are presented as follows:

$$D(GDP_t) = 7.43 + 7.24 * D(FDI_t) - 0.04 * D(GT_t) + 2.44 * D(GFCF_t) - 1.70 * D(TAX_t) + u_t$$

The regression results show that foreign direct investment during the study period is strongly promoting economic growth. Gross fixed capital formation is also a factor contributing to economic growth. However, international trade is showing a negative impact at a small level on economic growth. Finally, taxes less subsidies on products also shows an impact hindering economic growth. This result is consistent with the results in studies by Engen & Skinner (1996), Tsenes & Thomakos (2017), Okoth (2023).

Taxes less subsidies on products (TLS) can exert a detrimental effect on economic growth through several transmission channels. First, excessive reliance on product-based taxation, such as value-added tax and excise duties, raises production costs and consumer prices, thereby discouraging investment and suppressing aggregate demand. Second, when subsidies are inefficiently allocated or overly concentrated in low-productivity sectors, they create market distortions, crowd out private capital, and reduce incentives for technological upgrading. Third, frequent adjustments in tax and subsidy regimes generate uncertainty, undermining investor confidence and long-term planning. Moreover, in emerging economies such as Vietnam, limited administrative capacity may result in compliance burdens, rent-seeking behavior, and fiscal inefficiencies, further constraining growth. Collectively, these mechanisms highlight how an imbalanced configuration of TLS can hinder productivity, misallocate resources, and weaken competitiveness, thus impeding sustainable economic expansion.

5. Conclusion

The model reveals that taxes less subsidies on products has a significant negative influence on

growth during the research period of 2010-2023. Building upon the empirical findings, it becomes imperative to propose targeted policy measures that can improve the taxes less subsidies on products policy for promoting Vietnam's economic growth.

A first solution lies in the comprehensive digitalization of tax administration to enhance the efficiency and transparency of TLS collection. By adopting advanced information systems, including blockchain-enabled registries and big-data-driven monitoring platforms, governments can reduce transaction costs, minimize tax evasion, and ensure accurate revenue flows. Digital infrastructure allows for real-time reporting, automated compliance, and more effective allocation of subsidies, thereby narrowing the gap between statutory frameworks and practical enforcement. In the context of Vietnam's rapidly expanding digital economy, such innovation would not only improve fiscal sustainability but also reinforce public trust in tax policy, thus fostering broader economic dynamism.

A second imperative involves rationalizing the structure of indirect taxation embedded in TLS, with particular attention to value-added tax and excise duties. Excessive reliance on these instruments may distort consumer behavior, exacerbate inequality, and dampen productive investment. A calibrated reform should streamline tax brackets, eliminate redundant exemptions, and establish progressive rates where appropriate, ensuring both efficiency and equity. In parallel, digital monitoring tools can be employed to trace supply chains and evaluate tax burdens more precisely. Such measures are essential to strike a balance between government revenue needs and the competitiveness of domestic industries in the digital era.

A third solution emphasizes the strategic reallocation of subsidies toward innovation-driven and digitally intensive sectors, rather than perpetuating support for inefficient, resource-based industries. Subsidies should incentivize investment in digital infrastructure, renewable energy, and knowledge-based services, thereby aligning fiscal policy with long-term growth priorities. To minimize distortions, subsidy schemes must be targeted, conditional, and performance-based, supported by transparent evaluation mechanisms. By channeling subsidies toward sectors with high spillover potential, Vietnam can enhance productivity, stimulate entrepreneurial ecosystems, and strengthen resilience against external shocks, ultimately transforming TLS into a lever that fosters sustainable economic advancement in the digital age.

A fourth approach concerns the enhancement of fiscal decentralization to improve the responsiveness and effectiveness of TLS-related policies. Empowering local governments with greater discretion over tax administration and subsidy distribution can enable policies better tailored to regional economic structures, particularly in emerging digital clusters. Advanced digital platforms can be deployed to harmonize reporting, facilitate inter-regional coordination, and prevent fiscal leakages. Decentralization also creates incentives for local authorities to foster business environments conducive to innovation and investment. When effectively regulated, this approach enhances policy adaptability, strengthens institutional accountability, and accelerates the contribution of TLS reform to national economic growth.

A fifth solution requires strengthening international tax cooperation to address cross-border challenges arising from digital trade and global value chains. As Vietnam integrates more deeply into the digital economy, issues of profit shifting, tax base erosion, and inconsistent subsidy practices become increasingly salient. Participation in global frameworks, such as the OECD Inclusive Framework on BEPS and emerging agreements on digital services taxation, can help align TLS policies with international norms. Harmonized standards would reduce regulatory arbitrage, enhance investor confidence, and stabilize fiscal revenues. Ultimately, such cooperation ensures that TLS reforms are future-oriented, globally consistent, and conducive to long-term economic growth.

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DECOUPLING ECONOMIC GROWTH AND ENVIRONMENTAL IMPACT: PERSPECTIVE OF ANALYZING CO2 INDEX

PhD. Tran Hoang Vu*

Abstract: ***This study examines the drivers of CO2 emissions efficiency in Vietnam, focusing on the relationship between development private economic sector, industrial output, energy access, and urbanization. The study highlights the need for comprehensive urban planning and energy-efficient infrastructure to reduce emissions intensity while sustaining economic growth. Utilizing data from 1990 to 2020, the research employs econometric techniques such as ARIMA, ARDL to identify trends. Key findings reveal that CO2 emissions efficiency is heavily influenced by historical emissions patterns, industrial output, and urbanization. While significant progress in renewable energy and policy frameworks has been made, challenges remain in balancing industrialization with sustainable practices. These findings provide actionable insights for policymakers aiming to achieve Vietnam's environmental and economic goals especially in private economic sector.***

• Keywords: *economic growth; pollution; middle-income countries, CO2 emissions.*

JEL codes: O11, O13

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1. Introduction

Vietnam, a rapidly growing economy in Southeast Asia, has achieved significant economic growth over the past few decades. However, this growth has come with rising CO2 emissions, making environmental sustainability a critical concern. As Vietnam transitions from an agricultural to an industrial economy, balancing economic growth with environmental protection is a key challenge.

Measuring CO2 emissions efficiency defined as CO2 emissions per unit of GDP (in PPP $) provides a better understanding of Vietnam's environmental sustainability relative to its economic output. This research focuses on analyzing what drives CO2 emissions efficiency in Vietnam, allowing for targeted policy interventions.

Vietnam has made significant strides in renewable energy adoption and environmental regulations, but its CO2 emissions per unit of GDP remain higher compared to other countries with similar income levels. Understanding the factors driving these efficiency variations is crucial for formulating effective national policies. The relationship between economic growth, industrialization, and CO2 emissions is complex, with factors such as access to electricity, GDP growth rate, industrial output, and urbanization playing a significant role in emissions intensity. Rapid industrialization and urbanization, if coupled with fossil fuel reliance, can worsen emissions, while improving energy access and transitioning to renewable energy could decouple economic growth from emissions. This study aims to address the gap in research on how these factors influence CO2 emissions relative to GDP, providing insights to guide policies for sustainable growth and reduced carbon footprints.

2. Literature review

Several studies have examined the intricate relationship between foreign direct investment (FDI), urbanization, and CO2 emissions in Vietnam. FDI, while boosting economic growth, often increases emissions due to industrial expansion and energy-intensive manufacturing processes. Urbanization contributes further by escalating energy demand for transportation, housing, and infrastructure. For instance, Ngoc, Tuan, and Duy (2021) highlight the dual impact of FDI and urban development on environmental degradation, while Minh et al. (2023) emphasizes the role of urban population growth in amplifying energy consumption and emissions. These findings underline the need to balance economic

* *University of Finance and Accountancy; email: tranhoangvu@tckt.edu.vn*

development with sustainable urban planning.

Research on renewable energy and green finance highlights their potential to decouple economic growth from environmental harm. Studies like Hoffmann (2020) and Tran (2022) illustrate how green finance and investments in renewable energy sources, such as wind and solar, contribute to achieving CO2 reduction targets. Moreover, these measures support Vietnam's transition to a sustainable energy system while addressing the rising emissions associated with rapid industrialization and population growth. These findings align with the Environmental Kuznets Curve hypothesis, as explored by Vo et al. (2019), which suggests that emissions initially rise with economic growth but eventually decline with greater investments in sustainable practices.

Sector-specific analyses reveal that industrialization, agricultural practices, and export-driven growth are significant contributors to CO2 emissions in Vietnam. Structural decomposition studies, such as those by Nguyen (2012) and Raihan (2023), identify energy-intensive industries as major sources of emissions, while Nguyen (2007) highlights the role of renewable energy in reducing dependence on fossil fuels. Policy recommendations from this body of literature emphasize the importance of investing in renewable energy technologies, implementing stricter industrial emission standards, and fostering energy-efficient urban development. These strategies are critical for Vietnam to balance economic growth with environmental sustainability, ensuring long-term reductions in CO2 emissions while maintaining competitiveness in a globalized economy.

3. Data resource and Methodology

The study will use annual data from the World Bank World Development Indicators (WDI) for Vietnam, covering the period 1990–2020. Additional data on institutional quality will be obtained from the World Bank's Worldwide Governance Indicators (WGI). Energy consumption data, specifically on the share of renewables and the use of fossil fuels, will be sourced from the International Energy Agency (IEA).

The research employs econometric techniques such as ARIMA, ARDL to identify trends.

4. Result and Discussion

Table 1: Correlation Matrix

	CO2	ELC	GDP	IND	URB
CO2	1.000000	0.587490	-0.086840	0.156366	0.557710
ELC	0.587490	1.000000	-0.165028	0.070982	0.898465
GDP	-0.086840	-0.165028	1.000000	0.084286	-0.170177
IND	0.156366	0.070982	0.084286	1.000000	-0.081251
URB	0.557710	0.898465	-0.170177	-0.081251	1.000000

The correlation matrix shows a moderate positive correlation between CO2 emissions and both Access to electricity (ELC) (0.587) and Urbanization Rate (URB) (0.558), indicating that as electricity access and urbanization increase, CO2 emissions relative to GDP also rise. However, there is a high correlation between ELC and URB (0.898), suggesting multicollinearity, which could distort the regression results. To avoid unreliable estimates, it is important to check for multicollinearity (e.g., using Variance Inflation Factor) and possibly adjust the model by removing or combining these variables before proceeding with further analysis.

Table 2: Descriptive Statistics

	CO2	ELC	GDP	IND	URB
Mean	0.269872	94.32793	6.750477	34.19244	27.81635
Median	0.272470	96.10000	6.787316	35.39036	27.28100
Maximum	0.321258	100.0000	9.540480	40.20875	37.34000
Minimum	0.215774	78.40000	2.865413	22.67429	20.25700
Std. Dev.	0.028547	5.748656	1.399387	4.495348	5.289959
Skewness	-0.055560	-1.013609	-0.226784	-1.002409	0.249353
Kurtosis	2.191584	3.386133	3.654157	3.243956	1.797666
Jarque-Bera	0.860099	4.258711	0.818457	5.268463	2.188490
Probability	0.650477	0.118914	0.664162	0.071774	0.334792
Sum	8.366041	2263.870	209.2648	1059.966	862.3070
Sum Sq. Dev.	0.024448	760.0821	58.74849	606.2445	839.5100
Observations	31	24	31	31	31

4.1. Test for Stationarity (ADF Test)

Table 3: Stationary testing

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-0.96560	0.1671	2	60
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	0.46056	0.6774	2	60
ADF - Fisher Chi-square	1.75372	0.7809	2	60
PP - Fisher Chi-square	0.95450	0.9166	2	60

*** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.*

The results from the group unit root tests (Levin, Lin & Chu t*, Im, Pesaran and Shin W-stat, ADF-Fisher, and PP-Fisher) indicate that CO2 emissions relative to GDP are non-stationary since the p-values for all tests are greater than the common significance level (e.g., 0.05). For

instance, the p-value for the Levin, Lin & Chu test is 0.1671, which means we fail to reject the null hypothesis of a unit root (non-stationarity).

4.2. Differencing the Data

Table 4: Differencing the data

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.947487	0.0004
Test critical values:	1% level	-3.689194	
	5% level	-2.971853	
	10% level	-2.625121	

** MacKinnon (1996) one-sided p-values.*

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(D_CO2)
Method: Least Squares
Date: 10/18/24 Time: 07:20
Sample (adjusted): 1993 2020
Included observations: 28 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D_CO2(-1)	-1.253053	0.253271	-4.947487	0.0000
D(D_CO2(-1))	0.310852	0.189259	1.642470	0.1130
C	0.003841	0.002906	1.321712	0.1982
R-squared	0.542055	Mean dependent var		0.000197
Adjusted R-squared	0.505420	S.D. dependent var		0.021265
S.E. of regression	0.014955	Akaike info criterion		-5.466618
Sum squared resid	0.005591	Schwarz criterion		-5.323881
Log likelihood	79.53265	Hannan-Quinn criter.		-5.422982
F-statistic	14.79588	Durbin-Watson stat		2.102020
Prob(F-statistic)	0.000058			

The Augmented Dickey-Fuller (ADF) test on the differenced CO2 series (D_CO2) shows a t-statistic of -4.947 with a p-value of 0.0004, which is smaller than the 5% critical value and statistically significant. This means we can reject the null hypothesis, indicating that the differenced series is stationary. The R-squared of 0.54 suggests a decent fit for the model, and the Durbin-Watson statistic of 2.10 shows no serious autocorrelation issue. Since stationarity has been achieved, the next step is to proceed with regression analysis using the stationary differenced series (D_CO2) and your chosen independent variables.

4.3. Linear Trend Model

Table 5: Linear Trend Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000536	0.005814	0.092241	0.9272
@TREND	0.000112	0.000327	0.341842	0.7350
R-squared	0.004156	Mean dependent var		0.002272
Adjusted R-squared	-0.031410	S.D. dependent var		0.015287
S.E. of regression	0.015526	Akaike info criterion		-5.428313
Sum squared resid	0.006749	Schwarz criterion		-5.334900
Log likelihood	83.42469	Hannan-Quinn criter.		-5.398429
F-statistic	0.116856	Durbin-Watson stat		1.810763
Prob(F-statistic)	0.735022			

The results from the linear trend model suggest that the trend in differenced CO2 emissions (D_CO2) over time is not statistically significant. The p-value for the trend variable (@TREND) is 0.7350, indicating no meaningful relationship between CO2 emissions and time. Additionally, the R-squared value is extremely low (0.004), showing that the model explains almost none of the variability in CO2 emissions. The F-statistic confirms the lack of overall significance, with a p-value of 0.735. Given these findings, the linear trend model does not provide useful insight into CO2 emissions trends and suggests that other variables or models should be explored.

4.4. Autoregressive Model (AR)

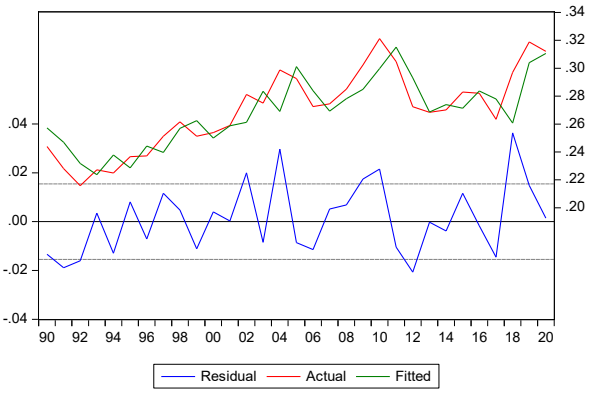
Autoregressive model for CO2:

$$CO2_t = \alpha_0 + \alpha_1 CO2_{t-1} + \alpha_2 CO2_{t-2} + \alpha_3 CO2_{t-3} + \varepsilon_t$$

Table 6: ARMA Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.271143	0.019070	14.21827	0.0000
AR(1)	1.072615	0.193336	5.547945	0.0000
AR(2)	-0.395299	0.269252	-1.468137	0.1541
AR(3)	0.186504	0.251091	0.742775	0.4643
SIGMASQ	0.000201	6.19E-05	3.241862	0.0032
R-squared	0.745616	Mean dependent var		0.269872
Adjusted R-squared	0.706480	S.D. dependent var		0.028547
S.E. of regression	0.015466	Akaike info criterion		-5.303966
Sum squared resid	0.006219	Schwarz criterion		-5.072678
Log likelihood	87.21147	Hannan-Quinn criter.		-5.228572
F-statistic	19.05193	Durbin-Watson stat		1.952730
Prob(F-statistic)	0.000000			
Inverted AR Roots	.86	.10+.45i	.10-.45i	

Figure 3: Actual, Fitted and Residual line of CO2 ARMA model



The AR(3) model for CO2 emissions shows a strong fit, with the first lag (AR(1)) being the only statistically significant predictor, indicating that last period's CO2 emissions are a strong influence on the current level. The model explains about 74.6% of the variance in CO2 emissions (R-squared =

0.7456), and the low residual variance (SIGMASQ = 0.000201) suggests accurate predictions with minimal unexplained noise. The Durbin-Watson statistic of 1.95 indicates no significant autocorrelation issues, confirming the model's stability. Overall, the model effectively captures most of the variability in CO2 emissions using past values, primarily driven by the most recent lag.

4.5. Autoregressive Integrated Moving Average (ARIMA) Model (1,1,2)

$$\Delta CO2_t = \varphi \Delta CO2_{t-1} + \theta_1 \varepsilon_{t-1} + \theta_2 \varepsilon_{t-2} + \varepsilon_t$$

The ARIMA(1,1,2) model for differenced CO_2 emissions shows a statistically significant constant term, indicating a slight upward trend, but both the AR(1) and MA terms are statistically insignificant with very high standard errors for MA terms, suggesting they add little predictive value. The low R-squared (0.27) implies limited explanatory power, and estimation issues indicate possible model instability. The Durbin-Watson statistic of 1.94 suggests no major autocorrelation, yet the model's challenges in convergence and high residual uncertainty suggest that an alternative, simpler model may be more appropriate for reliable forecasting.

Table 7: ARMA Maximum Likelihood

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.002413	0.000686	3.519077	0.0017
AR(1)	0.410652	0.422550	0.971843	0.3404
MA(1)	-0.553336	2153.166	-0.000257	0.9998
MA(2)	-0.446664	2657.773	-0.000168	0.9999
SIGMASQ	0.000166	0.116014	0.001427	0.9989
R-squared	0.266951	Mean dependent var		0.002272
Adjusted R-squared	0.149663	S.D. dependent var		0.015287
S.E. of regression	0.014097	Akaike info criterion		-5.453194
Sum squared resid	0.004968	Schwarz criterion		-5.219662
Log likelihood	86.79792	Hannan-Quinn criter.		-5.378485
F-statistic	2.276032	Durbin-Watson stat		1.936572
Prob(F-statistic)	0.089401			
Inverted AR Roots	.41			
Inverted MA Roots	1.00	-.45		

4.6. Autoregressive Distributed Lag (ARDL) Model (1,1,1,1,1)

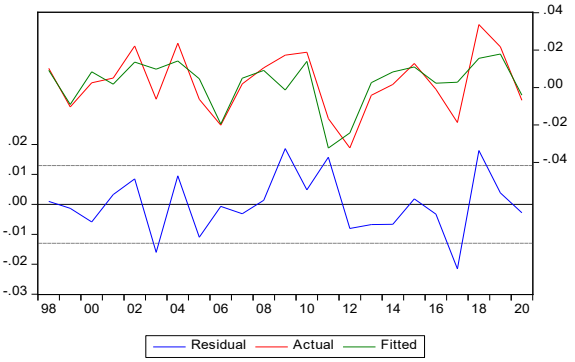
Table 9: ARDL Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.277963	0.181753	1.529350	0.1501
D(ELC)	-0.002999	0.002817	-1.064888	0.3063
D(GDP)	0.005512	0.003467	1.589955	0.1359
D(IND)	-0.003547	0.002724	-1.302074	0.2155
D(URB)	-0.033826	0.186250	-0.181617	0.8587
CO2(-1)	-0.221192	0.223497	-0.989687	0.3404
ELC(-1)	-0.005326	0.002704	-1.969441	0.0706
GDP(-1)	0.000114	0.004888	0.023280	0.9818
IND(-1)	0.002793	0.002328	1.199782	0.2516
URB(-1)	0.007213	0.002998	2.406307	0.0317

Variable	Coefficient	Std. Error	t-Statistic	Prob.
R-squared	0.627593	Mean dependent var		0.002641
Adjusted R-squared	0.369772	S.D. dependent var		0.016369
S.E. of regression	0.012995	Akaike info criterion		-5.549462
Sum squared resid	0.002195	Schwarz criterion		-5.055769
Log likelihood	73.81881	Hannan-Quinn criter.		-5.425300
F-statistic	2.434225	Durbin-Watson stat		2.437222
Prob(F-statistic)	0.070680			

The regression analysis with the dependent variable as the first difference of CO_2 emissions (D(CO2)) reveals that the model explains approximately 63% of the variation in CO_2 emissions, with an adjusted R-squared of 0.37. The results show that most of the variables, including electricity access (D(ELC)), GDP (D(GDP)), industrial output (D(IND)), and urbanization (D(URB)), do not have statistically significant short-term effects on CO_2 emissions, as their p-values are above the common significance threshold of 0.05. The lagged variable for CO_2 emissions (CO2(-1)) is also not significant. However, lagged electricity access (ELC(-1)) has a marginally significant negative effect on CO_2 emissions at the 10% level, while lagged urbanization (URB(-1)) has a positive and significant effect on CO_2 emissions at the 5% level. The F-statistic (2.43) is marginally significant, indicating some explanatory power for the model, but the p-value (0.0707) suggests that further improvements or more data might be needed for stronger conclusions

Figure 4: Actual, Fitted and Residual line in ARDL Model



The analysis reveals several key findings regarding the relationship between CO2 emissions efficiency and Vietnam's economic and structural variables. The Augmented Dickey-Fuller (ADF) test shows that CO2 emissions relative to GDP are non-stationary but become stationary after first differencing, confirming the need for data transformation to ensure reliable analysis. The AR(3) model demonstrates that past emissions significantly predict current

emissions, with the first lag (AR(1)) explaining most of the variance, accounting for approximately 74.6% of total variability. However, the ARIMA(1,1,2) model faces estimation challenges, with insignificant parameters and low explanatory power, suggesting it may not effectively capture the dynamics of CO2 emissions.

These findings underscore the complex interplay between economic growth, energy access, and environmental sustainability in Vietnam. The strong dependence of current CO2 emissions on historical values highlights the persistence of emissions trends, driven by structural and energy-related factors. High correlations between electricity access and urbanization raise concerns about multicollinearity, which could affect model reliability. Moreover, the limited causality results suggest that these variables may influence CO2 emissions through indirect or nonlinear pathways, necessitating further exploration using advanced techniques. Policymakers should focus on improving energy efficiency, particularly in urban areas and industrial sectors, while addressing the challenges of balancing economic growth with environmental sustainability. These insights provide a foundation for designing policies that decouple economic progress from environmental harm.

5. Conclusion

The research underscores the complexity of reducing CO_2 emissions relative to GDP in a rapidly developing economy like Vietnam. Despite advancements in renewable energy and environmental regulations, industrial output and urbanization remain key drivers of emissions intensity. The persistence of historical emissions trends further complicates mitigation efforts, emphasizing the importance of innovative policies to decouple economic growth from environmental degradation. By prioritizing energy-efficient technologies, stricter emissions standards, and sustainable urban planning, Vietnam can enhance its environmental efficiency without compromising economic expansion. This study offers a foundation for developing targeted interventions to support Vietnam's transition toward a low-carbon, sustainable future.

6. Policy Implications

For Vietnam's Environmental Policy:

Vietnam's environmental policies should prioritize enhancing energy efficiency and promoting renewable energy adoption to reduce CO2 emissions while supporting economic growth. Policymakers should strengthen incentives for cleaner technologies in industrial sectors and expand financial support for renewable energy projects. A key strategy is to implement stricter emissions standards for industries and encourage the adoption of low-carbon technologies through subsidies and tax breaks. Additionally, investments in research and development for green energy solutions, combined with public awareness campaigns, can foster long-term shifts toward sustainable energy consumption. Improving governance and monitoring systems to ensure compliance with environmental regulations will further enhance emissions efficiency.

For Urban Planning

Urban planning should integrate energy-efficient infrastructure and prioritize sustainable transportation systems to address the rising CO2 emissions associated with urbanization. Cities must focus on increasing public transit availability, developing walkable urban areas, and implementing green building standards to minimize energy demand. Expanding renewable energy usage in urban areas, such as through solar installations and energy-efficient grids, is critical for sustainable urban growth. Furthermore, urban planners should promote mixed-use developments that reduce the need for long commutes, thereby lowering transportation-related emissions. These initiatives, paired with robust policies supporting urban greening and waste management systems, will help Vietnam manage urban growth while minimizing its environmental footprint.

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WHAT DRIVES GREEN PURCHASE INTENTIONS? ECONOMIC IMPLICATION FOR ENTERPRISES

PhD. Le Thi Thoan* - Nguyen Hoang Nhut* - Tran Le Nguyen**
MSc. Tran Phan Doan Khanh***

Abstract: ***This study investigates key drivers of green purchase intentions among consumers in Ho Chi Minh City, in the context of increasing awareness of sustainability and the green transition. It focuses on three main factors: Drive for Environmental Responsibility, Green Brand Love, and Greenwashing. In addition, the study examines the mediating role of brand love in shaping consumer behavior. Based on survey data from 371 respondents and analysis using SmartPLS software, the findings reveal that all three factors significantly influence green purchase intentions, with Drive for Environmental Responsibility being the strongest predictor. These findings offer not only academic insights into sustainable consumer behavior but also practical economic implications for enterprises seeking to build transparent marketing strategies, enhance consumer trust, and improve their competitive advantage in the green economy.***

• Keywords: *drives, green purchase intentions.*

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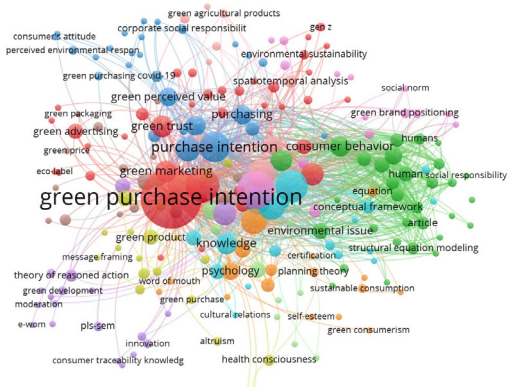
1. Introduction

In recent years, global environmental issues such as climate change, air pollution, and global warming have become increasingly severe, directly impacting ecosystems and human quality of life (Robinson, 2025). In response to this reality, many enterprises have proactively shifted toward sustainable development by "greening" their production and marketing activities. As a result, environmentally friendly products have gained greater attention and become a top priority for consumer choice. A bibliometric analysis using the Scopus database and VOSviewer software (Figure 1) indicates that various factors influence green purchase intention (GPI), including green marketing, green advertising, trust, environmental knowledge, consumer behavior, and brand-related emotions.

Building on this context, the present study focuses on analyzing the factors influencing green purchase intention (GPI) in Ho Chi Minh City, a dynamic and highly competitive market currently witnessing a growing trend in green consumption. Specifically, the research examines the roles of environmental responsibility drive, green brand love, and greenwashing behavior, while also exploring the mediating effect of green brand love in shaping green purchase intention.

Figure 1: Bibliometric analysis of studies related to green purchase intention



2. Theoretical foundation and research model

2.1. Theoretical Background

Concept of Green Purchase Intention

Green purchasing reflects the consumer trend of choosing products that have a positive or less harmful impact on the environment throughout their life cycle. In this context, green fast-moving consumer goods (FMCGs) refer to products made from natural or recycled materials, produced using resource-efficient and low-emission processes, and packaged with recyclable or biodegradable materials (Sharma & Bhardwaj, 2021).

** HUTECH University; Corresponding author, email: lt.thoan@hutech.edu.vn*
*** The Business School, RMIT University*
**** Tien Giang University*

Theory of Reasoned Action (TRA)

The Theory of Reasoned Action (Ajzen & Fishbein, 1980) explains the relationship between attitudes, social norms, and behavior. In green consumption, this theory is widely applied to analyze factors influencing environmentally friendly behavior. Studies have shown that green attitudes, values, and beliefs positively affect the intention to purchase green products (Zhuang et al., 2021), suggesting that TRA is a suitable theoretical foundation for predicting consumer behavior in the context of sustainable consumption.

2.2. Hypotheses and research model

Drive for Environmental Responsibility and Green Purchase Intention

The drive for environmental responsibility reflects an individual's commitment to protecting the environment through both awareness and concrete actions (Gadenne et al., 2011). When consumers are aware of the consequences of environmental degradation, they tend to adopt more environmentally friendly behaviors, including a preference for green products. Therefore, the following hypothesis is proposed:

H1: Drive for environmental responsibility has a positive effect on green purchase intention.

Greenwashing and Green Purchase Intention

Several studies suggest that, at the initial stage, green messages may generate a favorable impression of brands and products, especially when consumers are unable to detect greenwashing behaviors (Delmas & Burbano, 2011; Nyilasy et al., 2014). Visual and verbal elements in green advertisements can evoke positive emotions, thereby encouraging purchase intentions (Holbrook & Hirschman, 1982). Thus, the following hypothesis is proposed:

H2: Greenwashing has a positive effect on green purchase intention.

Greenwashing and Green Brand Love

When consumers fail to detect manipulative cues in green advertising, they may develop positive emotions and attachment toward the brand, regardless of the authenticity of the message (Delmas & Burbano, 2011). As such, greenwashing may contribute to the formation of brand love. The following hypothesis is proposed:

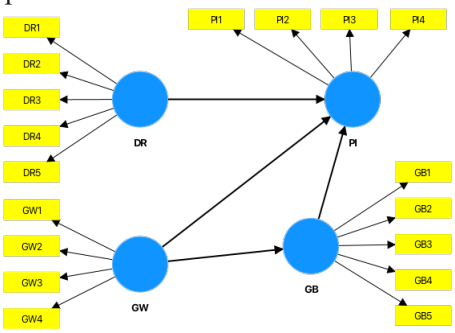
H3: Greenwashing has a positive effect on green brand love.

Green brand love and green purchase intention

According to Ajzen and Fishbein (1980), positive emotions play an important role in the formation of behavioral intentions. When consumers develop brand love, they are more likely to maintain a relationship with the brand through repeat purchasing behavior. In the context of green consumption, brand love not only reflects emotional attachment but also motivates the intention to purchase environmentally friendly products. A recent study by Zaid and Bawaqnee (2024) highlights green brand love as a key mediating factor linking advertising to green purchase behavior. Therefore, the following hypothesis is proposed:

H4: Green brand love has a positive effect on green purchase intention.

Based on this, the proposed research model is developed as follows:



Note: DR-Drive for environmental responsibility; GW-Greenwashing; GB-Green brandlove; PI-Green purchase intention.

3. Research methodology

This study employed a convenience sampling method, with the sample size determined based on the guidelines of Tabachnick & Fidell (2013). The survey was conducted with 381 individuals in Ho Chi Minh City who were interested in factors influencing green purchase intention. After data cleaning, 371 valid responses were used for analysis. The data were processed using SmartPLS software, applying analyses such as: Cronbach's Alpha reliability, convergent and discriminant validity, structural model testing, multicollinearity assessment, adjusted R^2, and f^2 effect size to determine the influence level of each variable and identify any potential omitted variables in the model.

4. Research results

4.1. Results of cronbach's alpha analysis

The reliability of the scales was assessed using Cronbach's Alpha coefficient, with results indicating that all variables met the acceptable reliability threshold (Cronbach's Alpha $\geq$ 0.7). Additionally, Average Variance Extracted (AVE) values were all $\geq$ 0.50, indicating good convergent validity of the scales (Chin, 1998).

Table 4.1: Summary of composite reliability and cronbach's alpha results

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
DR	0.836	0.837	0.884	0.603
GB	0.913	0.918	0.935	0.742
GW	0.862	0.867	0.906	0.707
PI	0.846	0.846	0.896	0.684

4.2. Convergent validity assessment

Table 4.2: Results of convergent validity assessment

	DR	GB	GW	PI
DR1	0.759			
DR2	0.778			
DR3	0.812			
DR4	0.757			
DR5	0.777			
GB1		0.875		
GB2		0.880		
GB3		0.850		
GB4		0.840		
GB5		0.862		
GW1			0.843	
GW2			0.836	
GW3			0.847	
GW4			0.837	
PI1				0.830
PI2				0.833
PI3				0.819
PI4				0.827

Convergent validity reflects the high correlation among observed variables that belong to the same construct (Bagozzi, Yi, & Phillips, 1991). When evaluating convergent validity, researchers often consider the outer loadings of each indicator and the Average Variance Extracted (AVE). According to established criteria, observed variables should have an outer loading ≥ 0.7 to be considered appropriate. Based on the SmartPLS analysis, all items have loadings above 0.7, indicating that all are accepted, and the measurement scales meet the requirement for convergent validity.

4.3. Discriminant validity assessment

Table 4.3: Discriminant validity test (Heterotrait-Monotrait Ratio - HTMT Matrix)

	DR	GB	GW	PI
DR				
GB	0.508			
GW	0.496	0.294		
PI	0.673	0.486	0.439	

According to Henseler et al. (2015), the Heterotrait-Monotrait ratio (HTMT) is proposed as a reliable criterion for assessing discriminant validity between constructs, with an acceptable threshold of below 0.90. The results presented in Table 4.3 indicate that all HTMT values are below 0.90, confirming that the measurement scales in the research model meet the requirement for discriminant validity.

Table 4.4: Discriminant validity assessment using Fornell-Larcker Criterion

	DR	GB	GW	PI
DR	0.777			
GB	0.444	0.861		
GW	0.426	0.267	0.841	
PI	0.567	0.430	0.377	0.827

According to the criterion proposed by Fornell and Larcker (1981), discriminant validity is confirmed when the square root of the AVE for each latent construct is greater than the correlations between that construct and any other construct in the model. The results in the table show that the diagonal values (square roots of AVE) are greater than the corresponding correlation coefficients in the same column, indicating that the measurement scales meet the discriminant validity criterion.

Table 4.5: Structural model assessment results

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
DR -> PI	0.413	0.404	0.111	3.714	0.000
GB -> PI	0.208	0.214	0.105	1.984	0.047
GW -> GB	0.267	0.275	0.081	3.300	0.001
GW -> PI	0.145	0.149	0.065	2.237	0.025

The path coefficients range from [-1;1]. Table 4.5 shows that all coefficients fall within the standard range, are positive, and approach 1, indicating strong positive relationships between the variables in the model. To test for statistical significance, the study employed the bootstrapping technique. Coefficients are considered statistically significant when $t > 1.96$ (corresponding to $p < 0.05$). The results confirm that all relationships in the model are statistically significant.

4.5. Model reassessment using PLS-SEM

Multicollinearity assessment

The model was reassessed using the PLS-SEM method to ensure the reliability and explanatory power of the variables. The multicollinearity test results indicate that all Variance Inflation Factor (VIF) values fall within a safe range (1.000-1.426), well below the exclusion threshold of 5, confirming no multicollinearity among the independent variables.

Table 4.6: Multicollinearity Test Results (Variance Inflation Factor - VIF)

	VIF
DR -> PI	1.426
GB -> PI	1.257
GW -> GB	1.000
GW -> PI	1.233

4.6. Evaluation of Adjusted R^2 Coefficient

The R^2 coefficient measures the predictive power of the model, reflecting the combined influence of exogenous variables on the endogenous variable (Hair et al., 2016). R^2 ranges from 0 to 1, with higher values indicating stronger predictive capability. In behavioral or exploratory studies, an R^2 value of 0.20 or higher is considered acceptable (Hair et al., 2017). Therefore, the findings reinforce the relationship between Green

Brand Love (GB) and Purchase Intention (PI) in the proposed theoretical model.

Table 4.7: Adjusted R^2 Coefficients

	R-square	R-square adjusted
GB	0.071	0.070
PI	0.378	0.376

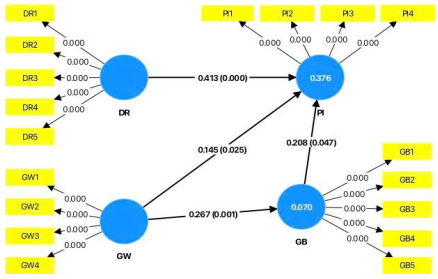
4.7. Evaluation of f^2 Effect Size

The f^2 statistic is used to assess the effect size of an independent variable on a dependent variable, with benchmark thresholds defined as: 0.35 (large), 0.15 (medium), and 0.02 (small) (Cohen, 1988). The results indicate that Drive for Environmental Responsibility (DR) exerts a moderate influence on Green Purchase Intention (PI) with $f^2 = 0.192$, while Green Brand Love (GB) and Greenwashing (GW) have smaller effects (f^2 values of 0.055, 0.077, and 0.028, respectively). These findings suggest that DR is a more significant factor in explaining variations in green purchase intention.

Table 4.6: Evaluation of f^2 effect sizes

	f-square
DR -> PI	0.192
GB -> PI	0.055
GW -> GB	0.077
GW -> PI	0.028

Thus, the research findings indicate that factors such as Drive for Environmental Responsibility (DR), Green Brand Love (GB), and Greenwashing (GW) all have statistically significant impacts on consumers' Green Purchase Intention (PI), with all relationships reaching a significance level of $p < 0.05$. Among these, DR exerts the strongest influence on PI, with a standardized beta coefficient of 0.413, suggesting it is the most important determinant of changes in consumers' purchase intention. This is followed by the effects of GB ($\beta = 0.208$) and GW ($\beta = 0.145$), both of which have moderate and positive impacts on PI. The final research model is presented as follows:



Note: DR - Drive for Environmental Responsibility; GW - Greenwashing; GB - Green Brand Love; PI - Green Purchase Intention.

5. Conclusion and managerial implications

This study contributes to clarifying the factors influencing green purchase intention (GPI) among consumers in Ho Chi Minh City, in the context where green transformation is becoming a development priority in modern economies. Based on the results of the PLS-SEM model, drive for environmental responsibility was identified as the most influential factor on green purchase intention ($\beta = 0.413$), highlighting the central role of personal awareness and ethical commitment in sustainable consumer behavior.

In addition, greenwashing despite being controversial still exhibited a positive effect on green purchase intention ($\beta = 0.267$), particularly in contexts where consumers are not yet able to critically assess the authenticity of environmental messages. More importantly, the study confirmed that green brand love is not only influenced by greenwashing but also significantly affects green purchase intention ($\beta = 0.208$), playing a mediating role in translating green communication into actual consumer behavior. This indicates that brand-related emotions serve as a psychological mechanism capable of transforming communication effects into concrete economic actions.

From an economic perspective, the findings suggest that non-financial factors such as drive for environmental responsibility and green brand love can generate practical commercial value, promote green consumption, and enhance competitive advantage. Therefore, businesses must not only communicate appealing green messages but also ensure authenticity and transparency to build long-term consumer trust. Overusing greenwashing may yield short-term benefits but entails significant risks, such as decreased brand loyalty and brand equity, which can adversely affect long-term business performance.

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THE IMPACT OF TRANSFORMATIONAL LEADERSHIP STYLE, PROACTIVE PERSONALITY AND JOB COMMITMENT ON THE JOB PERFORMANCE OF FACULTY MEMBERS AT VIETNAMESE UNIVERSITIES

PhD. Dao Tuyet Lan* - MSc. Le Thi Mai Huong**

Abstract: ***This study examines the relationship between the dependent variable: job performance (HSCV) of faculty members at Vietnamese universities, and the independent variables: transformational leadership style (LDCD), job commitment (CCCV), and proactive personality (TCCD). The research is based on primary data collected through surveys of 316 faculty members from various universities in Vietnam, conducted from February to April 2024. EFA analysis results indicate that all three independent variables, LDCD, CCCV, and TCCD, positively and significantly impact faculty job performance at the 1% significance level. Specifically, transformational leadership style and job commitment are the primary drivers of job performance, while a proactive personality contributes the least to improving work performance.***

• Keywords: *job performance, transformational leadership style, proactive personality, job commitment.*

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1. Introduction

Proactive personality is a personality construct that has been extensively studied and applied in education and economics. Over the past few decades, research has shown deep interest in the impact of proactive personality on individual work performance. This personality construct is one of the most widely researched in management and behaviour. It is considered a relatively stable disposition of an individual that changes their work performance. Proactive individuals have the potential and ability to overcome their career limitations by taking initiative, exploring available opportunities, and persisting until meaningful changes occur. They are described as pathfinders, discovering new ways to solve problems. The literature on proactive personality has growing value in predicting various behavioural outcomes, such as job crafting, information and feedback-seeking, accountability (Fuller & Marler, 2009), voice behaviour, and communication effectiveness. Additionally, other evidence indicates that proactive personality affects job satisfaction and engagement, job performance, extra-role behaviour, and career success (Converse et al., 2012).

Proactive personality is a critical factor in enhancing individual creativity within organizations, and organizations that emphasize proactivity can achieve more tremendous success if they attract individuals with these traits. Highly proactive individuals defined as those who take planned actions to influence themselves and their environment (Grant & Ashford, 2008) are more likely to act in advance and engage in change-oriented, focused, and meaningful actions to alter themselves, others and the communities or organizations in which they reside. While existing literature has significantly contributed to understanding the benefits of proactivity in organizations, this topic has yet to be systematically integrated, particularly regarding its relationship to transformational leadership and employee training in the academic profession.

According to leading career models in today's career research, academics must demonstrate proactivity and self-direction to succeed in their careers. In higher education, services are created through personal interactions between faculty and students, highlighting the importance of a proactive personality in this field. That is, the

** Van Lang University; email: lan.dt@vlu.edu.vn*
*** Ly Tu Trong College Ho Chi Minh City; email: maihuonglegv@gmail.com*

personality traits of faculty members are key factors determining the quality of their relationships with students and student satisfaction (Ekinci & Dawes, 2009). Proactive faculty members are more likely to align with the organization and their job when the work involves high levels of specialization (e.g., scientific research, curriculum development, teaching). These roles also encourage proactivity, a fundamental trait required for those who lead others. The increasingly important role of creativity and job commitment in achieving and maintaining high levels of competitiveness and work performance among faculty members has prompted the need to focus on the relationship between proactive personality creativity, and job commitment work performance. Research on this issue helps better understand the role of proactive personality in the work performance of faculty members.

This study is structured into five main sections. Section 1 introduces and provides the study's rationale, scope, contributions, and uniqueness. Section 2 offers a literature review through a summary of related studies. This section will discuss the theoretical framework used in this research and the concepts related to the variables in the research model, leading to the development of research hypotheses. Section 3 discusses the research model, data collection methods, and methodology. Section 4 interprets the empirical research results. In Section 5, the study's findings will be discussed in-depth, and theoretical and managerial implications will be proposed.

2. Literature review

Performance is a category widely used across all economics, engineering, and social sciences fields. In economics, performance is the degree of success that production units achieve in allocating input resources to optimize output, reflecting the efficiency in using resources (human, financial, material, and capital) to meet specific objectives. Work performance represents the correlation between the results obtained and the total costs incurred to achieve those results, reflecting the quality of activity the more significant the difference between these two quantities, the higher the performance (Pietro & Luca, 2014).

Theoretical arguments also suggest that a proactive personality influences work performance through job crafting and awareness. This idea aligns with Thompson (2005), who pointed out that individuals with proactive personalities perform well because they take personal initiative and engage in networking. Previous studies have demonstrated a positive, direct relationship between proactive personality and work performance, and thus, this direct connection is incorporated into the study's theoretical model. The study expects that transformational leadership and job commitment will also impact work performance.

There are several reasons engaged employees perform better than disengaged ones (Demerouti & Cropanzano, 2010), but one of the most compelling arguments is that engaged employees tend to experience positive emotions, including happiness, joy, and enthusiasm. These resources may include physical resources (e.g., physical skills, health), social resources (e.g., friendships, social support networks), intellectual resources (e.g., knowledge, executive control), or psychological resources (e.g., self-efficacy, optimism). These personal resources can be used to meet job demands and perform well. The number of studies showing a positive relationship between employee engagement and work performance is increasing. For instance, Halbesleben and Wheeler (2008) showed that among American employees, their closest supervisors and colleagues across various industries and professions, engagement with work significantly contributed to explaining differences in work performance after controlling for job attachment factors. Salanova et al. (2005) conducted a study among employees working in restaurants and hotels in Spain. Frontline employees (N = 342) from 58 hotel receptions and 56 restaurants provide information about organizational resources, engagement, and service environment. Additionally, these units' customers (N = 1140) provided information on employee performance and customer loyalty. Structural equation modelling analyses supported the full mediation model in which organizational resources and job engagement predicted the service environment, predicting employee performance and customer loyalty.

3. Methodology

3.1. Model

Hypothesis

A proactive personality recognizes opportunities, takes action, and persists until a significant change is achieved (Crant, 1995). These individuals are also seen as taking the initiative to improve or create new

conditions (Crant, 1995). Nowadays, innovation-driven companies create conditions that encourage, evaluate, and reward proactive behaviours among employees. Recruiting proactive personalities or enhancing employees' proactivity are two ways to foster creativity and commitment in the workplace, thereby increasing employee performance. In the study by Greguras and Diefendorff (2010) involving 165 employees and supervisors, it was shown that proactive personality predicts job performance and organizational citizenship behaviours (e.g., altruism, courtesy, and sportsmanship) through need satisfaction. Seibert et al. (2001) used a data design from 180 full-time employees and their supervisors. Among other findings, they discovered that a proactive personality at Time 1 was positively related to innovation and career initiative at Time 2. According to Crant (2000), proactivity positively impacts employees' attitudes and behaviours because proactive individuals identify or create opportunities, facilitating improved individual or team performance.

H1: Proactive personality positively impacts the job performance of university faculty members in Vietnam.

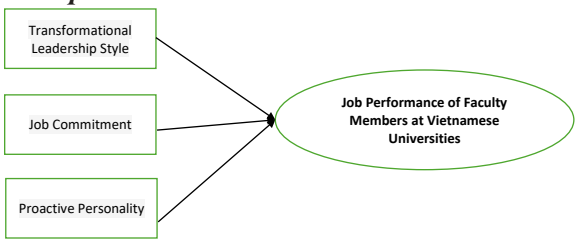
Transformational leadership is the exchange relationship between leaders and their subordinates based on contingent rewards. Transformational leaders are defined as those who positively envision future scenarios for the organization, mainly engage in boosting employees' confidence by helping them recognize their potential, communicate the organization's achievable mission and vision to employees, and work with them to meet their needs. While traditional leadership focuses on the exchange relationship between leaders and subordinates, transformational leadership goes beyond these immediate personal benefits. Transformational leadership emphasizes the leader's symbolic behaviours (e.g., inspirational messaging, vision, and values) instead of economic transactions between the leader and employees. Transformational leaders focus employees' attention on the long-term goals of the group or organization and instil a sense of higher purpose. Employees internalize the leader's values and perceive their work as aligning with their self-concept. Some perspectives suggest that transformational leadership can elevate employees beyond their self-interests by changing their spirit, ideals, interests, and values, motivating them to perform better than initially expected (Pieterse et al., 2010). Thus, good leadership is essential for optimal employee performance and for promoting positive employee behaviours.

H2: Transformational leadership positively impacts the job performance of university faculty members in Vietnam.

Job commitment is a positive, fulfilling, work-related state of mind characterized by dedication and enthusiasm. In essence, job commitment reflects how workers experience their jobs: it is stimulating, energizing, and something they genuinely want to devote their time and effort to (vigour component); as a significant and meaningful pursuit (dedication); and as something they are fully absorbed in (Bakker et al., 2012), thereby enhancing job performance. Qualitative studies have revealed that engaged employees are competent individuals with solid self-efficacy and exemplary job performance. Employees who optimize their job demands and resources can be expected to work in a challenging and resourceful environment. Several studies have indicated that such environments facilitate job engagement, enhancing job performance.

H3: Job commitment positively impacts the job performance of university faculty members in Vietnam.

Proposed model



Source: Author's proposal

3.2. Methodology

The research employs appropriate analytical tools for processing primary data, including reliability testing of the measurement scale and hypothesis testing through the least squares method model. Exploratory Factor Analysis (EFA) is used for each variable to ensure that observed variables measuring the same latent variable load onto the correct factor, without cross-loading, and to remove any unsuitable measurement criteria to avoid multicollinearity among latent variables. Specifically, reliability is assessed using Cronbach's alpha, with a requirement of alpha > 0.6 and an item-to-total correlation > 0.3, ensuring reliability. The study conducts linear regression analysis based

on the following regression equation:

$$HSCV = \beta_0 + \beta_1 LDCD + \beta_2 CCCV + \beta_3 TCCD + \varepsilon$$

The dependent variable HSCV, represents the job performance of lecturers at Vietnamese universities. The independent variables are as follows: LDCD represents the transformational leadership style variable; CCCV is the job commitment variable; TCCD is the proactive personality variable; ε refers to the standard deviation error in the regression model.

3.3. Data

The research is based on primary data collected through surveys conducted between February 2024 and April 2024. The author sent 350 online surveys via email (Google Forms) to lecturers at Vietnamese universities. After excluding 34 invalid responses, 316 valid samples were collected for formal analysis. According to Bolen (1989), at least five observations should be per estimated parameter (5:1 ratio). With 16 observed variables, the minimum sample size required by this method is 16*5 = 80. The study's sample size 316 ensures reliability and high representativeness for the population.

4. Results

Table 1. Results of reliability testing for the measurement scales in the model

Factor	Scale mean if item deleted	Scale variance if item deleted	Corrected item-total correlation	Cronbach's alpha if item deleted	Cronbach's alpha
LDCD1	10.14	3.308	.577	.739	0.784
LDCD2	10.10	3.219	.573	.740	
LDCD3	10.09	3.197	.565	.745	
LDCD4	10.15	2.902	.650	.700	
CCCV1	9.50	3.203	.635	.797	0.831
CCCV2	9.39	3.076	.661	.785	
CCCV3	8.88	2.792	.720	.757	
CCCV4	8.77	2.974	.624	.803	
TCCD1	10.21	3.459	.657	.810	0.842
TCCD2	10.22	3.598	.679	.799	
TCCD3	10.22	3.517	.685	.796	
TCCD4	10.28	3.687	.691	.795	
HQCV1	10.14	4.609	.791	.886	0.910
HQCV2	10.05	4.829	.747	.901	
HQCV3	10.16	4.784	.784	.888	
HQCV4	10.13	4.621	.866	.859	

Source: Calculated results from SPSS 25 software

Table 1 shows that all observed variables have Cronbach's alpha coefficients greater than 0.8, indicating high reliability of the measurement scales. Additionally, all observed variables have item-to-total correlation coefficients greater than 0.3, so all observed variables are accepted.

After Component 3, the total accumulated variance ratio reaches 65.515%, indicating that the first three components account for a large portion of the variation in the data. Three factors were extracted through exploratory factor analysis, with an Eigenvalue of 1.851 (>1). The KMO value is 0.797, close to 1, indicating the data is suitable for factor analysis. Bartlett's test for data suitability provides a p-value of 0.000, rejecting the null hypothesis (H0) and confirming that the data is appropriate for factor analysis.

Table 2. Total variance explained

Component	Initial eigenvalues			Extraction sums of squared loadings		
	Total	% of variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.686	30.715	30.715	3.686	30.715	30.715
2	2.325	19.375	50.090	2.325	19.375	50.090
3	1.851	15.424	65.515	1.851	15.424	65.515
4	.683	5.693	71.208			
5	.603	5.024	76.232			
6	.533	4.438	80.670			
7	.491	4.095	84.765			
8	.436	3.630	88.395			
9	.395	3.290	91.685			
10	.370	3.084	94.769			
11	.338	2.814	97.583			
12	.290	2.417	100.000			

Kaiser-Meyer-Olkin Measure of Sampling Adequacy: 0.797; df: 66; Sig.: 0.000

Source: Calculated results from SPSS 25 software

Table 3. Rotated component matrix

	Component		
	1	2	3
LDCD1			.753
LDCD2			.765
LDCD3			.762
LDCD4			.811
CCCV1		.780	
CCCV2		.808	
CCCV3		.854	
CCCV4		.782	
TCCD1	.798		
TCCD2	.822		
TCCD3	.811		
TCCD4	.818		

Source: Calculated results from SPSS 25 software

The rotated component matrix shows a clear structure with three main components identified. Component 1 relates to the variables TCCD1, TCCD2, TCCD3, and TCCD4, with high loadings (ranging from 0.798 to 0.822). Component 2 includes the variables CCCV1, CCCV2, CCCV3, and CCCV4, with loadings ranging from 0.780 to 0.854. Component 3 contains the variables LDCD1, LDCD2, LDCD3, and LDCD4, with loadings from 0.753 to 0.811.

Table 4. Regression model testing results

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-.453	.275		-1.650	.100		
	LDCD	.436	.059	.354	7.423	.000	.952	1.051
	CCCV	.469	.062	.368	7.623	.000	.927	1.079
	TCCD	.277	.056	.242	4.907	.000	.891	1.123

Durbin-Watson: 1.708

Sig: 0.000; Adjusted R Square: 0.422

Source: Calculated results from SPSS 25 software

The results show that the Adjusted R Square value is 0.422, meaning the independent variables can explain approximately 42.2% of the variation in work performance. This is a good indicator, showing that the regression model has good explanatory power.

The Durbin-Watson value is 1.708, falling within the range of 1.5 to 2.5, indicating no severe autocorrelation in the errors.

All VIF values are below 2, indicating no multicollinearity issues.

First, transformational leadership style (LDCD) significantly influences HSCV, with a regression coefficient 0.436. This indicates that lecturers' work performance increases accordingly as transformational leadership improves. Leaders with this style typically inspire and motivate employees, fostering a more positive work environment, thus accepting hypothesis H1.

Second, job commitment (CCCV) also strongly impacts HSCV, with a coefficient of 0.469. High commitment from lecturers helps them focus on their work and enhances their sense of responsibility and attachment to the organization, thereby improving work performance and accepting hypothesis H2.

Lastly, proactive personality (TCCD) has a regression coefficient of 0.277, indicating that proactive lecturers can better manage and improve their work performance. Although the effect of TCCD is smaller than the other two variables, it still contributes to improving work performance, underscoring the importance of encouraging lecturers to develop a proactive personality, thus accepting hypothesis H3.

5. Conclusion

The study examines the relationship between the dependent variable, HSCV (work performance of lecturers at Vietnamese universities), and the independent variables: LDCD (transformational leadership style), CCCV (job commitment), and TCCD (proactive personality). The results indicate that transformational leadership style (LDCD), job commitment (CCCV), and proactive personality (TCCD) all have positive and significant impacts on the work performance of lecturers at Vietnamese universities at a 1% significance level. Specifically, transformational leadership style and job commitment are the main factors driving performance, while a proactive personality makes the most negligible contribution. These findings highlight the importance of a supportive work environment encouraging lecturers' personal development. From these results, the study proposes several policy implications:

First, enhancing leadership training. Universities should organize leadership training programs for managers to develop transformational leadership styles. This improves leadership capacity and creates a positive working environment that encourages lecturers to maximize their potential.

Second, developing job commitment programs. Policies encouraging job commitment should be established, including opportunities for promotion, rewards for outstanding lecturers, and team-building activities.

Third, promoting a proactive personality. Universities should encourage lecturers to develop proactive personalities through personal development programs and promote self-learning. This could include providing learning resources, organizing workshops, and soft skills courses.

Fourth, evaluating and tracking performance. Universities should establish regular performance evaluation systems to adjust policies and training programs to meet practical needs and improve lecturers' work performance. By implementing these policies, universities will improve lecturers' work performance and contribute to the sustainable development of the entire education system.

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FACTORS AFFECTING THE WORK-LIFE BALANCE OF FEMALE LECTURERS: A CASE STUDY AT THE UNIVERSITY OF LABOUR AND SOCIAL AFFAIRS

PhD. Ha Duy Hao* - PhD. Pham Van Thieu*

Abstract: ***This study develops and empirically tests a model of five factors influencing the work-life balance of female lecturers, based on a case study at the University of Labour and Social Affairs. Utilizing a quantitative research methodology, the study analyzes data collected from a sample of 145 female lecturers at the institution. The findings reveal five significant factors affecting their work-life balance: Role Overload (RO), Quality of Health (QoH), Time Management (TM), Support Network (SN), and Dependent Care (DC). Based on these results, the study proposes policy implications for the university and relevant stakeholders to better support female lecturers in achieving work-life balance, thereby enhancing their professional contributions.***

• Keywords: *female lecturers; work-life balance; university; the university of labour and social affairs.*

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1. Introduction

In the contemporary socio-economic landscape, the profound interplay between professional and personal life has elevated work-life balance (WLB) to a topic of increasing scholarly and managerial significance. Achieving this equilibrium is not only crucial for the health and well-being of employees but also directly influences their engagement and performance, thereby determining the sustainable development of an organization. Escalating job pressures, extended working hours, and the pervasive influence of technology have rendered the attainment of WLB a considerable challenge for workers across numerous sectors.

Within the higher education sector, these pressures are particularly acute. The academic profession, traditionally perceived as offering ample time for family, now confronts escalating demands for teaching excellence, scientific research capabilities, and international publications. For female lecturers in Vietnam, this challenge is magnified by societal prejudices and traditional gender roles. They often bear a "double burden," striving for academic career advancement while fulfilling domestic responsibilities as wives and mothers. This predicament places female lecturers at a high risk of role conflict, which adversely affects both their professional careers and personal lives.

Although numerous domestic and international studies have investigated the WLB of teachers and lecturers, such as the work of Umma & Zahana (2021) in Sri Lanka and Tran Cam Tu et al. (2023) in Hanoi, a significant research gap persists. Previous studies have typically focused on teachers in general or have been conducted in multidisciplinary settings. In-depth research into the specific factors affecting the WLB of female lecturers within a specialized social sciences institution like the University of Labour and Social Affairs where female staff and lecturers constitute over 70% of the workforce remains notably limited.

Stemming from this analysis, the primary objective of this paper is to identify and analyze the factors influencing the work-life balance of female lecturers at the University of Labour and Social Affairs.

2. Theoretical framework on factors affecting the work-life balance of female university lecturers

2.1. Role overload

Role overload among female lecturers occurs when they are required to undertake multiple roles and responsibilities that exceed their capacity and

* *University of Labour and Social Affairs; haoulsa@gmail.com - thieupv.ulsa@gmail.com*

available time. This condition can lead to stress, fatigue, and diminished job performance and satisfaction.

2.2. Quality of health

Quality of health reflects the overall well-being of female lecturers, which may be compromised as they often prioritize professional and family responsibilities over self-care. It encompasses not only the absence of illness but also the ability to perform daily tasks, maintain social relationships, and experience a sense of happiness.

2.3. Time management

Time management for female lecturers involves the effective organization, allocation, and utilization of time to fulfill their duties in teaching, scientific research, community service, and personal development.

2.4. Dependent care

Dependent care constitutes a significant family role for female lecturers, alongside their professional responsibilities. Dependents may include children, parents, spouses, siblings, or other relatives who are unable to care for themselves due to age, illness, disability, or other serious conditions.

2.5. Support network

The support network of female lecturers comprises the relationships and resources they can rely on for assistance, encouragement, and aid in both their professional and personal lives.

2.6. Work-life balance of female lecturers

In recent decades, researchers have shown considerable interest in the health and well-being of the workforce, leading to increased attention on work-life balance as a critical determinant of employee happiness. Greenhaus et al. (2003) defined work-family balance as the extent to which individuals are equally engaged in and satisfied with their work and family roles. According to Padma & Reddy (2013), the work-life balance of lecturers merits special consideration due to the nature of their profession, which often extends beyond the university campus into their homes for preparation and research. Jumoke & Oyebanji (2016) noted that lecturers frequently dedicate extensive hours to their work, leaving limited time for other essential life aspects, thus creating an imbalance with negative consequences for themselves, their students, and the institution. Based on this theoretical foundation, this study conceptualizes the work-life balance of female lecturers as a positive state wherein they can effectively organize and manage their time to successfully fulfill their responsibilities at work, within their families, and in their communities.

3. Research hypotheses and model on factors affecting the work-life balance of female university lecturers

3.1. Research hypotheses

The investigation into factors influencing the work-life balance (WLB) of female lecturers is framed by foundational theories in social sciences and management.

Role theory posits that individuals assume multiple social roles (e.g., lecturer, mother, wife), and conflict arises when the expectations and demands of these roles are incompatible. Concurrently,

Scarcity theory asserts that personal resources such as time and energy are finite; consequently, when these limited resources must be allocated across numerous roles, competition and conflict become inevitable. Complementing these perspectives, Hobfoll's (1989)

Conservation of resources (COR) theory highlights the human tendency to accumulate, protect, and maintain resources. Psychological stress emerges when these resources are threatened, lost, or not replenished after investment. Collectively, these theories provide a robust framework for analyzing and formulating hypotheses regarding the relationship between various factors and the WLB of female lecturers.

Female lecturers in the modern academic environment frequently encounter role overload, as they must simultaneously perform three primary functions—teaching, scientific research, and community service—in addition to their familial roles. According to Role Theory, the overlap and sometimes conflicting demands of these roles inevitably lead to conflict. When a heavy workload is combined with substantial family responsibilities, finite resources like time and energy are excessively depleted, consistent with the principles of Scarcity Theory. This situation engenders stress and exhaustion, thereby diminishing the capacity to focus on both professional and personal domains. Empirical studies have consistently demonstrated this inverse relationship, identifying role overload as a significant negative predictor of WLB. Accordingly, the following hypothesis is proposed:

H1: Role overload has a negative effect on the work-life balance of female lecturers.

Beyond external demands, internal resources play a decisive role. Quality of health, both physical and mental, is a core personal resource according to COR Theory. Good health provides the necessary energy and resilience to cope with pressures from multiple roles. Conversely, diminished health reduces an individual's capacity to manage stress, exacerbating work-life imbalance. Similarly, effective time management skills are considered a personal resource that optimizes the use of the scarce commodity of time (Scarcity Theory). The ability to organize and prioritize tasks systematically enables female lecturers to complete their responsibilities without extending work hours, thus mitigating stress and creating space for personal life. Empirical research supports the positive correlation of these two factors with WLB. Based on this reasoning, the next two hypotheses are proposed:

H2: Quality of health has a positive effect on the work-life balance of female lecturers.

H3: Time management has a positive effect on the work-life balance of female lecturers.

In contrast to factors that deplete resources are those that help conserve and augment them. COR Theory suggests that a support network from family and colleagues is a crucial social resource. This support can be emotional (e.g., listening, sharing), instrumental (e.g., assisting with tasks), or informational (e.g., offering advice). Access to such support provides female lecturers with additional resources to manage stress and alleviate the burden of work and family responsibilities, thereby preserving their personal energy. Research by Fatima & Sahibzada (2012) and Adekoya et al. (2021) confirms that support from both family and the workplace positively impacts WLB. Therefore, the following hypothesis is proposed:

H4: Support network has a positive effect on the work-life balance of female lecturers.

Among family roles, dependent care (e.g., for young children or elderly parents) is one of the most resource-intensive responsibilities, representing a specific manifestation of role pressure. According to Scarcity Theory, the time and mental energy devoted to caregiving reduce the resources available for professional duties and other personal activities. In the Vietnamese cultural context, this responsibility is often heavily placed on women, making it difficult for them to fully dedicate themselves to their careers. Studies by Fernando & Umma (2016) and Feeney & Stritch (2017) have indicated that childcare responsibilities negatively affect women's WLB and career advancement opportunities. Thus, the following hypotheses can be formulated:

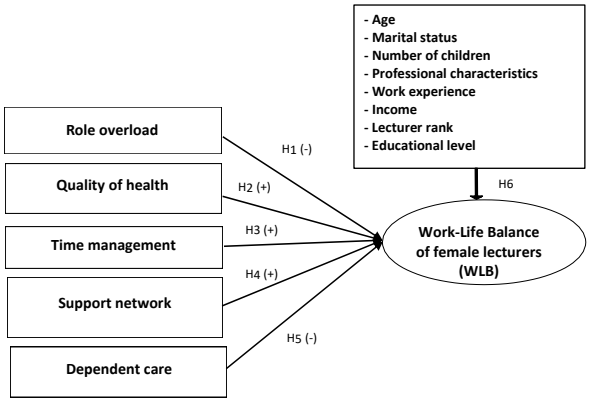
H5: Dependent care has a negative effect on the work-life balance of female lecturers.

H6: The demographic control variables of female lecturers affect their work-life balance.

3.2. Research model

Based on the synthesis of Role Theory, Scarcity Theory, and Conservation of Resources Theory, this study proposes the research model depicted in Figure 1. The model illustrates the hypothesized relationships between the independent variables (Role Overload, Quality of Health, Time Management, Support Network, Dependent Care) and the dependent variable (Work-Life Balance of female lecturers), while also accounting for demographic control variables.

Picture 1. Proposed research model by the research team



4. Research methodology

The study was conducted in three phases: (1) preliminary qualitative research, (2) preliminary quantitative research, and (3) formal quantitative research.

The measurement scales in this study consist of six primary constructs: (1) Work-Life Balance of female lecturers (WLB), (2) Role Overload (RO), (3) Quality of Health (QoH), (4) Time Management (TM), (5) Support Network (SN), and (6) Dependent Care (DC). The WLB scale was developed based on the work of Greenhaus et al. (2003), comprising three observed variables (WLB1, WLB2, WLB3). The scales for Role Overload (six observed variables:

RO1-RO6), Quality of Health (four observed variables: QoH1-QoH4), and Dependent Care (five observed variables: DC1-DC5) were adapted from Mathew and Panchanatham (2011). The Support Network (SN) scale, divided into two dimensions - support from colleagues (SFC1-SFC4) and support from family (SFF1-SFF4) - was adapted from Caplan et al. (1980). All observed variables were measured using a five-point Likert scale, ranging from 1 (Strongly Disagree) to 5 (Strongly Agree).

Regarding the sampling method, a survey was administered to 150 female lecturers at the main campus of the University of Labour and Social Affairs in Hanoi between October and December 2024, using a random and convenience sampling technique. The sample size was determined based on the number of variables in the model. According to Hoang Trong and Chu Nguyen Mong Ngoc (2008), a sample size that is at least four to five times the number of variables is considered adequate for factor analysis. With 30 measurement items in this study, the required sample size is 150 (30 items × 5). Consequently, considering practical constraints of time, personnel, and finances, the authors established a target sample size of 150 observations.

This research employed Partial Least Squares Structural Equation Modeling (PLS-SEM) to analyze the survey data. Primary data collected via questionnaires were processed using SPSS and SmartPLS 4.0. The PLS-SEM analysis involved a two-step evaluation process: assessment of the measurement model and assessment of the structural model.

5. Research results

5.1. Demographic profile of respondents

Out of 150 distributed questionnaires, 145 were deemed valid for analysis after eliminating incomplete or invalid responses, resulting in a response rate of 96.7%.

The descriptive statistics of the sample are as follows:

In terms of **age**, 29.7% of respondents were between 30 and 40 years old, 63.4% were between 41 and 50, and 6.9% were over 50.

Regarding **marital status**, 93.8% were married, 4.8% were single, and 1.4% reported another status.

As for the **number of children**, 86.9% had one or two children, 10.3% had three or more, and 2.8% had no children.

In terms of **professional characteristics**, 78.6% of respondents were primarily engaged in teaching and scientific research, while 17.2% held the position of Head of Department and 4.1% were Head of a Faculty.

The majority of participants had extensive **work experience**, with 62.8% having over 15 years of service and 33.1% having between 10 and 15 years.

The monthly **income** distribution showed that 40.0% earned between 15-20 million VND, 36.6% earned between 11-15 million VND, and 20.0% earned over 20 million VND.

For **lecturer rank**, 62.8% were Lecturers, 35.2% were Principal Lecturers, and 2.1% were Senior Lecturers.

Finally, regarding **educational level**, 49.7% held a Doctoral degree, 49.0% held a Master's degree, and 1.4% were Associate Professors.

5.2. Measurement model analysis

The measurement model, which includes 6 constructs and 26 observed variables, was analyzed. The results are presented in Table 1.

Table 1. Construct reliability and validity

Dimension	Indicator	Outer loadings	Cronbach's Alpha	C.R	AVE
Support from colleagues (SFC)	SFC 1	0,867	0,891	0,925	0,755
	SFC 2	0,901			
	SFC 3	0,894			
	SFC 4	0,812			
Support from family (SFF)	SFF 1	0,808	0,851	0,90	0,692
	SFF 2	0,848			
	SFF 3	0,879			
	SFF 4	0,79			
Dependent Care (DC)	DC2	0,775	0,772	0,854	0,597
	DC3	0,621			
	DC4	0,825			
	DC5	0,85			
Quality of Health (QoH)	QoH1	0,794	0,736	0,849	0,653
	QoH2	0,874			
	QoH4	0,752			
Role Overload (RO)	RO2	0,747	0,721	0,81	0,517
	RO3	0,77			
	RO5	0,685			
	RO6	0,67			
Time Management (TM)	TM1	0,548	0,799	0,865	0,623
	TM2	0,846			
	TM3	0,873			
	TM4	0,845			
Work-Life Balance of female lecturers (WLB)	SWLB1	0,894	0,865	0,917	0,787
	SWLB2	0,893			
	SWLB3	0,874			

The findings in Table 1 show that all outer loadings of the observed variables are greater than 0.7. Additionally, the Cronbach's Alpha

and Composite Reliability (C.R.) values for all constructs exceed the 0.7 threshold, and the Average Variance Extracted (AVE) for each construct is above 0.5. Therefore, the analysis confirms that the data possesses the necessary reliability and convergent validity.

Table 2 indicates that discriminant validity is established, as all Heterotrait-Monotrait (HTMT) ratio values are below the recommended threshold of 0.9.

Table 2. Discriminant validity

	Dependent Care (DC)	Quality of Health (QoH)	Role Overload (RO)	Time Management (TM)
Quality of Health	0,181			
Role Overload	0,772	0,160		
Time Management	0,140	0,861	0,186	
Work-Life Balance of female lecturers	0,546	0,697	0,473	0,660

5.3. Structural model analysis

First, the issue of multicollinearity was examined. Table 3 shows that all Variance Inflation Factor (VIF) values in this study are less than 3, indicating that there is no multicollinearity problem among the predictor constructs.

Table 3. VIF, f^2, and R^2 values

	R^2	Work-Life Balance of female lecturers (WLB)	
		f^2	VIF
Time Management (TM)	0,621	0,165	1,966
Support Network (SN)		0,100	1,175
Quality of Health (QoH)		0,083	1,97
Dependent Care (DC)		0,066	1,648
Role Overload (RO)		0,063	1,552

Kết quả cho thấy các giá trị R^2 > 62% mức độ giải thích của biến độc lập đối với sự biến thiên của biến phụ thuộc được chấp nhận. Kết quả cho thấy tất cả các liên kết có mức độ ảnh hưởng tương đối với f^2 > 0,02, cho thấy kích thước ảnh hưởng hợp. Kết quả đánh giá mô hình cấu trúc, bao gồm hệ số đường dẫn và giá trị p được trình bày trong Bảng 4.

The results indicate an R-squared (R^2) value greater than 0.621 (or 62%), which signifies a substantial level of explanatory power of the independent variables on the variance of the dependent variable. Furthermore, the analysis of effect size (f^2) reveals that all path coefficients have a meaningful impact, with f^2 values exceeding the 0.02 threshold.

Để kiểm tra các giả thuyết mô hình cấu trúc PLS được sử dụng. Trong nghiên cứu này, có năm giả thuyết tác động trực tiếp đã được đề xuất. Mức ý nghĩa 5% được đề xuất để làm căn cứ chấp nhận hoặc bác bỏ các giả thuyết. Bảng 4 cho thấy tác động trực tiếp, chúng cho thấy rằng tất cả các giả thuyết đều được chấp nhận.

The structural model assessment, including path coefficients and p-values, is presented in Table 4. To test the hypotheses, the PLS structural model was utilized. Five direct effect hypotheses were proposed in this study, with a significance level of 5% ($p < 0.05$) established as the criterion for acceptance or rejection. The results in Table 4 confirm that all five hypotheses are supported.

Table 4. The results of testing the research hypotheses

Hypothesis	Path relationship	β	P-values	Conclusion
H1	Role Overload (RO) -> Work-Life Balance of female lecturers (WLB)	- 0,192	0,002	Supported
H2	Quality of Health (QoH) -> Work-Life Balance of female lecturers (WLB)	0,249	0,001	Supported
H3	Time Management (TM)n -> Work-Life Balance of female lecturers (WLB)	0,351	0,000	Supported
H4	Support Network (SN) -> Work-Life Balance of female lecturers (WLB)	0,211	0,003	Supported
H5	Dependent Care (DC) -> Work-Life Balance of female lecturers (WLB)	- 0,204	0,002	Supported

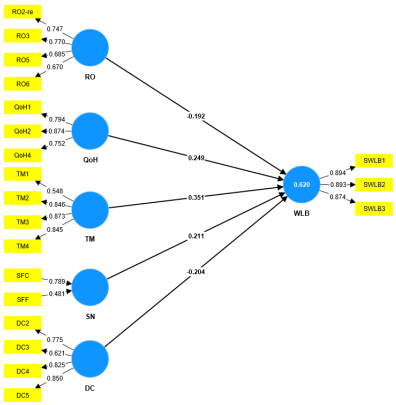
Specifically, the findings support the hypothesized relationships between the constructs. Quality of Health ($\beta = 0.249$, $p < 0.05$), Time Management ($\beta = 0.351$, $p < 0.05$), and Support Network ($\beta = 0.211$, $p < 0.05$) all have a significant positive influence on the work-life balance of female lecturers. Conversely, Role Overload ($\beta = -0.192$, $p < 0.05$) and Dependent Care ($\beta = -0.204$, $p < 0.05$) exhibit a significant negative impact. These results imply that enhancing health quality, time management skills, and support networks, while concurrently minimizing role overload and dependent care burdens, will improve the work-life balance for female lecturers. Among these factors, Time Management emerges as the most influential predictor.

Table 5. Assessment of control variables

Path relationship	Original sample (O)	Sample mean (M)	Standard Deviation - STDEV	T statistics (|O/STDEV|)	P values
Faculty-> WLB	0,419	0,186	0,505	0,828	0,408
Civil Status-> WLB	0,084	0,011	0,515	0,164	0,87
Age -> WLB	0,117	0,127	0,184	0,634	0,526
Number of children -> WLB	0,188	-0,02	0,607	0,309	0,757
Position -> WLB	-0,339	-0,16	0,282	1,202	0,23
Years of experience -> WLB	-0,208	-0,246	0,149	1,395	0,163
Monthly Income -> WLB	-0,187	-0,198	0,113	1,659	0,097
Lecturer Rank -> WLB	0,235	0,262	0,183	1,285	0,199
Educational qualifications -> WLB	0,262	0,318	0,231	1,134	0,257

Regarding the control variables, the analysis presented in Table 5 shows that their corresponding p-values range from 0.097 to 0.757, all of which are greater than the 0.05 significance level. Therefore, it is concluded that the demographic control variables do not have a statistically significant effect on the work-life balance of female lecturers. Figure 2 illustrates the final results of the tested model.

Figure 2. Results of the model test



5.4. Discussion of findings

The empirical results reveal the descending order of factors impacting the work-life balance of female lecturers as follows: Time Management, Support Network, Quality of Health, Dependent Care, and Role Overload.

The findings underscore the critical role of Time Management as the most potent factor. Following this, the Support Network is identified as the second most significant influence. A robust support system contributes to greater life satisfaction, enhances job performance, and fosters a sense of happiness derived from familial understanding and shared responsibilities.

The Quality of Health ranks third in importance. Health-related issues not only worsen work-life imbalance but also impede the career success of female lecturers. A higher level of health and a better work-life balance are directly linked to greater dedication to both domestic life and professional motivation, leading to more significant contributions. Conversely, increased working hours and stress can lead to physical ailments such as insomnia, anxiety disorders, and depression, which in turn may precipitate further health risks.

The final two factors, Dependent Care and Role Overload, also present significant negative impacts. These results collectively suggest that to achieve and maintain work-life balance, strategic focus should be placed on reducing role overload, enhancing health, promoting effective time management, strengthening support networks, and facilitating shared responsibility for dependent care.

6. Conclusion

This study aimed to investigate the influence of five factors - role overload, quality of health, time management, support network, and dependent care - on the work-life balance of female university lecturers. Based on a survey of 145 female lecturers at the University of Labour and Social Affairs and analyzed using the PLS-SEM method, the results confirm that all five factors significantly affect their work-life balance.

The research offers important contributions to both theory and practice. Theoretically, it provides empirical evidence for a model of factors influencing the WLB of female lecturers within the specific context of a social sciences university in Vietnam. Practically, the findings and recommendations serve as a valuable scientific basis for the university's leadership and human resource managers to formulate effective support policies. Such initiatives can empower female lecturers to better balance their careers and personal lives, ultimately fostering greater job satisfaction, organizational commitment, and dedication to the university's overall development.

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DEVELOPING CULINARY TOURISM IN ASSOCIATION WITH THE CIRCULAR ECONOMY: A SOLUTION FOR GREEN TOURISM

MSc. Vo Dinh Thuat*

Abstract: ***Culinary tourism has increasingly become a prominent trend, not only offering unique cultural experiences but also creating momentum for sustainable economic development at the local level. In the context of the urgent demand for green tourism development, linking culinary tourism with the circular economy is considered a strategic solution. This paper analyzes the theoretical foundation, potential, and current situation of culinary tourism development, while clarifying the applicability of the circular economy model to enhance product value, reduce resource waste, and minimize environmental impacts. Based on these findings, the paper proposes several solutions, including strengthening value chain linkages, applying the "zero-waste" model in culinary services, developing green products, and raising community awareness. The conclusion highlights that integrating culinary tourism with the circular economy is a practical approach to realizing green tourism in Vietnam.***

• Keywords: *culinary tourism, circular economy, green tourism, sustainable development.*

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1. Introduction

In the context of climate change, environmental pollution, and resource depletion becoming global challenges, sustainable tourism development is considered an inevitable trend to balance economic growth with environmental protection. Green tourism emerges as an important pathway, helping to minimize the negative impacts of tourism activities on ecosystems while bringing humanistic values and long-term benefits to local communities (Doan Manh Cuong, 2025). Among them, culinary tourism, with its role in promoting culture, creating unique experiences, and attracting visitors (Phan Huy Xu & Tran Minh Tam, 2017), has the potential to become a driving force for green transformation if it is harmoniously linked with the circular economy model. The circular economy in culinary tourism is not limited to waste reduction and optimal use of resources, but also aims at regenerating cultural and social values through a chain of activities, from producing clean ingredients and processing with environmentally friendly methods, to responsible consumption and reuse of by-products (Ly Hoang Phu, 2023). When these models are applied, the tourism industry not only creates sustainable experiences for visitors but also increases income for local communities, preserves natural resources, and spreads the message of green living. Vietnam's Tourism Development Strategy to 2030 identifies culinary culture as a core cultural stream and gastronomy as one of the key product lines that enhance national tourism competitiveness and branding (Prime Minister, 2020). However, in reality, the development of culinary tourism linked with the circular economy in Vietnam still faces many limitations. Infrastructure systems remain inconsistent, environmental awareness among some businesses and tourists is still low, and circular models have only been applied on a small scale without forming a closed value chain. Therefore, researching and proposing solutions to promote the integration of culinary tourism with the circular economy is an urgent requirement, contributing to orienting green tourism development and strengthening the competitiveness of Vietnam's tourism sector in the context of global integration.

2. Research methodology

This study adopts a qualitative approach, combining theoretical synthesis with practical analysis to clarify the relationship between culinary tourism development and the orientation toward a circular economy, thereby proposing solutions to promote green tourism. Specifically, the author first collected and synthesized secondary data from domestic and international scientific works, tourism industry reports, as well as policy documents related to the circular economy, sustainable tourism, and culinary tourism. Next, the study applied the method of analysis and synthesis to systematize the theoretical foundations, concepts, and sustainable development models in the tourism sector. On this basis, the author conducted comparative and contrastive analysis with the current situation of culinary tourism development in

* *Van Hien University; email: thuatvd@vhu.edu.vn*

Vietnam, particularly at destinations that have been implementing circular economy-based models. In addition, content analysis was employed to identify trends, influencing factors, and existing limitations, from which feasible solutions are proposed. These solutions aim to advance green tourism development, while simultaneously preserving cultural and culinary values and fostering local economic growth within a sustainable framework.

3. Research findings

3.1. Theoretical foundations of culinary tourism, circular economy and green tourism

3.1.1. Concept of culinary tourism

Culinary tourism is understood as a type of tourism in which dining experiences and the exploration of local cuisine serve as the main or significant motivation for tourists (Hall & Sharples, 2003). Beyond the simple act of consuming food, culinary tourism also encompasses visiting traditional markets, participating in cooking classes, learning about local food cultures, and engaging with agricultural and craft-producing communities (Ellis et al., 2018). In Vietnam, culinary tourism is considered one of the country's distinctive competitive advantages, thanks to the richness and diversity of its national cuisine (Nguyen Thi Hong Yen, 2024). The Vietnam Tourism Development Strategy to 2030 identifies culinary culture as a core cultural theme, with cuisine positioned as one of the key tourism products that contribute to enhancing national competitiveness and branding (Prime Minister of Vietnam, 2020).

3.1.2. Concept and principles of the circular economy

The circular economy (CE) is an economic development model in which the value of products, materials, and resources is maintained for as long as possible, while waste and emissions are minimized (European Commission, 2015). Unlike the traditional linear model of "take - make - consume - dispose," CE emphasizes the principles of "3R": Reduce, Reuse, and Recycle, aiming toward closed-loop production and consumption systems (Ellen MacArthur Foundation, 2021). When applied to culinary tourism, CE can be realized through the use of organic ingredients, green production practices, recycling of food waste, and the establishment of short supply chains.

3.1.3. Green tourism and sustainable tourism

Green tourism is considered a branch of sustainable tourism, with a focus on environmental protection, efficient resource use, emission reduction, and the enhancement of social responsibility (UNWTO, 2017). Green tourism goes beyond the "greening" of tourism products and services, encompassing the active participation of local communities as well as raising visitor awareness about sustainable consumption (Tourism Information Center, 2025).

3.1.4. Theoretical framework for linking culinary tourism with the circular economy

Based on the aforementioned theoretical foundations, the framework of this study is structured around three pillars:

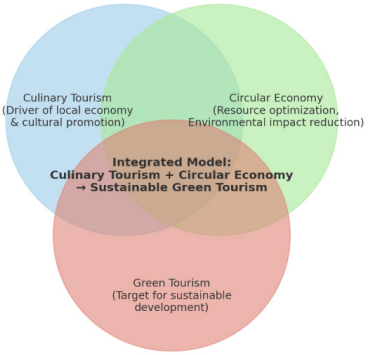
- Culinary tourism as a driver of local economic development and cultural promotion.

- The circular economy as a tool for optimizing resources and minimizing environmental impacts.

- Green tourism as the ultimate goal, ensuring the harmonious integration of economic, social, and environmental development.

The interconnection of these three pillars forms a model for developing culinary tourism aligned with the circular economy, thereby contributing to the overall objective of sustainable tourism development in Vietnam.

Figure 1. Theoretical framework on linking culinary tourism with the circular economy



Source: Compiled by the author

The theoretical framework demonstrates that the linkage between culinary tourism and the circular economy does not merely stop at utilizing gastronomy as a tourism product, but also opens up pathways for sustainable development and creates multiple layers of added value for both tourism and the broader economy. Culinary tourism is inherently grounded in local cultural identity, indigenous ingredients, and traditional cooking methods, while the circular economy emphasizes the principles of "reduce - reuse - recycle - regenerate." When these two elements are integrated, they can form an ecosystem in which tourism is both attractive to visitors and efficient in resource utilization, while minimizing negative environmental impacts.

First, the production of raw materials serves as the foundation. Within this framework, culinary tourism is closely tied to the use of local agricultural produce, seafood, and regional specialties. The circular economy promotes clean and organic production, limits chemical inputs, and encourages the reuse and recycling of agricultural by-products. This not only reduces production costs but also enhances the quality of culinary experiences, as visitors increasingly value "green - clean - safe" food attributes.

Next, the processes of food preparation and consumption are connected with circular principles. Restaurants and food service establishments in the culinary tourism value chain can adopt energy-efficient technologies, minimize plastic waste, and classify and recycle organic waste into fertilizer or biogas. At the same time, presenting gastronomy under a "zero waste" approach not only adds uniqueness to the tourism product but also strengthens the destination's image as a sustainable tourism hub.

In addition, cultural and educational values are emphasized in the framework. Culinary tourism is not merely about eating and drinking, but also about conveying messages of green living, respect for natural resources, and preservation of traditional culinary knowledge. This process contributes to raising community awareness and building a closed loop in which tourists, businesses, and local residents all participate and benefit.

Finally, the framework highlights the creation of multi-layered added value: economic benefits (income growth, expansion of the value chain), social benefits (job creation, cultural recognition), and environmental benefits (emission reduction, efficient resource use). The integration of culinary tourism and the circular economy thus generates a "dual cycle" in which tourism stimulates the demand for green products, while the circular economy ensures that tourism develops along a sustainable and long-term trajectory.

3.2. The current state of culinary tourism in Vietnam

In recent years, culinary tourism has emerged as one of the most prominent trends in Vietnam's tourism industry. With the advantage of a diverse cuisine deeply connected to history, culture, and regional characteristics, Vietnam holds significant potential to develop culinary tourism as a flagship product. Vietnamese cuisine has been highly praised by international experts and media, with many dishes ranked among the world's best (Ngoc Ha, 2024). Culinary tourism has been identified as a national strategic product under the Vietnam Tourism Development Strategy to 2030 (Prime Minister, 2025).

Vietnamese cuisine is not only beloved by domestic tourists but is also increasingly recognized on the international stage. In 2022, Vietnam won several categories at the World Culinary Awards, including Asia's Best Culinary Destination 2022, Asia's Best Culinary Festival 2022, Asia's Best Restaurant 2022, and the World's Best Hotel Fine Dining Restaurant 2022 (Tuong Bach, 2022). In 2023, Michelin Guide announced its first list of star-rated restaurants in Hanoi and Ho Chi Minh City, significantly boosting Vietnam's culinary tourism image in the global market. Additionally, CNN (USA) consistently listed pho and banh mi among the world's best foods, while The Travel (Canada) ranked Vietnam in the top 5 most attractive culinary destinations worldwide. At the 5th World Culinary Awards in 2024, Hanoi - Vietnam's culinary capital - impressively surpassed strong competitors such as Auckland (New Zealand), Cape Town (South Africa), Lima (Peru), Los Angeles (USA), Bangkok (Thailand), Seoul (South Korea), and Tokyo (Japan) to win two major categories: "World's Leading Culinary City" and "Asia's Leading Culinary City" (Tourism Information Center, 2024).

According to the General Statistics Office, revenue from accommodation and food services in 2024 reached 733.9 trillion VND, accounting for 11.5% of total revenue and marking a 12.9% increase compared to the previous year. Growth in 2024 compared to 2023 was also notable across several localities, such as Khanh Hoa (up 16.7%), Can Tho (up 13.7%), Hanoi (up 11.7%), Ho Chi Minh City (up 10.5%), and Binh Duong (up 9.8%) (Duc Anh, 2025).

However, the development of culinary tourism in Vietnam still faces numerous challenges. First, activities remain largely spontaneous, with few professional products carrying a strong national brand. Food safety and hygiene continue to be concerns for international visitors. Furthermore, international promotion lacks a comprehensive strategy and relies heavily on organic media coverage. Human resources in culinary tourism are also limited, particularly in terms of tour guides skilled in storytelling to connect dishes with cultural and historical narratives.

3.3. The current state of integrating culinary tourism with the circular economy in Vietnam

In the context of Vietnam implementing its National Strategy on Green Growth and promoting the circular economy (CE) in line with Resolution No. 55-NQ/TW and the Law on Environmental Protection 2020, applying CE models to culinary tourism development has increasingly gained attention. This approach not only

enhances visitor experiences but also helps minimize environmental impacts (Ly Hoang Phu, 2023).

In practice, although CE remains a relatively new concept in Vietnam's tourism sector, recent years have witnessed initial applications signaling a shift from the traditional linear economy toward a circular model. Many food service businesses, restaurants, hotels, and culinary tourism destinations have experimented with eco-friendly materials such as bamboo straws, paper straws, bagasse food containers, and biodegradable bags as substitutes for single-use plastics. Several restaurants-farmstay models in Lam Dong, Quang Nam, and Sa Pa have applied closed-loop systems, where tourists visit organic vegetable gardens, harvest ingredients by hand, prepare and enjoy meals, and later see organic byproducts processed into compost for the garden.

In major urban areas such as Hanoi, Ho Chi Minh City, and Hoi An, fine-dining restaurants and specialty coffee shops have emphasized waste reduction, recycling, and the use of local ingredients while promoting "green gastronomy" as an attractive feature for international visitors.

However, overall, the application of CE in culinary tourism in Vietnam remains limited and primarily small-scale and spontaneous. Single-use plastic consumption is still widespread, particularly at street food stalls - a core strength of Vietnamese gastronomy. Waste collection, sorting, and recycling systems for food waste are not yet synchronized; most food waste from restaurants, hotels, and tourist destinations is discarded, leading to resource wastage. Moreover, awareness of CE among businesses and food service households remains low, while the initial investment costs for green technologies and eco-friendly materials remain high, making it difficult to scale up circular models.

From a policy perspective, despite clear directions from the government, detailed guidelines for the tourism industry in general and culinary tourism in particular are still lacking, creating a significant gap between policy and practice.

It can be affirmed that the application of CE in culinary tourism in Vietnam is still in its early stages, with both opportunities and challenges ahead. With stronger policy support, synchronized infrastructure investment, and enhanced community awareness, sustainable green culinary tourism could become a strategic direction - one that not only enriches visitor experiences but also contributes to resource conservation and environmental protection, aligning with the goal of sustainable tourism development by 2030.

4. Solutions for developing Vietnamese culinary tourism in connection with the circular economy

To develop culinary tourism in a sustainable direction, Vietnam needs to integrate circular economy principles into all stages, from ingredient production, processing, and consumption to waste management. This not only contributes to enhancing the quality of culinary tourism products but also creates added value in terms of environment, economy, and society. Several specific groups of solutions can be proposed as follows:

4.1. Developing a sustainable and environmentally friendly food supply chain

To connect culinary tourism with the circular economy, building a sustainable and eco-friendly food supply chain is a central and foundational solution. Currently, many culinary products serving tourism still depend on traditional supply sources without sufficient control over production, preservation, and distribution processes, leading to risks of environmental pollution, resource waste, and reduced quality of tourist experiences. Therefore, it is necessary to encourage localities, enterprises, cooperatives, and household businesses to participate in building a closed-loop supply chain that ensures food safety while minimizing plastic waste, emissions, and other waste throughout the farm-to-table process.

First, ingredients for culinary tourism should be developed in the direction of organic agriculture, clean farming, and high-tech applications to limit chemicals, pesticides, and chemical fertilizers. Growing areas for vegetables, fruits, meat, fish, and other produce should be clearly planned and certified under VietGAP or GlobalGAP standards to ensure a stable, safe, and transparent supply. This not only enhances the reputation of Vietnamese culinary products but also helps build the story of "green cuisine" linked with agri-tourism experiences, a trend attracting growing interest from international visitors. In addition, close cooperation between farmers, cooperatives, restaurants, and travel businesses will form a sustainable value chain in which all stakeholders benefit.

Next, processing and distribution must also adopt circular solutions. Restaurants, hotels, and food service businesses should prioritize local and seasonal ingredients to reduce transportation costs and greenhouse gas emissions. Food packaging should be shifted from single-use plastics to environmentally friendly materials such as banana leaves, bamboo, recycled paper, or biodegradable boxes. Furthermore, cold storage technologies, green logistics, and short supply chains (farm-to-table) need to be widely applied

to ensure freshness while minimizing losses and food waste in circulation.

Another important factor is waste management in the supply chain. Culinary tourism facilities should sort waste at the source, reuse agricultural by-products and leftovers to produce organic fertilizers, biogas, or recycle them into new products. The "zero waste kitchen" model can become a unique highlight that enhances professionalism while spreading the message of green tourism. At the same time, the application of digital technologies such as blockchain for food traceability will increase transparency and strengthen visitor trust in the safety, quality, and sustainability of the supply chain.

In addition, government support plays a vital role in building and operating sustainable food supply chains. Incentive policies on credit, taxation, technical training, and trade promotion should be implemented to encourage stronger participation from enterprises and communities. Moreover, the issuance of standards and regulations on eco-labels, "green cuisine" certification, or "circular restaurant" labels will guide the market and improve the competitiveness of Vietnamese culinary tourism.

4.2. Applying the "zero waste" model in food services

In the context of increasing demand for cultural and culinary tourism experiences, food services have become one of the key links in green tourism development. However, this sector also generates a large amount of waste, especially single-use plastics and food leftovers. Applying the "zero waste" model in food services not only minimizes environmental impacts but also improves the image and competitiveness of tourist destinations.

First, in preparation and service, restaurants, eateries, and food service establishments can minimize the use of single-use plastics by replacing them with eco-friendly materials such as banana leaves, paper, bagasse containers, or cups and straws made from bamboo, grass, or rice. Many hotels and resorts in Vietnam have already eliminated small plastic bottles in rooms, replacing them with glass bottles or water refill stations, thereby encouraging sustainable consumption habits among tourists.

Second, the "zero waste" culinary model also emphasizes food surplus management. Instead of being discarded, surplus food can be sorted for safe reuse or recycled into organic fertilizer and animal feed. Some restaurants in Europe and Asia have successfully applied technology applications to connect surplus food with charities, helping to avoid waste while delivering social benefits. This is an experience that Vietnam's tourism sector can learn from and adopt.

Third, designing a "green menu" is another key solution. Service providers can encourage customers to choose reasonable portions, prioritize local ingredients, organic foods, and seasonal produce to reduce emissions from long-distance transport and support sustainable agriculture. Many "farm-to-table" restaurants are becoming popular with international tourists, especially those concerned about health and environmental protection.

Fourth, this model not only reduces waste but also contributes to building a "green cuisine" brand for destinations. Food service establishments adopting the "zero waste" approach are often highly valued for social responsibility, thereby attracting environmentally conscious customer groups. Moreover, telling the story of the "green journey" in cuisine helps create a distinctive mark and effectively promotes local tourism.

Thus, applying the "zero waste" model in food services is both an urgent requirement to minimize negative environmental impacts and an opportunity for Vietnam's tourism industry to develop sustainably while generating added value for both businesses and communities.

4.3. Developing culinary tourism products linked with local culture and value regeneration

Cuisine is one of the most important factors shaping the attractiveness and identity of a tourist destination. Leveraging culinary strengths should not stop at showcasing specialty dishes but must also be closely tied to cultural stories, traditions, and local community values. For culinary tourism products to be competitive, they must be both unique and deliver authentic experiences to visitors.

To regenerate value, emphasis should be placed on restoring and preserving traditional recipes, while innovating in preparation, presentation, and service methods in line with modern consumption trends. At the same time, developing experiential tourism activities such as visiting rural markets, joining cooking classes with locals, and enjoying culinary feasts within cultural rituals will give tourists deeper insights. In this way, cuisine becomes not only a product for consumption but also a medium to convey cultural identity, thereby enhancing value and vitality for the tourism industry.

4.4. Raising awareness and capacity of stakeholders

One of the decisive factors for the success of sustainable tourism development is raising awareness and capacity among stakeholders, including local authorities, enterprises, communities, and tourists. Proper awareness will create consensus and shared responsibility in building a civilized, friendly, and sustainable tourism environment.

Training programs and capacity-building workshops should be organized for local communities on skills for community-based tourism, service management, and the preservation of natural and cultural resources. For businesses, innovation and the application of modern management technologies should be encouraged, while business ethics must be enhanced to promote responsible tourism products. At the same time, communication and education efforts targeting tourists about civilized behavior and sustainable consumption should also be emphasized to spread a positive influence throughout the industry.

4.5. Strengthening international cooperation and digital technology application

In the context of globalization, international cooperation is a key factor for modern and integrated tourism development. Expanding partnerships with international tourism organizations, regional countries, and global networks creates opportunities for knowledge exchange, resource sharing, and broader destination promotion. Through forums, fairs, and international exchange programs, Vietnamese tourism can strengthen its position and expand the international tourist market.

Alongside international cooperation, digital technology application is an important driver to enhance management efficiency and service quality in tourism. Digital platforms such as online booking systems, digital maps, artificial intelligence (AI) in travel advisory, and virtual/augmented reality (VR/AR) for destination promotion can enhance visitor experiences. Moreover, collecting and analyzing big data supports policymakers in making accurate and timely decisions for tourism development.

4.6. Improving policies, support mechanisms and long-term investment

For tourism to develop sustainably, a consistent, transparent, and long-term policy system is essential. The government and state management agencies should continue to review, adjust, and supplement legal regulations related to tourism planning, management, and development to ensure alignment with practice and international trends.

In addition, incentive mechanisms on taxation, land, and credit should be introduced to encourage enterprises to invest in green tourism, community-based tourism, and innovative models. Establishing a tourism development fund, prioritizing resources for infrastructure, human resource training, and heritage conservation, will also create a solid foundation for the industry. More importantly, policies must harmonize the interests of the state, businesses, and communities to ensure sustainability and long-term development in tourism.

5. Conclusion

The development of culinary tourism in connection with the circular economy is not only an inevitable trend but also an important solution toward a green and sustainable tourism industry. By applying models such as "zero waste," recycling and reusing resources, saving energy, and preserving local culinary values, the tourism sector can not only minimize negative impacts on the environment but also create added cultural, social, and economic value. This contributes to building a friendly, attractive, and distinctive destination image, thereby enhancing competitiveness in the context of globalization. To achieve this goal, close cooperation among stakeholders is required: government, tourism and culinary enterprises, local communities, and tourists. The State plays the role of policy maker, providing legal frameworks and infrastructure support. Businesses must take the initiative in innovation and invest in sustainable business models. Local communities need to raise awareness and actively participate in operations, while tourists play an important role in practicing responsible consumption. It can be affirmed that developing culinary tourism based on circular economy principles is the key to simultaneously achieving two objectives: environmental protection and economic growth. This is not only consistent with Vietnam's green tourism development strategy but also contributes to the fulfillment of international commitments on sustainable development and climate change adaptation.

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THE IMPACT OF ADVERTISING CONTENT ON THE CONSUMPTION OF SNACK FOOD: EVIDENCE FROM BACK-OFFICE EMPLOYEES IN VIETNAM

PhD. Bui Thi Hai Yen*

Abstract: ***This study investigates the impact of social media advertising content on the impulsive buying behavior of snack food products among back-office employees in Vietnam. Drawing on the S-O-R model and Impulse Buying Theory, six hypotheses were developed and tested with survey data from 357 administrative, HR, and finance staff. SEM results reveal that product transparency enhances perceived quality, while exclusive offers improve consumer attitudes, thereby stimulating impulsive purchases. The study suggests developing authentic and sustainable advertising content to help businesses engage customers more effectively.***

• Keywords: *integrated marketing and communication (IMC), advertisement, social media, back-office employee, impulsive buying behavior, SEM, SOR.*

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1. Introduction

Numerous studies examining the impact of video advertisements on impulsive buying behavior have reported positive results. However, little research has focused specifically on video advertisements content - a creative strategy that discloses production processes, ingredient sourcing, and packaging procedures, while subtly showcasing product strengths. Such content is both discreet and persuasive, stimulating consumer purchase behavior in a natural and sustainable manner.

Against this backdrop, the present study investigates the influence of video advertisement content on the impulsive buying behavior of back-office employees. This study is guided by a single overarching research question: How do the elements of video advertisement content affect consumers' impulsive buying behavior? The findings are expected to contribute new insights and practical implications for food companies, enabling them to design more effective content strategies to enhance future Integrated Marketing and Communication (IMC) campaigns.

2. Theoretical background and hypothesis development

2.1. Theoretical background

This study is grounded in the integration of the Stimulus-Organism-Response (S-O-R) framework, developed by Mehrabian and Russell in 1974, and the Impulse Buying Theory, introduced by Hawkins-Stern in 1962, to examine the impact of video advertisements on the impulsive buying behavior of snack food among back-office employees in Vietnam.

The S-O-R framework has proven highly effective in exploring the determinants of consumer purchasing behavior, particularly in the context of online shopping. In this study, the Stimulus (S) refers to video advertisement content - backstage materials that typically highlight production processes, packaging procedures, ingredient origins, and the individuals and factors involved in product creation. Based on the characteristics of this content pillar, the proposed stimulus factors include: (1) Product Transparency and (2) Exclusive Offers.

Next, the Organism (O) captures the internal information processing of back-office employees in Vietnam when exposed to these video advertisements, reflecting both their emotional responses and cognitive evaluations. Through the transparent information provided by ad content, viewers are able to perceive the quality of the featured product (Zhang & Shi, 2022), while consumer attitudes are also significantly shaped by promotions and exclusive offers. Accordingly, the proposed organism factors in this model are: (1) Perceived Quality and (2) Attitude toward Video Advertisements.

Finally, the Response (R) represents consumer behavioral outcomes shaped by cognitive processing and emotional engagement stimulated by these video advertisements, which, in turn, foster purchase behavior. Specifically, drawing on Impulse Buying Theory (Hawkins-Stern, 1962), ad content often delivers authentic, relatable visuals that create situational influences, lowering consumer resistance. When coupled with exclusive offers, these stimuli increase the likelihood of unplanned, immediate purchases.

** Hanoi School of Business and Management (HSB) - Vietnam National University*

In summary, applying these foundational theories through a study employing Structural Equation Modeling (SEM) provides valuable insights into how ad content integrated into video advertisements influences consumer behavior among back-office employees in Vietnam, with a particular focus on impulsive buying behavior.

2.2. Research hypothesis development

2.2.1. Product information transparency

Product transparency refers to the extent to which information about a product's attributes, quality, sourcing, and manufacturing processes is presented clearly and accessibly. As noted by J. Yang & Battocchio, (2020), such transparency can substantially enhance consumer trust and engagement, particularly within the food and beverage industry. Moreover, transparency in advertising content - such as providing insightful information about production processes - has a significant influence on perceived quality. Studies indicate that when brands are transparent about how their products are created, including the origin and composition of ingredients, consumers tend to evaluate those products as being of higher quality. In addition, transparent advertising strategies that reflect brand values enhance consumer trust and foster positive attitudes, particularly when the content is perceived as fair and authentic. Therefore, this study proposed the following hypotheses:

H1: Product transparency positively influences perceived quality

H2: Product transparency positively influences attitude toward advertisements

2.2.2. Exclusive Offers

Exclusive offers are promotional incentives, such as discounts, limited-time deals, or special access, embedded directly within video or social media advertisements. By fostering a sense of urgency and exclusivity, these offers stimulate faster purchasing decisions among viewers. According to Dou & Zhang, (2023), exclusive promotions presented during video viewing can generate a sense of urgency, thereby motivating consumers to engage in purchasing behavior. Furthermore, when combined with authentic content, exclusive offers cultivate distinctive perceptions of product quality and strengthen perceived savings, thereby improving attitudes toward the advertisement and increasing the likelihood of immediate purchase. Therefore, this study proposes the following hypotheses:

H3: Exclusive offer positively influences perceived quality

H4: Exclusive offer positively influences attitude toward advertisements

2.2.3. Perceived quality

*N*umerous studies have demonstrated that perceived quality plays a pivotal role in consumer purchase decision-making. When consumers evaluate a product as being of high quality, their purchase intention increases significantly. This effect becomes even more pronounced when such perceptions are reinforced by engaging advertising content. Moreover, attractive displays and quality perceptions are recognized as key drivers of impulsive buying behavior, underscoring the relationship between perceived quality and unplanned purchases (Karahan, 2024). Therefore, this study proposed the following hypotheses:

H5: Perceived quality positively influences impulsive buying behavior

2.2.4. Attitude toward advertising

Yaprak & Coban (2023) argued that emotionally driven purchasing behavior can positively enhance consumers' attitudes toward social media advertising, thereby influencing impulsive buying behavior. In addition, prior studies have confirmed the relationship among consumer attitudes, purchase intention, and impulsive buying behavior (Peña-García et al., 2020). Therefore, in this context, the present study proposes the following hypotheses:

H6: Attitude toward advertisement positively influences impulsive buying behavior.

3. Research method

3.1. Sample and data collection

The study employed a quantitative approach through an online survey conducted from March to May 2024, without geographical restrictions, to ensure objectivity in measuring perceptions of online video advertising. Data were collected using a Google Form comprising three main sections: (1) screening questions; (2) demographic information; and (3) measurement items for the constructs. A 5-point Likert scale was applied to capture five constructs with 27 items. A non-probability convenience sampling method was adopted with screening criteria including: (1) respondents had to be back-office employees in one of two departments administration & human resources, and finance & accounting; and (2) respondents had previously purchased snack food products after watching a video advertisement on any social media platform, including TikTok, Shopee, Facebook, or YouTube.

The survey was distributed online via email, Zalo, and Facebook Messenger. 400 questionnaires were distributed, yielding 391 responses. Of these, 34 were excluded due to poor response quality, resulting in a valid response rate of approximately 91.30%. Thus, 357 valid responses were retained for data analysis.

The collected data were analyzed using SPSS 27.0 and AMOS 24.0 to describe the sample, assess the reliability, convergent validity, and discriminant validity of the measurement scales, test the model fit, and evaluate the research hypotheses.

3.2. Measures

A structured questionnaire was designed to evaluate the dependent variables, including product transparency

(PIT), exclusive offers (EIO), perceived quality (PQ), attitude toward video advertisements (EAT), and impulsive buying behavior (IBB). Table 1 presents the sources of measurement scales, the number of measurement items, and their reliability, indicated by Cronbach's Alpha and Average Variance Extracted (AVE). All observed items demonstrated factor loadings greater than 0.6 and composite reliability (CR) values exceeding 0.7, confirming the internal consistency of the indicators within the scales at an acceptable level. The Cronbach's Alpha coefficients of all constructs were above 0.7, satisfying the required reliability threshold. Furthermore, all AVE values were greater than 0.5, providing evidence of convergent validity across the constructs in the model.

Table 1: Measurements

Factor & Number of scales	Source	Cronbach's Alpha	CR	AVE
Product Transparency (PIT) - 08 items	(Liu, 2013) and (Chen et al., 2021)	0.861	0.866	0.549
Exclusive offers (EIO) - 06 items	(Büyükdağ et al., 2020) and (Palazon & Delgado-Ballester, 2009)	0.866	0.549	0.668
Perceived Quality (PQ) - 03 items	(Dodds et al., 1991)	0.840	0.668	0.631
Attitude toward Video Advertisements (EAT) - 04 items	(Shareef et al., 2018)	0.837	0.631	0.568
Impulsive Buying Behavior (IBB) - 06 items	(Akram et al., 2018) and Self-Development	0.842	0.850	0.589

4. Research results

4.1. Participants

The demographic of respondents shows the general characteristics of the study participants. The number of women (58.8%) was nearly half-time more than that of men (41.2%). Most participants ranged in age from 20 to 34, and the largest age group was 25-34 (51.3%). The majority of the participants came from the North of Vietnam (68.1%). More than half of respondents had a bachelor's degree (57.1%). A large proportion of respondents worked in finance and accounting (73.1%), whereas a smaller share were employed in administration and human resources (26.9%). As office workers, the survey participants held the most leadership positions (38.7%), followed by employees (34.5%) and the least specialists (5.0%).

The biggest reason office workers buy snack food through video advertisements is "Product information is provided more clearly" (54.6%), "More convenient" (23.5%), "More exclusive discounts" (11.8%), and "Video advertising is more intuitive" (10.1%). Besides, the frequency of Purchase through video advertisements of Back-office employees is mostly 1 time per 1-3 months (43.7%), and the frequency of Purchase of Snack Food through video advertisements is the same, about 1 time per 1-3 months (56.3%).

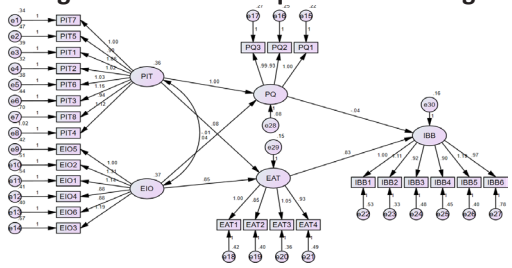
4.2. Structural equation modeling (SEM) analysis

The structural model was tested after confirming the reliability and validity of the measurement model. The fit indices met the following criteria: CMIN/df = 3.947 (≤ 5, Bentler & Bonett, 1980); CFI = 0.912 (> 0.9); TLI = 0.990 (> 0.9); RMSEA = 0.075 (< 0.08, Hu & Bentler, 1995; Garver & Mentzer, 1999). Moreover, all parameter estimates in the model are statistically significant at the 5% level, confirming that the measurement model demonstrates a good fit with the observed data. Based on the Estimate table, the author has compiled the necessary information for hypothesis testing (Table 2) as follows:

Table 2: Results of Analysing the SEM model

Hypotheses	Relationship			Estimate	S.E	P value	Results
H1	PQ	<---	PIT	1.004	0.075	0.000	Supported
H2	EAT	<---	PIT	0.083	0.052	0.115	Not supported
H3	PQ	<---	EIO	0.040	0.044	0.356	Not supported
H4	EAT	<---	EIO	0.849	0.084	0.000	Supported
H5	IBB	<---	PQ	-0.39	0.047	0.408	Not supported
H6	IBB	<---	EAT	0.827	0.082	0.000	Supported

Figure 2: Structural Equation Modelling



Source: Author's analysis

The SEM results reveal that three of six hypotheses (H1, H4, and H6) were supported ($p<0.05$), and three hypotheses (H2, H3, and H5 were not supported. Among these, product transparency (PIT) ($\beta = 1.004$) had the strongest direct effect on perceived quality (PQ), but product transparency (PTI) did not have an impact on attitude toward advertisements (EAT). In addition, exclusive offers (EIO) were found to have a strong effect on attitude toward advertisements (EAT) ($\beta = 0.849$), but no significant impact on perceived quality. Lastly, while perceived quality (PQ) does not significantly predict impulsive buying behavior (IBB), exclusive in-video offers (EIO) show a substantial positive effect on impulsive buying behavior ($\beta = 0.827$).

5. Discussion and conclusion

5.1. Discussion

The findings of this study provide meaningful insights into the mechanisms through which advertising content and exclusive offers shape consumer behavior in the context of social media advertising. Out of the six proposed hypotheses, three (H1, H4, and H6) were supported, whereas H2, H3, and H5 were not, suggesting that the effects of BTS-based advertising are more nuanced than initially expected.

First, product transparency (PIT) demonstrated the strongest direct effect on perceived quality (PQ) ($\beta = 1.004$). This result aligns with prior studies emphasizing that transparent communication regarding production processes and ingredient sourcing can substantially enhance consumer perceptions of product quality (Chang, 2014; Zhang & Shi, 2022). However, PIT did not significantly influence attitude toward advertisements

(EAT), which diverges from earlier findings (Buell et al., 2017) that suggested transparency fosters positive consumer attitudes. A possible explanation lies in the nature of ad content: while it effectively conveys product authenticity and quality, it may not necessarily evoke favorable affective responses toward the advertisement itself. This highlights a potential boundary condition of transparency its effect may be limited to cognitive evaluations (quality perception) rather than emotional or attitudinal dimensions.

Second, exclusive offers (EIO) were found to significantly shape consumer attitudes toward advertisements ($\beta = 0.849$) but did not influence perceived quality.

Finally, the relationship between perceived quality (PQ) and impulsive buying behavior (IBB) was not supported, contradicting previous research that identified perceived quality as a strong driver of purchase behavior (Lee et al., 2022; P. Yang et al., 2024). One possible explanation is that impulse buying, by its very nature, is less influenced by rational quality assessments and more by situational and emotional triggers. Supporting this interpretation, EIO exhibited a substantial positive effect on IBB ($\beta = 0.827$), reinforcing the view that urgency-driven promotions stimulate unplanned purchases. These results suggest that impulsive buying is more strongly rooted in affective responses than in cognitive evaluations of quality.

Taken together, the findings extend both the S-O-R framework and Impulse Buying Theory by clarifying the distinct pathways through which transparency-based and promotion-based stimuli operate. Transparency influences cognitive perceptions of quality, whereas promotional urgency affects affective responses and directly drives impulsive buying. This dual mechanism underscores the importance for marketers to carefully balance transparency and promotional strategies when designing social media advertisements, particularly in food-related industries.

5.2. Implications

5.2.1. Theoretical implications:

This study provides empirical evidence in the Vietnamese context regarding the distinct effects of product transparency and exclusive offers on impulsive buying behavior. The findings demonstrate that in social media advertising, transparency primarily strengthens cognitive evaluations (perceived quality), whereas exclusive in-video offers serve as affective triggers that directly stimulate impulsive buying. This clarifies the specific dynamics of the S-O-R model in emerging markets such as Vietnam, where consumers simultaneously value brand authenticity and remain highly responsive to situational promotional cues.

5.2.2. Managerial implications

Based on the discussion above, the author proposes four managerial implications for practitioners to consider when designing future IMC strategies:

First, manufacturers and brands should develop transparent content to strengthen long-term consumer trust. In particular, within Vietnam's food industry, product safety and quality are persistent concerns. Firms are encouraged to utilize ad content to disclose production processes, ingredient origins, and safety standards. This approach helps build brand credibility, especially in a market where consumers are increasingly skeptical of "exaggerated" advertising.

Second, advertising campaigns will be more successful if they incorporate exclusive offers to stimulate impulsive buying behavior. The findings show that exclusive promotions embedded in video ads (e.g., discount codes revealed only after watching a TikTok, Shopee Live, or YouTube Shorts advertisement) exert a strong influence on impulsive purchases. Vietnamese firms can leverage time-limited promotions to align with the fast-paced shopping habits of office employees, who are often constrained by time.

Third, instead of relying solely on short-term promotions, firms should combine them with transparent messaging to simultaneously encourage immediate purchases and build long-term trust. For instance, a video advertisement could showcase a clean and safe production process while offering an exclusive discount for the first order.

Finally, companies should specifically target the back-office employee segment to increase sales. Employees in administration, human resources, finance, and accounting typically have short lunch breaks and often opt for junk food or snack food as a substitute for main meals. Businesses can design concise, engaging video ads on platforms frequently accessed by this group (e.g., TikTok, Facebook), embedding exclusive offers to boost the likelihood of immediate purchases during limited time windows.

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SUSTAINABLE EATING HABITS: FACTORS SHAPING GEN Z'S CONTINUED INTENTION TOWARD PLANT-BASED HOT MEALS

Nguyen Thi Quynh Nhu* - Assoc.Prof.PhD. Nguyen Van Nguyen*

PhD. Nguyen Minh Dat**

Abstract: ***Plant-based hot meals (PHM) have attracted a large number of young people in Vietnam, especially those from Gen Z. However, no studies have explored the continued intention to adopt plant-based hot meals (IN), which has created a large theoretical gap. Therefore, this study focuses on exploring the motivation and barriers behind IN. The data was collected through a survey with 325 participants. Analysis of the Partial Least Squares Structural Equation Modeling indicates that the benefits of PHM and barriers to adopting PHM are important predictors of IN, which are mediated by the global motives. This study has many meaningful contributions to plant-based consumption theory. At the same time, this study provides a foundation for the development of more comprehensive communication and education policies and interventions to promote PHM choice in the community.***

• Keywords: *animal welfare, environmental benefits, health benefits, plant-based, sustainability.*

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1. Introduction

In recent years, Vietnam has witnessed an increase in awareness of sustainable consumption, especially in the field of vegan food choices. In 2024, the vegan food market size will reach about 103.2 million USD, and is expected to increase to 220.5 million USD by 2033, with a Compound Annual Growth Rate of 8.1% (IMARC, 2024). A major part of this shift seems to come from young consumers, who tend to be better informed, more health-conscious, and more mindful of ecological issues (vnEconomy, 2024).

Promoting the choice of plant-based meals not only leads to a healthy lifestyle but also contributes to solving environmental and ethical issues in animal food production. Previous studies indicate that food temperature strongly affects appetite, satisfaction, and long-term satiety; in particular, hot food is often seen as a real meal compared to cold food (Zhang et al., 2024). Therefore, it is necessary to study the intention to adopt a plant-based hot meal (PHM) to explain the acceptance mechanism and provide a scientific basis for product development and marketing strategies in accordance with modern consumer needs. PHM is defined as a meal where most of the dishes are cooked and served hot, with ingredients mainly from plant-based sources. On the opposite side, cold meals include only cold dishes, such as salads, ready-to-eat cereal, muesli, and smoothies.

Adopting the PHM of consumers is not just about health but also a lifestyle that reflects ecological and ethical concerns. The temperature of dishes strongly affects the perception and acceptance, as hot dishes are often considered the main meal. However, the habit of eating plant-based meals still faces plenty of hurdles, and research into why people choose (or avoid) vegetarian options remains fairly limited. Therefore, this study aims to explore the factors that determine IN, with the hope of offering insights that may guide product strategies, marketing approaches, and even policy efforts to encourage more sustainable eating habits.

2. Theoretical Background

The theory of planned behavior (TPB) introduced by Ajzen (1991) is considered a framework for predicting human behavior. According to TPB, the more positive the attitude and subjective norms, the better the perceived behavioral control, the higher the intention to perform the behavior (Ajzen, 1991). The TPB is considered an appropriate framework for this research because it has been applied to understand a variety of behaviors, especially in the food sector.

** Tra Vinh University; email: ntqnhu2308@sdh.tvu.edu.vn - nguyentvu@tvu.edu.vn*

*** Ho Chi Minh City University of Law; email: nmdat@hcmulaw.edu.vn*

However, TPB also has limitations Conner and Armitage (1998). To overcome this, Westaby (2005) developed the Behavioral Reasoning Theory (BRT), which emphasizes the role of reasons in linking beliefs, values, global motives, intentions, and behaviors. Reasons that help individuals justify, strengthen confidence when acting. Reasons are classified into two categories: reasons for and reasons against. Meanwhile, global motives such as attitudes, subjective norms, and perceived behavioral control are abstract, which stably affect intentions in many contexts.

From there, it is expected that the combination of TPB and BRT in this study will help improve the ability to interpret behavioral intention, maintain the generality and strict predictive structure of TPB, and supplement the theoretical dimension of BRT to clarify the role of contextual factors and behavioral reasons.

3. Hypotheses development and conceptual framework

3.1. Factors influencing the continued intention to adopt plant-based hot meals

Behavioral intention is defined as the level of conscious effort of the individual to perform a particular behavior in the future, and the attitude reflects the individual's global positive or negative evaluation of that behavior (Ajzen, 1991). In this study, the continued intention to adopt plant-based hot meals (IN) reflects an individual's willingness and desire to continue adopting PHM. Besides, attitudes towards plant-based hot meals (AT) reflect the individual's global positive assessment of PHM.

When individuals have a positive attitude, it thereby promotes their continued intention to adopt PHM. Many studies in the context of food consumption have demonstrated a relationship between attitudes and intention (Kopplin & Rausch, 2022). From there, the author puts forward the following research hypothesis:

H1: AT has a positive impact on IN

Subjective norms (SN) represent the approval or disapproval of important people for a plant-based meal. When individuals believe that relatives, friends, or the community support and desire them to perform a certain behavior, they will tend to be more likely to form the intention to perform that behavior (Ajzen, 1991). Many studies indicate that encouragement or approval from the reference group has a significant impact on food choice intention (Kopplin & Rausch, 2022). From the above arguments, the following hypothesis is proposed:

H2: SN has a positive impact on IN

Perceived behavioral control (PBC) refers to the level of control that a person believes is involved in performing a particular behavior (Ajzen, 1991). In this study, PBC reflects the ease with which PHM is adopted. TPB shows that the better the PBC, the higher the intention to perform the behavior (Ajzen, 1991). Many studies have shown a positive relationship between PBC and behavioral intention (Ajzen, 1991; Paul et al., 2016). From the above grounds, the author puts forward the following research hypothesis:

H3: PBC has a positive impact on IN

3.5. The influence of environmental benefits (EB) and animal welfare (AW) on global motives

First, environmental benefits (EB) are defined as an individual's perception and belief that a plant-based meal can contribute to reducing harm to the environment, such as reducing greenhouse gas emissions, saving water, or conserving biodiversity (Gifford et al., 2024; Hartmann & Siegrist, 2017). Secondly, animal welfare (AW) reflects an individual's belief in the benefits that a plant-based meal brings to animals, saving animals from having to live and being killed in fear and pain (OIE, 2018)

The BRT, along with empirical evidence, all support the existence of a relationship between EB, AW, and global motives (AT, SN, and PBC) (Le-Anh et al., 2023; Norman et al., 2012; Westaby et al., 2010). So it can be expected that when the individual is aware that adopting PHM is a moral action, bringing EB and AW will increase AT. As EB and AW become prominent in awareness, individuals tend to believe that significant others and the community will support plant-based meals because it is moral. Finally, EB and AW provide moral motivation to help individuals overcome barriers to enforcement and increase PBC. From the above bases, the author puts forward the following research hypothesis:

H4a, b, c: EB has a positive impact on AT, SN, and PBC

H5a, b, c: AW has a positive impact on AT, SN, and PBC

3.4 The influence of Physical health (PH) and Psychological health (PSH) on global motives

Plant-based diets have been shown to provide many benefits for physical and psychological health. First, the physical health benefits of vegetarianism

have been proven in numerous studies. A properly planned plant-based diet can provide health benefits, help prevent and cure certain diseases, plant-based diet helps reduce the risk of cardiovascular diseases, diabetes, high cholesterol, high blood pressure, cancer, and death, and reduce the risk of disease (Appleby & Key, 2015; Tonstad et al., 2009). Therefore, in this study, the physical health benefits (PH) reflect an individual's perception of the benefits that PHM can bring to their body, such as helping them improve their physical health, cure diseases, and prevent disease.

Besides, a plant-based diet has been proven to bring many benefits to psychological health. Studies show that a plant-based diet improves positive emotions (Warner et al., 2017) life satisfaction, happiness, and psychological health (Blanchflower et al., 2013) increases vitality, euphoria, and motivation (Conner et al., 2017) and reduces anxiety and depression (Null & Pennesi, 2017). Based on BRT (Westaby et al., 2010) and above grounds, the author puts forward the following research hypothesis:

H6a, b, c: PH has a positive impact on AT, SN, and PBC

H7a, b, c: PSH has a positive impact on AT, SN, and PBC

3.5. The influence of perceived barriers (PB) on global motives

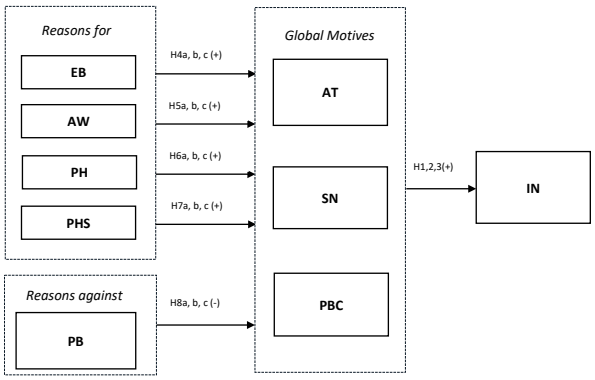
The previous research pointed out that the choice of plant-based food in Vietnam faces three biggest barriers, including inconvenience, high prices, and taste. To be more specific, Vietnamese consumers said they had difficulty finding plant-based products where they lived, plant-based products cost more than traditional animal products, and are not as tasty as animal-based ones (AAU Consulting, 2025). These obstacles seem to make the shift to a plant-based diet more difficult. From the above bases, in this study, perceived barrier (PB) reflects how individuals perceive the barriers of adopting PHM, such as inconvenience, high price, and unattractive taste. Based on BRT (Westaby et al., 2010) and the above grounds, the author puts forward the following research hypothesis:

H8a,b,c: PB has a negative impact on AT, SN, and PBC

3.7 Research framework

Based on theories and practices, relationships from H1-H8 are integrated to build a more comprehensive conceptual framework to explain the influences of factors on continued intention to adopt PHM (Figure 1).

Figure 1. Conceptual framework



4. Methodology

The current study uses convenience sampling. The survey subjects are Gen Z residents of Ho Chi Minh City (HCM), aged 18 to 25, who had chosen PHM in the last 3 months. The questionnaire uses a five-point Likert scale. The data was processed using the Partial Least Squares Structural Equation Model (PLS-SEM) method using SmartPLS 4 software.

5. Results

5.1 The assessment of the measurement model

The results of PLS-SEM analysis show that the scale ensures reliability, discriminant validity, and convergent validity (Hair et al., 2017). Specifically, all outer loadings, Cronbach Alpha, and composite reliability exceed the threshold of 0.7, and AVE is higher than 0.5 (Table 1). In addition, the structures all meet the Fornel-Lacker criteria and the HTMT index (Table 2, Table 3)

Table 1: Reliability and validity

Variable/item	Outer loadings	Cronbach's alpha	Composite reliability (rho_a)	Average variance extracted (AVE)
AT		0.943	0.943	0.815
AT1	0.921			
AT2	0.905			
AT3	0.895			
AT4	0.886			
AT5	0.905			
AW		0.934	0.937	0.836
AW1	0.939			
AW2	0.933			
AW3	0.928			
AW4	0.854			
EB		0.929	0.931	0.825
EB1	0.919			
EB2	0.911			
EB3	0.912			
EB4	0.890			
IN		0.930	0.930	0.826
IN1	0.907			
IN2	0.927			
IN3	0.907			
IN4	0.894			
PB		0.889	0.891	0.693

Variable/item	Outer loadings	Cronbach's alpha	Composite reliability (rho_a)	Average variance extracted (AVE)
PB1	0.857			
PB2	0.823			
PB3	0.824			
PB4	0.823			
PB5	0.834			
PBC		0.941	0.945	0.808
PBC1	0.915			
PBC2	0.903			
PBC3	0.931			
PBC4	0.872			
PBC5	0.871			
PH		0.917	0.918	0.708
PH1	0.809			
PH2	0.868			
PH3	0.841			
PH4	0.854			
PH5	0.852			
PH6	0.823			
PSH		0.909	0.909	0.610
PSH1	0.779			
PSH2	0.792			
PSH3	0.784			
PSH4	0.798			
PSH5	0.770			
PSH6	0.812			
PSH7	0.773			
PSH8	0.738			
SN		0.937	0.942	0.798
SN1	0.939			
SN2	0.909			
SN3	0.909			
SN4	0.851			
SN5	0.857			

Table 2: Discriminant validity

	AT	AW	EB	IN	PB	PBC	PH	PSH	SN
Fornell-Larcker Criterion									
AT	0.903								
AW	0.647	0.914							
EB	0.616	0.631	0.908						
IN	0.748	0.557	0.517	0.909					
PB	-0.466	-0.412	-0.366	-0.441	0.832				
PBC	0.559	0.598	0.576	0.593	-0.504	0.899			
PH	0.702	0.664	0.590	0.602	-0.434	0.624	0.841		
PSH	0.678	0.642	0.651	0.607	-0.431	0.626	0.689	0.781	
SN	0.520	0.610	0.581	0.570	-0.460	0.524	0.626	0.628	0.894
Heterotrait-Monotrait Ratio (HTMT)									
AT									
AW	0.690								
EB	0.658	0.677							
IN	0.798	0.598	0.554						
PB	0.508	0.450	0.401	0.483					
PBC	0.589	0.635	0.613	0.630	0.548				
PH	0.753	0.717	0.635	0.651	0.479	0.669			
PSH	0.732	0.697	0.707	0.660	0.477	0.673	0.752		
SN	0.549	0.649	0.619	0.609	0.501	0.552	0.673	0.678	

5.2 Structural Model Evaluation

The results of PLS-SEM analysis (Table 4) indicate that all constructs have VIF <3, so multicollinearity does not occur (Hair et al., 2017).

Bootstrapping analysis with 5,000 bootstrapping times on SmartPLS 4 software is performed to evaluate the relationships in the structural model. The results of direct effects and indirect effects shown in Table 6 show that the hypotheses are statistically significant (p-value less than 0.05).

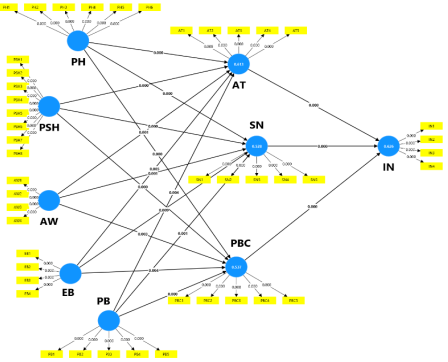
Table 4: VIF - Inner model matrix

	AT	AW	EB	IN	PB	PBC	PH	PSH	SN
AT				1.622					
AW	2.245					2.245			2.245
EB	2.044					2.044			2.044
IN									
PB	1.307					1.307			1.307
PBC				1.633					
PH	2.348					2.348			2.348
PSH	2.451					2.451			2.451
SN				1.537					

Table 6: Hypothesis Testing

	Beta	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values	Outcome
AT -> IN	0.543	0.544	0.056	9.661	0.000	supported
AW -> AT	0.163	0.161	0.050	3.287	0.001	
AW -> PBC	0.151	0.147	0.050	3.013	0.003	
AW -> SN	0.180	0.180	0.054	3.363	0.001	
EB -> AT	0.150	0.149	0.054	2.807	0.005	
EB -> PBC	0.155	0.157	0.053	2.892	0.004	
EB -> SN	0.158	0.157	0.061	2.611	0.009	
PB -> AT	-0.119	-0.120	0.041	2.906	0.004	
PB -> PBC	-0.212	-0.212	0.044	4.842	0.000	
PB -> SN	-0.150	-0.150	0.044	3.382	0.001	
PBC -> IN	0.190	0.191	0.050	3.841	0.000	
PH -> AT	0.307	0.309	0.044	6.945	0.000	
PH -> PBC	0.206	0.206	0.058	3.575	0.000	
PH -> SN	0.210	0.210	0.060	3.514	0.000	
PSH -> AT	0.213	0.212	0.050	4.223	0.000	
PSH -> PBC	0.196	0.194	0.053	3.669	0.000	
PSH -> SN	0.200	0.202	0.054	3.711	0.000	
SN -> IN	0.188	0.187	0.047	3.966	0.000	

Figure 2: Results of structural modelling



The R-square shown in Table 7 indicates that reasons for and reasons against explain 61.3% of the variation of AT, 53.7% of the variation of PBC, and 52.8% of the variation of SN. In addition, three variables of TPB account for 62.6 per cent of the variation of the IN.

Table 7: R-squared and R-squared adjusted

	R-square	R-square adjusted
AT	0.613	0.607
IN	0.626	0.623
PBC	0.537	0.530
SN	0.528	0.521

The *f*-square effect size was employed to evaluate the importance of independent variables. The results

presented in Table 8 show that the ATT has a strong impact, whereas PBC has the smallest impact on IN. Moreover, the exogenous variables exhibit only a small effect on global moties (AT, SN, PBC).

Table 8: f-square matrix

	AT	AW	EB	IN	PB	PBC	PH	PSH	SN
AT				0.487					
AW	0.031					0.022			0.031
EB	0.029					0.025			0.026
IN									
PB	0.028					0.074			0.037
PBC				0.059					
PH	0.103					0.039			0.040
PSH	0.048					0.034			0.035
SN				0.062					

6. Discussion

First, the results show that a combination of reasons for (benefits) and reasons against (barriers) is meaningful in forecasting IN through the global motives (AT, SN, and PBC). This shows that compared to TPB, which only relies on AT, SN, and PBC to forecast IN, BRT helps to provide a more multi-dimensional perspective, capturing both the motives and barriers that have affected IN. Similar to previous studies, this study shows the positive impact of global motivation on behavioral intentions. In addition, among global motives, AT is the most important factor and has the strongest impact on IN ($\beta = 0.543$, $p<0.000$).

Second, the current research stands out in detecting the relationship between PSH and global motives. Most notably, among the reasons influencing global motives, PSH and PH are the two most influential factors. Specifically, PSH and PH both have significant positive effects on AT ($\beta = 0.213$, $\beta = 0.307$, $p < 0.001$). This new point shows that young people adopt PHM not only for physical health benefits but also for psychological health benefits.

7. Implications and limitations

By combining BRT and TPB, this study makes a valuable contribution to the existing theory to predict behavioral intention. This combination provides a more comprehensive view of the psychological and social factors influencing IN, which also shows the value of the BRT and TBP theoretical frameworks in predicting IN. More importantly, this study explored the causal relationship between PSH and AT, SN, and PBC. So far, these causal relationships haven't been explicitly discussed in previous studies. Together, the PH and PSH aspects shed more light on the effects of health on AT, SN, and PBC.

In terms of management, a multi-dimensional approach is recommended to promote the transition to PHM as a sustainable meal option, including communication, education, and policy interventions. The media needs to raise awareness of PSH, PH, EB, EW, and, at the same time, inspire responsible eating choices. Interventions can be to provide free PHM at schools, businesses, and public places, combined with promoting the support of family, friends, professionals, and nutrition organizations. This resonant effect will strengthen AT, SN, and PBC, thereby increasing IN in the community.

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UNIVERSITY SOCIAL RESPONSIBILITY IN VIETNAM: FROM EMPLOYEE RESPONSIBILITY PERSPECTIVE

Assoc.Prof.PhD. Le Thi Thanh Hai*

Abstract: ***The quality of teaching and research, driven by faculty and researchers, is the cornerstone of success in today's competitive university environment. As universities face increasing challenges in attracting and retaining qualified personnel, the need for social responsibility towards employees becomes paramount. This study investigates the social responsibility of universities towards their employees in Vietnam, utilizing primary survey data collected through a custom-designed questionnaire. The questionnaire, informed by prior research and expert consultations, assesses eight attributes of social responsibility. Employing a mixed-methods approach, including descriptive statistics, the analysis demonstrates that these attributes are perceived as relatively high and statistically significant within Vietnamese universities. This study provides a valuable academic contribution by examining university social responsibility towards employees, drawing on both established research and original survey data within the Vietnamese context.***

• Keywords: *social responsibility, university social responsibility, employees, social responsibility accounting, economics, accounting.*

JEL codes: I23, M41, M14

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1. Introduction

Social responsibility is a topic of increasing importance for researchers and leaders of businesses and organizations alike. Recent CSR (Corporate Social Responsibility) research has expanded to encompass various types of entities, including those in the public sector, with universities being a prominent example (DeNisi et al., 2014). As a unique type of organization primarily focused on education and research, University Social Responsibility (USR) possesses distinct characteristics.

Within universities, the workforce comprises faculty, researchers directly involved in teaching and research, and support staff facilitating these activities. A university's responsibility toward its workforce is manifested in several key aspects:

Firstly, responsibility in developing faculty, researchers, and staff plans (including attraction, recruitment, appointment, allocation, contract termination, and retirement) aligned with the university's development direction and met needs in training, scientific research, and community service. Recruitment and selection criteria for faculty, researchers, and staff (including ethics and competence) are clearly defined and publicly disseminated.

Secondly, responsibility in managing work outcomes to motivate employees. This involves measuring and monitoring employee workload as a basis for improving the quality of training, scientific research, and community service activities. Objective performance evaluations are crucial for accurately reflecting actual capabilities and informing fair compensation policies, such as salaries and bonuses.

Thirdly, responsibility in creating opportunities and favorable conditions for employees to develop their expertise and improve their skills. Universities identify needs, encourage employee participation in training courses, and actively seek and attract resources to support teaching, research, and community engagement.

However, USR remains a relatively new area of research. While UNESCO has recognized its importance in creating, preserving, and developing values (UNESCO, 2014), significant gaps persist in current USR research worldwide. Specifically, there is a lack of consistency in theoretical frameworks of USR, and frameworks for analyzing how universities implement USR principles (Santos et al., 2020). Therefore, this study offers significant theoretical and practical implications.

2. Literature review

According to Wigmore-Álvarez et al. (2020), the fundamental difference between CSR and USR lies in the specialized training and knowledge development function of the university. This function generates results with impacts far exceeding those of businesses. Therefore, some researchers argue that USR should not be separated from a university's teaching and research activities (Parsons, 2014). Social responsibility has now become

** Thuongmai University, Hanoi; email: nghialehai@tmu.edu.vn*

a defining characteristic of universities, manifested in their internal organization and external relations. Many researchers also assert that higher education institutions must adhere to social responsibility principles; this creates institutional identity and even contributes to the school's success and reputation (Kotecha, 2010).

In the modern world, concepts of social responsibility are being incorporated into curriculum design principles and higher education content, contributing to the education and training of future professionals by emphasizing the development of a strong sense of ethics, social values, and concern for the economic, social, and environmental impacts of business activities (Aznar Minguet et al., 2011). Within the context of Education for Sustainable Development (ESD), teaching social responsibility in universities is an increasing trend (Setó-Pamies et al., 2011). Furthermore, prior research has shown that managerial commitment to CSR within corporations is primarily linked to qualities acquired (through education and training) from a student's experience at a higher education institution, rather than inherent physical characteristics (Quazi, 2003). Indeed, the critical role of education and awareness in achieving behavioral change has been argued as central to sustainable development processes (Tang et al., 2011), as universities educate and train future business leaders while also fostering the development of appropriate skills and attributes. Consequently, corporations interested in integrating social issues into their strategic business plans to achieve a competitive advantage will require graduates and managers with formal education, training, and ongoing professional development across a broad spectrum of sustainability issues (Quazi, 2003).

Various definitions of USR have been proposed, with Vallaeys' definition widely accepted in the academic community (Wigmore-Álvarez & Ruiz-Lozano, 2012): USR is the ethical implementation of social responsibility through responsible management of education, research, and the environment, with societal participation to promote sustainable human development.

3. Methodology

3.1. Scale and questionnaire design

This study employs a 5-point Likert scale, ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). Statements within each scale were adapted from previous research and expert opinions, with adjustments made to suit the context of Vietnamese universities. These adjustments were based on expert interviews and group discussions. The social responsibility of universities towards their employees is measured using eight observed variables (see Table 1).

3.2. Sample and data collection

The research sample was selected using a convenience sampling method. After designing the questionnaire, we conducted online surveys using Google Docs, as well as in-person surveys. The survey link was shared via social media platforms like Zalo and Facebook, as well as through email. The target respondents included university council chairpersons, university council members, presidents, vice presidents, chief accountants, and accounting staff at universities in Vietnam.

This sampling strategy ensured a good representation of the education system. Out of 650 questionnaires collected, 64 were deemed invalid due to unreliable responses. These 64 responses were removed, leaving 586 questionnaires for analysis.

3.3. Data analysis

Quantitative research methods, supported by SPSS software, were used, and descriptive statistics were applied.

4. Findings

The survey results regarding the implementation of social responsibility by universities towards their employees are summarized in Table 1.

Table 1. Social responsibility of universities towards employees

Item	N	Minimum	Maximum	Mean	Std. Deviation
USRE1: Develop faculty, researcher, and staff plans aligned with the university's development direction and meet the needs in training, scientific research, and community service activities.	586	2	5	3.27	.689
USRE2: Clearly define and publicly disseminate recruitment and selection criteria for faculty, researchers, and staff (including ethics and competence).	586	2	5	4.27	.770
USRE3: Ensure the recruitment and selection of faculty, researchers, and staff meet the regulated quality standards of qualifications.	586	2	5	4.20	.789
USRE4: Internal spending mechanisms, salary policies, and bonus regulations ensure equality, non-discrimination, and fairness.	586	3	5	4.42	.636
USRE5: The university has salary and bonus policies ensuring the living needs of employees are met, allowing them to focus on teaching, research, and work at the university.	586	2	5	3.51	.756
USRE6: The management and evaluation of employee performance is carried out objectively, ensuring accurate reflection of actual capabilities as a basis for compensation, such as salaries and bonuses.	586	2	5	3.52	.778
USRE7: Create opportunities and favorable conditions for employees to study, develop expertise, and improve qualifications and skills.	586	2	5	3.88	.401
USRE8: Recognize social responsibility initiatives of students and employees.	586	2	5	3.91	.442
Valid N (listwise)	**586**			**3.87**	**.398**

Source: Authors' compilation and SPSS SPSS20 Software

Table 1 shows that the average values corresponding to the social responsibility of universities towards their employees are above average, with an overall mean of Mean = 3.87 (less than 4)

Analysis also shows that human resources in any organization are considered a valuable resource and a core element for organizational change and development. For non-public universities, the faculty is seen as an even more important factor in affirming quality and attracting students. If non-public universities previously attracted faculty with salary schemes and dynamic working

environments, now, in the context of university autonomy, public universities have also made timely adjustments to working conditions to retain talent. The proportion of faculty with doctoral degrees tends to increase, while the proportion of master's and bachelor's degrees decreases.

Besides academic requirements, universities, especially private ones that are more application-oriented, also invite business lecturers who are successful entrepreneurs to participate in teaching from specialized topics to internship guidance. The criteria for business lecturers are flexible according to each school. Therefore, universities are concerned about defining and publicly disseminating the criteria for recruiting and selecting lecturers, researchers, and staff (including ethics and competence); and ensuring the quality standards for qualifications as prescribed in the recruitment and selection of lecturers, researchers, and staff (Mean = 4.27; Mean = 4.20). In addition to general standards, the recruitment criteria corresponding to each job position being recruited are defined more specifically by the schools. Many public universities develop Regulations on the Recruitment, Use, and Management of Civil Servants based on current legal regulations and implement recruitment in compliance with the civil servant recruitment process as prescribed. Therefore, the quality of the faculty at many public universities is high, ensuring the stability of the faculty and contributing to improving the quality of training at the university. However, the application of general regulations on recruitment and management of civil servants according to Decree 115/2020/ND-CP and some related legal documents is not really suitable for university lecturers, especially in attracting and recruiting lecturers, scientists, and good experts who are working abroad or working for the private sector to become lecturers at public higher education institutions.

However, the quality of lecturers is not really uniform, ensuring regulations at all universities in different localities. According to Dr. Tran Ai Cam (2023), due to the uneven quality of education at training institutions in Vietnam, with a clear difference between the leading group concentrated in major cities directly under the central government and the group of universities in the provinces, good lecturers are concentrated in major cities such as Hanoi, Da Nang, Hue, and Ho Chi Minh City. Universities in the provinces face difficulties in attracting high-quality lecturers to work. A fact that also needs to be discussed is that higher education institutions in localities that often do not recruit enough students or recruit enough but the student scale is not large enough will find every way to optimize costs over the priorities of ensuring quality. For example, educational institutions can reduce the number of full-time lecturers for specialized subjects and invite visiting lecturers for basic subjects. The shortage of lecturers is compensated for by "borrowing" the profiles of people who meet the teaching standards but are working in other fields and not working directly at the educational institution.

Survey results also indicate that the development of planning for faculty, researchers, and staff suitable for the development orientation and meeting the needs of training, scientific research, and community service activities of the school has not been implemented evenly between schools. Therefore, the overall average assessment only reached Mean = 3.27.

Private universities are less influenced by regulations regarding salary and bonus systems for civil servants and employees. This allows them to be more proactive in developing and implementing salary and bonus policies that ensure employees' living needs are met, allowing them to focus on teaching, research, and working at the university (according to survey results, at private/non-public universities, the Mean = 3.78, while public universities only reached a Mean = 3.39). Furthermore, with higher compensation levels and a focus on work performance rather than formality, especially since the issuance of Circular 02/2022/TT-BGDĐT dated January 18, 2022, by the Ministry of Education and Training, the mechanism for signing 12-month professional contracts, regardless of whether the school is public or private, to qualify lecturers for opening new majors and student recruitment. Non-public schools have an easier time recruiting highly qualified lecturers from public sector units, with corresponding compensation. Young, capable lecturers will seek new challenges, leading to a transfer of high-quality labor (skilled lecturers and researchers) from public to private schools. Therefore, private universities often focus on managing and evaluating employee performance objectively, ensuring that it accurately reflects actual capabilities as a basis for paying remuneration such as salaries and bonuses to employees more than public universities (according to survey results, at private/non-public universities the Mean = 3.76, while public universities only reached a Mean = 3.41).

In today's modern world, universities are always competing with each other through the quality of training and scientific research. The decisive factor in the quality of training and scientific research is people - the university's faculty and researchers. Therefore, highly qualified human resources (faculty and researchers) have been considered an important asset determining the success of each school, but survey data shows that creating opportunities and favorable conditions for employees to study, develop professionally, and improve their skills is only rated at a modest level (Mean = 3.88) and is not consistent between schools. According to Assoc.Prof.Dr. Lam Nhan (2023), most faculty in cultural and artistic institutions in Ho Chi Minh City have weak foreign language skills. Therefore, links, cooperative exchanges of expertise domestically and internationally, are limited. It is also difficult for lecturers to independently study abroad in countries with higher levels of training. Employee initiatives on

social responsibility have not been adequately assessed and recognized (Mean = 3.91). Internal spending mechanisms, salary regulations, and reward regulations that ensure equality, non-discrimination based on gender, and fairness are assessed as being implemented relatively well, with an average value of Mean = 4.42.

6. Conclusion

Universities play a vital role in societal progress as centers for education, knowledge dissemination, and the cultivation of ethical and cultural values for students, who will contribute directly to the economic and cultural development of society. Research findings reveal that Vietnamese universities are increasingly aware of their social responsibility towards stakeholders, especially employees, as evidenced by the average values across key indicators. While differences exist in implementation levels, the overall average of 3.87 indicates a positive trend. However, this awareness is not comprehensive, particularly concerning social responsibility oriented towards sustainable development. Fulfilling university social responsibility requires not only commitment from the universities themselves but also collaboration among all stakeholders to achieve mutual benefits.

To strengthen the implementation of USR and promote sustainable development, the research team proposes the following recommendations:

Firstly, the Vietnamese government should enhance the development of guidelines and synchronize the legal framework concerning USR with all university stakeholders. This would establish a clear and specific legal corridor for universities to implement USR more effectively.

Secondly, raise awareness among higher education institutions and the community. Social responsibility is now a concern not only for the private sector but also for public service providers, including universities. As the economy develops and globalization intensifies, the social responsibility of universities is gaining importance. Universities need to recognize this issue and materialize it in their strategies and actions, allocating budgets and developing specific programs to fulfill their (voluntary) social responsibility commitments.

Thirdly, innovate university governance based on autonomy and accountability, proactively exploiting financial resources from the community while actively fulfilling responsibilities to students, the community, and partners. Increase accountability and transparency of information, especially communication with students, the community, and partners.

Fourthly, universities should identify and implement solutions to improve the quality of faculty and researchers, including:

- Implementing policies and measures to improve the expertise and research capacity of faculty, such as organizing in-depth training programs both domestically and internationally, short-term and long-term. Encourage graduate students and junior faculty to study abroad through scholarship programs.

- Developing and implementing talent retention policies, such as increasing salaries and bonuses based on work performance and research results; attracting high-level faculty and scientists from home and abroad (special contracts, flexibility); continuously improving working conditions: laboratories, academic resources, libraries, specialized software.

- Creating a favorable research environment by developing strong research groups, specialized laboratories, and interdisciplinary research centers; providing financial support for research: foundation-level research funds, national-level funds, corporate cooperation; simplifying administrative procedures in scientific and technological activities.

- Promoting international cooperation and industry linkages, connecting with businesses and employers to develop training programs and technology transfer.

- Innovating faculty evaluation and ranking through the development of a performance evaluation system based on competence and substantial contributions: scientific publications, inventions, graduate student guidance, and community contributions.

- Developing pedagogical capacity and innovative teaching methods through modern teaching method training, such as active learning, project-based learning, and blended learning; encouraging faculty to apply digital technology in teaching (AI, LMS, simulation software).

Fifthly, actively innovate training and research, integrating sustainable development-related modules, changing perceptions of sustainable business, increasing applied research, and actively and proactively linking regions and localities with universities in training, applied research, and deployment.

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FACTORS AFFECTING CUSTOMERS INTENTION TO USE OMNICHANNEL APPROACH WHEN PURCHASING AT CHAIN STORES IN HO CHI MINH CITY

Assoc.Prof.PhD. Pham Hung Cuong* - Nguyen My Hong Thi - Nguyen Hoang Long*****

Abstract: ***After completing 1 month of data collection from October to November 2024 in Ho Chi Minh city with 270 responses were received, filtering 250 valid responses, and data analysis was conducted. The study used SPSS software to analyze data and test scales and hypotheses. The research has successfully accomplished its objective of factors affecting customers intention to use omnichannel approach when purchasing at chain stores in Ho Chi Minh City: (1) Perceived Value, (2) Habit, (3) Perceived Risk, (4) Perceived Compatibility, (5) Personal Innovativeness, (6) Perceived Usefulness and (7) Purchase Intention.***

• Keywords: *omnichannel, chain stores.*

JEL codes : M31, C83, D12, L81

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1. Introduction

Under the impact of digital transformation, the retail sector is compelled to comprehensively change from sales methods to system operations due to shifts in consumer behavior. The growing adoption of omnichannel retail brings not only opportunities but also concerns related to pricing, service quality, payment security, and personal data leakage. Therefore, an effective omnichannel strategy must focus on the entire customer experience and encourage consumer acceptance of new technologies. Studying customer perspectives on this model, especially at chain stores in Ho Chi Minh City, is essential to better understand shopping behavior and develop appropriate strategic directions.

2. Review of literature

Theory of Planned Behavior (TPB) was developed by Ajzen (1991) from Theory of Reasoned Action, by adding the factor of "perceived behavioral control" into the original Theory of Reasoned Action (TRA) by Fishbein and Ajzen (1975, 1980s). To prove the necessity of such addition, Ajzen conducted 16 different studies which all confirm the impact of perceived behavioral control on actual behavior.

Fundamentally, Theory of Planned Behavior is an extension of Theory of Reasoned Action, with the addition of "perceived behavioral control". The purpose of is "perceived behavioral control" to reflect the level of ease or difficulty experienced by users when carrying out the actual behaviors. Such a level of ease or difficulty depends on availability of resources and opportunities to carry out actual behaviors.

The Technology Acceptance Model (TAM), developed by Davis in 1989 and derived from the Theory of Reasoned Action (TRA), aims to explain users' acceptance of information technology. The model focuses on two main beliefs: perceived usefulness (the extent to which a person believes that using a system will enhance job performance) and perceived ease of use (the degree to which a person believes that using the system will be effortless or save time). These beliefs are influenced by external variables, including social influence and individual experiences with technology.

In a later refinement, Davis (1989) emphasized that perceived usefulness plays a central role in shaping users' behavioral intentions. The model suggests that when both perceived usefulness and ease of use are high, users are more likely to adopt new technologies. Conversely, low levels of these beliefs lead to resistance. Given its relevance, TAM serves as a foundational framework for the author's research model.

To unify diverse streams in technology acceptance research, the Unified Theory of Acceptance and Use of Technology (UTAUT) was developed by Venkatesh et al. (2003), integrating eight competing models. Earlier studies, including those by Davis (1989), Ajzen (2011), and Moore & Benbasat (1991), focused on psychological and innovation-specific factors, but often lacked a comprehensive, generalizable framework.

** Foreign Trade University; email: phamhungcuong.cs2@ftu.edu.vn*
*** La Trobe University; email: 22159801@students.latrobe.edu.au*
**** Foreign Trade University, Ho Chi Minh City Campus; email: nguyenhoanglong2015535299@ftu.edu.vn*

UTAUT addressed this gap by identifying four core constructs performance expectancy, effort expectancy, social influence, and facilitating conditions as key determinants of behavioral intention, with moderating effects from age, gender, experience, and voluntariness of use. Recognizing the need for an updated model in the evolving consumer technology landscape, Venkatesh et al. (2012) introduced UTAUT2, which added hedonic motivation, price value, and habit, while removing voluntariness.

A foundational framework for understanding how innovations spread across social groups is Innovation diffusion theory (IDT). The theory outlines five stages in the adoption process awareness, interest, evaluation, trial, and adoption and categorizes adopters into innovators, early adopters, early majority, late majority, and laggards. (Wani et al. 2015)

Key factors influencing adoption include perceived usefulness, social influence, and ease of use. Building on Rogers' work, Moore and Benbasat (1991) refined the model for technology adoption, while Agarwal and Prasad (1998) emphasized the role of personal innovativeness and trust. In the omnichannel context, where consumers interact with multiple technologies across platforms, understanding individual openness to innovation is crucial for predicting and promoting technology adoption.

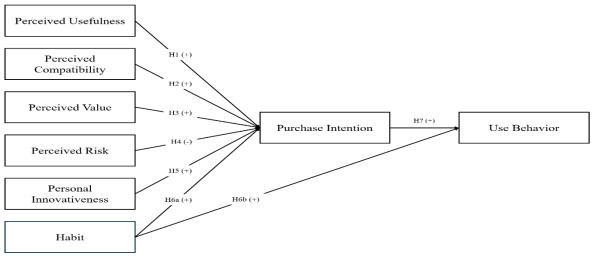
The study Omnichannel Customer Behavior: Key Drivers of Technology Acceptance and Use and Their Effects on Purchase Intention (Juaneda Ayensa, E. et al., 2016) examines the factors influencing customers' intention to adopt omnichannel shopping. Based on the UTAUT2 model, with the addition of Personal Innovativeness (PIN) and Perceived Security (PS), data were collected from 628 Spanish Zara customers using at least two shopping channels. Findings reveal that PI, Effort Expectancy (EE), and Performance Expectancy (PE) significantly impact purchase intention, with PI being the strongest predictor ($\beta = 0.310$, $p < 0.05$). In contrast, Social Influence (SI), Habit (HB), Hedonic Motivation (HM), and PS showed no significant effect. The study concludes that customers' willingness to embrace innovation is the key driver of omnichannel purchase intention.

Vu Thi Kim Chi et al., 2021 employed the UTAUT2 framework to examine key influences on omnichannel shopping behavior. Based on survey data from 433 consumers and analyzed using SEM in SPSS 20 and AMOS 20, the research identified Perceived Usefulness (PU) and Compatibility (PC) as the most impactful factors. Notably, Compatibility ($\beta = 0.305$) and Perceived Risk ($\beta = -0.165$) significantly influenced Purchase Intention, while Cost ($\beta = 0.128$) had a moderate effect. Habit (HB), however, showed no meaningful impact ($\beta = 0.038$, $p = 0.489$) and was statistically rejected. The study further confirmed a positive link between Purchase Intention and Actual Use ($\beta = 0.146$, $p = 0.004$). Overall, the findings highlight that aligning retail channels with consumers' needs and minimizing perceived risks are critical to encouraging omnichannel adoption in Hanoi.

3. Proposed research model and hypothesis

Based on the previous research and hypotheses, the author concludes the research model below, inheriting the framework of UTAUT2 model and incorporating personal innovativeness factor. The model includes 6 independent variables, one mediating variable and one dependent variable. The relationship between the variables is shown below (Figure 1).

Figure 1: Proposed research model and hypotheses



Source: Self-deprived by authors, 2024

Hypothesis

H1. Perceived usefulness has positively affected customers' purchase intention through omnichannel approach in chain stores at Ho Chi Minh City.

H2. Perceived compatibility has positively affected customers' purchase intention through omnichannel approach in chain stores at Ho Chi Minh City.

H3. Perceived value has positively affected customers' purchase intention through omnichannel approach in chain stores at Ho Chi Minh City.

H4. Perceived risk has negatively affected customers' purchase intention through omnichannel approach in chain stores at Ho Chi Minh City.

H5. Personal innovativeness has positively affected customers' purchase intention through omnichannel approach in chain stores at Ho Chi Minh City.

H6(a). Habit has positively affected customers' purchase intention through omnichannel approach in chain stores at Ho Chi Minh City.

H6(b). Habit has positively affected customers' use behavior through omnichannel approach in chain stores at Ho Chi Minh City.

H7. Purchase Intention has positively affected customers' use behavior through omnichannel approach in chain stores at Ho Chi Minh City.

4. Research methodology

Data collection took place over a span from October to November, 2024 in Ho Chi Minh city, utilizing Google Forms methods. The focus participants are in Ho Chi Minh City and has either acknowledged or been familiar with omnichannel model and chain stores. In total, out of the 270 responses received, 250 responses are utilized for subsequent statistical analysis.

5. Results

Cronbach's alpha coefficient test

The results show that all independent variables have Cronbach's coefficients that meet the criteria, all are greater than 0.6 and less than 0.95. At the same time, the total correlation coefficient of the observed variables is greater than 0.3, so all variables are retained for subsequent testing (Table 1).

Table 1. Cronbach's Alpha coefficients result of the official study

Variables	Abbreviations	Cronbach's Alpha	N of Items
Perceived Usefulness	PU	0.844	4
Perceived Compatibility	PC	0.827	3
Perceived Value	PV	0.746	3
Perceived Risk	PR	0.870	4
Habit	HB	0.838	3
Personal Innovativeness	PIN	0.832	4
Purchase Intention	PI	0.847	4
Use Behavior	UB	0.857	4

Source: SPSS result (2024)

Exploratory factor analysis (EFA)

The KMO coefficient for the independent variables is 0.791, satisfying the condition KMO ∈ [0.5; 1], indicating that the dataset is suitable for factor analysis. Additionally, the significance value (Sig.) of Bartlett's Test is 0.000 < 0.05 (5%), demonstrating that the observed variables meet the requirements for factor analysis and that there is a correlation among the observed variables within each group of factors or independent variables. The Eigenvalue is 1.286 > 1, confirming that the number of factors identified in the scale for EFA is appropriate and can be retained. The total variance explained is 72.002%, which exceeds the threshold of 50.00%, as shown in Table 2.

Table 2. KMO, Bartlett's Test and Sums of Squared Loading

	KMO	Sig.	Eigenvalue	TVA
Independent variables	0.791	0.000	1.286	72.002%
Dependent variables	0.778	0.000	2.809	70.235%

Source: SPSS results, 2024

The KMO coefficient for the dependent variable is 0.778, also meeting the requirement of KMO ∈ [0.5;1]. Furthermore, the significance value (Sig.) of Bartlett's Test is 0.000 < 0.05 (5%), indicating a correlation among the observed variables within the factor group of the dependent variable, and confirming that the variables are eligible for factor analysis. Moreover, the Eigenvalue is 2.809 > 1, which implies that this factor can be retained. The total variance explained is 70.235%, which is greater than 50.00%, satisfying the established criterion (Table 2).

Pearson Correlation Coefficient Test

The results of the correlation analysis in Appendix reveal significant positive correlations between the dependent variable (Use Behavior - UB) and most independent variables, suggesting that as UB increases, so do perceptions of Perceived Usefulness (PU), Perceived Compatibility (PC), Perceived Value (PV), Habit (HB), and Personal Innovativeness (PIN). The strongest positive correlation is with Purchase Intention (PI) at .517, indicating that intention is particularly impactful on use behavior.

Additionally, there is a notable negative correlation with Perceived Risk (PR) at -.381, suggesting that as perceived risks increase, use behavior decreases. All Sig. values of the correlation coefficients are below 0.05, confirming that the Pearson coefficients are statistically significant. This indicates that each pair of independent and dependent variables in the model is closely correlated.

Therefore, all independent variables are eligible for inclusion in the next step of the analysis, the regression model, to further explain the dependent variable UB. Moreover, some independent variables show moderate correlations among themselves, such as between Perceived Compatibility (PC) and Habit (HB), with a Pearson coefficient of .387. Thus, it will be essential to check for potential multicollinearity issues between independent variables during the regression analysis.

Multiple Regression Analysis

The adjusted R-square value is 63%, indicating the research model's ability to explain 63% of the impact of factors within a physical store on purchase intention of young customers in Ho Chi Minh City when buying clothing products. The other 37% depend on factors undefined or not included in the research model.

According to the ANOVA analysis, if the Sig. value equal 0.000 < 0.05 at F = 35.304 then H0 is rejected. Therefore, it can be deduced that there is at least one among the proposed variables influencing the purchase intention of young customers in Ho Chi Minh City when buying clothing products.

The results show that the significance levels (Sig.) for all independent variables affecting PI are less than 0.05, allowing us to confidently reject the null hypothesis that "the regression coefficient of each variable is equal to 0". This indicates that the variables PU, PC, PV, PR, HB, and PIN significantly explain the dependent variable, Purchase Intention (PI).

Regarding the relation between PI, HB and UB, the significance level (Sig.) for PI is less than 0.05, allowing us to confidently reject the null hypothesis that "the regression coefficient of PI is equal to 0". This

indicates that PI significantly explains the dependent variable, Use Behavior (UB). However, the effect of HB is less definitive due to a Sig. value of 0.054, which is marginally above the significance threshold.

Regarding PI variable, the OLS regression results yield an R^2 value of 0.347. The adjusted R^2, which is less affected by the exaggerated deviation of R^2, provides a closer reflection of the model fit. The adjusted R^2 value of 0.332 indicates that the six independent factors explain 33.2% of the variance in the dependent variable (PI - Purchase Intention). The remaining 66.8% variation in PI is due to other factors, including measurement errors and unknown or unaccounted-for variables.

Regarding the UB variable, the Adjusted R^2 value of 0.272 indicates that the two independent factors (PI - Purchase Intention and HB - Habit) explain 27.2% of the variance in the dependent variable (UB - Use Behavior). The remaining 72.8% of variation in UB is due to other factors, including measurement errors and unknown or unaccounted-for variables.

In conclusion, the standardized linear regression equation of the model after analysis is as follows:

$$PI = 0.215*PV + 0.191*HB - 0.164*PR + 0.155*PC + 0.129*PIN + 0.115*PU + \varepsilon$$

$$UB = 0.475*PI + 0.107*HB + \varepsilon$$

Table 3. Coefficients table in regression analysis

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		β	Std. Error	β			Tolerance	VIF
1	(Constant)	1.069	.403		2.650	.009		
	PU → PI	.116	.054	.115	2.143	.033	.829	1.207
	PC → PI	.148	.052	.155	2.865	.004	.811	1.234
	PV → PI	.240	.059	.215	4.057	.000	.851	1.175
	PR → PI	-.167	.054	-.164	-3.062	.002	.833	1.200
	HB → PI	.184	.055	.191	3.372	.001	.741	1.350
	PIN → PI	.132	.057	.129	2.319	.021	.774	1.292
2	(Constant)	1.384	.231		5.997	.000		
	PI → UB	.481	.056	.475	8.573	.000	.847	1.181
	HB → UB	.105	.054	.107	1.938	.054	.847	1.181

Source: SPSS results, 2024

The purpose of analyzing the influence of qualitative variables on the use behavior (UB) of customers is to demonstrate the level of discrepancy in usage behavior among different target groups in the same attributes. To analyze the effect of qualitative variables, the authors utilized the average test method - ANOVA for each attribute: gender, occupation, income and product category. There are two steps in conducting ANOVA: firstly, the tested element must meet the homoskedastic criteria, which means there is no difference in variance of the object groups in the same attribute. At this moment, the Sig. of the Levene value must be greater than 0.05. Secondly, the Sig. coefficient of the ANOVA test must be checked if it is less than 0.05, therefore, we can confirm the difference in usage behavior among groups studied.

From the data analyzed by SPSS, it can be seen that in the qualitative variables including Gender, Age, Income and Product categoy purchased via omnichannel, there is no difference in Omnichannel shopping behavior. This conclusion is drawn from the fact that the Sig. values of these variables in the Levene test and F test are all > 0.05. This result shows that there is no difference in omnichannel shopping behavior between men and women and other genders. There is little difference preference among age group regarding omnichannel shopping. Different occupations do not indicate significant differences in the way they shop via omnichannel. Income level is not a determining factor in the difference in omnichannel shopping behavior. The type of product frequently purchased via omnichannel does not affect the difference in consumer shopping behavior. The avarage speding does not have large effect on customer's omnichannel shopping opinion.

Table 4. ANOVA TEST

	Sig. of Levene	Sig. of ANOVA
Gender	0.432	0.916
Age	0.294	0.314
Occupation	0.603	0.772
Income	0.574	0.184
Product Category	0.528	0.148
Average Spending	0.852	0.105

Source: Authors compiled from SPSS, 2024

It can be concluded that the study did not find significant differences according to these qualitative variables in omnichannel shopping behavior, therefore, these factors may not be strong determinants in shaping omnichannel shopping behavior.

6. Conclusions and implications

6.1. Conclusions

After completing 1 month of data collection, 270 responses were received, with 250 valid responses, and data analysis was conducted. The study used SPSS software to analyze data and test scales and hypotheses. The research has successfully accomplished its objective of factors affecting customers intention to use omnichannel approach when purchasing at chain stores in Ho Chi Minh City: (1) Perceived Value, (2) Habit, (3) Perceived Risk, (4) Perceived Compatibility, (5) Personal Innovativeness, (6) Perceived Usefulness and (7) Purchase Intention.

6.2. Recommendations

For Company

This is the most influential factor. Customers are primarily concerned with the value they receive relative to the price paid. Retailers can increase perceived value by offering fast, efficient, and enjoyable shopping experiences both pre- and post-purchase. Platforms should also minimize customer costs, including time and effort, while maintaining competitive pricing.

Consumers frequently move between channels during their shopping journey. Retailers should adapt by maintaining a consistent presence across platforms

like Shopee, Lazada, and TikTok Shop. Aligning with consumer habits, while ensuring consistency and convenience between channels, is essential to boosting conversions.

Customers are more likely to purchase when their values align with the brand. Personalization plays a crucial role - from product recommendations to acknowledging customer milestones. Younger consumers, in particular, value sustainability, health, and smart consumption, pushing retailers to provide transparent product information and environmentally conscious practices. The rise of "shopper entertainment" (integrating shopping with entertaining content) is also shaping customer engagement.

Consumers in dynamic markets are open to trying new technologies. Retailers should adopt innovations like AR, AI, and live chat support to create engaging and interactive experiences. Investing in IT and training staff for adaptability is also important.

Although it has the least impact among the factors, perceived usefulness still plays a role. Customers prefer platforms that are practical and easy to navigate. Retailers should streamline operations across channels, ensure cross-device compatibility, and offer features like real-time inventory updates and omnichannel loyalty programs.

This negatively impacts purchase intention. Security in transactions and data handling is critical. Businesses must build trust through secure platforms, transparent policies, and user reviews that validate product authenticity and reliability.

A strong purchase intention often leads to actual buying behavior. However, external influences social, cultural, or economic can moderate this. To convert intention into action, retailers should focus on simplifying customer journeys, optimizing select platforms, and building a trustworthy brand image.

For customers

The development of omnichannel retail in Vietnam has rapidly advanced, especially due to the COVID-19 pandemic, which compelled both retailers and consumers to shift toward digital platforms. With physical store closures and movement restrictions during the pandemic, retailers were forced to adopt online sales strategies to survive, while consumers became increasingly accustomed to shopping online. As a result, the need for seamless integration between online and offline channels grew stronger.

Beyond the pandemic, Vietnam's growing internet penetration, widespread use of mobile devices, and fast-paced digital transformation have contributed to the expansion of omnichannel retailing. Vietnamese consumers today expect convenience, flexibility, and personalization in their shopping experiences, and businesses are under pressure to meet these expectations through integrated systems and smart technologies.

For customers, the omnichannel model offers numerous benefits. It enhances the shopping experience by allowing for quick product searches, cross-platform comparisons, and real-time access to reviews and product details. Chain stores often act as fulfillment centers, enabling faster deliveries and local pickups, which saves time and increases convenience. The ability to switch between online and offline channels provides greater flexibility and supports informed decision-making.

Customers engaging with omnichannel platforms experience a more personalized and efficient journey. For example, they can browse products online, check in-store availability, choose home delivery or in-store pickup, and easily compare prices and promotions. These combined experiences improve accessibility, simplify the buying process, and help customers find products that best meet their needs.

However, omnichannel retailing also introduces certain risks. Financially, retailers face the challenge of investing in technologies and infrastructure needed to support omnichannel operations. If systems are not well-integrated, businesses may not see the expected return on investment. On the consumer side, the ease of shopping across platforms can lead to impulsive buying and overspending.

Data security is another major concern. With customer data collected across various platforms, including personal and payment information, the risk of cyberattacks and data breaches increases. Retailers must implement strong security protocols, while consumers should take care to shop only on trusted platforms and be cautious about the data they share.

Another potential drawback is overbuying. Because omnichannel retail makes shopping so easy and accessible, consumers may purchase more than they need, which can lead to buyer's remorse, financial strain, and complications with returns especially if policies vary by channel.

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FACTORS AFFECTING DIGITAL TRANSFORMATION IN THE TAX INDUSTRY OF VIETNAM: A RESEARCH FROM TAX SYSTEM USERS' PERSPECTIVE

PhD. Nguyen Thi Phuong Mai* - Dao Thi Minh Nguyet*

Abstract: ***This study uses quantitative methods to identify and evaluate factors that affect the digital transformation in the Vietnamese tax sector. We surveyed 356 tax system users via an online questionnaire. Data is processed and analyzed by SPSS 26 software through the following techniques: descriptive statistics, scale reliability tests, exploratory factor analysis, correlation analysis, multiplicity analysis and comparative testing between groups. The results of the study accept the hypothesis about the influence of five factors, including (1) awareness and attitudes of users; (2) government interest; (3) breakthrough technology; (4) transformation cost; and (5) perceived risk on the digitalization in the tax industry. Meanwhile, there is no statistical evidence to confirm the impact of digital transformation goals and strategies on the digital transformation of Vietnam's tax sector.***

• Keywords: *digital transformation, tax industry, tax system reformation, breakthrough technology, transformation cost....*

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1. Introduction

The rapid growth of the digital economy, driven by advanced technologies such as Big Data, Cloud Computing, IoT, AI and Blockchain, is significantly transforming various sectors, including taxation. In Vietnam, *the Tax System Reform Strategy for 2016-2030* aims to modernize the tax administration using electronic platforms, ensuring efficiency and professionalism. However, challenges such as economic competition, technological advancements and emerging digital economic models, including the network and sharing economy, impact the implementation of this strategy.

The Vietnamese taxation sector is committed to building a modern and efficient tax administration that aligns with global trends. Achieving this goal requires collaboration between the government, businesses and individuals to accelerate digital transformation.

This research examines factors influencing digital transformation in Vietnam's tax industry, guided by two research questions: (1) What are the key factors impacting digital transformation? and (2) How do these factors affect the transformation process?

To address these questions, the study employed qualitative and quantitative methods, analyzing data from 356 tax system users in Hanoi. The research model was developed based on previous studies and findings are presented in the Results section. The study provides insights into the current digital transformation process and offers recommendations for improvement. The final section discusses key findings and suggests further research directions to enhance digitalization in Vietnam's tax sector.

2. Literature review

2.1. Definition of digital transformation in the tax industry

The concept of digital transformation has been extensively explored in academic literature; however, there remains no universally accepted definition. Various scholars have proposed differing perspectives on the phenomenon. Sabuncu (2022) defines digital transformation as the integration of technological innovations into business models, processes and capabilities to enhance efficiency. Similarly, Kane et al. (2015) argue that digital transformation extends beyond technological innovation and necessitates a fundamental strategic shift within organizations. Meanwhile, Ebert and Duarte (2018) emphasize the role of advanced technologies in improving productivity, creating value and contributing to social welfare.

Drawing upon existing literature, the digital transformation of the tax industry can be defined as a comprehensive modernization process that leverages digital technologies to enhance tax management and taxpayer services. From the perspective of taxpayers, digital transformation entails the adoption of electronic tax declaration, payment, refunds and related services. Conversely, for tax authorities, it involves automating operations, integrating digital communication channels and fostering real-time engagement with system users and tax personnel through public service portals.

In 2016, tax administrations from 48 countries collaborated under *the OECD's Forum on Tax Administration* to develop a roadmap aimed at transitioning towards digital tax authorities. The primary objective was to transform tax administration processes into real-time, data-driven operations, rather than treating data merely as a byproduct of tax compliance. Digital transformation in taxation enhances transparency, efficiency and fraud prevention while reducing compliance costs and

** Foreign Trade University; email: maintp@ftu.edu.vn*

supporting e-commerce. It integrates government databases, fostering a unified tax ecosystem. Additionally, it drives digital governance, advancing the digital economy, society and citizenship, modernizing government operations and aligning tax administration with global best practices.

2.2. Criteria for assessing digital transformation

There are many different ways and perspectives to assess the digital transformation in an industry in general and in the tax industry in particular.

According to Singh et, al.(2021), digital transformation is the use of technologies that can enable the extraction of meaningful insights that can support data-driven decision-making. It can help organizations adapt to the necessary environment, save costs and build flexibility. Therefore, they used the following criteria to measure the digital transformation: flexibility, cost savings and decision-making support based on available data.

Diller, Asen and Späth (2020) argued that the influence of personal traits on digital transformation is about changing the way companies work and communicate with their clients using data-driven methods such as artificial intelligence and advanced statistical methods to increase efficiency in tax advisory services. Employee familiarity with the digital transformation of the tax consulting business, the consequences of digital transformation on all company operations and the implementation of digital transformation in all corporate duties were used to quantify digital transformation

According to Chu (2019), it is critical to identify both positive and negative elements for effective digital transformation of enterprises in order to mitigate risks for organizations in the digitalization process. The success of digital transformation is measured in that study utilizing corporate interests, employee interests, leader satisfaction and business progress.

It is clear that researchers have their unique methods for quantifying digitalization based on how they interpret this process. The previous digital transformation studies serve as a foundation for developing digital transformation initiatives in general and specifically in the tax sector.

2.3. Factors impacting the tax industry's digitalization

The digital transformation of the tax industry has garnered significant attention in recent years, with numerous studies examining the factors that influence its success. Previous research has identified key determinants, including human cognition and abilities, government interest, digital transformation goals, breakthrough technologies, transformation costs and perceived risk. This study synthesizes these factors, providing a comprehensive analysis of their impact on digital transformation in the tax sector.

Human Cognition and Abilities

The rapid advancements in technology driven by the Fourth Industrial Revolution have fundamentally reshaped work processes across various industries, including taxation. Individuals play a central role in digital transformation as both implementers and users. As a result, their ability to adapt, acquire relevant skills and demonstrate a cooperative attitude is essential for successful digitalization (Diller, Asen, & Späth, 2020). Digital transformation necessitates a workforce with strong information technology competencies, ensuring efficient adoption and integration of digital tools into daily operations. Governments must therefore invest in educational programs and training initiatives to equip individuals with the necessary knowledge and skills to facilitate digital transformation in the tax sector.

Digital Transformation Goals and Strategies

The establishment of clear and effective digital transformation goals and strategies is crucial for its success. Chu (2019) underscores the significance of well-defined objectives, asserting that organizations must develop structured strategies to guide their transformation efforts. Effective digital transformation strategies should possess four key attributes: clarity, feasibility, relevance and consistency. Strategic planning enables leaders to set a clear direction, implement optimal solutions and efficiently manage errors encountered during the transition process. Without a coherent strategy, digital transformation initiatives risk becoming fragmented and ineffective.

Breakthrough Technology

Technological advancements serve as a driving force behind digital transformation. Pousttchi et al. (2019) emphasize that disruptive technologies create favorable conditions for digital transformation by introducing innovative digital products and internet-enabled devices. These advancements alter user expectations regarding response times and accessibility across multiple platforms. Organizations equipped with modern technological infrastructure can seamlessly integrate digital solutions, enhance management models and upgrade existing services. Maintaining up-to-date IT systems provides a competitive advantage, ensuring smoother transitions during digitalization initiatives.

The Role of Government

Government support plays a pivotal role in facilitating digital transformation within the tax sector. Ab Wahit et al. (2021) highlight the positive impact of governmental initiatives on digital transformation, emphasizing the necessity of policies that promote technological adoption. The government serves as both a regulatory body and a facilitator, providing financial and non-financial support to businesses and individuals. Furthermore, government-led initiatives, such as tax incentives and digital infrastructure investments, can accelerate the adoption of digital solutions within tax administration.

Transformation Costs

Cost considerations remain a significant barrier to digital transformation. Singh et al. (2021) argue that high implementation costs deter organizations from adopting digital solutions. Beyond the initial investment in software and infrastructure, organizations must also account for hidden costs, including operational adjustments, employee training and extended implementation timelines. A lack of adequate financial planning can lead to project failures,

making cost management a critical aspect of successful digital transformation.

Perceived Risk

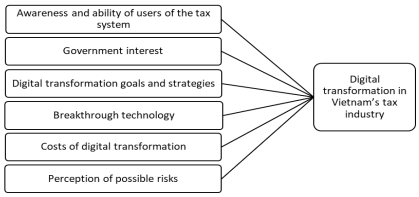
Risk perception influences decision-making in digital transformation initiatives. Diller et al. (2020) suggest that organizations must anticipate and address potential risks to ensure smooth transitions. According to McKinsey (2020), resistance from employees, insufficient managerial support and a lack of motivation to implement organizational changes are among the primary risks that hinder digital transformation. Effective risk management strategies, including proactive stakeholder engagement and adaptive policy frameworks, are essential to mitigate these challenges.

3. Research methods

3.1. Research model and hypothesis

Based on the gradual changes in the tax industry in Vietnam and the inheritance and development of the previous research, we established a research model comprising six factors possibly affecting the digital transformation in Vietnam's tax industry: (1) awareness and ability of users of the tax system; (2) government interest; (3) digital transformation goals and strategies; (4) breakthrough technology; (5) costs of digital transformation; and (6) perception of possible risks.

Figure 1: Research model



The following hypotheses were proposed:

(H1): The awareness and ability of taxpayers has *a positive influence* on the digital transformation of Vietnam's tax industry.

(H2): The Government's interest *has a positive influence* on the digital transformation of Vietnam's tax industry.

(H3): Clear digital transformation goals and strategies have *a positive impact on* the digital transformation of Vietnam's tax industry.

(H4): Breakthrough technology has *a positive impact* on the digital transformation of Vietnam's tax industry.

(H5): High transformation costs have *a negative impact* on the digital transformation of Vietnam's tax industry.

(H6): Risk perception has *a negative impact on* the digital transformation of Vietnam's tax industry.

The scales for independent and dependent variables were developed based on studies by Diller, Asen and Späth (2020), Singh, Sharma and Dhir (2021), McKinsey (2020), Wahid and Zulkifli (2021), Chu (2021), Nguyen and Dinh (2021) and Nguyen (2020). These scales were adapted to the specific characteristics of Vietnam's tax industry.

Users' awareness and ability (AA) were measured by three factors: personal traits (AA1), attitudes (AA2) and cognitive ability (AA3). Government interest (GI) was assessed using four indicators: investment (GI1), promotion of technology use (GI2), financial support (GI3) and monitoring and evaluation (GI4). Transformation goals and strategies (GS) were evaluated through clarity and specificity (GS1), feasibility (GS2), practicality (GS3) and consistency (GS4).

Breakthrough technology (BT) was measured by diversity (BT1), accessibility (BT2), ease of use (BT3) and willingness to recommend (BT4). Transformation costs (TC) were assessed through cost-quality matching (TC1), affordability (TC2) and government support (TC3). Lastly, perceived risk (PR) was analyzed based on concerns of termination if issues arise (PR1), objections to workforce reductions (PR2) and delays due to manpower shortages (PR3).

For the dependent variable, digital transformation in Vietnam's tax industry (DT) was measured using three indicators: readiness for digitalization (DT1), relevance to digital technology development (DT2) and overall popularity (DT3).

3.2. Data collecting and analysing methods

This study uses quantitative methods. To assess the model's variables, a questionnaire with a 5-point Likert scale ranging from strongly disagree (1 point), disagree (2 points), neutral (3 points), agree (4 points) and strongly agree (5 points) was developed. We sent an online survey to accountants, tax agents and individuals who are taxpayers. The survey obtained 367 responses, of which 11 did not qualify due to poor or lack of information. Research data were taken from 356 valid responses from 85 accountants, 33 tax agents and 238 individuals.

Data processing and analysis were carried out by SPSS26 software through the following techniques: Descriptive statistics, scale reliability test, exploratory factor analysis, Correlation analysis, multiplicity regression analysis and comparative testing between groups.

4. Research results and discussion

4.1. Descriptive statistics

The survey results indicate that all scales assessing digital transformation in Vietnam's tax industry are appropriate with mean scores above 3 and standard deviations around 1, reflecting general acceptance among respondents. The perceived risk variable (PR1) scored the highest average of 3.82, followed closely by transformation costs (TC1) at 3.78, suggesting that many participants believe the digital transformation process may be disrupted by issues and that costs are reasonable compared to the quality received. Conversely, the transformation goals and strategies variable (GS3) had the lowest mean of 3.09, indicating concerns about the practicality of digitalization strategies in the tax sector. Overall, the digital transformation readiness in the tax industry scored about 3.4, showing that most respondents do not agree that the sector is fully ready for transformation or that it is widely popular. Specifically, DT1 ("completely ready for transformation") scored 3.44, DT2 ("consistent with digital technology development") was 3.42 and DT3 ("widely popular transformation") rated 3.32. These findings reveal that while there is awareness and some interest in

digital transformation, Vietnam's tax industry remains in the early stages of the process, with notable concerns regarding readiness and implementation strategies.

4.2. Scale reliability

Cronbach's Alpha was used to assess the scale's dependability on each variable. It aids in determining the suitability of the scale, allowing the elimination of unsuitable observable variables and it also aids in determining how much the variable contributes to quantifying the effect of the variable.

Table 1: Cronbach's Alpha test results

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Cronbach's Alpha: 0.873				
AA1	6.79	3.532	.797	.786
AA2	6.92	3.878	.674	.891
AA3	6.85	3.034	.811	.772
Cronbach's Alpha: 0.939				
GI1	10.19	7.275	.868	.916
GI2	10.17	7.021	.871	.915
GI3	10.12	7.703	.831	.928
GI4	10.24	7.034	.855	.921
Cronbach's Alpha: 0.842				
GS1	9.57	5.821	.697	.793
GS2	9.47	5.580	.688	.795
GS3	9.65	5.610	.712	.785
GS4	9.53	5.606	.618	.828
Cronbach's Alpha: 0.908				
BT1	10.28	7.146	.792	.885
BT2	10.28	6.730	.775	.887
BT3	10.29	6.052	.828	.870
BT4	10.35	6.383	.792	.882
Cronbach's Alpha: 0.893				
TC1	7.38	3.127	.789	.848
TC2	7.40	2.951	.798	.839
TC3	7.54	2.959	.782	.854
Cronbach's Alpha: 0.900				
PR1	7.37	3.240	.786	.872
PR2	7.47	2.870	.825	.837
PR3	7.54	2.973	.799	.860
Cronbach's Alpha: 0.858				
DT1	6.74	3.314	.796	.738
DT2	6.76	3.963	.659	.865
DT3	6.87	3.279	.749	.786

Source: Results from SPSS 26 software

According to Table 1, the Cronbach's Alpha coefficients of all six factors were greater than 0.6. This value indicates that the independent variable scales in this study all have a relatively good level of confidence. In addition, the Corrected Item-Total Correlation of each observed variable on each scale is greater than 0.3. The above results confirm that each observed variable has a contribution to building the confidence level of the scale and that no variable needs to be removed. Therefore, all 21 scales of the six factors can be used to perform further analysis.

4.3. Exploratory Factor Analysis

The KMO coefficient is 0.844, which is higher than 0.5, indicating that the data in the study is suitable for exploratory factor analysis. Barlett's test result of 2389.126, with significance less than 0.05, demonstrates that the test is statistically significant and the observed variables are correlated in the exploratory factor analysis.

After factor analysis, we obtained a table of total variance extracted from the independent variables, with a total value of 79.872%. Hence, it can be said that 79.872% of the variation in the data has been explained by six factors.

All of the observable variables of the six factors have been loaded to an independent factor and all of the factor loading values are higher than 0.5. Thus, after conducting exploratory factor analysis, all elements in the model are guaranteed to be qualified for use in the next analysis steps.

Factor analysis of the dependent variable results in a KMO coefficient of 0.705 > 0.5, the sig of Bartlett's test is less than 0.05 and the quotation variance value is 77.918% > 50%. The factor loadings of DT1, DT2 and DT3 are 0.916, 0.892 and 0.838, respectively, indicating that EFA discovery factor analysis is appropriate and is retained for the next step of analysis.

4.4. Pearson correlation analysis

After the data were validated through scale reliability test and exploratory factor analysis, we conducted Pearson correlation analysis. It aims to examine the strong linear correlation between the dependent variable and the independent variables and to identify the problem of multicollinearity early when the independent variables are also strongly correlated with each other.

The Pearson correlation ranges from -1 to 1 (it only makes sense when the sig value is less than 0.05; if the sig value is greater than 0.05, then the variable pair has no linear correlation). Thus, through Pearson correlation analysis, it can be concluded that each independent variable has a correlation relationship with respect to the dependent variable; there is also a linear correlation relationship between the independent variables, but, based on the value of the Pearson correlation index, it can be tentatively concluded that, between pairs of independent variables, the possibility of the phenomenon has not been detected. Therefore, all variables are retained to continue performing regression analysis.

4.5. Regression analysis

According to the results, the adjusted R^2 of 0.494 indicates that the independent variables included in the regression analysis affect 49.4% of the variability of the dependent variable. The remaining proportion is due to out-of-model variables and random error. From this, it can be concluded that the research model is good, with a high degree of relevance.

To evaluate the phenomenon of first-order autocorrelation, the Durbin-Watson value was chosen. The Durbin-Watson value which is 1.934 in the ranges from 1.5 to 2.5 shows that the results do not violate the assumption of first-order autocorrelation (Yahua Qiao, 2011).

According to the results of the ANOVA table, through the F-test, the sig value obtained is 0.000 (< 0.05), therefore, the regression model is suitable.

According to the results in Table 2, the Sig value of 5 out of 6 independent variables satisfies the condition of less than 0.05, so 5 independent variables, including users' awareness and ability, government interest, breakthrough technologies, transformation costs and perceived risk, are statistically significant and have effects on the dependent variable. Accordingly, hypotheses 1, 2, 4, 5 and 6 are accepted. Meanwhile, the sig value of the "goals and strategies" independent variable is equal to 0.185, which is higher than 5%, so the third hypothesis is rejected.

Table 2: Analysis of t-test and regression coefficient

Coefficients[a]								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	2.186	.419		5.218	.000		
	AA	.358	.063	.357	5.689	.000	.574	1.743
	GI	.125	.060	.122	2.081	.039	.656	1.524
	GS	.094	.070	.080	1.332	.185	.632	1.582
	BT	.235	.060	.218	3.913	.000	.729	1.372
	TC	-.206	.061	-.192	-3.386	.001	.704	1.420
	PR	-.209	.062	-.195	-3.372	.001	.674	1.483
a. Dependent Variable: DT								

Source: Results from SPSS 26 software

4.6. Independent samples test and homogeneity variances test

We conducted an independent sample t-test with a gender variable to find out whether male and female respondents have different points of view on the factors affecting the digital transformation in the tax industry. The results show that Sig Levene's test value is 0.727, which is higher than 0.5. The Std Error Mean value of men and women are 0.09184 and 0.11856, which are both greater than 0.05. These results indicate that there is no difference between the average value between the two genders. Therefore, it can be said that men and women have the same interest and role in the digital transformation of the Tax industry.

To test the homogeneity of variances, we conducted the Levene test for the occupation amd age variables. The Levene test result indicates a sig value for occupation and age variable of 0.323 and 0.236 respectively, which are greater than 0.05, showing that respondents with different occupations and ages have homogeneity variances.

Then, an ANOVA test was employed. The sig. values of both occupation and age are higher than 0.05, indicating that there is no statistical difference between the occupation and aging groups of respondents regarding the digital transformation in the tax industry. It shows that people of different ages and with different jobs pay attention to and are interested in the digitalization of Vietnam's tax sector.

Table 3: ANOVA test results for occupation and age

		Sum of Squares	Mean Square	F	Sig.
Occupation	Between Groups	5.293	1.764	2.198	.091
	Within Groups	121.997	.803		
	Total	127.290			
Age	Between Groups	1.243	.249	.296	.915
	Within Groups	126.047	.840		
	Total	127.290			

Source: Results from SPSS 26 software

5. Discussion and recommendations

The research highlights five main factors influencing digital transformation in Vietnam's tax sector, ranked by impact: users' awareness and ability, government interest, breakthrough technologies, transformation costs, perceived risk and transformation goals and strategies.

Firstly, users' awareness and ability are the most crucial factors, as positive perceptions and skills accelerate digital adoption. Therefore, tax agencies should hold seminars and training sessions for accountants, tax staff and taxpayers to promote understanding and readiness. Moreover, government interest is vital for a smooth transition, so the Vietnamese government must speed up implementing Decision No. 749/QD-TTg to build a digital tax system and introduce tailored support programs for different taxpayer groups to encourage adoption. In addition, breakthrough technologies require optimized investment and procurement processes. Thus, simplifying technology procurement can attract providers, shorten selection time, improve system quality and reduce costs, thereby addressing rapid technological changes effectively. Furthermore, managing transformation costs and risks is essential since digital transformation needs significant financial resources. While the General Department of Taxation oversees planning and regulation, local departments handle implementation and taxpayer support and strong risk management ensures reasonable expenses and prevents misuse. Finally, although statistical data do not directly link transformation goals to success, the tax sector has set clear and realistic objectives; consequently, authorities should provide ongoing guidance, ensure consistency, evaluate progress regularly and adjust strategies through annual assessments. In summary, effective digital transformation in Vietnam's tax sector depends on raising user awareness, enhancing government support, improving technology procurement, controlling costs, managing risks and maintaining clear goals, so that strategic planning and continuous evaluation become key to overcoming challenges and achieving successful transformation.

6. Conclusion: The digital transformation of the tax industry in Vietnam is a continuous process influenced by multiple factors. This research identifies four key factors impacting digital transformation and contributes to both theoretical and practical perspectives. It provides empirical evidence on the relationship between digital transformation and taxpayer-related factors, addressing gaps in existing literature. Additionally, the study offers recommendations for the Vietnamese government, such as enhancing taxpayer awareness, accelerating policy implementation and improving tax system investments. However, limitations exist, including the complexity of assessing influencing factors and the research model explaining only 49.4% of variability. Over 50% of changes in digital transformation success are attributed to other factors and random errors. Another limitation is the sample size, suggesting the need for larger, more comprehensive studies with additional independent variables. Future research should adopt broader methodologies to improve assessments, contributing to a deeper understanding and advancement of digital transformation in the tax sector.

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IMPACT OF FACTORS AFFECTING INNOVATION INTENTION OF ENTERPRISES IN NORTHERN MIDLANDS AND MOUNTAINS REGION OF VIETNAM

PhD. Vu Quynh Nam*

Abstract: ***This study investigates the factors influencing innovation intention among enterprises in the Northern Midlands and Mountains region of Vietnam. Using survey data from 420 firms, the research applies exploratory factor analysis and multiple linear regression to identify the key determinants. The findings reveal eight significant factors affecting innovation intention, including science and technology, capital resources, institutional and policy factors, firm size, owners' attitudes and characteristics, entrepreneurial education, business sector, and entrepreneurial experience. Based on these results, the study proposes several strategies to foster innovation and enhance competitiveness, such as integrating science and technology into production and management, improving access to preferential and venture capital, reforming innovation-support policies, expanding market linkages, fostering an innovation-oriented culture, and promoting experience sharing and training programs. The findings provide practical implications for policymakers and enterprises in promoting innovation capacity and sustainable business development in Vietnam's mountainous regions.***

• Keywords: *innovation intention, Northern Midlands and Mountains region, enterprises, Vietnam.*

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1. Introduction

Innovation is a critical driver of national development and constitutes a core activity within enterprises to generate product value that meets market demands. According to the Law on Science and Technology (2013), "innovation refers to the creation and application of achievements in technical solutions, technology, and management practices to enhance socio-economic development, productivity, quality, and the added value of goods and products." As noted by Blank (2010), innovative enterprises are characterized by "disruptive business ideas that generate exceptional growth value," thereby creating market differentiation.

Article 17 of the Law on Supporting Small and Medium - sized Enterprises (2017) defines "Innovative startups as small and medium-sized enterprises (SMEs) established to realize business ideas based on the exploitation of intellectual property, technology, or novel business models, with the potential for rapid growth". An enterprise is considered an innovative startup if it meets the following criteria, an enterprise must meet the following criteria: it must be a legal entity, utilize intellectual property, science and technology, or apply a new business model, and demonstrate high growth potential. Decision No. 844/QĐ-TTg (2016) further affirms that innovative startups are businesses capable of rapid growth based on leveraging intellectual assets, technologies, or new models, and must be within five years of their initial business registration.

Mavlutova et al. (2020) emphasize that innovative entrepreneurship is grounded in the exploitation of intellectual property and the application of science and technology to business operations to improve products, services, or processes thus enabling rapid organizational growth. According to these authors, an innovative startup is an enterprise established for no more than five years, operating based on the utilization of intellectual property, science and technology, or a new business model, with high growth potential. Similarly, Kim et al. (2018) argue that innovation is an essential requirement for businesses, encompassing innovations in processes, technology, cognition, and mindset.

The Northern Midlands and Mountainous region of Vietnam is widely regarded as the nation's economic "poverty core." The estimated per capita GRDP of the region is VND 68 million, with the highest poverty rate in the country 11.29%, equating to approximately 364,681 poor households. As of the end of 2023, Vietnam had a total of 996,758 enterprises, yet newly established firms in this region accounted for only 4.95% of the national total (Ministry of Planning and Investment, 2024). Accordingly, to promote innovation within enterprises in this region,

** Thai Nguyen University of Economics and Business Administration; email: quynhnam@tueba.edu.vn*

it is essential to analyze the extent to which various factors influence innovation intentions. This analysis will inform recommendations to foster innovative thinking among enterprises, stimulate business growth, enhance competitiveness, and support integration into the global economy and sustainable development.

2. Theoretical Background and Research Model

2.1. Theoretical Overview

The Theory of Reasoned Action proposed by Fishbein and Ajzen (1975) posits that an individual's intention is determined by two key components: attitude toward the behavior and subjective norms.

Shapero and Sokol's Entrepreneurial Event Theory (1982) asserts that when an individual perceives a business opportunity as both desirable and feasible especially when prompted by a triggering event they are likely to initiate a venture. This theory has significantly contributed to later studies on entrepreneurial processes and startup behavior.

The Theory of Planned Behavior by Ajzen (1991) builds on psychological foundations to explain how personal beliefs can translate into specific behaviors. According to the theory, attitude toward behavior, perceived social norms, and perceived behavioral control are the three main predictors of individual behavior.

The Entrepreneurial Potential Theory by Krueger and Brazeal (1994), derived from Ajzen's framework, emphasizes that an individual's entrepreneurial potential is heavily influenced by personal characteristics.

In Vietnam, various studies have investigated factors influencing innovation intention among enterprises, including those by Nguyen Ngoc Thuc (2009), Phan Anh Tu et al. (2017), and Vu Quynh Nam et al. (2023). These studies identify multiple factors such as entrepreneurial education, firm size, capital, entrepreneurial experience, personal attitudes and traits, institutional policies, and science and technology as determinants of innovation in enterprises.

2.2. Research Model and Hypotheses

Numerous studies suggest that education significantly affects entrepreneurial intention and motivation (Wang et al., 2004; Blank, 2013). According to Gloor et al. (2011) and Xu & Chen (2015), education is a crucial success factor for entrepreneurship. Vu Quynh Nam et al. (2023) also confirms that entrepreneurial education positively influences entrepreneurial intention.

H1: Entrepreneurial education positively affects the innovation intention of enterprises.

Firm size refers to the scale and scope of a business and is assessed based on several indicators such as number of employees, revenue, profit, and assets (Driesen et al., 2006). According to the Law on Supporting Small and Medium Enterprises (2017), firms are categorized as large, small and medium-sized, or microenterprises. Vu Quynh Nam (2023) indicates that larger firms are more likely to engage in innovation compared to smaller ones.

H2: Firm size positively affects the innovation intention of enterprises.

North et al. (2013) emphasize that capital is a crucial enabler of entrepreneurship and innovation. Similar views are echoed by Nguyen Thao Nguyen (2018) and Seung Hoo Jin et al. (2019), who classify startup capital into personal savings, financial support from family and friends, credit, equity investments, and public funding programs. Gloor et al. (2011) also include venture capital funding as an essential financial resource.

H3: Capital resources positively affect the innovation intention of enterprises.

Schuller (2001) defines entrepreneurial experience as the accumulated knowledge gained through practical work over time. Wang et al. (2011) emphasize that entrepreneurial success is tied to production, sales, and management experience. According to Zhang et al. (2006) and Vu Quynh Nam et al. (2023), having at least five years of experience is crucial for successful startup ventures.

H4: Entrepreneurial experience positively affects the innovation intention of enterprises.

Personal attitudes and traits are significant predictors of entrepreneurial intention (Cheng et al., 2015; Kabir et al., 2017). These traits may include a need for power, self-awareness, adaptability, flexibility, and decisiveness (Nguyen Thao Nguyen, 2018; Driesen et al., 2006; Xu et al., 2015). Nguyen Hai Quang et al. (2017) further emphasizes the role of behavioral awareness and self-control in fostering innovation within firms.

H5: Personal attitudes and characteristics of the firm owners affect the innovation intention of enterprises.

Davidsson et al. (2010) define institutions as the rules, norms, and organizational structures that shape

social behavior. North et al. (2013) further categorize institutions into formal constraints (laws, regulations) and informal constraints (norms, conventions). Policies can thus either promote or hinder innovation within enterprises (Vu Quynh Nam et al., 2023; Nguyễn Ngọc Thức, 2020). Xu and Chen (2015) also confirm that policy support is a critical factor in fostering entrepreneurship.

H6: Institutional frameworks and policy support positively affects the innovation intention of enterprises.

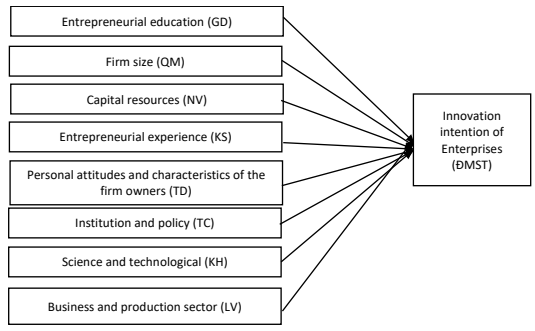
Science and technology play a central role in driving business innovation (Tomi Heimonen, 2012; Blank, 2013). Vu Quynh Nam et al. (2023) assert that science and technology enhance product quality, optimize business processes, and enable firms to meet market demands and deliver higher customer value. Tomi Heimonen (2012), Mekonnin (2015), and Mukson et al. (2021) all confirm that science and technology are decisive factors in innovation.

H7: Science and technology positively affect the innovation intention of enterprises.

The business sector encompasses all activities related to the production, processing, and delivery of goods and services to meet market demand. This includes agriculture, forestry, fisheries, industry, trade, and tourism. Mukson et al. (2021), along with Nguyen Hai Quang et al. (2017) and Nguyen Ngoc Thuc (2020), argue that the sector in which a startup operates significantly influences its innovation behavior.

H8: The Business and production sector affects the innovation intention of enterprises.

Figure 1. Research Model



3. Research Methodology

To address the research objectives, the authors employed Exploratory Factor Analysis (EFA) and regression modeling based on survey data collected from 420 startup enterprises (DNKN) operating in the Northern Midlands and Mountainous region of Vietnam.

Sampling Methodology:

During the 2019 - 2023 period, a total of 31.211 new businesses were established in this region (Ministry of Planning and Investment, 2024). Using Slovin's formula, the minimum sample size was determined to be 395. The research was conducted across 14 provinces in the Northern Midlands and Mountainous area, with a target of surveying approximately 30 enterprises per province, totaling 420 enterprises (420 questionnaires). Of the 420 distributed questionnaires, 400 were valid and used for analysis.

Table 1. Descriptive Statistics of the Respondent Sample

Firm Size	Proportion (%)
Micro-enterprises	88,67
Small and medium-sized enterprises	6,89
Medium-sized enterprises	3,33
Large enterprises	1,11
Total	**100**

Business Sector	Proportion (%)
Industry	12,00
Trade and Services	67,11
Agriculture, Forestry and Fisheries	17,33
Others	3,56
Total	**100**

Each questionnaire, in addition to collecting general information about the respondents, included a set of questions designed using a 5-point Likert scale (from "strongly agree" to "strongly disagree").

4. Results and Discussion

Assessment of Scale Reliability and Observed Variables:

The item-total correlation coefficients of all observed variables were greater than 0,3, indicating acceptable levels of internal consistency. Furthermore, the Cronbach's Alpha coefficients for all factors exceeded 0,6, confirming that the constructs are reliable and suitable for Exploratory Factor Analysis (EFA).

Table 02. Cronbach's Alpha and Item-Total Correlation Coefficients

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Personal attitudes and characteristics of the firm owners: Cronbach's Alpha = 0,756				
TD1	15.336	4.818	.605	.681
TD2	15.040	5.060	.583	.690
TD3	14.982	4.873	.611	.679
TD4	14.700	6.377	.444	.741
TD5	14.787	6.436	.397	.753
Capital resources: Cronbach's Alpha =0,853				
NV1	7.072	2.603	.688	.829
NV2	7.220	2.411	.788	.733
NV3	7.072	2.640	.699	.818
Entrepreneurial education: Cronbach's Alpha =0,820				
GD 1	7.491	2.048	.671	.754
GD2	7.394	1.950	.673	.752
GD3	7.585	1.910	.676	.749
Entrepreneurial experience: Cronbach's Alpha =0,890				
KS 1	15.908	14.863	.763	.862
KS2	15.886	15.410	.651	.881
KS3	15.751	14.974	.802	.856
KS4	15.703	15.636	.730	.867

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
KS5	15.751	16.019	.643	.881
KS6	15.615	15.929	.665	.877
Science and technological: Cronbach's Alpha = 0,848				
KH1	22.278	13.759	.538	.839
KH2	22.209	14.188	.591	.829
KH3	22.231	13.917	.622	.824
KH4	22.018	13.931	.645	.821
KH5	22.368	13.871	.604	.827
KH6	22.112	14.411	.569	.832
KH7	22.134	13.993	.693	.815
Firm size: Cronbach's Alpha = 0,763				
QM1	7.260	2.258	.586	.694
QM2	7.397	2.168	.616	.660
QM3	7.422	2.006	.588	.695
Business and production sector: Cronbach's Alpha = 0,601				
LV1	10.083	4.678	.322	.574
LV2	10.177	4.653	.287	.595
LV3	10.755	3.128	.597	.335
LV4	10.812	3.639	.356	.563
Institution and policy: Cronbach's Alpha = 0,860				
TC1	19.260	10.266	.606	.845
TC2	19.336	10.050	.606	.845
TC3	19.419	9.940	.541	.861
TC4	19.267	9.668	.760	.817
TC5	19.339	9.957	.715	.826
TC6	19.300	9.863	.714	.826

The results of the model validity test show that the Kaiser-Meyer-Olkin (KMO) value is 0,922 > 0,5, with a significance level (Sig.) of 0,000. This indicates that the observed variables are linearly correlated with the representative factors and that the dataset is suitable for Exploratory Factor Analysis (EFA).

Table 03. KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.922
Bartlett's Test of Sphericity	Approx. Chi-Square	5150.465
	df	420
	Sig.	.000

The Model's Explained Variance for the Observed Variables:

The results in Total Variance Explained Table of SPSS show that the cumulative variance explained is 62,541%, meaning that 62,541% of the variation in the factors is accounted for by the observed variables.

Table 04. Rotated Factor Loadings for the Dependent Variable

Observable variable	Factor loading
.813	.771
.816	.773
.799	.837
.800	.826
.805	.823

The results of the rotated factor loadings for the dependent variable show that the lowest factor loading is 0,771, which is greater than 0,5, indicating a strong correlation between the observed variables and the representative factor. Therefore, the innovation in enterprises is a valid representative construct for the observed variables.

Regression Analysis:

Table 05. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.890[a]	.845	.809	.26831349

Table 06. Regression coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.098	.050		.341	.685
	NV	.201	.050	.201	3.418	.001
	TD	.098	.050	.098	2.246	.000
	KS	.084	.050	.054	1.458	.001
	KH	.212	.050	.212	4.643	.000
	QM	.132	.050	.132	3.001	.000
	LV	.088	.050	.088	1.662	.002
	TC	.198	.050	.198	2.872	.000
	GD	.097	.050	.097	2.863	.047
a. Dependent Variable: ĐMST						

The regression results, using enterprises' innovation intention as the dependent variable, indicate that 84,5% of the variance in innovation intention is explained by the following independent variables: entrepreneurial education, firm size, capital resources, entrepreneurial experience, personal attitudes and traits, institutional and policy factors, science and technology, and the business sector. The remaining 15.5% is attributed to other factors not included in the model. The results are statistically significant at the 99% confidence level.

Discussion:

The regression model analysis shows that all variables included in the model are statistically significant, with Sig. values less than 0,05. The unstandardized regression coefficients are all greater than zero, indicating that the independent variables are positively correlated with the dependent variable. Therefore, all proposed hypotheses are accepted. Based on the unstandardized coefficients presented in Table 07, the regression model can be expressed as follows:

ĐMST = 0,098 + 0,201NV + 0,098TD + 0,084KS + 0,212KH + 0,132QM + 0,088LV + 0,198TC + 0,097GD.

This result indicates that all independent variables included in the model are positively associated with the innovation intention of enterprises. Specifically, a one-point increase in capital (NV) leads to a 0,201-point increase in innovation intention; a one-point increase in personal attitudes, perspectives, and traits (TD) results in a 0,098-point increase; a one-point increase in entrepreneurial experience (KS) increases innovation intention by 0,084 points; a one-point increase in science and technology (KH) increases innovation intention by 0,212 points; a one-

point increase in firm size (QM) leads to a 0,132-point increase; a one-point increase in the business sector (LV) leads to a 0,088-point increase; a one-point increase in institutional and policy support (TC) results in a 0,198-point increase; and a one-point increase in entrepreneurial education (GD) raises innovation intention by 0,097 points.

Table 07. Determining the Relative Importance of Influencing Factors

Independent Variable	Absolute Value	%
Science and Technology (KH)	0,212	19,63
Capital Resources (NV)	0,201	18,61
Institutional and Policy Support for Enterprises (TC)	0,198	18,33
Firm Size (QM)	0,132	12,22
Personal attitudes and characteristics of the firm owners (TD)	0,098	9,07
Entrepreneurial education (GD)	0,097	8,98
Business and production sector (LV)	0,088	8,15
Entrepreneurial experience (KS)	0,054	5,00
Total		**100**

The results of the factor importance analysis indicate that science and technology (KH) contributed the highest proportion at 19,63%, followed by capital (NV) at 18,61%, institutional and policy support (TC) at 18,33%, firm size (QM) at 12,22%, Personal attitudes and characteristics of the firm owners (TD) at 9,07%, entrepreneurial education (GD) at 8,98%, business sector (LV) at 8,15%, and finally, entrepreneurial experience (KS) with the lowest contribution of 5%.

5. Conclusion and Recommendations

The research findings identify eight key factors influencing the innovation intention of enterprises: science and technology, capital resources, institutional frameworks and policy support, firm size, personal attitudes and traits, entrepreneurial education, business sector, and entrepreneurial experience. Among these, science and technology exert the strongest influence on enterprises' innovation intention, followed by capital, policy environment, firm size, personal traits, education, business sector, and lastly, entrepreneurial experience, which has the weakest effect.

To effectively enhance innovation intentions among enterprises in the Northern Midlands and Mountainous region, a comprehensive and coordinated policy framework should be adopted, including but not limited to: (i) integration of advanced technologies into operational practices; (ii) expansion of accessible financing channels; (iii) improvement of institutional mechanisms and incentive structures; (iv) enterprise scaling through collaborative networks; (v) capacity-building through targeted training programs; (vi) strategic sector alignment; and (vii) experiential learning to reinforce innovative behavior *Firstly*, enterprises should adopt and integrate science and technology into their production, business operations, and management practices.

Secondly, enterprises should proactively seek credit sources, especially preferential loans, and improve access to venture capital to support innovative entrepreneurship.

Thirdly, businesses need to engage with central and local government policies, particularly those promoting innovation and investment.

Fourthly, it is important to leverage all available internal resources to expand firm size, while also establishing strong linkages among enterprises, between enterprises and households, and across regions to scale operations and markets.

Fifthly, business owners and employees should enhance their awareness, skills, and competencies in both management and production, and equip themselves with knowledge in market dynamics, financial management, and technical operations to better enable innovation.

Sixthly, entrepreneurs should participate in training programs on business startup to effectively understand and apply innovation in enterprise management.

Seventhly, enterprises should strategically choose business sectors aligned with their local comparative advantages, prioritizing innovation in agriculture which accounts for a large share of the region's economic structure.

Eighthly, since business success requires not only production but also market development, accumulating practical experience for both business owners and workers is essential for sustained innovation and growth.

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MECHANISMS OF LABOR PRODUCTIVITY IN HIGHER EDUCATION: A CASE STUDY OF INNOVATION AND MONETARY MOTIVATION AT HUTECH EDUCATION SYSTEM

PhD. Tran Thi Trang* - Do Thi Anh Nguyet* - Phan Thi My Hanh*

Abstract: ***Based on a survey of office employees of the HUTECH education system, the research team validated the proposed model and provided implications for enhancing workforce productivity. These improvements contribute to the overall efficiency of the education system and the quality of its services. The findings indicate that the labor force, materials and equipment, management, projects, and external factors all positively influence both labor productivity and innovation. Notably, innovation and income play a crucial role in enhancing office staff productivity.***

• Keywords: *HUTECH education system, innovation, office employees, productivity.*

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1. Introduction

In recent years, Vietnam's labor productivity has increased steadily, contributing significantly to the country's socio-economic development. According to the General Statistics Office of Vietnam, labor productivity reached around 8,380 USD per worker in 2023, with an average annual growth rate of 5.29%. However, this level remains significantly lower than that of neighboring countries, highlighting ongoing challenges in narrowing the productivity gap. For the HUTECH Education System, which includes HUTECH University, UEF University, and Royal School, improving labor productivity is not just about staff efficiency; it also enhances student support and educational quality, helping students succeed in an increasingly competitive job market.

2. Theoretical overview

2.1. Theoretical foundation

2.1.1. Labor productivity

Labor productivity is influenced by various internal and external factors, including leadership policies, material availability, project characteristics, and external factors such as accidents and weather (Almamlook et al., 2020). Sauermann (2023) also highlights the link between productivity and human resource (HR) practices, showing that incentives, training, peer support, and working hours can positively affect employee performance. Building on these insights, this study examines both internal and external influences on labor productivity, with a focus on HR management. Five independent variables are proposed: workforce and management (HR-related), projects, materials and equipment (internal), and external factors.

2.1.2. Innovation

Innovation includes new products, ideas, and processes, and is closely linked to organizational performance and productivity. Studies have shown that work motivation is related to employee innovation, which in turn positively impacts labor productivity (Kong et al., 2020). According to Zhu et al. (2021), innovation contributes to both inputs (R&D, technological infrastructure) and outputs (products, processes), serving as a bridge between organizational resources and productivity outcomes. As innovation is deeply embedded in business operations, it enhances production efficiency and employment practices, ultimately boosting firm-level labor productivity. Therefore, this study places innovation at the core of the research model, positioning it as a key linking factor between various internal mechanisms and labor productivity. Therefore, this study places innovation at the center of the research model as a linking factor between different mechanisms and labor productivity.

2.1.3. Efficiency wage theory

Efficiency wage theory explains labor productivity by suggesting that people act in their self-interest. To boost productivity, businesses should pay wages above the market average. When income increases, employee morale and motivation also improve, which in turn leads to higher productivity (Katz, 1986). This study applies efficiency wage theory to assess how

** HUTECH University, Ho Chi Minh City, Viet Nam; corresponding: tt.trang@hutech.edu.vn*

financial incentives, through income, influence labor productivity.

2.2. Research hypotheses

2.2.1. The labor force

The labor force directly utilizes the company's tools and resources to produce goods and services. Characteristics of the labor force significantly influence work performance. The skills and experience of employees are among the most critical factors determining an organization's overall productivity, as they reflect the quality of the staff's performance (Almamlook et al., 2020).

H1: The labor force has a positive impact on the labor productivity of office employees (OE).

2.2.2. Materials and equipment

Materials and equipment are essential tools that employees rely on to complete tasks and produce outputs (Hamza et al., 2022). Therefore, materials and equipment are essential support tools that enable employees to work more effectively. If the necessary tools or supplies are missing, workers may be unable to perform their jobs properly, which will reduce productivity (Alabdullah et al., 2023). Outdated or unsuitable equipment is also a significant factor contributing to poor performance (Almamlook et al., 2020).

H2: Materials and equipment have a positive impact on the labor productivity of OE.

2.2.3. Management

The management factor in this study refers to the relationship between the staff system and the managers of an organization. Management is a crucial element that helps encourage employee motivation, which in turn enhances labor productivity. It is evident in the company's training and reward policies. Management also encompasses dimensions like supervision and leadership provided by managers to their staff (Almamlook et al., 2020). Furthermore, management also reflects how well tasks and resources are distributed across the staff system (Alabdullah et al., 2023).

H3: Management has a positive impact on the labor productivity of OE.

2.2.4. Projects

Another factor examined in this study is the project variable, which refers to the nature and characteristics of tasks assigned to individuals or teams within a specific timeframe. Projects typically come with deadlines and may require varying levels of work intensity, depending on their complexity and timing (Hamza et al., 2022). For example, during peak demand periods, employees often need to work more intensively, which can lead to higher productivity (Kong et al., 2020). Additionally, the location or setting where tasks are carried out can influence employee productivity (Hamza et al., 2020).

H4: Projects have a positive impact on the labor productivity of OE.

2.2.5. External factors

External factors refer to the conditions outside an organization that influence its operations and internal structure. Studies on construction and outdoor projects show that weather and climate can affect labor productivity (Alabdullah et al., 2023). Additionally, macroeconomic and social conditions have a significant impact on productivity, particularly in project-based businesses. Unexpected risks or incidents, such as accidents, can also reduce employee performance (Hamza et al., 2022).

H5: External factors have a positive impact on the labor productivity of OE.

2.2.6. Innovation

Innovation often originates from a company's culture and is nurtured through each employee's commitment to solving business problems (Kong et al., 2020). Positive changes in the workforce, such as increased motivation or improved skills, can help spread innovation across teams and departments. Additionally, the quality of materials and equipment plays a crucial role in supporting innovation. Since innovation involves real actions rather than just ideas, a lack of tools may hinder the implementation of ideas (Chakravarty, 2022). Moreover, management practices and training programs also influence employee innovation. Supportive managers who create an open and empowering environment encourage employees to think creatively and share new ideas (Karatepe et al., 2020). Besides, working on collaborative projects that require employees to share and discuss solutions helps promote innovation within the organization (Bhatti et al., 2021). Corporate culture, as an external factor, also significantly affects innovative behavior (Fuad et al., 2022). Ultimately, a creative and collaborative work environment fosters innovation, which in turn enhances employee productivity (Nasifoglu et al., 2020).

H6a: The workforce has a positive impact on the innovation of OE.

H6b: Materials and equipment have a positive impact on the innovation of OE.

H6c: Management has a positive impact on the innovation of OE.

H6d: Projects have a positive impact on the innovation of OE.

H6e: External factors have a positive impact on the innovation of OE.

H6f: Innovation has a positive impact on the productivity of OE.

2.2.7. Income

In this study, the income factor refers to the salary and financial benefits provided by the company. Income is considered a key element affecting employee performance and productivity (Hamza et al., 2022). Employees who receive higher-than-average pay often show better productivity. Income can influence productivity during different work periods. For example, when demand increases, and employees need to work overtime or at a faster pace, companies usually offer additional pay as motivation (Kong et al., 2020).

H7: Income has a positive impact and controls the variation in the productivity of OE.

3. Research method

The quantitative study involved three steps: (i) designing a structured questionnaire, (ii) conducting a pilot test with ten respondents to ensure clarity, and (iii) distributing an online survey. Each questionnaire item aligned with a specific concept in the model. A total of 298 office employees from the HUTECH Education system participated in the final survey.

4. Results

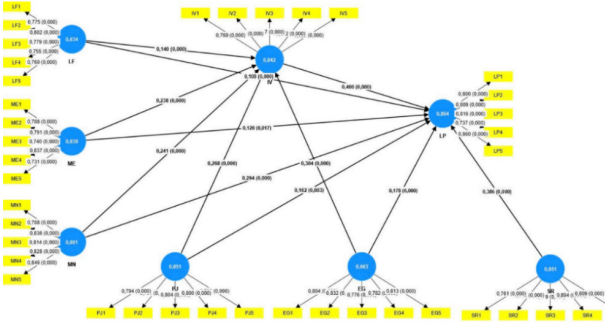
The study evaluated the measurement model using SmartPLS 4.0. Results showed that all items had outer loadings above 0.7, so no indicators were removed. Cronbach's Alpha values ranged from 0.834 to 0.881, exceeding the acceptable threshold of 0.7. Composite reliability (rho_c) values ranged from 0.882 to 0.913, while AVE values ranged from 0.599 to 0.677, all of which exceeded the required levels, confirming the model's convergent validity.

The structural model results revealed that the variables EG, LF, ME, MN, and PJ had small to moderate effects on IV and moderate effects on LP. Notably, IV had a strong effect on LP ($f^2 = 0.940$), while SR had a moderate effect ($f^2 = 0.268$). All path coefficients (Original Sample - O) were positive, and all P-values were ≤ 0.05, indicating statistically significant and positively directed relationships. Among these, EG had the most substantial impact on IV, and IV significantly influenced LP with a coefficient of 0.400, highlighting its key role. SR was the most influential factor on LP, while LF had the weakest effect. The adjusted R^2 value for IV was 0.599, meaning that EG, LF, ME, MN, and PJ explained 59.9% of its variance. Similarly, the adjusted R^2 for LP was 0.573, indicating that IV explained 57.3% of its variance. All VIF values were below 3, suggesting no multicollinearity. Additionally, the Q^2 value for the IV-related model was 0.543, showing high predictive accuracy, while the Q^2 value for LP was 0.378, indicating moderate predictive accuracy.

5. Conclusion

The findings of this study support previous research. The workforce, materials and equipment, management, projects, and external factors all positively affect labor productivity, as shown in studies by Almamlook et al. (2020), Alabdullah et al. (2023), Hamza et al. (2022), and Kong et al. (2020). These factors also contribute to innovation, which has a strong influence on productivity, consistent with research by Kong et al. (2020) and Chakravarty (2022). However, the mediating role of innovation is not statistically confirmed, suggesting the need for strategies that support both innovation and related factors. Ultimately, income has the most significant impact on productivity, underscoring the crucial role of financial incentives.

Figure 1. Structural model assessment



5.1 Theoretical implications: This study examines key factors that influence labor productivity among office employees at HUTECH, thereby helping to fill existing research gaps. It confirms the strong link between productivity and HR practices (Sauermann, 2023) and also relates to areas like project management and risk assessment (Hamza et al., 2022). New variables such as innovation and income are introduced. While innovation is not a confirmed mediator, it may serve as a connecting factor for future studies (Zhu et al., 2021). The study also applies the Efficiency Wage Theory to examine the effect of income on wages. Focusing on office staff complements earlier research in other sectors (Almamlook et al., 2020; Chakravarty, 2022).

5.2. Managerial implications: In the educational environment, the labor productivity and innovation of office staff play an important role. An effective learning environment, combined with a productive team of staff, ensures that students receive proper support, enabling them to actively study and develop skills that meet the increasing demands of both domestic and international labor markets. To minimize the productivity gap among office employees at HUTECH, UEF, and ROYAL, as well as among staff with different income levels, the

leadership of the HUTECH education system should implement appropriate policies and plans that match the specific nature of work in each unit, based on the following suggestions.

External factors have the most substantial impact on both innovation and labor productivity, requiring close attention from leadership. To support creativity and efficiency, internal communication channels should be improved to keep staff informed about economic changes and global trends. Regular inspections of facilities and equipment are also crucial to ensure a safe and healthy working environment. Maintenance and upgrades should be well-planned and communicated to avoid disruptions and reduce risks.

The project factor is the second strongest influence on innovation and a key driver of labor productivity. To maximize the benefits, the institution should invest in projects that enhance staff skills and efficiency. Leadership can boost innovation by enhancing work processes and encouraging staff to propose workflow improvements. Organizing brainstorming sessions and workshops also supports creativity. After each project, conducting evaluations and sharing results helps draw lessons and promote continuous improvement.

In addition to management capabilities, setting and evaluating job performance is key to improving productivity. A practical approach is to apply a KPI (Key Performance Indicator) system based on the Balanced Scorecard (BSC) model, which considers financial, customer, internal process, and learning perspectives. Breaking down KPIs for each employee allows for accurate performance assessment. Using KPI and BSC helps managers track progress and also motivates employees to improve and be more creative.

Although materials and equipment have only a modest impact on labor productivity and innovation, their influence is still positive. Therefore, HUTECH does not need to invest heavily in this area but should ensure that resources are sufficient and appropriate for staff needs. Management should provide tools, equipment, and stable Internet access in a timely and consistent manner to prevent disruptions that could affect productivity.

To develop the skills and potential of office staff, leadership should provide training programs that cover both professional and soft skills. Internal sharing sessions are also useful for encouraging idea exchange, creativity, and process improvement. At HUTECH, using tools like the MBTI (Myers-Briggs Type Indicator) can help assess personality fit with the organization and guide appropriate career development for new employees.

Research findings indicate that income and innovation are the most significant factors influencing labor productivity, with higher income being associated with improved performance. To enhance productivity, leadership should offer fair and competitive salary, bonus, and benefits policies. A basic income must reflect an employee's abilities and remain competitive in the market. Additional support, such as transport allowances, lunch subsidies, and clear overtime pay, should be provided. Regular employee satisfaction surveys on compensation can also help gather feedback and guide necessary adjustments.

To enhance innovation among office staff, the leadership should focus on promoting digitalization and increasing the application of information technology in work processes. This aims to improve operational efficiency and enhance competitiveness in the context of digital transformation becoming a global trend. The adoption of modern technological tools and software not only improves work performance but also brings practical benefits, such as minimizing errors in processes and automating repetitive tasks, thereby saving significant time and organizational resources.

5.4. Limitations

This study has three main limitations: it focused only on direct relationships, used a limited set of variables, and surveyed only HUTECH employees. It did not consider mediating or moderating factors like innovation or income, limiting the generalizability and comprehensiveness of the findings.

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SILVER ECONOMIC DEVELOPMENT IN THE CONTEXT OF POPULATION AGING: WORLD EXPERIENCES AND LESSONS FOR VIETNAM

PhD. Nguyen Thi Huong Lan* - Hoang Thi Thuy Nga*

Abstract: ***The remarkable advancements in science and technology and economics have significantly increased human life expectancy. However, the increase in human life expectancy, combined with declining birth rates, may lead to rapid population aging in many countries, including Vietnam. Population aging poses numerous challenges but also opens up new opportunities for economic development. This situation presents a major challenge for Vietnam in identifying the key drivers of economic growth under these new demographic conditions. This paper will synthesize experiences of countries around the world then draw lessons for Vietnam in developing the silver economy.***

• Keywords: *population aging, silver economy, silver economy development, experiences, Vietnam.*

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1. Introduction

Vietnam is one of the countries facing population aging due to the average life expectancy increasing but the birth rate is decreasing. This poses a big challenge for Vietnam in finding the driving force for economic development in the new context. The trend of developing a "silver economy" can be considered the most suitable solution for this demographic change in Vietnam.

2. The current status of population aging in Vietnam

Currently, Vietnam is facing a rapid population aging. According to the National Statistics Office (2025)[1], Vietnam's aging index in 2024 is 60.2%, an increase of 11.4 percentage points compared to 2019 and 16.9 percentage points compared to 2014. The number of elderly people aged 60 and over is 14.2 million, an increase of 2.8 million people (equivalent to 1.25 times) compared to 2019 and an increase of 4.7 million people (equivalent to 1.5 times) compared to 2014. It is forecasted that by 2030, the number of people aged 60 and over will be approximately 18 million people, an increase of nearly 4 million people compared to 2024.

Looking at the pyramid above, we can see the change in Vietnam's population in the past 5 years. The bars at the bottom (two bars of the age groups 0-4 and 5-9) in 2024 tend to be shorter than in 2019, indicating a decrease in the birth rate after 5 years. In the middle of the pyramid in 2024, the bars of the age groups 20-24, 25-29 and 30-34 are narrower than in 2019, showing that the proportion of Vietnam's young people is decreasing, mainly due to the low birth rate of the previous period, combined with the impact of mortality factors. The bars of the age group 35-64 in the pyramid in 2024 are wider than in the pyramid in 2019, showing that Vietnam is still maintaining an abundant working-age population, an advantage that needs to be taken advantage of in economic development in the coming time. In 2024, the age group at the top of the pyramid continues to expand compared to 2019, meaning that our country's elderly population continues to increase.

In addition, the National Statistics Office (2025) also pointed out that the aging index in 2024 is 60.2%, an increase of 11.4 percentage points compared to 2019 and 16.9 percentage points compared to 2014. The number of elderly people aged 60 and over is 14.2 million, an increase of 2.8 million people (equivalent to 1.25 times) compared to 2019 and an increase of 4.7 million people (equivalent to 1.5 times) compared to 2014. It is forecasted that by 2030, the number of people aged 60 and over will be approximately 18 million people, an increase of nearly 4 million people compared to 2024.

3. World experiences in developing silver economy

South Korea

Policies and measures to utilize elderly labor resources in economic development. This means that Korea has transformed the limitations of human resources into a new method to develop the "silver economy". In 2004 the Korean Government launched the "Senior Citizen Employment Support Project". The project was implemented to create and provide jobs for the elderly aged 65 and over who are in need of work. Addition, the project also issues support policies for businesses to recruit the elderly and develop specialized working models for the elderly.

In 2018, the Korean government issued the "Third Basic Plan for Aging and Low Birthrate Society" with the aim of expanding the employment base for middle-aged and elderly people. In the plan, the government emphasized the requirements of (1) supporting raising the retirement age to

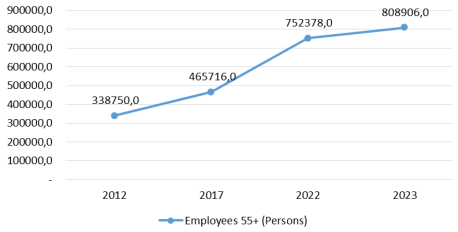
[1] *National Statistics Office (2025), Results of the 2024 mid-year population and housing census*

** University of Economics and Business, Vietnam National University, Hanoi; email: lannth@vnu.edu.vn (coresponding author) - hoangngadecem@gmail.com*

60 years old, (2) reviewing mid- and long-term plans for the retirement system, (3) promoting shorter working hours for the elderly, (4) strengthening employment support for middle-aged and elderly people, (5) strengthening the start-up support system for middle-aged and elderly people, (6) supporting the improvement of the elderly-friendly working environment, and (7) promoting the formulation of a social consensus plan to re-establish the old-age standard.

Similarly, in 2020, the Korea Employment Stability Support Fund also encouraged businesses to implement the "Encouraging the Elderly to Work Continuously" program through subsidies. "Encouraging the Elderly to Work Continuously" is a system that partially supports the costs of companies that apply the continuous work system. Continuous work means that the company re-hires workers without letting them retire even when they have reached retirement age or extends or abolishes the retirement age. The result of these policies demonstrated by the Figure 1 below:

Figure 1: Employees 55+ in Korea 2012-2023



Source: Korean Statistical Information Service (KOSIS)

In addition, to take advantage of the above opportunity, the Korean Labor Fund established the "Hope Office" to help the elderly find jobs and gain work skills in order to adapt to the new market.

Besides the Korean government has established a long-term care insurance system to provide health care services that are appropriate to the health characteristics of the elderly. This insuarance system is established to promote health, stability in old age and reduce the burden on families.

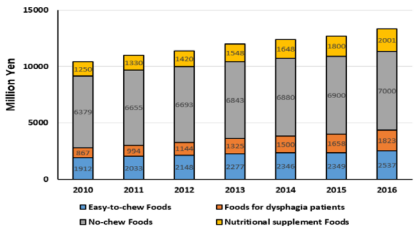
Japan

Based on the recognition of the elderly's willingness to spend on health, the Japanese government introduced Long-Term Care Insurance (LTCI) in 2021 to develop new forms of living for the elderly. By participating in Long-Term Care Insurance, the elderly can use services such as nurse visits and home care, rehabilitation at home or at day care centers, and support for monthly payments to family physicians to monitor the client's health.

In the context of a population structure with a large proportion of elderly people, companies also change the research and development process by focusing on elderly customers. They begin to expand the production process and provide products and services that improve the quality of the elderly and caregivers. In addition, some Japanese companies have developed products that help seniors take care of themselves and live alone healthly such as: Aronkasei foldable bath chair, systems that removes urine from adult diapers of Unicharm and Hitachi, Kajitaku house cleaning service,…

In the food sector, some companies developed products that meet the nutritional needs and are easy to use for the elderly. Some of their products are low-calorie and low-sodium food lines, nursing care foods. The figure 3 below demonstrated the increase of the market food for the elderly in Japan.

Figure 2: Trends on the market food for the elderly in Japan



Source: KATI, 2017

In addition to measures to promote consumption related to the elderly, Japan also has policies to encourage the elderly to continue working. Since 1986, Japan has established 1,300 job introduction centers nationwide. These centers are responsible for introducing part-time, short-term and simple jobs for local elderly people. In order to encourage active participation from businesses, Japan has introduced regulations on supporting businesses to contribute to implementing measures to ensure stable employment for the elderly. In addition, the law also encourages the elderly to participate more actively in economic activities by supporting the elderly to start a business. At the same time, the Japanese National Assembly also ensures that the elderly continue to participate in economic activities by increasing the pension age at 65 years old in the National Pension Insurance System.

China

The increasingly serious trend of population aging has placed great demands on China in developing a sustainable economy as its workforce ages. Recognizing this situation, on January 15, 2024, the General Office of the State Council of China issued the "Opinions on Developing Silver Economy to Improve the Welfare of the Elderly". The opinion outlined 26 measures in four aspects of developing silver economy and improving the welfare of the elderly. The "Opinion" mentioned measures to solve the difficult and urgent problems in the livelihood of the elderly as a oppotunity to develop silver economy.

This issue is also emphasized in China's 14th Five-Year Plan for National Economic and Social Development and the Long-Term Goals to 2035. Through the plan, the Chinese government emphasizes the implementation of the National Strategy for Responding to Population Aging, which includes the task of improving the health care service system for the elderly. Based on that basis, China promotes the improvement of elderly care services and the development of elderly-friendly products and technologies, and the construction of new business models, smart elderly care is an example.

In addition to increasing products and services for the elderly, the State Council Office of China also emphasizes

supporting the development of supply sources and the development of product quality. China promotes the development of industrial parks and plans to arrange about 10 high-end silver economic zones and high-end silver industrial zones.

In addition, the Chinese government emphasized strengthening research and design of products with structures, styles, auxiliary equipment, etc. suitable for the characteristics of the elderly, at the same time developing functional clothing, shoes, hats for the elderly; strongly developing the rehabilitation support equipment industry. Medical formula foods suitable for the nutritional needs, chewing and swallowing ability of the elderly are also focused. Beside that, China also promotes the development of family tourism products and launches a number of tourism products for the elderly. In the context of industrialization, China recognizes the importance of applying scientific and technological achievements in caring for the elderly.

Besides, China has stepped up support for scientific research activities, and provided special support for enterprises and economic entities implementing projects related to the development of the silver economy. For example, the Fuzhou Municipal People's Government has provided one-time subsidies for non-profit elderly care startups, subsidies for the operation of hospitals, the construction of new elderly care service facilities, and operating subsidies for existing elderly care service facilities, etc.

China has also promoted the development of the silver economy by increasing the number of elderly people who continue to work after retirement. Through the 11th session of the Standing Committee of the National People's Congress, China issued a document on the gradual implementation of the statutory retirement age, including measures of the State Council related to retirement. In the document, China decided to extend the retirement age from 60 to 63 years old for men, from 50 years old and 55 years old to 55 years old and 58 years old for women, respectively. These decisions take effect from January 1, 2025. In addition to the regulations directly extending the retirement age, China has introduced pension-related solutions to encourage older workers to continue working. Starting from January 1, 2030, the minimum contribution period for workers to receive a basic monthly pension will gradually increase from 15 years to 20 years.

Germany

According to the Hyundai Research Institute, seniors in Germany tend to spend much more than the younger generation. Therefore, the German government decided to recognize aging as a major economic opportunity. The Hyundai Research Institute points out that each year the country supports 300-400 million euros for research and development (R&D) projects related to aging. Aging projects are developed in the fields of medicine, pharmaceuticals and product development for people over 50.

In addition, Germany also encourages the expansion of age-friendly production models. These production models include not only products for the care of the elderly but also all products that support the elderly to live independently, from food, consumer goods, clothing, household appliances to means of transportation. At the same time, Germany also established a new market including areas related to the robotics industry; drugs and biopharmaceuticals for the elderly.

Besides producing products to support the elderly, Germany also develops and provides services for the elderly. In Germany, the service industries related to the elderly such as insurance, health, home care, and pensions are considered to be age-friendly industries.

Germany has also taken measures to develop the "silver economy" by taking advantage of the retired and pre-retirement workforce. This has been clearly demonstrated in the "Madrid International Action Plan on Ageing (MIPAA)" and the Regional Implementation Strategy (RIS). The German government encourages employers to value older workers and facilitate recruitment and utilization of older people's work experience.

Characteristics of Vietnamese elderly

Characteristic in spending

According to Nam&Duc[2], Vietnamese elderly people tend to want to be cared for at home more than being cared for at inpatient and semi-residential care centers.

Table 1: Percentage of older people in need of assistance who received assistance from different people

Caring people	Aged group		
	60-69	70-79	80+
Spouse	60,75	36,69	11,70
Son	32,19	43,16	52,09
Daughter	22,37	30,67	36,97
Son in law	4,15	4,28	5,85
Daughter in law	18,33	28,82	42,74
Grandson	6,55	9,88	13,15
Granddaughter	6,32	9,24	12,00
Employee/caregiver	1,52	3,40	2,75
Health personnel	1,06	1,60	0,64
Nursing home staff	0,00	0,00	0,06
Others	7,01	2,54	1,16

Source: "Phân tích từ Điều tra Biến động dân số và Kế hoạch hóa gia đình năm 2021"

The proportion of elderly people in all three age groups 60-69, 70-79 and 80+ who want to be cared for at home accounts for a very high proportion of more than 85% and even exceeds 90% of the total elderly population nationwide.

Characteristic in spending for insurance

According to data from the National Statistics Office, the rate of social insurance participants gradually increased from 22,6% in 2015 to 35,2% in 2023. Meanwhile, the rate of health insurance participants increased sharply from 74,2% in 2015 to 93,3% in 2023. The increase in the rate of insurance participation represents an increase in people's uncertainty about their health and future. The trend of Vietnamese people paying more attention to health has contributed to creating a potential market for the development of insurance packages for the elderly and insurance packages to support old age life.

Characteristic about jobs

According to data from the National Statistics Office, the number of employed workers over 50 years old increased from 8.613,9 in 2009 to 13.360,3 in 2021. At the same time,

unemployment rate of workers over 50 years old in Vietnam tends to decrease sharply after the pandemic from 1,86% in 2021 to 1,17% in 2022. The increase in the number of workers combined with the decrease in the unemployment rate further emphasizes the desire of Vietnamese elderly in continuing to contribute and work.

Although the number of employed elderly people is increasing, the quality of employment for elderly workers is still not guaranteed, most of the elderly in Vietnam are still doing vulnerable jobs.

Characteristic in income

According to statistics from the Social Insurance Board, in 2023, in Vietnam, there will be 2,7 million elderly people (accounting for about 16,77% of the total number of elderly people nationwide) receiving pensions from the social insurance fund with an average pension of 4,75 million VND/month. Meanwhile, the average monthly income per person in 2023 is 4,96 million VND, the income from pensions is even lower than the average income. With a rate of 16,77%, pension coverage is still quite slow and most of the elderly in Vietnam do not have a pension. In addition, most of the elderly work in vulnerable sectors, simple labor so the income from employment is low and unstable.

Besides to income from work, investment and savings, a large part of the elderly's income comes from support from their children and grandchildren. According to statistics, support from children and relatives dominates the income sources of the elderly today. This is a limitation in the financial independence of the elderly.

4. Lessons for Vietnam

Based on the experiences of the above countries and the characteristics of the elderly in Vietnam, the article will draw out solutions to help Vietnam develop silver economy effectively:

Solutions to utilize the elderly labor force

First, implement measures to encourage the elderly to continue working after reaching retirement age.

Second, the Vietnamese government needs to issue policies to educate, train and support older workers to improve their skills to increase their employability and find higher-paying jobs.

Third, Vietnam can establish agencies to support employment for older people to make the process of implementing measures related to employment support activities for older people more effective.

Fourth, in addition to encouraging the elderly to continue working in enterprises, the Vietnamese government can support the elderly to start their own businesses to have a more active life. Vietnam can issue specific support policies for start-up projects of the elderly.

Solutions to help take advantage of consumption related to the elderly

First, improve the quality of existing services. Vietnamese elderly people tend to make decisions based more on personal experience rather than opinions from those around them. Therefore, the process of researching and providing products and services needs to focus on the experience of the elderly when using those products and services.

Second, the income of Vietnamese elderly people is still quite low and unsustainable. Therefore, the State needs to have policies to increase pensions and improve the coverage of subsidies for the elderly. The fact that the elderly receive larger subsidies for products and services or receive salary increases means that their purchasing power will be greater.

Third, research and develop methods to prevent epidemics. The elderly are considered to be more vulnerable than other generations due to poor health. They often have a high probability of getting sick, low resistance and are more severely affected by epidemics.

Fourth, health care facilities should expand the provision of home care products and services based on the wishes of the elderly.

Fifth, Vietnam needs to promote the application of technology in the development and production of elderly care products. This solution can be implemented by encouraging businesses to carry out R&D projects for modern products in the field of elderly care with cost support and support, creating favorable conditions for the process of learning experiences and transferring technology from countries around the world.

Sixth, Vietnam can produce entertainment programs, television programs, classes and courses specifically for the elderly to encourage them to spend on these areas. This will help the elderly reduce the feeling of loneliness when their children go to work or live separately.

Solutions to promote spending for insurance sector

First, expand the diversity of insurance programs, expand the scale of services covered by special insurance programs, such as home health care services for the elderly.

Second, insurance programs should be carefully researched to offer reasonable fees that are suitable for the spending ability of the elderly and the willingness to spend of relatives.

Third, expand the advertising target of insurance programs. When promoting and marketing insurance products, consider the potential consumer segment, which is the younger generation and young people whose parents and grandparents are elderly.

Fourth, educate and raise awareness among the elderly about the importance of participating in insurance in the context of increasingly small family sizes.

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REVEALING THE EFFECTS OF DIFFERENT KNOWLEDGE SPILLOVERS FROM FDI ON GREEN TOTAL FACTOR PRODUCTIVITY

MSc. Nguyen Thuy Trang* - Assoc.Prof.PhD. Nguyen Minh Ngoc**
Assoc.Prof.PhD. Nguyen Xuan Hung**

Abstract: ***Productivity growth is crucial for growing welfare gains. This study looked at the impact of FDI knowledge spillover on production. In addition to the traditional OLS, FE, and FGLS approaches, system generalized methods of moments (S-GMM) are used to investigate data from several official databases in 63 Vietnamese provinces from 2011 to 2022. The regression analysis shows that: (1) Higher levels of depth of human capital knowledge spillovers can significantly improve provincial green productivity; (2) Higher levels of depth of organizational knowledge spillover through FDI and breadth of human capital knowledge spillover from FDI can reduce green productivity of provinces; (3) The depth of human capital knowledge spillover from FDI can more significantly and effectively promote green total factor productivity Our findings offer insight on the indirect effects of foreign direct investment on green productivity at the regional level.***

• Keywords: *human capital knowledge spillovers, knowledge spillovers from FDI, organizational knowledge spillovers, green total factor productivity*

JEL codes: C5, D22

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1. Introduction

Because of the direct link between increased productivity and welfare benefits, there has been a growing interest in understanding the determinants of productivity variations within and among nations during the previous few decades. FDI activity has long been proposed as a potential explanation for these disparities (Bournakis & Tsionas, 2022).

Although numerous scholars have investigated the link between FDI spillovers and productivity, few have examined the relationship at the provincial level. Furthermore, past research has primarily employed microeconomic methodologies, firm or industry level analysis, and produced mixed results (Belitski et al., 2023; (Li et al., 2019), with a few studies using macro-level data, such as Malikane & Chitambara (2018).

For a variety of reasons, we selected the province as the unit of study. First, there is significant regional heterogeneity in institutional and economic elements that can influence productivity. Second, as shown in the current literature, spatial closeness is essential for technology and knowledge spillovers (Jaffe, 1989). Third, changes in regional FDI attractiveness policies influence not just FDI inflows but also the cost of doing business across regions (Chan et al., 2010). As a result, there is an urgent need to investigate the relationship between FDI knowledge spillovers and regional productivity in order to acquire a deeper understanding of the interaction of place, space, and organizations.

The aim of this research is to investigate the effects of FDI knowledge spillovers on productivity through the lens of organizational and human capital knowledge spillovers. In addition to the traditional OLS, FE, and FGLS approaches, system generalized moments (S-GMM) are used on a panel data set of 63 provinces in Vietnam from 2011 to 2022, with a total of 756 observations used. First, productivity, as measured by green total factor productivity (GTFP), is calculated using the global Malmquist-Luenberger index and data envelopment analysis (DEA). Second, the organizational and human capital knowledge spillovers from FDI and GTFP are incorporated into the same theoretical framework to investigate the link between the three variables. Finally, the heterogeneity effect is introduced into the model to better analyze the impact of knowledge spillover from FDI on productivity in various locations.

This work adds to literature in several ways. First and foremost, this is groundbreaking research of the impact of FDI knowledge spillovers on productivity, looking at both organizational and human capital knowledge spillovers. While most research categorizes knowledge spillovers based on their development mechanism and spillover channel (Havranek & Irsova, 2011), this study examines different channels of knowledge spillovers from FDI that may substitute for one another. Second, this study uses a regional approach to analyzing the influence of FDI knowledge spillovers on production since spatial proximity is important for technology and knowledge

** Thuyloi University; email: trangnt@tlu.edu.vn*
*** National Economics University; email: ngocieds@neu.edu.vn - hungnx@neu.edu.vn*

spillovers (Jaffe, 1989). Finally, this study illustrates the various effects of FDI-induced knowledge spillover on green productivity in different regions of Vietnam.

This study suggests that future provincial productivity policies should examine and balance the number of foreign and local firms to create a competitive environment in an area and reduce the potential crowding-out effects of knowledge spillovers. Professional conferences and trade fairs should also be promoted as forums for knowledge exchange between foreign and local employees.

The following is the rest of the article: Section 2 explains the theoretical underpinnings of this investigation, whereas Section 3 gives the data and empirical framework of this research. Section 4 summarizes the key findings, and Section 5 concludes.

2. Literature review and hypothesis development

Scholars hold varied viewpoints on knowledge spillovers. Ferreira et al. (2017), for example, proposed that knowledge spillover may be caused by knowledge externality and that businesses could profit from the technical breakthroughs and R&D of competitors. Pan and Liu (2013) define knowledge spillovers as the effect of a firm's R&D operations on innovative performance. Kim (2015) defined transnational knowledge spillover as a favorable external outcome of FDI-induced productivity growth in host nations. Knowledge spillovers from FDI are defined in this study as a positive externality that boosts indigenous firms' knowledge because of the presence of foreign operations in the region

Endogenous growth literature recognizes knowledge spillovers as an important factor in explaining domestic productivity, and FDI is viewed as a conduit for spillovers, through which technological innovations and knowledge about themselves can be transferred and transformed to meet local demands Ali et al. (2016).

Although various studies have been undertaken on the relationship between FDI and productivity, little scholarly attention has been dedicated to its regional distribution (Li et al., 2019). Previous study, which used microeconomic approaches, firm or industry level analysis, yielded varied outcomes (Girma, 2005; Meyer and Sinia, 2009). Given that scholarly research indicates that regions differ in both large and small countries due to significant developmental disparities (Bravo-Ureta et al., 2020), it is critical to investigate the mechanism of knowledge spillovers from FDI to local firms in order to understand the effect of FDI knowledge spillovers on provincial productivity.

In this work, we distinguish between two forms of knowledge spillovers from foreign direct investment. FDI knowledge spillovers can be further divided into organizational and human capital knowledge spillover. Even though these spillovers come from the same source, foreign-owned businesses, they may be substitutes for one another.

2.1. Organizational knowledge spillover from FDI and productivity

Spatially nearby foreign enterprises generate positive information externalities (Mariotti et al., 2010), which encourages more foreign firms to locate in the region. Increasing the quantity and density of foreign enterprises in a region creates more opportunities for knowledge and experience exchange in a given spatial setting (Argote & Miron-Spektor, 2011).

Prior literature outlined the mechanisms of such vicarious learning, which occurs when domestic companies watch and source knowledge from foreign firms via direct knowledge transfer of spillovers, changes in their routines, and behaviors.

Localized organizational spillovers from multinational companies are viewed as a source of new competencies and capabilities for existing domestic firms (Shepherd & Patzelt, 2022). Knowledge spillovers will also generate new ideas, best practices, and the spread of excellence throughout an organization, all of which relies on the collection, communication, relocation, and connection of information among organizational members (Shepherd & Patzelt, 2022). In this manner, knowledge spillovers promote industrial and technical growth in the region while simultaneously reducing environmental pollution, proving the province's GTFP. Spillovers that drive GTFP may result from the breadth (number of MNEs) and depth (concentration in a region) of organizational knowledge. First, the greater the number of foreign MNEs present, the more diverse the breadth of possible knowledge sources available to provide domestic firms with potential inputs, insights, and opportunities to develop organizational learning and capabilities to imitate and transform them into production technology and management methods with their own local characteristics (Fosfuri & Motta, 2001). Second, the density of foreign MNEs increases the possibility that a foreign firm may participate in an inter-firm interaction between foreign and domestic enterprises, hence raising the total depth or volume of unique foreign knowledge spillover. Employee turnover, demonstration, and market intermediaries can all contribute to knowledge spillover (Spencer, 2008)), which promotes new discoveries, best practices, and the spread of excellence (Shepherd & Patzelt, 2022).

To summarize, the breadth of knowledge spillover captures information novelty and diversity (Beliski et al., 2023). greater the variety of potential knowledge sources available, the more inputs, insights, and opportunities for local enterprises to expand their organizational learning and capacities. Meanwhile, organizational knowledge

spillover depth measures information volume (Beliski et al., 2023). At the same time, the greater the density of foreign firms, the more likely it is that a foreign enterprise will engage in inter-firm interaction with domestic firms, increasing the overall depth or amount of novel foreign knowledge spillover that can be combined with the organizational structures, practices, networks, and rules of FDI-owned firms to generate new products and services. As a result, we propose the first two hypotheses.

Hypothesis 1: Higher levels of organizational knowledge spillover breadth from FDI will affect green TFP improvement.

Hypothesis 2: Higher levels of organizational knowledge spillover depth from FDI will affect green TFP improvement.

2.2. Human capital knowledge spillover from FDI and productivity

The arrival of foreign enterprises in an area is accompanied by the hiring of a large number of workers with comprehensive and sophisticated working knowledge of the domestic market. These individuals can quit foreign corporations to start their own businesses, or they can join new firms as key members, leveraging industry knowledge gained in foreign firms, resulting in human capital knowledge spillover in an area. Individual knowledge and skills are enhanced by managerial abilities to combine knowledge flows and use knowledge embedded in humans (i.e., human capital) in other organizations.

Tacit knowledge is conveyed to other organizations through face-to-face interactions between foreign personnel and staff from other enterprises co-located in a region (Beliski et al., 2023). Human capital knowledge spillover to GTFP growth occurs through management communication between employees working at different enterprises in a region that may sprout. Managerial contacts between employees from diverse FDI businesses and domestic counterparts in an area, for example, can spark fresh ideas and lead to creative solutions that have a greater influence on efficiency and production (Helfat & Martin, 2015). As a result, we propose the following two hypotheses.

Hypothesis 3: Higher levels of human capital knowledge spillover breadth from FDI will affect green TFP improvement.

Hypothesis 4: Higher levels of human capital knowledge spillover depth from FDI will affect green TFP improvement.

3. Research design

3.1. Data and variable definitions

This study is based on a balanced Vietnam panel data set of 63 cities and provinces polled between 2011 and 2022. The data set was compiled from the Socio-Economic Statistical Data of 63 Provinces and Cities, the Vietnam Statistical Yearbook, the appropriate annual Vietnamese Provincial Statistical Yearbook, and the White Books on Vietnamese Businesses.

Table 1. Variable descriptions and measurements

Variable	Measurements	Unit
Dependent variable		
Green total factor productivity (GTFP)	Global Malmquist Luernberger index	%
Independent variables		
Breadth of organizational knowledge spillover (Breath_OR_FS)	Natural logarithm of number of foreign firms in a region	%
Depth of organizational knowledge spillover (Depth_OR_FS)	Share of foreign firms in a region	%
Breadth of human capital knowledge spillover (Breath_HC_FS)	Natural logarithm of the number of employees in foreign firms in a region	%
Depth of human capital knowledge spillover (Depth_HC_FS)	Share of employment in foreign firms in a regional	%
Control variables		
Marketization (MAR)	Ratio of employees of non-state-owned businesses to all employees in a province	%
Energy structure (ES)		%
Industrial structure (IS)	Percentage of coal consumption that is converted to standard coal relative to the total energy consumption in a province	%
Trade openness (OPEN)	Proportion of GDP to total goods imported and exported serves as a proxy for trade openness	%

The descriptive statistics for the variables are shown in Table 2.

Table 2. The variables' descriptive statistics

	Obs	Mean	Std. Dev.	Min	Max
GTFP	756	1.0012	0.0131	0.9064	1.0771
Breath_OR_FS	755	3.4889	1.9282	0.0000	8.92319
Depth_OR_FS	755	1.9042	2.5236	0.0000	16.6933
Breath_HC_FS	756	9.0243	2.6768	0.0000	13.4957
Depth_HC_FS	756	33.6959	35.9434	0.0000	100
MAR	756	92.1182	31.6316	46.4170	930.9856
IS	756	1.11E-05	0.0001	6.92E-08	0.0034
ES	756	21.2563	6.2206	6.1265	48.8396
OPEN	756	173.6842	549.4547	5.11E-07	9627.54

Table 2 displays the model variable's descriptive statistics. The final sample consists of 756 observations from Vietnam's 63 provinces collected between 2011 and 2022. The mean GTFP score of 1.002 indicates significant variability in green productivity between provinces and years, with values ranging from 0.906 to 1.077. With standard deviations ranging from 1.9282 to 35.9434 and average levels of FDI spillover ranging from 1.9042 to 33.6959, there appear to be significant geographical disparities in how knowledge from FDI has diffused.

3.2. Model settings

To investigate the impact of various types of FDI knowledge spillover on green total factor production, as described in Hypotheses 1-4, the following panel model is developed:

$$GTFP_{it} = \alpha_0 + \alpha_1 GTFP_{it-1} + \alpha_2 FS_{it} + \sum_{i=3}^{k} \alpha_i X_{it} + \mu_i + \mu_t + \epsilon_{it} \quad (1)$$

Where i and t denote the city and year, respectively. $GTFP_{it}$ is the proxy of green total factor productivity. The

primary explanatory variable that denotes knowledge spillover from FDI is $FDIspill_{it}$. The coefficient of interest is α_1, which reveals the influence of FDI knowledge spillover on TFP. X_{it} denotes a collection of control variables including markelization (MAR), industrial structure (IS), energy consumption structure (ES), and trade openess (OPEN). μi and μt are fixed effect in region and time, respectively.

4. Results and discussions

4.1. Main results

In this part, econometric approaches are used to empirically validate the theoretical hypothesis given earlier. As the lag term for the dependent variable is introduced, the independent variable may become linked with a random error term. As a result, endogeneity-induced deviation is eliminated using the FGLS and system-GMM models.

Table 3 highlights the empirical findings on the influence of various types of knowledge spillover from FDI on GTFP. The Arellano-Bond (AR) test results reveal that the random error terms' first order difference items are autocorrected at the 1% significance level, while the second-order difference items are not. The Hansen test results show that the null hypothesis cannot be rejected at a 10% significance level. As a result, the system-GMM model passes both the AR and Hansen tests, indicating that the model is plausible and the results credible.

First, as shown in Table 3, the FLGS and system-GMM models have a negative and significant coefficient on the lagged term of GTFP, indicating that GTFP growth is continuous and dynamic.

Second, the estimated coefficients of knowledge spillover from FDI are mostly significant, except for organizational knowledge spillover. The coefficient representing the breadth of organizational knowledge spillover (Breath_OR_FS) is not significant. This implies that increasing the number of foreign enterprises in a province has little effect on the local GTFP. As a result, hypothesis 1 becomes invalid. The loose business connectivity between FDI-invested enterprises and their domestic counterparts may contribute to the issue's potential growth. Vietnamese enterprises rarely participate in foreign firms' supply chains, resulting in limited knowledge transfer.

The remaining FDI spillover forms have clearly different directions. According to system GMM estimates, the coefficients of depth of organizational knowledge and breadth of human capital knowledge spillover are strongly negative. Specifically, increasing the share of foreign enterprises in a province (organizational spillover depth) reduces provincial green productivity growth because the depth of knowledge spillover coefficient (depth_OR_FS) is notably negative, leading to hypothesis 2 is validated. Similarly, the calculated coefficient of breadth of human capital knowledge spillovers (breath_HC_FS) is strongly negative, implying that an increase in the number of employees in foreign enterprises hinders a province's GTFP growth. Therefore, theoretical hypothesis 3 is confirmed. One possible cause is that an enormous amount of foreign enterprises and personnel came from minuscule foreign firms with limited technology, therefore knowledge spillover from overseas firms is not new or updated. As a result, this will be detrimental to GTFP growth.

Table 3

Dependent variable: GTFP	POLS	FE	FGLS	SGMM
	(1)	(2)	(3)	(4)
L.GTFP			-0.634***	-0.206***
			(0.0357)	(0.0643)
Breath_OR_FS	0.0033	0.0032	0.0027	-0.0007
	(0.0041)	(0.0043)	(0.0028)	(0.0052)
Depth_OR_FS	-0.0105***	-0.0108***	-0.0060***	-0.0064**
	(0.0030)	(0.0032)	(0.0022)	(0.0032)
Breath_HC_FS	-0.0092**	-0.0101**	-0.0060***	-0.0053*
	(0.0037)	(0.0040)	(0.0022)	(0.0031)
Depth_HC_FS	0.0102***	0.0107***	0.0027	0.0067***
	(0.0032)	(0.0034)	(0.0028)	(0.0025)
MAR	-0.0091	-0.0093	-0.0064	-0.0064*
	(0.0057)	(0.0059)	(0.0091)	(0.0033)
IS	0.0013*	0.0012	0.0014**	0.0021*
	(0.0007)	(0.0008)	(0.0006)	(0.0012)
ES	0.0273***	0.0274***	0.0160***	0.0231***
	(0.0039)	(0.0041)	(0.0027)	(0.0052)
OPEN	0.0002	0.0002	0.0018***	0.0030***
	(0.0002)	(0.0002)	(0.0005)	(0.0011)
Constant	-0.0009	-0.0009	7.31e-05	-0.0003
	(0.0009)	(0.0009)	(0.0008)	(0.0005)
R-squared	0.106	0.107		
AR(1)				0.0000
AR(2)				0.674
Hansen test				0.102

*Note: (1) The values in parentheses are robust standard errors clustered at the provincial level; (2) ***, ** and * represent statistical significance at the 1%, 5%, and 10% levels, respectively.*

In contrast, the fraction of such employees (Depth_HC_FS) is crucial for raising GTFP (β=0.067, p<0.001). As a result, hypothesis 4, which claims that increased levels of human capital knowledge spillover via FDI raise GTFP, is supported. Interactions between international and domestic personnel make knowledge adaptable to local contexts, which strengthens the GTFP in the local provinces.

Finally, regression results for effects of control variables on GTFP demonstrate that the coefficients of industrial structure (IS), energy structure (ES), and trade openness (OPEN) were all significantly positive. This means that trade liberalization and industrial structure optimization play major roles in improving GTFP. Meanwhile, Vietnam's economic growth remains strongly dependent on natural resources such as coal, therefore increased coal consumption continues to contribute to GTFP. However, improved marketization (MAR) has a negative influence on GTFP. One possible

factor is an insufficient connectivity between private enterprises and other sectors of the Vietnamese economy.

4.2. Heterogeneity of provincial location

To provide a theoretical foundation for developing varied investment policies, the study sample is further separated into three regions: northern, central, and southern provinces. Its aim is to investigate the influence of various FDI-induced knowledge spillovers on green productivity in different regions of Vietnam.

Table 4. Estimation results of province location

Dependent variable: GTFP	North	Central	South
	(1)	(2)	(3)
Breath_OR_FS	-0.0063	-0.0042	0.0127
	(0.0079)	(0.0059)	(0.0111)
Depth_OR_FS	-0.0040	-0.0032	-0.0158**
	(0.0086)	(0.0039)	(0.0060)
Breath_HC_FS	0.0085*	-0.0005	-0.0188**
	(0.0049)	(0.0038)	(0.0072)
Depth_HC_FS	-0.0049	0.0049*	0.0099***
	(0.0042)	(0.0028)	(0.0033)
Control variables	Yes	Yes	Yes
AR(1)	0.0000	0.0000	0.0000
AR(2)	0.665	0.599	0.661
Hansen test	0.161	0.215	0.142

*Note: (1) The values in parentheses are robust standard errors clustered at the provincial level; (2) ***, ** and * represent statistical significance at the 1%, 5%, and 10% levels, respectively.*

Table 4 shows that the provinces in the southern region have a higher estimated coefficient of depth human capital knowledge spillover from FDI than those in the northern and central regions. The southern region has a stronger economic foundation and resource endowment, as well as a larger talent pool, so the depth of human capital knowledge spillover from FDI can improve green total factor productivity more significantly and effectively than the two remaining regions.

5. Conclusions

Prior research has shown an increasing interest in studying the impact of FDI spillovers on productivity (Bournakis and Mallide, 2021; Malikane and Chitambara, 2017). FDI has been associated with both positive and negative spillovers (Girma, 2005; Meyer and Sinia, 2009). However, the impact of knowledge spillovers from FDI on a province's production has remained unknown. In this regard, our analysis underlines the importance of FDI knowledge spillovers in aiding a province's productivity growth by introducing new insights, best practices, and creative opportunities.

This study analyzes the breadth and depth of organizational and human capital knowledge spillovers and their impact on provincial green productivity. The research conclusions are as follows, based on panel data from 63 Vietnamese cities and provinces from 2011 to 2022: (1) Higher levels of depth of human capital knowledge spillovers can significantly improve provincial green productivity; (2) higher levels of depth of organizational knowledge spillover through FDI and breath of human capital knowledge spillover from FDI can reduce green productivity of provinces; (3) The depth of human capital knowledge spillover from FDI can more significantly and effectively promote green total factor productivity in provinces in the south than that of the central and north of Vietnam.

The following policy recommendations are made in light of the findings. First, while welcoming foreign firms to a region, local governments should consider the potential unintended consequences. A policy that promotes foreign investment without taking into account the country's current resources and competencies would diminish provincial green productivity. To create a competitive environment in a region, it is critical to analyze and balance the number of foreign and domestic firms. Second, governments should promote the hiring of foreign experts and skilled workers in a region, as well as an increase in their proportion of the territory's workforce. Furthermore, the regional engagement of FDI workers is intrinsically connected to increased local green TFP. As a result, more professional conferences and trade fairs are required to improve knowledge exchange among foreign and local employees. Third, significant human capital is required for the knowledge spillovers from FDI to be beneficial. As a result, it is vital for a province to create highly skilled individuals.

One limitation of our analysis is that we are unable to account for various important parameters such as FDI business size and technological capacity. The issue could be resolved in the future by merging data from enterprise surveys. We anticipate that including company heterogeneity controls will make related research more rigorous.

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IVESTIGATING THE IMPACT OF AUDITORS' OPINIONS ON FINANCIAL RISKS FOR VIETNAMESE LISTED MANUFACTURING ENTERPRISES ON UPCOM

PhD. Nguyen Hong Thoa* - PhD. Nguyen Thu Nha Trang* - Dao Thi Cam Tien**
MSc. Tran Khanh Dung*

Abstract: ***The main objective of the study is to assess the impact of auditors' opinions on financial risks of manufacturing enterprises on the Upcom stock. After removing observations with incomplete financial reports from 2019-2022, there are 275 manufacturing enterprises suitable for analysis, corresponding to 1,100 observations. The article utilizes descriptive statistics and fixed regression methods to achieve the research objective. The research results show that auditors' opinions have an impact on financial risk (proxied by Z-score). In addition, the results also show that 2/5 control variables have a statistically significant influence on financial risk, specifically auditor changes and audit delay. The study contributes to helping stakeholders such as investors and enterprises consider audit opinions to make appropriate decisions.***

• Keywords: *auditor's opinions, financial risk, manufacturing enterprises, upcom.*

JEL codes: G21, G34

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1. Introduction

In the contemporary digital economy, stock exchanges are extensively developed and more favored by investors both nationally and globally. Stock exchanges furnish investors with comprehensive information regarding listed companies, encompassing stock codes, operational status, company size, and additional details. This aims to guarantee the transparency and impartiality of financial statements (FS) produced by publicly traded corporations. Consequently, the function of independent auditing firms has grown essential across all businesses and sectors represented on the exchange, aiding in the validation of the accuracy and integrity of financial statements submitted by companies. Simultaneously, they can offer appropriate financial counsel for individuals and groups seeking to invest in a company.

According to auditing standards, auditing companies will evaluate the integrity and rationality of FS, encompassing both the presentation format of the FS and the existence and precision of the statistics. Subsequently, auditors will render a suitable opinions. Will the audit opinions for the just finished financial year influence the company's operations and affect its financial risks? This is the rationale for conducting this investigation.

This research aims to examine the influence of audit opinions from the recently finished financial year on the financial risks that manufacturing companies may encounter in the subsequent fiscal year. Consequently, the study attempts to deliver adequate responses to the aforementioned problems, which are prevalent inquiries among scholars in Accounting and Auditing. The study utilizes data gathered from 275 manufacturing firms listed on the Upcom Stock Exchange, a platform for unlisted public companies managed directly by the Hanoi Stock Exchange.

2. Literature review

Backgound theory

Agency Theory: Formulated by Jensen and Meckling (1976), this theory primarily examines the interaction between the principal and the agent. The agent will execute specific activities on behalf of the principle as stipulated in a contract, especially highlighting the interaction between shareholders and managers. Two categories of contracts that receive particular focus in illustrating the relationship between the principle and the agent are: the agreement between shareholders and managers, and the loan agreement (the contract between managers representing the firm and creditors). Agency theory posits that both the principal and the agent consistently seek to optimize their respective profits. Consequently, contractual connections frequently result in agency expenses. Agency costs are the losses incurred by the principal as a result of the divergence

** Can Tho University, Vietnam; email: nhthoa@ctu.edu.vn - ntntrang@ctu.edu.vn - tkdung@ctu.edu.vn*
*** H-Tas Tax Accounting Services Company Limited; email: dtctien0705@gmail.com*

between their interests and those of the agency. Public corporations frequently use external managers to assist in the company's operations, prompting owners to meticulously oversee all managerial activities to optimize their earnings. Consequently, the greater the volume and detail of information disclosed by managers, the more it mitigates management costs, including monitoring expenses, binding costs, and associated losses, while simultaneously diminishing distrust between shareholders and managers.

Theory of Asymmetric Information: This theory was formulated by three scholars George Akerlof, Michael Spence, and Joseph Stiglitz (2001) who were awarded the Nobel Prize in Economics. Kyle (1985) states that asymmetric information in the stock market arises when certain investors hold private information or have access to more publicized information about a company than their counterparts. The prevalence of asymmetric information in the market adversely affects firms, resulting in substantial consequences for the stock market, notably for investors. Insufficient information from corporations can cause investors to miscomprehend the company's operations or misinterpret circumstances, leading to misguided actions with significant repercussions. This theory advocates for enterprises to enhance the dissemination of precise, standardized information to less-informed persons in order to mitigate harm to investors specifically and the economy broadly.

Auditor's opinion

Based on the Vietnamese Standards on Auditing, Standard No. 700: Forming an Audit Opinion and Reporting on Financial Statements, paragraph 10, it stipulates that the auditor has to articulate an audit opinion regarding the conformity of the financial statements with the relevant financial reporting framework, in all material respects. This encompasses two categories of audit opinions: an unqualified opinion and a modified opinion.

Unqualified opinion: An unqualified opinion is defined by the Vietnamese Standards on Auditing, Standard No. 700: Forming an Audit Opinion and Reporting on Financial Statements, paragraph 07c, as an audit opinion issued when the auditor concludes that the financial statements, in all material respects, are prepared in accordance with the applicable financial reporting framework.

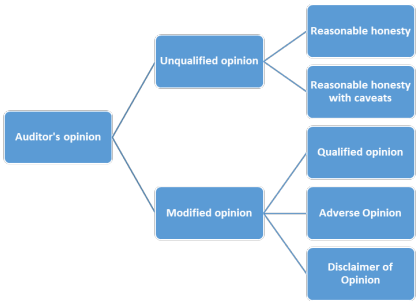
Modified opinion: An unqualified opinion is defined by the Vietnamese Standards on Auditing, Standard No. 700: Forming an Audit Opinion and Reporting on Financial Statements, paragraph 07c, as an audit opinion issued when the auditor concludes that the financial statements, in all material respects, are prepared in accordance with the applicable financial reporting framework.

- Qualified opinion: A qualified opinion, or "partial acceptance" opinion, is issued when the auditor determines that the financial statements, in all material respects, accurately represent the entity's financial position, with the exception of specific matters identified in the audit report (Auditing Standard 705, paragraph 7).

- Adverse Opinion: This opinion is opposite with with an unqualified opinion, as it relies on adequate and pertinent audit evidence gathered. The auditor determines that the misstatements, both individually and collectively, are material and pervasive to the financial statements (Auditing Standard 705, paragraph 8).

- Disclaimer of Opinion: The auditor have to refuse to issue an opinion when unable to gather sufficient acceptable audit evidence to substantiate the audit opinion, and determines that the potential impact of undiscovered misstatements, if any, might be serious and pervasive to the financial statements. Conversely, if there exists a significant constraint on the audit's scope, the auditor shall refrain from declining to give an opinion to prevent issuing a contradicting opinion (Auditing Standard 705, paragraph 9).

Figure 1 - Types of audit opinions



Source: ISA 700 standard summary

Financial risk

Financial risk denotes the risk of financial loss inside enterprises. Financial risk may stem from external sources, such as market volatility that diminishes asset prices, or from internal financial decisions that impact debt capacity and cash flow management. Certain concerns linked to financial risk encompass:

Market risk: Characterized as the risk to a financial portfolio arising from variations in market prices, including stock prices, currency rates, interest rates, and commodity prices.

Liquidity risk: A particular risk associated with executing transactions in markets exhibiting poor liquidity, marked by diminished trading volumes and extensive bid-ask spreads. Under these circumstances, efforts to liquidate assets may exacerbate price declines, necessitating sales at values below their intrinsic worth or extending the timeframe for divestiture beyond initial projections.

Operational risk: The potential for loss arising from physical disasters, technical malfunctions, and human errors in a company's operations, encompassing fraud, managerial misjudgments, and procedural failures.

Credit risk: The likelihood that a counterparty may fail to meet some or all of their obligations by the specified deadline. Consequently, credit risk includes both the risk of a party defaulting on their obligations and the danger of receiving partial payments or payments beyond the stipulated deadline.

Business risk: The potential that alterations in the variables of a business strategy could jeopardize its feasibility. This encompasses quantifiable risks, such cyclical hazards and demand equations, and unquantifiable risks, such as alterations in competitive behavior or technology. Business risk is defined as the hazards inherent to a company's fundamental operations that require appropriate management.

Z-score model

Altman established the Z-score model in (1968) as an indicator of financial risk for firms. Altman employed statistical analysis and discriminant analysis methods to rectify the discrepancies among accounting variables in Beaver's prior univariate model (1966). The model utilized data from 66 manufacturing and small enterprises in the U.S. with total assets below $1 million, spanning the years 1946 to 1965, comprising 33 bankrupt firms and 33 non-bankrupt firms. The Z-score was originally utilized just for manufacturing companies and not for other sectors. The Z-score is computed using five financial ratios, each with specific weights, to evaluate business risk. The Z-score model, first created in the United States, can be effectively utilized in several countries. The preliminary model comprises five financial ratios with varying weights, applied to unlisted manufacturing firms in Vietnam. The initial comprehensive model comprises five financial ratios with varying weights: the working capital to total assets ratio; the retained earnings to total assets ratio; the earnings before interest and taxes (EBIT) to total assets ratio; the market value of equity to book value of total debt ratio; and the sales to total assets ratio.

In 2000, Altman researched and developed the Z-score for applicability to non-manufacturing enterprises. The study's results identified five independent variables (financial ratios) that most accurately forecast a company's likelihood of default: the ratio of earnings before tax, interest, and depreciation to total assets; short-term debt to book value of equity; retained earnings to total assets; cash to total assets; and earnings before tax, interest, and depreciation to interest expenses. This model can be utilized in the contemporary economy to forecast bankruptcy one, two, or even three years ahead, owing to its simplicity and considerable accuracy. The approach has been augmented for larger enterprises across many sectors. The metrics utilized in the calculation method are readily accessible from the companies' financial statements and extensively disseminated information.

3. Research methodology

Hypothesis proposing

The auditor's role is to provide an opinion on the extent to which the company's fiscal report accurately represents its financial situation, operational results, and cash flows in all significant aspects. A modified audit opinion (MAO) from the auditor will affect the quality of accounting information, resulting in heightened information asymmetry between external and internal parties. Subpar accounting information will increase investors' estimation risk and agency costs, leading investors to seek larger returns to offset the added risks and costs (Francis et al., 2005; Lambert et al., 2007). Increased external finance costs correlate with heightened financial limitations for the company (Fazzari et al., 1988). If an auditor's judgment diminishes the capacity to obtain equity financing and bank loans (Li et al., 2005), then the auditor's view influences financial risk. Consequently, the subsequent hypothesis is posited.

Hypothesis: Modified audit opinion has a positive impact on financial risk.

Data collection and analysis methods

This research employs secondary data in a panel format, integrating time-series and cross-sectional data from the financial statements of 275 publicly listed manufacturing firms on the Upcom Stock Exchange, spanning the years 2019 to 2022. The data obtained from audited and extensively published financial records guarantees substantial trustworthiness, enhancing the objectivity of research outcomes. The study also employs data from the Ministry of Planning and Investment and the General Statistics Office's website.

The research used a multivariate regression technique to assess the influence of audit views on financial risk. Financial accounting information is generally gathered and presented on an annual basis. The implementation of a one-year lag enables the research model to utilize historical data for enhanced forecasting or trend analysis accuracy. Moreover, employing independent and dependent variables concurrently may result in endogeneity proplems inside the financial econometric model, potentially yielding biased and less objective analytical outcomes. Consequently, employing a one-year lag alleviates the effects of this problem. Thus, the authors have integrated a one-year lag into this study model to guarantee the validity and precision of the analytical outcomes. The comprehensive regression model is expressed as follows:

$$RISK_{i,t} = \beta_0 + \beta_1 AO_{i,t-1} + \beta_2 ROA_{i,t-1} + \beta_3 ROE_{i,t-1} + \beta_4 BIG4_{i,t-1} + \beta_5 ChangMH_{i,t-1} + \beta_6 DAY_{i,t-1} + \mu_{i,t} \quad (2)$$

In which,

RISK: financial risk, determined by Alman's (1968) Z-score model

Z-score =1,2WA + 1,4RA + 3,3EA + 0,64MB + 0,999SA

With the X:

WA: Working capital to total assets ratio

RA: Retained earnings to total assets ratio

EA: Earnings before interest and taxes to total assets ratio

MB: Market value of equity to book value of total debt

SA: Sales to total assets ratio.

AO: is the audit opinion over the years

ROA: Return on total assets

ROE: Return on Equity.

BIG4: Are the auditing firms among the top 4 largest auditing firms in the world (E&Y, Deloitte, KPMG and PwC)

ChangeMH: there is a change in auditing company over research period

DAY: audit opinion lag

Table 1 - Variables measurement

Variables	Code	Measurement	Expectation
Financial risk	RISK	Proxied by Z-score index	
Audit opinion (independent variable)	OA	The variable will take a value of 1 if the audit opinion is not an unqualified opinion and a value of 0 if the audit opinion is an unqualified opinion.	+
Return on total assets (control variable)	ROA	Net income / Average total asset	+
Return on equity (control variable)	ROE	Net income / Average total equity	+
The auditing firms are among the top 4 largest in the world (control variable)	BIG4	is a dummy variable, with 0 being non-top 4 and 1 being top 4 auditing firms	+
A change in auditing company over research period (control variable)	ChangeMH	A dummy variable, where 0 indicates no change and 1 signifies a change in the auditing firm	+
Audit opinion lag (control variable)	DAY	Represent the time from the end of the fiscal year to the date the auditor signs the report	+

Source: authors' review, 2024

4. Research result

Data description

The data is analyzed using STATA 17 software in panel data format, providing descriptive statistics on the bankruptcy rate (RISK), audit opinions from 2019 to 2022, the duration of audit opinion issuance each year, BIG4 (the four leading audit firms), changes in auditing firms, and financial metrics such as return on assets (ROA) and return on equity (ROE), as detailed in Table 2. The findings reveal that, on average, approximately 23% of audit opinions in the sample were not unqualified; the mean duration for audit opinion issuance was 90 days; the average proportion of companies audited by BIG4 firms was 15%; and around 29% of companies underwent changes in audit firms over the years.

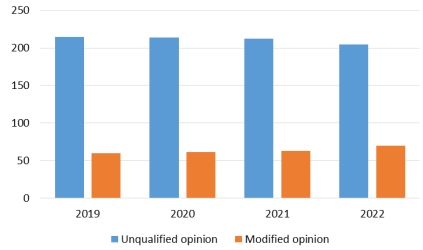
Table 2 - Variable description

Variable	Obs	Mean	St.de	Min	Max
RISK	1,088	6.700858	70.77424	-109.05	1547.81
OA	1,095	.2328767	.4228575	0	1
ROA	1,088	1.734518	33.93092	-42.08	1063.92
ROE	1,088	.3426471	5.856568	-7.05	168.75
BIG4	1,088	.1534926	.3606275	0	1
ChangeMH	1,088	.2941176	.4558546	0	1
DAY	1,088	90.33915	54.26278	2	360

Source: authors' calculation, 2024

Figure 2 depicts the audit opinions on the financial statements of 275 surveyed companies from 2019 to 2022. It indicates that unqualified opinions constitute a significant majority (exceeding 70%) relative to non-unqualified opinions throughout the years, exhibiting a declining trend over time (specifically 78.2%, 77.8%, 77.1%, and 74.5% for the years 2019 to 2022, respectively).

Figure 2. Types of audit's opinions from 2019-2022



Autocorrelation and multicollinearity test results

The results of correlation analysis are shown in Table 3, indicating the absence of multicollinearity among the independent variables in the regression, since the correlation values remain within the allowable threshold (<0.8).

Table 3. Correlation coefficient matrix

	RISK	OA	ChangeMH	DAY	BIG4	ROA	ROE
RISK	1.0000						
OA	0.0270	1.0000					
ChangeMH	-0.0095	-0.0749	1.0000				
DAY	0.0061	0.0158	-0.0400	1.0000			
BIG4	0.0555	-0.0843	-0.0734	-0.0229	1.0000		
ROA	0.0216	-0.0149	0.0335	0.1225	-0.0248	1.0000	
ROE	0.0221	0.0045	0.0227	0.0816	-0.0161	0.0829	1.0000

Source: authors' calculation, 2024.

In addition, the VIF analysis results further confirmed that there was no multicollinearity among the explanatory variables (Table 4).

Table 4. VIF test

Variables	VIF	1/VIF
ROA	3.25	0.308085
ROE	3.21	0.311331
DAY	1.02	0.979945
OA	1.02	0.984979
ChangeMH	1.02	0.985011
BIG4	1.01	0.985392
Mean VIF	1.75	

Source: authors' calculation, 2024

Regression analysis

Table 5 presents the regression outcomes derived from the random effects model (REM) and the fixed effects model (FEM), accompanied by the Hausman test results. The fixed effects model (FEM) is thus advised for use. The analysis and conclusions concerning the influence of explanatory variables on the dependent variable (financial risk) of publicly listed manufacturing firms on Upcom from 2019 to 2022 are founded on this model.

Table 5. Regression result

RISK	REM		FEM	
	Coef	P>|z|	Coef	P>|z|
OA L1.	.7588643	0.152	1.346584	**0.057**
ChangeMH L1.	1.564403	0.002	4.169138	**0.000**
DAY L1.	-.0125152	0.007	-.0103094	**0.064**
BIG4 L1.	.9583818	0.149	-2.336368	0.175
ROA L1.	4.841012	0.000	.0350024	0.991
ROE L1.	-.3991124	0.526	-.2206275	0.790
Number of obs	812		812	
Number of groups	275		275	
R-sq	0.0616		0.0074	
Hausman test:				
Prob > chi2 = 0,4557				

Source: authors' calculation, 2024

The FEM model indicates that three out of the six explanatory variables significantly influence financial risk. The variables OA (audit opinion), ChangeMH (change in audit firm over the years), and DAY (delay in audit opinion) exhibit statistical significance at levels of 10%, 1%, and 10%, respectively.

The primary aim of the study is to investigate the correlation between audit opinions and financial risk in manufacturing companies that are not yet listed on the Upcom exchange from 2019 to 2022. The findings in Table 5 indicate that the auditor's modified opinion exhibits a positive impact on the company's financial risk at a 10% significance level. This outcome corresponds with the conclusions of Etemadi et al. (2012). Companies facing financial risk tend to obscure this risk in certain indicators in their financial statements. Consequently, an increase in modified opinions from auditors indicates a heightened financial risk for the companies.

In addition, the results indicate that the influence of two out of five control variables is statistically significant at the 1% and 10% levels for the variables ChangeMH (auditor changes over the years) and DAY (lag of audit opinion), respectively. This outcome aligns with the findings of Schwartz and Menon (1985), who contended that firms under financial risk frequently alter their auditors. Indeed, financial difficulties are significantly correlated with intentional changes, especially when companies have incentives to hide negative financial information (Khikmah et al., 2020). Furthermore, the duration required for auditors to render audit opinions also influences financial risk. A reduced audit duration for the issuance of an audit opinion correlates with an increased probability of financial risk for a corporation. Although this result contradicts the findings of Khikmah et al. (2020), it aligns with the study by Okonewa and Okafor (2024). The authors argued that the time of audit report disclosure is crucial and should occur promptly, as it influences investors' judgments. Delays may convey a negative indication to investors regarding the audited company.

Conclusion: The audit opinion is considered as a protective measure for a company's financial status, particularly in the context of a volatile economy and challenges arising from the COVID-19 epidemic. This study analyzes data from 275 manufacturing companies listed on the Upcom stock exchange between 2019 and 2022 to investigate the influence and direction of audit opinion, particularly modified opinions, on financial risk. Moreover, the Z-score and several control variables are employed to construct the estimated research model, such as BIG4, audit change, audit opinion lag, return on asset, and return on equity. The research utilized descriptive statistics and fixed regression techniques to examine the variations in the indicators. The findings indicate that the financial risk of unlisted manufacturing firms on Upcom is influenced by audit opinion; particularly, an increase in the frequency of modified opinions correlates with a rise in financial risk. The study indicates that the financial risk of manufacturing enterprises on Upcom is also affected by alterations in audit firms and delays in audit opinions.

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THE INFLUENCE OF STRUCTURAL CAPITAL ON FINANCIAL PERFORMANCE IN RETAIL ENTERPRISES LISTED ON VIETNAMESE STOCK EXCHANGES

MSc. Khuong Huyen Duc* - Assoc.Prof.PhD. Do Duc Tai**
Assoc.Prof.PhD. Nguyen Trong Than***

Abstract: ***This study investigates the impact of structural capital on the financial performance of retail companies listed on the Vietnamese stock market, based on a dataset of 421 observations from 55 companies over the period from 2016 to 2023. Using both Return on Assets (ROA) and Tobin's Q (ToQ) as measures of financial performance, the analysis reveals that structural capital (SCE) has a positive and statistically significant effect on both ROA and ToQ. The study finds that an increase in structural capital leads to improvements in financial performance, with the impact being similar across companies using standalone and consolidated financial statements. However, the effect on ToQ is slightly stronger in companies using consolidated financial statements, suggesting that the type of financial reporting can influence the magnitude of the impact of structural capital. Additionally, firm size (SIZE) was found to have a negative impact on ROA but a positive impact on ToQ, while financial leverage (DA) negatively affected ROA and positively influenced ToQ. The results highlight the importance of structural capital as a key driver of financial performance and suggest that investments in intangible assets, as well as the adoption of comprehensive financial reporting practices, can enhance operational efficiency and market value.***

• Keywords: *intellectual capital, stuctural capital, financial efficiency, accounting, finance.*

JEL codes: M40, M41, F65

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1. Introduction

The dynamic and evolving nature of the global economy has amplified the importance of intellectual capital, a concept encompassing human, relational, and structural dimensions. It forms the backbone of organizational efficiency, innovation, and resilience, particularly in competitive industries like retail. The Vietnamese retail sector, driven by rapid urbanization and a burgeoning consumer base, presents a fertile ground for examining how structural capital influences key performance indicators: Return on Assets (ROA) and Tobin's Q. These metrics, widely recognized in financial performance analysis, encapsulate operational efficiency, profitability, and market valuation, respectively.

Structural capital facilitates knowledge creation and transfer, enabling organizations to enhance their operational capabilities and strategic adaptability. In the retail context, where competition is intense, and consumer preferences are constantly shifting, structural capital serves as a pivotal determinant of sustainable growth and profitability. Studies have highlighted that firms with robust structural capital are better equipped to manage resources efficiently, innovate processes, and respond to market dynamics, thereby achieving superior financial outcomes (Kamukama, Ahiauzu, & Ntayi, 2011).

In the Vietnamese market, structural capital assumes heightened significance due to the unique challenges and opportunities within the country's retail sector. Factors such as rapid technological adoption, evolving consumer behaviors, and regulatory frameworks necessitate a strong structural foundation to maintain competitiveness. By leveraging structural capital, firms can streamline operations, optimize supply chains, and foster innovation, directly influencing metrics like ROA, which measure operational efficiency and shareholder returns.

** PhD candidate, Hanoi University of Industry, Vietnam; East Asia University of Technology, Vietnam; email: duckh@haui.edu.vn, duckh@eaut.edu.vn; Orcid: https://orcid.org/ 0009-0001-5058-3350*
*** Hanoi University of Industry, Vietnam; email: taiketoanquocte@gmail.com, taidd@haui.edu.vn; Orcid: https://orcid.org/0000-0003-2756-0692*
**** Academy of Finance, Vietnam; email: thansdh66@gmail.com; Orcid: https://orcid.org/0000-0003-0821-8285*

Furthermore, the market valuation of firms, often reflected in Tobin's Q, is significantly impacted by the perceived efficiency and innovation capabilities associated with structural capital (Phusavat et al., 2011).

ROA, and Tobin's Q are integral to assessing corporate performance. ROA indicates how effectively a company utilizes its assets to generate profits. Tobin's Q, calculated as the ratio of market value to the book value of assets, serves as an indicator of market expectations and growth potential (Yeh, Chung, & Liu, 2019). The interplay between structural capital and these metrics has been a focal point in academic research, with evidence suggesting a strong correlation between structural capital efficiency and improved financial performance.

In Vietnam, where the retail sector is characterized by high fragmentation and intense competition, these metrics provide valuable insights into how firms leverage structural capital to achieve performance objectives. The retail sector's reliance on consumer trust, technological integration, and supply chain efficiency amplifies the importance of structural capital in driving ROA, and Tobin's Q. Studies focusing on Vietnamese enterprises have demonstrated that firms with advanced structural capital frameworks exhibit superior financial performance, thereby reinforcing the significance of this intangible asset (Pham & Nguyen, 2021; Vu, 2020).

Empirical evidence underscores the impact of structural capital on firm performance in Vietnam. For example, Pham and Nguyen (2021) found that companies with well-developed structural capital, including advanced IT systems and streamlined operational processes, achieved higher ROA. Additionally, Vu (2020) highlighted the role of structural capital in enhancing supply chain efficiency, a critical factor in the retail sector, where timely delivery and inventory management are paramount. These findings align with global studies, such as those by Kamukama et al. (2011), which emphasize the universal applicability of structural capital in driving corporate success.

Despite its critical importance, the specific impact of structural capital on financial performance metrics like ROA, and Tobin's Q remains underexplored, particularly in the Vietnamese retail context. While global studies have provided valuable insights, the unique characteristics of Vietnam's economy and retail sector warrant a localized investigation. Factors such as rapid technological adoption, regulatory changes, and cultural nuances necessitate a context-specific analysis to uncover the intricate dynamics between structural capital and financial performance (Pham & Nguyen, 2021).

This study aims to bridge the existing research gap by examining the impact of structural capital on ROA, and Tobin's Q in Vietnamese retail companies listed on the stock exchange.

2. Literature review

This literature review examines the impact of structural capital on two key performance metrics - Return on Assets (ROA) and Tobin's Q - specifically within the context of retail companies listed on Vietnamese stock exchanges.

Structural capital is often viewed as the "skeleton" of an organization, encompassing the systems, structures, and processes that enable efficient operations. Nguyen and Phan (2020) emphasize the role of IT infrastructure, logistics systems, and customer relationship management (CRM) in retail firms as critical elements of structural capital. In the retail industry, structural capital facilitates supply chain management, enhances customer satisfaction, and drives innovation. Le and Phan (2017) underline the importance of process automation and inventory management systems in improving retail efficiency. Retail firms in Vietnam are increasingly adopting digital platforms and big data analytics to manage customer relationships and streamline operations, thus leveraging structural capital for competitive advantage.

Structural capital directly impacts a firm's ability to utilize its assets effectively. Studies by Nguyen and Nguyen (2018) and Abor (2005) demonstrate that investments in structural capital enhance operational efficiency, leading to higher ROA. For retail companies, advanced IT systems and logistics networks minimize waste and improve inventory turnover, thereby increasing asset returns. Nguyen and Phan (2020) analyzed the relationship between structural capital and ROA across non-financial firms in Vietnam, finding a positive correlation. Firms that invested heavily in infrastructure and technology reported higher profitability due to reduced operational costs and improved customer retention. Similarly, Mohammad et al. (2019) found that structural capital contributes significantly to profitability metrics, including ROA, in emerging markets. In the retail sector, structural capital investments often lead to

faster adaptation to market changes. For example, companies with robust e-commerce platforms and data-driven decision-making capabilities show higher ROA, as reported by Dang et al. (2019). These systems enable firms to anticipate consumer behavior and optimize pricing strategies.

Tobin's Q, which compares a firm's market valuation to its asset replacement cost, is heavily influenced by investors' perceptions of a company's intangible assets, including structural capital. Nguyen and Phan (2020) found that structural capital investments in IT systems, branding, and innovation significantly enhance market confidence, resulting in higher Tobin's Q values. Research by Sakr and Bedeir (2019) indicates that firms with strong structural capital often experience a market premium, as investors value their potential for sustained growth and innovation. In the Vietnamese retail sector, companies leveraging digital transformation and advanced supply chain technologies have reported higher Tobin's Q ratios, suggesting that the market recognizes the value of structural assets. Nguyen and Nguyen (2018) argue that the valuation of structural capital extends beyond its immediate financial returns. For example, retail firms with strong branding and customer loyalty programs, elements of structural capital, tend to have higher Tobin's Q due to perceived competitive advantages and future growth prospects.

Despite its benefits, structural capital investments involve significant initial costs and risks. Studies by Le and Phan (2017) emphasize the need for balanced financial strategies to fund these investments without undermining equity returns.

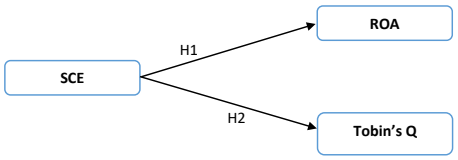
The research gap lies in understanding how structural capital impacts both ROA and Tobin's Q in the retail sector specifically, given the distinct economic and market dynamics in Vietnam. Further research could explore how retail companies in Vietnam, an emerging market with unique economic characteristics and market dynamics, leverage their structural capital to enhance financial performance.

3. Methodologies and result

3.1. Quantitative approaches

Empirical studies often use regression models to analyze the relationship between structural capital and financial performance. Le and Phan (2017) employed a panel data approach to assess the impact of structural capital on ROA and Tobin's Q, controlling for variables such as firm size and leverage. Similarly, Panda et al. (2021) used generalized least squares regression to address heteroscedasticity and autocorrelation issues. This study also uses regression models to analyze the collected data.

3.2. Research model



Independent Variables: SCE

Dependent Variables: ROA, Tobin's Q

Proposed regression model

To test the relationship between intellectual capital and financial performance, use linear regression models as follows:

$H1: ROA_i = \beta_0 + \beta_1 SCE_i + \epsilon_i$

$H2: Tobin's\,Q_i = \beta_0 + \beta_1 SCE + \epsilon i_i$

With:

β_0: Intercept coefficient.

β_1: Estimated coefficient, measuring the influence of Structural capital component.

ϵ_i: Error of the model.

3.3. Collect data

Secondary data: Financial data from annual reports of listed companies, including necessary information to calculate SCE and financial indicators (ROA, Tobin's Q).

Sample scope: Companies in the information and communication technology industry or knowledge-intensive industries.

3.4. Analytical method

Measuring intellectual capital: Use the VAIC (Value Added Intellectual Coefficient) model to calculate SCE indexes**.**

SCE = VA / HC Structural capital efficiency (VA: Added value, HC: Human capital, SC: Structural capital (Added Value - Human resources costs).

Hypothesis testing:

Test the relationship between each intellectual capital component and financial indicators using linear regression or multivariate regression.

Analyze model fit (R^2, F-test) and statistical significance level (ppp-value).

4. Result

4.1. Descriptive statistics

The dataset was collected from 55 retail companies listed on the Vietnamese stock market. Data were

obtained from audited financial statements and annual reports of these companies over eight years, from 2016 to 2023. To calculate Tobin's Q, a prerequisite was that the company must have a market value for its shares. Consequently, delisted companies and those not publicly listed were excluded from the study sample. After applying these criteria, the final dataset comprised 421 observations, including 168 from companies using standalone financial statements and 253 from those using consolidated financial statements (see Table 1).

Specifically, the average financial performance of the retail companies, measured by ROA, was 0.0441. There was no significant difference in ROA between the companies using consolidated financial statements and those using standalone financial statements. The average Tobin's Q across all companies in the sample was 1.146. However, the Tobin's Q for companies using consolidated financial statements (1.293) was higher than that of companies using standalone financial statements (0.926).

The average structural capital efficiency (SCE) across the sample was 0.458, with companies using standalone financial statements showing a higher SCE (0.541) compared to those using consolidated financial statements (0.447). In contrast, financial leverage (DA) for companies using consolidated financial statements was higher (0.549) than for those using standalone financial statements (0.485), with an overall average of 0.512 for the entire sample. Notably, some companies exhibited very high debt-to-asset ratios (>0.9), such as Vimedimex Pharmaceutical Company (VMD) from 2016 to 2021 and Phuong Nam Cultural Company (PNC) in 2017.

Additional detailed metrics for other variables in the study are presented in the table below.

Table 1: Description of variables included in the study sample

Index	ROA	Toq	SCE	SIZE	DA
Enterprises use single financial statements (n=168)					
Mean	0.0443	0.926	0.541	12.766	0.458
Sd	0.0643	0.656	0.673	0.928	0.229
Min	-0.087	0.020	-3.853	9.966	0.001
Max	0.654	4.670	2.987	15.365	0.891
Enterprises use consolidated financial statements (n=253)					
Mean	0.0440	1.293	0.447	14.588	0.549
Sd	0.0641	1.053	1.063	1.380	0.231
Min	-0.150	0.100	-5.986	11.270	0.013
Max	0.600	7.020	3.798	18.193	0.965
General samples (n=168)					
Mean	0.0441	1.146	0.485	13.861	0.512
Sd	0.0642	0.932	0.927	1.511	0.235
Min	-0.150	0.020	-5.986	9.966	0.001
Max	0.654	7.020	3.798	18.193	0.965

Source: Author compiled from STATA 14 software

4.2. Correlation and multicollinearity analysis

The correlation matrix illustrates the relationships between independent and dependent variables, as well as among the independent variables themselves. In this study, covariance was used to measure the relationships between structural capital efficiency (SCE) and financial performance indicators (ROA and Tobin's Q), alongside the correlations of control variables such as firm size (SIZE) and financial leverage (DA) with financial performance.

The analysis results (see Table 2) indicate that structural capital efficiency (SCE) is positively correlated with financial performance (ROA and Tobin's Q) at a statistically significant level. Control variables such as firm size (SIZE) and financial leverage (DA) exhibit statistically significant positive correlations with Tobin's Q. However, these control variables show negative correlations with ROA, although only the correlation between DA and ROA is statistically significant.

Moreover, the table reveals that the correlation coefficients among the independent and control variables are all below 0.6. This suggests a low likelihood of multicollinearity. Nevertheless, to confirm the absence of multicollinearity, the study employs the Variance Inflation Factor (VIF) for further verification during regression analysis.

Table 2: Results of correlation analysis

Variables	SCE	SIZE	DA
SCE	1		
SIZE	0.16**	1	
DA	-0.07	0.43***	1
ROA	0.55***	-0.03	-0.18***
ToQ	0.41***	0.37***	0.168***

*Note: * is significant at <0.05 level; **is significant at <0.01 level; *** is significant at the <0.001 level.*

Source: Author compiled from STATA 14 software

Measuring the impact of structural capital on financial performance

To evaluate the impact of structural capital on a firm's financial performance, the study employed three regression methods: Ordinary Least Squares (OLS), and two panel data analysis models - Fixed Effects Model (FEM) and Random Effects Model (REM). Additionally, diagnostic tests, such as tests for autocorrelation and heteroscedasticity, were conducted to assess the robustness of the models. In cases where these models exhibited deficiencies, the Generalized Least Squares (GLS) method was used as an alternative for more reliable estimation.

Regression analysis results using the OLS model

The analysis of the impact of structural capital on financial performance (ROA and Tobin's Q) using

the OLS method (see Table 3) revealed that the P(F) values for both models were less than 0.001, confirming the validity of the models. To ensure the reliability of the models, diagnostic tests were conducted. Multicollinearity was assessed using the Variance Inflation Factor (VIF), with results showing an average VIF ≤ 2. This indicates that the independent and control variables included in the model did not exhibit multicollinearity.

Heteroscedasticity was tested using the Breusch-Pagan test, which yielded P(chi²) values of less than 0.05 (at the 5% significance level) for both models. This result indicates the presence of heteroscedasticity in the OLS models. Consequently, the OLS estimation results are deemed unreliable and are not used for further estimation purposes.

Table 3: Summary of regression results using the OLS model

Independent Variables	ROA		ToQ	
	Coefficients	P.value	Coefficients	P.value
DA	-0.032	0.01	0.299	0.104
SIZE	-0.003	0.145	0.157	<0.001
SCE	0.038	<0.001	0.306	<0.001
Cons	0.081	0.001	-1.542	<0.001
N	421		421	
R2	0.325		0.271	
Adj R2	0.320		0.266	
F (p)	67.01	<0.001	51.68	<0.001
Multicollinearity (VIF)	1.19		1.19	
Heteroscedasticity *Breusch-Pagan: Chi2 (P)*	387.97	<0.001	115.68	<0.001

Source: Author compiled from STATA 14 software

Regression analysis results using FEM and REM models

To measure the impact of structural capital on the financial performance of enterprises, the study used two panel data regression models, FEM and REM, and also applied the Hausman test to select the appropriate model. If the test result shows a P.value <0.05, the fixed effects model (FEM) is selected. The results of the model selection test (see Table 4) show that the P.value in the Hausman test for the model with ROA as the dependent variable is 0.036 <0.05, so the FEM model was selected. Similarly, in the model with Tobin's Q as the dependent variable, the P.value in the Hausman test is <0.001, so the FEM model was chosen.

In addition, the diagnostic results for deficiencies such as heteroscedasticity and autocorrelation of the two selected models indicate: The model measuring the impact of structural capital on ROA (regression using FEM) does not exhibit autocorrelation but does show heteroscedasticity; the model measuring the impact of structural capital on Tobin's Q (regression using FEM) exhibits both autocorrelation and heteroscedasticity. Based on these results, the selected models do not ensure robustness for estimation. To overcome these deficiencies, the study used the generalized least squares (GLS) model for estimation.

Table 4: Regression results using FEM, REM models and tests

Independent Variables	ROA		ToQ	
	FEM	REM	FEM	REM
SCE	0.034***	0.036***	0.210***	0.251***
SIZE	-0.010*	-0.004	0.161*	0.186***
DA	0.002	-0.025	-0.202	-0.003
Cons	0.166*	0.092**	-1.085	-1.548**
N	421		421	
R2	0.259	0.255	0.924	0.910
F test/ Wald test (P)	<0.001	<0.001	<0.001	<0.001
Hausman test (P)	0.036		<0.001	
Heteroscedasticity *(P)*	<0.001		<0.001	
Autocorrelation (P)	0.719		<0.001	

*Note: * is significant at <0.05 level; **is significant at <0.01 level; *** is significant at the <0.001 level.*

Source: Author compiled from STATA 14 software

Estimation results of the impact of structural capital on financial performance

The results of measuring the impact of structural capital on the financial performance of retail enterprises were obtained using the GLS method. In this method, the model with the dependent variable ROA (1) applied a correction for heteroscedasticity, while the model with the dependent variable ToQ (2) applied corrections for both heteroscedasticity and autocorrelation. The estimated results of the two models are detailed in Table 5 and Table 6, where the Wald test results show p-values < 0.005, indicating that the estimated models are appropriate. The degree of impact of the factors on financial performance is as follows:

Impact of structural capital on ROA

Table 5: Estimation results using the GLS regression model with ROA

Independent Variables	ROA(1)		ROA(1a)		ROA(1b)	
	Coefficient β	P.value	Coefficient β	P.value	Coefficient β	P.value
SCE	0.038	<0.001	0.040	<0.001	0.039	<0.001
SIZE	-0.003	<0.001	-0.004	0.159	-0.009	<0.001
DA	-0.044	<0.001	-0.022	0.072	-0.048	<0.001
Cons	0.088	<0.001	0.078	0.01	0.190	<0.001
N	421		168		253	
Wald test (chi2/p)	453.80	<0.001	79.40	<0.001	470.29	<0.001

Note: a is a sample that includes businesses using single reports; b is a sample of businesses that use consolidated reporting.

Source: Author compiled from STATA 14 software

Impact of structural capital on ROA

For model (1), which examines the impact of structural capital on ROA, all variables included in the model have a statistically significant effect (P-value < 0.05) on ROA. Specifically, structural capital (SCE) has a positive effect, meaning that an increase in structural capital leads to an increase in ROA. Both firm size (SIZE) and financial leverage (DA) have a negative effect on ROA, meaning that an increase

in either firm size or financial leverage results in a decrease in ROA. Additionally, the estimation results by groups of enterprises using standalone financial statements (a) and consolidated financial statements (b) also show that the impact of SCE on ROA is statistically significant and positive in both groups. However, the magnitude of the effect of SCE on ROA is similar across the two groups, with the impact of SCE being 0.040 in group (a) and 0.039 in group (b). This suggests that the type of financial statement used does not significantly affect the magnitude of the impact of SCE on ROA.

Impact of structural capital on ToQ

Table 6: Estimation results using the GLS regression model with ToQ

Independent Variables	ToQ(2)		ToQ(2a)		ToQ(2b)	
	Coefficient β	P.value	Coefficient β	P.value	Coefficient β	P.value
SCE	0.212	<0.001	0.167	<0.001	0.245	<0.001
SIZE	0.139	<0.001	0.051	<0.001	0.099	0.003
DA	0.310	0.018	0.305	0.011	0.844	<0.001
Cons	-1.119	<0.001	0.000		-0.820	0.061
N	421		168		253	
Wald test (chi2/p)	152.02	<0.001	12200	<0.001	125.57	<0.001

Note: a is a sample that includes businesses using single reports; b is a sample of businesses that use consolidated reporting.

Source: Author compiled from STATA 14 software

Impact of structural capital on ToQ

For model (2), which examines the impact of structural capital on ToQ, variables such as structural capital (SCE), firm size (SIZE), and financial leverage (DA) all have a statistically significant positive effect (P-value < 0.05) on ToQ. This indicates that an increase in these variables leads to an increase in ToQ. Furthermore, the magnitude of the β coefficients for the variables SCE, SIZE, and DA in model (2) reflects the degree of their impact on ToQ. Additionally, the estimation results by groups of enterprises using standalone financial statements (a) and consolidated financial statements (b) show that the impact of SCE on ROA is statistically significant and positive in both groups. However, the impact of SCE on ToQ in group (b) is 0.245, which is larger than in group (a) (0.67). Based on this, we can conclude that the type of financial statement used may influence the magnitude of the impact of structural capital (SCE) on ToQ.

5. Conclusion and discussion

This study examined the impact of structural capital on the financial performance of retail companies listed on the Vietnamese stock market, using a dataset of 421 observations from 55 companies over an eight-year period (2016-2023). The results reveal that structural capital (SCE) positively influences financial performance, as measured by both Return on Assets (ROA) and Tobin's Q (ToQ). In particular, the findings suggest that an increase in structural capital leads to improvements in both ROA and ToQ. This conclusion is supported by the statistically significant positive coefficients for SCE in the Generalized Least Squares (GLS) regression models, highlighting its importance as a driver of financial performance.

Additionally, the study found that firm size (SIZE) negatively affects ROA but positively impacts ToQ, indicating that larger companies may experience diminishing returns on assets, while their market value could benefit from their scale. Financial leverage (DA) had a negative correlation with ROA, suggesting that higher debt levels might harm operational efficiency, but it showed a positive effect on ToQ, which may reflect a market perception that higher leverage can increase firm value through potential tax advantages or increased investment returns.

The diagnostic tests confirmed that the regression models were robust, with no significant multicollinearity detected, and the models appropriately accounted for heteroscedasticity and autocorrelation. The use of GLS estimation techniques further strengthened the reliability of the results.

In conclusion, the study highlights the critical role of structural capital in shaping the financial performance of retail companies in Vietnam. The findings suggest that companies should prioritize investments in intangible assets, such as systems, processes, and intellectual property, which can lead to improved operational efficiency and market valuation. Moreover, the impact of structural capital on financial performance may vary depending on the type of financial reporting used, emphasizing the importance of comprehensive and transparent reporting practices in enhancing the credibility and attractiveness of companies in the market.

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IMPACT OF CORPORATE SOCIAL RESPONSIBILITY ON COST STICKINESS: EMPIRICAL EVIDENCE FROM LISTED COMPANIES VIETNAM

MSc. Phan Thi Huyen* - Assoc.Prof.PhD. Nguyen Thi Phuong Hong**

Abstract: ***The research objective is to evaluate the impact of corporate social responsibility (CSR) on the stickiness of selling, general & administrative expenses (SG&A) costs of listed companies on the Vietnamese stock market. Data from 197 listed companies on the Vietnamese stock market during the period 2020-2023 were used. After comparing Pooled OLS, FEM, REM models and performing the necessary defect tests (multicollinearity, homogeneity of variances and serial correlation), the authors used the FGLS model to overcome the problem of heteroscedasticity and autocorrelation to test the hypothesis. The results show that CSR has an impact on the stickiness of SG&A costs.***

• Keywords: *corporate social responsibility, cost stickiness, selling and administrative expenses, listed companies, Vietnam.*

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1. Introduction

The development of enterprises plays an important role in the economy; however, if not aligned with sustainable development, it can lead to serious consequences such as environmental pollution and climate change. Howard R. Bowen (1953) emphasized that "the duty of businessmen is not to negatively impact societal interests," which also reflects the social responsibility of businesses. Nowadays, CSR goes beyond shareholder interests, encompassing responsibilities toward employees, customers, suppliers, and the environment, thereby contributing to sustainable growth (Chen & Wang, 2023). CSR has become a key strategic factor for large companies globally, with organizations like the United Nations and OECD emphasizing and issuing many policies and guidelines. This has created positive pressure, encouraging companies to increase investments in environmental protection and social activities, thereby enhancing reputation and competitiveness in the global economy.

Currently, in Vietnam, there is no specific legal framework directly regulating the CSR activities of enterprises. Instead, related regulations mainly fall within separate legal documents such as the Law on Environmental Protection 2020, the Labor Law 2019, etc. Additionally, government policies like Decision No. 882/QD-TTg on the "National Action Plan for Green Growth" (2022) and Decision No. 681/QD-TTg on the "Roadmap for Implementing Vietnam's Sustainable Development Goals until 2023" (2019) demonstrate increasing interest from the state in CSR activities. Domestic enterprises have also made positive shifts towards sustainable development strategies. For example, in the Top 50 Sustainable Enterprises Award (CAS, 2023), 20 FDI enterprises, 24 listed companies, and 6 unlisted companies were honored, reflecting a serious orientation of both businesses and the government toward CSR implementation. However, implementing these activities entails significant investment and financial costs. Cost management plays a crucial role because it is a key factor in enhancing competitiveness and long-term strategies (Kaplan & Cooper, 1998). Therefore, understanding cost behavior related to CSR activities is essential to support managers in making effective decisions (Yook & Kim, 2018). From a behavioral cost perspective, a key issue is whether managers adjust resource allocation appropriately according to business activity levels, a phenomenon known as "The cost stickiness" (Habib & Hasan, 2019). An expression of this is asymmetric behavior in costs where the increase when business activity rises is larger than the decrease when activity declines (Ballas et al., 2019). Consequently, this study focuses on the impact of CSR on cost stickiness, based on empirical evidence from listed companies on the Vietnam stock market.

** University of Finance - Marketing; email: phanhuyen@ufm.edu.vn*
*** School of Business - University of Economics Ho Chi Minh City (UEH); email: hongntp@ueh.edu.vn*

In this study, the data from 197 listed companies on the stock market of Vietnam from 2020 to 2023 were collected to examine the impact of CSR on cost stickiness. This study contributes to the theoretical framework of cost behavior and provides empirical evidence on the impact of CSR activities at Vietnamese listed companies. The following contents of this study include: (2) Theoretical framework and research hypotheses, (3) Methodology, (4) Research results, and (5) Conclusion.

2. Theoretical framework and research hypotheses

In this section, the authors will present some concepts and develop research hypotheses. One of the important concepts of interest is corporate social responsibility and cost stickiness. These concepts are defined as follows:

2.1. Corporate social responsibility

From the 1960s to the early 1970s, social activist groups promoted the idea of corporate responsibility, leading to the establishment of government agencies such as the Equal Employment Opportunity Commission, the Environmental Protection Agency, the Consumer Product Safety Commission, and the Occupational Safety and Health Administration with aim to protect the interests of consumers, workers, and the environment. Corporate managers during this period faced the challenge of balancing the needs of owners with those of a broader range of stakeholders (Carroll, 1991).

In the 1980s, the focus was shifted to improving the definition and study of CSR, which was classified into several concepts and topics such as social responsiveness, social performance, business ethics, and stakeholder theory. CSR is defined as corporations voluntarily considering the interests of stakeholders beyond shareholders, such as employees, customers, suppliers, and local communities (Jones, 1980). In the early 1990s, the definition of CSR continued to expand, becoming the foundation for other related concepts. Carroll's (1991) CSR pyramid identifies four main aspects including economic responsibility, legal responsibility, ethical responsibility and philanthropic responsibility.

In addition, the World Business Council for Sustainable Development (WBCSD) defines CSR as the ethical behavior of a company towards society. CSR includes management's responsibility to the stakeholders holding a legitimate interest in the business, as well as the long-term obligation through management, participation, and ethical contribution to economic growth, while improving the quality of life of employees, their families, and society at large (Moir, 2001).

Later, Hopkins states in a study that "CSR involves treating a company's stakeholders in an ethical or responsible manner. 'Ethical or responsible' refers to treating stakeholders in a way that is considered acceptable in civilized societies. The CSR includes economic and environmental responsibility. Stakeholders exist both within a firm and outside. The broader goal of CSR is to create higher and higher standards of living, while preserving the profitability of the corporation, for its stakeholders both within and outside the corporation." (Hopkins 2007, p. 15). After carrying out CSR activities, in order to provide information to stakeholders, the company will carry out the disclosure of CSR activities.

Corporate Social Responsibility Disclosure (CSRD) refers to companies sharing accurate information about their environmental and social activities, enabling stakeholders to assess the company's CSR efforts (Feneir, 2021). Over the past decade, many governments in the European Union and the United States have issued regulations requiring companies to disclose non-financial information related to CSR activities, aiming to enhance transparency and corporate social responsibility (Najah & Jarboui, 2013). International organizations such as ISO 26000, GRI, and SASB have developed standards and guidance tools for CSR reporting, contributing to the establishment of global benchmarks in this field. In Vietnam, Circular No. 96/2020/TT-BTC issued by the Ministry of Finance, effective from January 2021, has expanded the scope and deadline for reporting for publicly listed companies, promoting transparency and timely disclosure of corporate social responsibility information.

2.2. Cost stickiness

Cost "stickiness" is an asymmetry in cost behavior phenomenon of a firm when the sales change, attracting the attention of many researchers (Anderson et al., 2003).

Instead of responding symmetrically, increasing or decreasing correspondingly with fluctuations in revenue, cost tend to exhibit a "stable" behavior: increasing faster when revenue rises, but decreasing more slowly when revenue falls (Weiss, 2010). This phenomenon occurs because firms often face adjustment costs when they want to change the size of their activities, especially during production downturn. These costs can include the cost of laying

off employees, the cost of liquidating assets, or the cost of canceling contracts (Anderson et al., 2003). These costs often cause the managers to delay cutting costs, hoping that the sales will recover soon. In a growing economy, it is necessary for costs to increase with sales to meet market demand and seize opportunities. However, in a recession, the cost "stickiness" can cause major problems, reduce profits, increase financial risks, and even threaten the existence of companies. Therefore, identifying, measuring, and effectively managing cost "stickiness" is critical for managers, helping them make informed business decisions and respond flexibly to market fluctuations.

2.3. Hypothesis development

As stated in agency theory, managers (agents) may have an incentive for "empire-building" causing the "stickiness" of SG&A expenses (Chen et al., 2012). Ethical managers may enhance the cost stickiness to benefit the companies. However, although the CSR implementation increases the company value (Lukiman & Wirianata, 2024) and brings many benefits such as reducing financial risks, improving reputation (Broadstock et al., 2020), it can also be an opportunity for the managers to take private benefits at the expense of shareholders (Brammer & Pavelin, 2006). Therefore, it is argued that the managers always try to obtain cost stickiness when investing in CSR activities.

Furthermore, as stated in the stakeholder theory, companies must balance the interests of stakeholders who provide important resources (Chatterji, 2014). Engaging in Corporate Social Responsibility initiatives is a key way for companies to meet the demands of their stakeholders, which requires the managers to consider the associated costs (environmental investments, employee training, community activities, CSR reporting, and environmentally friendly technology, etc). Therefore, the managers must ensure the cost stickiness when implementing CSR, including CSR operating costs to fulfill commitments to the stakeholders. Based on agency theory and stakeholder theory, it can be seen that the CSRD reduces conflicting goals between parties and increases transparency in corporate activities. From the above analysis, the following research hypothesis is proposed:

H: Corporate social responsibility positively impacts the cost stickiness.

3. Methodology

3.1. Research sample

In this study, data of 197 companies listed on HOSE and HNX (period 2020-2023) were collected from financial statements and annual reports posted on https://finance.vietstock.vn. Companies were excluded due to insufficient information on revenue, expenses or ownership, including banks, securities companies, finance, insurance, and financial institutions. The number of observations was 788, using the convenience sampling method to conduct the study.

3.2. Research model

To test the research hypothesis, multiple regression was used to estimate the impact of corporate social responsibility on cost stickiness, including dependent variables (stickiness of selling, general & administrative expenses), independent variable (corporate social responsibility), and control variables (company size, financial leverage, asset intensity, and employee intensity). The research model is proposed as follows:

$$LNSGA_{it} = \beta_0 + \beta_1 LNSALE_{it} + \beta_2 LNSALE_{it}*DEC_{it} + \beta_3 LNSALE*DEC_{it}*CSR_{it} + \beta_4 CSR_{it} + \beta_5 SIZE_{it} + \beta_6 AI_{it} + \beta_7 LEV_{it} + \beta_8 EI_{it} + \varepsilon_{it} \quad (1)$$

Where: i and t respectively are company i and year t; LNSGA and LNSALE respectively are the logarithms of total SG&A expenses and sales/revenue from the sale of goods, rendering of service of company i in year t. LNSGAit, LNSALEit, LNSALEit*DECit are the values representing the dependent variable and the cost stickiness; CSR is the independent variable representing corporate social responsibility; SIZE, LEV, AI and EI are control variables representing the level of correlation between company size, financial leverage, asset intensity and employee intensity; β0 is the intercept coefficient; $\sum_{(n=1)}$^8 β are the coefficients of variation and ε is the residual.

3.3. Measurement of variables

3.3.1. Measurement of cost stickiness

Scale of Anderson et al. (2003) was used to measure the stickiness of total SG&A expenses as follows:

$$LN\frac{SGAi,t}{SGAi,t-1} = \beta_0 + \beta_1 LN\frac{SALEi,t}{SALEi,t-1} + \beta_2 * LN\frac{SALEi,t}{SALEi,t-1} *DEC + \varepsilon_{i,t} \quad (2)$$

Where, $SGA_{i,t}$ and $SGA_{i,t-1}$ are total SG&A expenses of company i in the current year t and the previous year t-1, respectively; $SALE_{i,t}$ and $SALE_{i,t-1}$ are the sales/revenue from the sale of goods, rendering of service of company i in the current year t and the previous year t-1, respectively. DEC is a dummy variable and equals 1 when the sales decrease, and

it equals 0 if the sales increase. Since the dummy variable DEC equal 0 when the sales increase, the coefficient β_1 represents the cost stickiness, the models present the percentage increase in costs due to a 1% increase in sales. Furthermore, since DEC equal 1 when the sales decrease, $\beta_1 + \beta_2$ represents the percentage decrease in costs due to a 1% decrease in sales. If costs are sticky, the percentage increase in costs when the sales increase must be greater than the percentage decrease in costs when the sales decrease, or in other words, $\beta_1 > 0$ and $\beta_2 < 0$.

3.3.2. Measurement of independent variables and control variables

- CSR: The independent variable is measured by using the content analysis method on CSR in the Annual Reports of listed companies based on the GRI 2016 standards. The process of analyzing the content by the authors is based on determining whether a company refers to the content in any of the GRI 2016 standards, assigning a score of 1 if it does, and conversely assigning a score of 0 if it does not. After determining the score for each criterion of each business in each year, CSR in the year is calculated using the unweighted average method (Nekhili et al., 2017) as follows:

$$CSR_{it} = \frac{\sum_{i=0}^{n=77} X_t}{n}$$

Where: CSRit is total CSR index of company i in year t, with 0 < CSRit < 1. The CSR level score (Xt) in each observation is calculated based on the total score that the companyi in year t achieved out of the total criteria (maximum n = 77 scores).

- SIZE: Firm size, measured by the logarithm of total assets at the end of the fiscal year (Ballas et al., 2019).

- LEV: Financial leverage, measured by the ratio of total debt to total assets (Chen & Wang, 2023).

- AI: Asset intensity, measured by the logarithm of total assets divided by the sales (Habib & Hasan, 2019).

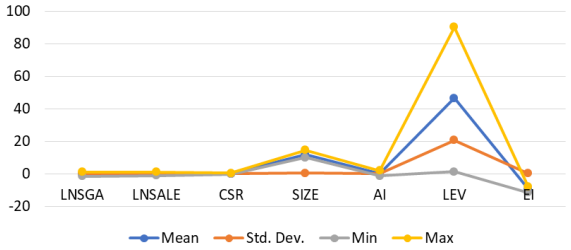
- EI: Employee intensity, measured by the logarithm of total employees divided by the sales (Habib & Hasan, 2019).

4. Research results.

4.1. Descriptive statistics

According to the Figure 1, the average LNSGA is 0.0239, reflecting large fluctuations among companies (standard deviation = 0.17). Sales and service revenue (LNSALE) growth is low, averaging 0.0078, but fluctuates strongly from -0.88 to 1.26. CSR has a low average (0.1241) and small variation, indicating that CSR activities are still limited and uneven. The average company size (SIZE) is 12.89, while asset intensity (AI) has large fluctuations, reflecting differences in financial structure. The average financial leverage (LEV) is highest (46.67), accompanied by high risk, while the average employee intensity (EI) is negative (-9.46), reflecting industry specificity.

Figure 1. Statistics of research variables



Source: Data collected and processed by the authors using Excel and STATA 15

4.2. Research results

This study uses balanced panel data of 197 companies listed on the Vietnamese stock market in the 4 years 2020-2023. We estimate regressions using all three models: Pooled OLS, Fixed Effects Model (FEM) and Random Effects Model (REM) to choose the most suitable model for the research data. After estimating all three models, the F-test results (F(196, 582) = 0.63; Prob > F = 0.9999) and Breusch-Pagan Lagrange multiplier (Chibar2 (01) = 0.0000; Prob > Chibar2 = 1.0000) show that the Pooled OLS model is appropriate.

Because the appropriate application of panel data analysis necessitates fulfilling several core assumptions such as: multicollinearity, homogeneity of variance, and serial correlation were studied.

Firstly, we used the variance inflation factor (VIF) to detect general multicollinearity. A large VIF on an independent variable indicates a high collinearity with other variables. The general rule is that a VIF exceeding 10 is a sign of severe multicollinearity, but the results showed that all VIF values are <10, so the multicollinearity does not exist. To test for homoscedasticity, a modified Wald test was used, and the results (Prob>chi2 = 0.0002) show that the model may have heteroscedasticity. In addition, the Wooldridge test for autocorrelation showed that there was a first-order correlation (F (1,196) = 5.460, Prob > F = 0.0205).

The test results show that the model experiences problems of heteroscedasticity and autocorrelation,

making the Pooled OLS model unsuitable. Therefore, a more efficient estimation method is Feasible Generalized Least Squares (FGLS) which corrects these problems. Table 1 compares the OLS, FEM, REM, and FGLS models; it shows that FGLS is superior in overcoming the heteroscedasticity and autocorrelation errors of the OLS model.

Table 1. Comparison results between Pooled OLS, FEM, REM and FGLS

LNSGA	Pooled OLS	FEM	REM	FGLS
LNSALE	0.705***	0.733***	0.705***	0.697***
	[12.64]	[9.43]	[12.64]	[25.65]
LNSALE*DEC	-0.246**	-0.302*	-0.246**	-0.299***
	[-2.10]	[-1.91]	[-2.10]	[-5.04]
LNSALE*DEC*CSR	-1.194**	-0.699	-1.194**	-0.693***
	[-2.07]	[-0.87]	[-2.07]	[-2.72]
CSR	-0.067	-0.0995	-0.067	-0.0222*
	[-1.02]	[-1.13]	[-1.02]	[-1.66]
SIZE	0.00343	0.146*	0.00343	0.00950***
	[0.33]	[1.66]	[0.33]	[3.16]
AI	0.000845	0.0367	0.000845	-0.00925*
	[0.05]	[0.42]	[0.05]	[-1.72]
LEV	-0.0000151	-0.00087	-1.5E-05	-0.00011
	[-0.05]	[-0.79]	[-0.05]	[-1.16]
EI	-0.000235	0.0629	-0.00024	0.00714*
	[-0.02]	[1.22]	[-0.02]	[1.68]
_cons	-0.0367	-1.142	-0.0367	-0.0394
	[-0.26]	[-1.24]	[-0.26]	[-0.88]
N	788	788	788	788
R-sq	0.257	0.261		
t statistics in brackets				
* p<0.1, ** p<0.05, *** p<0.01				

Source: Data collected by the authors, STATA 15

According to Anderson et al. (2003), the costs are considered sticky when the coefficient $\beta_1 > 0$ and $\beta_2 < 0$. The results in Table 1 show that the coefficient β_1 of 0.697 is statistically significant at 1% level of significance, and the coefficient β_2 of -0.299 is also statistically significant at 1% level of significance. This shows that the SG&A expenses of listed companies on the stock market of Vietnam are sticky. Specifically, when the company's sales increase by 1%, the SG&A expenses will increase by about 0.697%, and when the sales decrease by 1%, these SG&A expenses will decrease by about 0.398%. In other words, the SG&A expenses of listed companies on the stock market of Vietnam in the period 2020 - 2023 tended to be sticky. In addition, the coefficient LNSALE*DEC*CSR is $\beta3 = -0.693 < 0$ with a significance of 1% (P_value = 0.000), indicating that the implementation of CSR activities affects the cost stickiness. The coefficient $\beta3 < 0$ shows that the more listed companies carry out CSR activities, the more they increase the cost stickiness; this result supports hypothesis H. The result is similar to the research results of (Habib & Hasan, 2019; Ballas et al., 2019, …).

The control variables affecting the variation of SG&A expenses include firm size (SIZE) with $\beta5 = 0.00950$ (P_value = 0.002), asset intensity (AI) with $\beta6 = -0.00925$(P_value = 0.085), and employee intensity (EI) with $\beta8 = 0.00714$ (P_value = 0.092) while the financial leverage (LEV) has no effect.

Conclusion: The objective of this study is to assess the stickiness of SG&A expenses, as well as the impact of CSR on the stickiness of SG&A expenses of enterprises. The results show that CSR increases the stickiness of SG&A expenses at companies listed on the Vietnamese stock market. This result is consistent with reality because enterprises have to fulfill environmental and social commitments that often require long-term investments such as green technology, wastewater treatment, etc. This makes it difficult for them to reduce costs quickly even when sales decrease. This research result is consistent with the research results of some authors such as Habib & Hasan (2019) or Ballas et al. (2019), showing that, despite different national scopes, the impact of CSR on the cost stickiness. Actively participating in CSR activities helps listed companies enhance their reputation, image and manage costs more effectively, thereby maintaining stable operations and minimizing financial risks. For the government, this result provides a basis for developing policies to encourage businesses to implement CSR as part of a sustainable development strategy, contributing to promoting economic stability and enhancing national competitiveness.

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DEVELOPING A FRAMEWORK OF CRITERIA TO EVALUATE PROJECT ELIGIBILITY FOR GREEN FINANCING

PhD. Phan Tien Nam* - PhD. Le Thanh Ha*

Abstract: ***This article underscores the need for science-based criteria to define truly green projects and prevent greenwashing. It reviews major international frameworks (GBP, GLP, EU Taxonomy, ASEAN Standards) and outlines key steps for building a transparent, measurable system for green project evaluation. Drawing on Vietnam's recent policies, it shows how clear criteria enhance green bond issuance, green banking and trust in sustainable finance.***

• Keywords: *green financing, GBP, GLP, green loans, taxonomy,…*

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Introduction

With climate change and the drive for sustainable development, green finance has become essential for directing capital toward environmentally beneficial projects. Clearly, science-based standards are required to identify truly "green" initiatives and prevent greenwashing. Establishing a strong evaluation framework ensures green financial instruments such as bonds, loans, and deposits, are properly allocated and produce genuine environmental benefits. This article covers key international principles, methods for designing qualitative and quantitative criteria, and the importance of robust frameworks for issuing green debt and developing green banks.

1. International guidelines and standards for green projects

Various international guidelines and standard frameworks have been established to define and assess green projects, serving as references when developing a domestic criteria system. These include:

1.1. Green bond principles (GBP)

The Green Bond Principles (GBP), issued by the International Capital Market Association (ICMA), define four pillars for green bond issuance: (1) Use of Proceeds, (2) Project Evaluation and Selection, (3) Management of Proceeds, and (4) Reporting (IFC, 2022).

Proceeds must fund projects with clear, quantifiable environmental benefits, and issuers should disclose evaluation methods to ensure transparency. Eligible sectors such as renewable energy, energy efficiency, clean transport, and sustainable water management all contribute to goals like climate mitigation, adaptation, and resource conservation.

Serving as the global benchmark, GBP guide about 98% of sustainable bond issuances worldwide (ICMA, 2023).

1.2. Green loan principles (GLP)

The Green Loan Principles (GLP), issued by the Loan Market Association (LMA), mirror the Green Bond Principles (GBP) to standardize the green loan market through four pillars: use of proceeds, project evaluation and selection, management of proceeds, and reporting (LMA, 2025).

Borrowers must define the project's environmental objectives, demonstrate compliance with eligibility criteria, and outline risk-management and exclusion processes. This internal framework justifies why each loan qualifies as green.

GLP require loans to finance projects with measurable environmental benefits preferably quantified and apply to sectors such as renewable energy, sustainable agriculture, and water or climate adaptation. Transparency is essential: borrowers should disclose both qualitative and quantitative impact metrics with clear methodologies.

1.3. Green deposits

Green deposits are bank deposit products in which funds are used exclusively to finance green projects. To ensure transparency and prevent greenwashing, banks or regulators establish specific management frameworks.

For example, the Reserve Bank of India (RBI) introduced its Green Deposit Framework in 2023, requiring banks to define eligible project lists, apply strict evaluation procedures, and allocate funds solely to qualifying activities (RBI, 2023). The framework

** Academy of Finance; email: phantiennam@hvtc.edu.vn*

classifies "green projects" as those supporting climate mitigation, adaptation, or biodiversity conservation, and mandates annual public disclosure of fund allocation and environmental impacts verified by independent auditors.

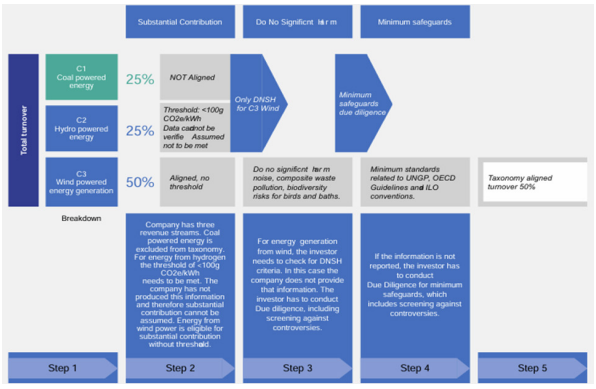
Compared with green bonds or loans, green deposits are more tightly regulated to enhance transparency, accountability, and auditability, reinforcing investor confidence and integrity in green finance markets.

1.4. EU taxonomy

The EU Taxonomy is the EU's main sustainability classification system, designed to define what qualifies as environmentally sustainable. It guides investors, companies, and policymakers toward a low-carbon, resource-efficient economy and sets technical screening criteria to determine whether an activity is "green" (EU Technical Expert Group, 2020).

Under EU regulation, an activity is considered environmentally sustainable if it simultaneously: (1) Substantially contributes to at least one of six environmental objectives (climate mitigation or adaptation, sustainable water use, circular economy, pollution control, biodiversity protection); (2) Does no significant harm (DNSH) to any of the other objectives; and (3) Meets minimum social safeguards (e.g., OECD due-diligence standards).

Figure 1: Process for applying the taxonomy



Source: EU Technical Expert Group (2020)

The Taxonomy applies a detailed, science-based approach such as CO_2 thresholds (g/km or gCO_2/kWh) and assessments are made at the activity level, not the whole company. It identifies which operations qualify as sustainable and requires major firms and financial institutions in the EU to disclose their taxonomy-aligned activities.

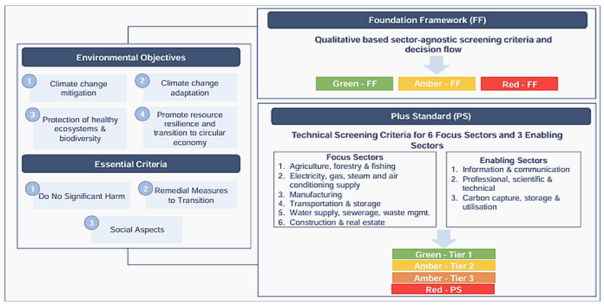
The EU Green Bond Standard will require that EU-labelled bonds finance only taxonomy-compliant projects with independent verification. Though complex, the taxonomy standardises green finance terminology, reduces ambiguity, and raises market credibility. It has influenced global frameworks such as those in the UK, China, and ASEAN promoting alignment in defining "green" activities worldwide.

1.5. ASEAN green bond standards & ASEAN taxonomy

The ASEAN Green Bond Standards (AGBS), issued by the ASEAN Capital Markets Forum (ACMF), adapt ICMA's Green Bond Principles (GBP) to the regional context. They are built on four pillars use of proceeds, project evaluation, management of proceeds, and reporting and provide detailed guidance on eligible sectors, fund tracking, and disclosure (ACMF, 2019). To prevent greenwashing, AGBS excludes high-emission projects such as coal and fossil-fuel production and require issuers to publicly disclose fund use and management. External reviews are encouraged and must be performed by qualified, transparent assessors (Climate Bonds Initiative, 2019).

In addition to AGBS, ASEAN has formulated a Sustainable Finance Taxonomy, of which: Version 2 (2023) introduces a two-tier approach: (i) Foundation Framework (FF): qualitative screening via guiding questions and decision trees; (ii) Plus Standard (PS): detailed quantitative and qualitative technical criteria. Version 3 (2024) further refines this structure, aligning the "green" category with internationally recognized taxonomies (such as the EU Taxonomy) and adapting thresholds for ASEAN's context. Activities are color-coded: green (significant environmental contribution); yellow (transitioning activities); red (non-eligible).

Figure 2: Structure of the ASEAN taxonomy



Source: ASEAN Taxonomy Board (ATB, 2023).

The ASEAN taxonomy recognizes the varied needs of user groups - including companies, investors, and governments - across all ASEAN nations. To address the limitations of a uniform approach, the FF and PS tiers are designed to accommodate economies at different stages of development. The FF tier delivers an entry-level assessment guided by qualitative criteria, while the PS tier facilitates advanced evaluation through the application of explicit quantitative or qualitative standards.

In essence, ASEAN standards uphold core global principles: defining eligible sectors, ensuring

measurable environmental benefits, maintaining transparency, and enforcing comprehensive reporting to build investor confidence. These shared practices form the foundation for credible green-project evaluation frameworks across Southeast Asia.

2. Designing a green project criteria system

Developing a framework to identify projects eligible for green financing requires a systematic, evidence-based approach. The recommended process involves the following key stages:

(1) Define objectives and scope

Determine how the criteria system will be applied whether for green bonds, green loans, or a broader green-credit policy. Clarify whether "green" focuses solely on climate mitigation (e.g., CO_2 reduction) or also includes wider environmental goals like biodiversity protection and pollution control. Clear objectives ensure consistency with the institution's sustainability strategy.

(2) Refer to existing standards and taxonomies

Identify relevant green definitions and reference frameworks. Options include: (i) broad international lists (e.g., GBP), (ii) regional or national standards (ASEAN GBS, China's green guidelines), and (iii) detailed taxonomies (EU or Climate Bonds Initiative).

The choice depends on legal requirements and market targets. Institutions seeking global investors should align with strict frameworks such as the EU Taxonomy, while those focused on local markets may adopt national or ASEAN standards. Many combine both starting with ICMA's framework and adding specific exclusions (e.g., coal bans) to enhance credibility and reduce greenwashing risks.

(3) Identify eligible green sectors and categories

Create a list of qualifying sectors or project types based on selected definitions. Common areas include renewable energy, energy efficiency, sustainable transport, waste and water management, organic agriculture, afforestation, and emission-reduction technology (IFC, 2022). Each category should link to a clear environmental objective, and exclusions (e.g., coal power, fossil extraction, deforestation) must be specified to ensure transparency and consistency (ACMF, 2019).

(4) Develop quantitative criteria for each project type

For each category, establish measurable indicators or thresholds that projects must meet. Examples include: minimum renewable energy capacity, CO_2 reduction targets, or energy-saving percentages. Standards like the EU Taxonomy's <100 g CO_2/kWh benchmark can guide these thresholds, adjusted to regional contexts. Indicators should be scientifically grounded and practical, with input from sector experts to ensure environmental relevance.

(5) Establish qualitative and process-related criteria

Complement numerical benchmarks with qualitative factors such as valid Environmental Impact Assessments (EIA), alignment with national environmental plans, technology innovation, and transparency in management (e.g., ESG teams, disclosures). Certifications like LEED, EDGE, or CDM registration serve as qualitative indicators. These criteria also incorporate governance and social safeguards ("do no significant harm" principles per the EU Taxonomy, 2020).

(6) Design the project appraisal and approval process

Develop a transparent process covering proposal submission, screening against eligibility and exclusion lists, and evaluation using both quantitative and qualitative criteria. Outcomes may include approval, rejection, or a "green score." A designated committee (e.g., Sustainable Finance Committee) reviews applications, with external experts consulted for complex cases. All procedures should be documented in the institution's Green Financing Framework and publicly disclosed to ensure investor confidence (ICMA).

(7) Integrate monitoring and verification mechanisms

Embed compliance checks to ensure funds are used as intended. Monitoring should track project implementation, fund allocation, and environmental performance. Annual impact reports covering metrics such as emissions reduced or renewable energy generated are essential (LMA, 2025). Independent audits, as required by the Reserve Bank of India's Green Deposit Framework (RBI, 2023), can strengthen transparency and credibility. Continuous verification ensures ongoing compliance rather than one-time approval.

(8) Update and refine criteria over time

Review and update the framework regularly (every 1-2 years) to reflect advances in technology and evolving international standards (e.g., GBP revisions). Updates may add new project types, adjust thresholds, or remove outdated criteria. Expert consultation and benchmarking against newer taxonomies help maintain relevance and balance between rigor and practicality.

By following these stages, institutions can build a robust, transparent green-project criteria system aligned with international best practices and local needs serving as a solid foundation for objective project evaluation and effective green capital allocation.

3. Assessing green projects: Quantitative and qualitative indicators

3.1. Quantitative indicators

Quantitative indicators serve as numerical metrics that evaluate a project's environmental benefits or sustainability performance. These measures are critical for enabling objective and comparable assessments among different projects. In establishing assessment criteria, each green project category should be aligned with a defined set of primary quantitative indicators, such as:

+ *Greenhouse Gas (GHG) Emissions Reduction:* measured in tons of CO_2 equivalent avoided per year (tCO_2e/year) relative to a business-as-usual scenario. Applies to most climate-related projects (clean energy, clean transport, energy efficiency, waste management).

+ *Energy Savings:* measured in megawatt-hours saved per year (MWh/year) or tons of oil equivalent per year (TOE/year). For example, a building retrofit project might report X MWh in annual electricity savings due to high-efficiency HVAC systems.

+ *Renewable Energy Generation:* measured in MWh of clean electricity produced per year or installed capacity in kWp. Applies to solar, wind, biomass, and hydropower projects.

+ *Renewable Energy Share:* percentage of total energy supply derived from renewable sources. Relevant for energy utilities or grid projects demonstrating portfolio greenification.

+ *Clean Water Supply or Conservation:* measured in cubic meters per day (m^3/day). Used for water-treatment, water-reuse, and leakage-control projects.

+ *Reforested or Restored Area:* measured in hectares. Applies to afforestation, biodiversity conservation, and ecosystem restoration projects.

+ *Waste Diverted or Recycled:* measured in tons per year. Relevant for circular-economy and waste-management initiatives.

+ *Pollution Reduction:* measured in tons of pollutants (SO_2, NOx) reduced or volume of treated effluent per year. Used for air- and water-pollution control projects.

Certain sectors may adopt specific indicators suited to their activities such as the number of electric vehicles deployed, kilometers of rail built, or recycled material share in manufacturing. Indicators should match project characteristics, use reliable data, and apply internationally recognized units to ensure investor comparability.

To strengthen transparency and accountability, environmental benefits must be quantified. Frameworks like the GBP and GLP require issuers and borrowers to disclose quantitative impacts wherever possible (IFC, 2022; LMA, 2025). For example, the RBI's 2023 Green Deposit Framework suggests metrics such as renewable energy capacity (MW), clean power generation (MWh/year), and emissions avoided (tCO_2e/year), illustrating how standardized indicators improve clarity and credibility in green finance

Figure 3: Key sustainability performance metrics

Source: ADB (2021).

3.2. Qualitative indicators

Qualitative indicators evaluate project dimensions that defy simple quantification. They are often expressed as narrative criteria, pass/fail thresholds, or rating scales. Key qualitative measures include:

+ *Project Environmental Objectives:* alignment with the sponsor's ESG strategy or national environmental goals. For example, an offshore wind farm may score highly if it aligns with the national renewable-energy roadmap and contributes toward a net-zero commitment.

+ *Compliance with Standards or Certifications:* presence of recognized green labels (LEED, EDGE for buildings; GlobalGAP organic certification for agriculture; ISO 14001 environmental management systems for industrial facilities). These certifications serve as qualitative proxies for green performance.

+ *Environmental-Social Risk Management:* evaluation of how projects identify and mitigate negative environmental or social impacts. GBP and GLP encourage issuers to describe their risk-management processes, including stakeholder consultations and mitigation plans (IFC, 2022). For instance, a large-scale solar plant should outline post-decommissioning module disposal to avoid environmental contamination.

+ *Social Co-benefits:* consideration of social outcomes such as green job creation, community livelihood improvements, or inequality reduction. Although environmentally in focus, green projects with strong social co-benefits often receive priority under comprehensive sustainability frameworks.

+ *Innovation and Scalability:* projects that implement advanced clean technologies or pioneer

innovative green business models with strong replication potential may receive further qualitative recognition.

+ *Reporting and Monitoring Commitment:* projects whose sponsors pledge regular, transparent reporting and independent assurance of environmental outcomes.

Within a comprehensive criteria framework, quantitative and qualitative indicators complement each other to ensure a balanced evaluation. The Green Bond Principles (GBP) recommend using quantitative impact data alongside qualitative disclosures for clarity (LMA, 2025). Similarly, the EU Taxonomy combines sector-specific quantitative thresholds with qualitative Do No Significant Harm (DNSH) and social safeguards. Institutions should establish a concise set of indicators for each category, integrating numerical precision with contextual analysis to enhance transparency and comparability.

It is recommended to choose a specific set of relevant indicators instead of a large quantity. Common indicators that can be reported by all projects (such as CO_2 avoided) should be prioritized to allow for portfolio-level comparisons, while specialized indicators may be offered as optional additions.

Ensuring the feasibility of data collection is essential. Quantitative indicators provide value only when data can be consistently obtained and verified, while qualitative criteria should also be supported by documentary evidence such as EIA reports or certification documentation. Consequently, it is imperative that the criteria system is directly integrated with a practical monitoring and reporting framework.

4. Importance of a criteria system in issuing green debt instruments and building green banks

The development and effective implementation of a green project criteria system offer significant strategic advantages for both green debt instruments, including bonds, deposits, and loans, and the overarching objective of establishing green banks. The benefits are as follows:

For green-debt issuance, having a clear and credible set of criteria is important for investor placement. Issuers who use a Green Bond Framework that aligns with international standards such as the GBP provide greater transparency, making it easier for investors to assess and compare bonds in the market. This transparency may lead to reduced funding costs, as green bonds with established and recognized criteria can appeal to ESG-focused funds and sometimes achieve lower yields, a phenomenon sometimes referred to as the "greenium" effect. In contrast, unclear criteria may result in investors requesting higher yields due to the uncertainty regarding impact.

Second, a well-defined criteria system enhances the efficiency of the green-debt issuance process. By relying on established guidelines, issuers can promptly identify eligible projects, ensuring a faster time to market. Standardized criteria further streamline due diligence by offering a consistent framework, thereby reducing project-specific evaluation costs. In addition, clear criteria function as an effective risk management tool, filtering out projects that do not meet environmental standards or pose reputational and legal risks. As a result, this helps maintain the integrity and quality of assets backing up green debt instruments.

Third, A comprehensive criteria system is essential for advancing green banking, which embeds environmental considerations into strategic planning and portfolio management. Green banks aim to expand green credit and reduce exposure to high-impact sectors. Applying clear criteria allows banks to identify eligible green loans, which may receive preferential rates or access to dedicated funding. Non-qualifying projects face rejection or stricter conditions, such as mitigation measures. This framework systematically channels capital toward sustainable sectors, builds high-quality green portfolios, and mitigates policy and transition risks in the shift toward a low-carbon economy.

Additionally, establishing green criteria helps create a consistent understanding of "green" initiatives throughout an organisation, reinforcing both its culture and environmental awareness. When credit officers are trained on these standards, they are better prepared to evaluate environmental risks and spot new opportunities, such as financing renewable energy projects. Senior management can use reporting frameworks based on these green criteria to set and track goals for their green portfolios, calculated as a share of total outstanding exposure. These internal processes help embed green banking practices across the entire institution. Moreover, regulatory authorities are increasingly requiring or encouraging financial institutions to adopt green-credit taxonomies and related reporting standards.

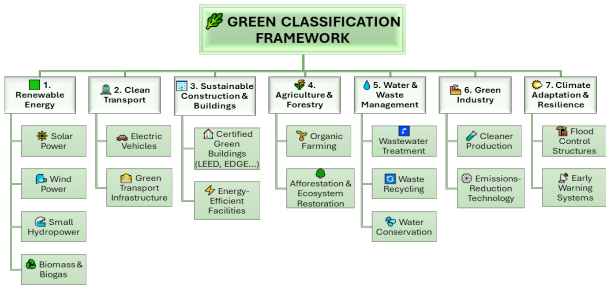
On July 4, 2025, the Prime Minister of Vietnam issued Decision No. 21/2025/QĐ-TTg, establishing environmental criteria and certification procedures for projects in the national green classification catalogue. The decision addresses urgent issues of climate change, pollution, and ecosystem degradation, while fulfilling Vietnam's international commitments on emission reduction, climate adaptation, and green growth.

It provides the legal foundation for attracting investment in green sectors and sets a consistent framework for classifying, assessing, and supporting projects that meet transparent standards. Collectively, these measures promote the integration of green finance

and advance Vietnam's transition toward a sustainable, climate-resilient economy aligned with the national development strategy.

Decision No. 21/2025/QĐ-TTg stipulates 45 fields and types of projects across seven sector groups described in Figure 4, which are considered "green" and serve as the legal basis for credit institutions to determine projects eligible for green credit or for issuing green bonds. According to this, the State Bank of Vietnam (SBV) is tasked with guiding credit institutions on adopting this Catalogue and requires reporting on green credit outstanding balances according to the classified sectors.

Figure 4: Seven green sectors in Vietnam's green taxonomy



Source: Compiled by the authors based on Vietnam's Decision No. 21/2025/QĐ-TTg.

Pursuant to Decision No. 21/2025/QĐ-TTg, Circular No. 17/2022/TT-NHNN (December 23, 2022) requires credit institutions to identify, assess, and manage environmental risks in lending activities. Banks must establish internal policies for comprehensive environmental assessments before approving credit, prioritize projects meeting green criteria, and monitor high-risk sectors.

The circular encourages diversification of green lending products such as green bonds and concessional loans and improvement of green credit portfolios. Mandatory reporting and public disclosure of environmental risk management strengthen governance, transparency, and social responsibility, attract international green funding, and raise awareness of sustainable finance within the corporate sector and community.

On a macroeconomic scale, adopting a unified set of green standards across the banking industry can steer the financial sector toward fostering a sustainable economy. When banks jointly apply uniform exclusion criteria, like limiting funding for coal-based projects and favouring investments in clean energy, lending decisions become more environmentally focused. This collective approach creates a ripple effect, motivating businesses to adopt sustainable practices to qualify for funding. As such, banks play a vital role as intermediaries, helping to balance economic growth with environmental responsibility.

A green-project criteria system is a strategic tool that supports efficient green capital use, improves issuer credibility and risk management, and advances sustainable lending. It forms the basis of a transparent, impactful green finance market by preventing greenwashing and supporting long-term climate goals.

5. Conclusion

Establishing a comprehensive and rigorous criteria framework for identifying projects eligible for green financing is both critical and intricate. This process necessitates the alignment of international standards, such as the Green Bond Principles, Green Loan Principles, ASEAN standards, and the EU Taxonomy, with domestic legislation and prevailing market conditions, striking a balance between scientific rigor and operational feasibility. Key design stages include clearly defining objectives and scope, selecting appropriate national or international standards, specifying eligible sectors and exclusions, setting quantitative thresholds and qualitative safeguards, documenting appraisal and approval protocols, and implementing robust systems for monitoring, reporting, and periodic review.

A well-structured criteria framework is essential to prevent greenwashing by ensuring only qualified projects are approved and maintaining transparency throughout the financing process. Such a system supports the successful issuance of green debt instruments, enhances global investor confidence, and accelerates the banking sector's transition toward sustainable business models. In advancing sustainable development finance, green criteria provide both directions for channeling capital into authentic environmental initiatives and protection for maintaining the integrity of the green finance market. Continuous improvement reflecting scientific progress and evolving regulations will be pivotal in mobilizing substantial resources to meet climate and development goals in the years ahead.

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LEVERAGING FINANCIAL TECHNOLOGY TO BOOST GREEN CREDIT IN VIETNAMESE COMMERCIAL BANKS

PhD. Tang My Sang*

Abstract: ***This study examines the impact of Fintech on the development of 28 Vietnamese commercial banks' green credit from 2014 to 2023. According to panel data regression models, the research examines the impacts of Fintech on green credit lending. The findings indicate that Fintech positively affects green credit growth, particularly improved risk management and operating capabilities. Bank size and loan-to-deposit ratio have a strong positive impact on green credit, while financial leverage, asset turnover, and income-to-cost ratio have little impact on green credit. The research has policy implications for the policymakers and financial institutions, concerning the need for facilitative policies in encouraging Fintech and green credit growth.***

• Keywords: *fintech, green credit, commercial bank, sustainable development.*

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1. Introduction

In the global context, climate change and environmental degradation are becoming urgent issues, requiring countries and industries to promote green initiatives to achieve sustainable development goals (Hasan et al., 2022). The financial sector, especially banks, play a central role in supporting green projects through the granting of green credit. Green credit has become a focus of sustainable finance, making an important contribution to the sustainable development goals (SDGs) set by the United Nations, especially in reducing carbon emissions and promoting renewable energy (Hasan et al., 2022).

However, Vietnam's green credit indicators are still modest compared to countries in the region, such as China and Singapore. Moreover, FinTech in Vietnam, despite growing rapidly, with a series of startups and advanced technology platforms, still faces many limitations in integrating into the green credit sector due to lack of legal framework and effective support mechanisms (Nguyen, 2022). And green credit is still quite new in Vietnam. That makes banks quickly seek innovative solutions to promote green credit to meet the needs of sustainable development. Therefore, commercial banks are also strongly transforming and promoting green credit activities. In addition, research on the application of FinTech in promoting green credit in Vietnam is still very limited, leading to a shortage of scientific basis to guide policy and implementation practices.

Although there have been many studies on green credit and FinTech, these studies mainly focus on developed countries or large markets such as China, the US and Europe (Fuster et al., 2019). The studies pay little attention to the differences in the level of FinTech development and financial systems in developing countries like Vietnam. Furthermore, current studies still lack a focus on transmission mechanisms such as resource allocation or green credit risk in the relationship between FinTech and green credit, so that it can be applied in the context of FinTech and green credit. specific situation of Vietnam. This is research gap. The research will test the influencing factors of Fintech on Green credit at Vietnamese commercial banks and proposing policy and management implications to improve and enhance green credit policies. The article is structured including introduction, literature review, methodology and results.

2. Literature review

FinTech has emerged as a rapidly growing concept frequently discussed in academic practice and economic literature. The development of emerging FinTech technologies such as big data, cloud computing, blockchain and artificial intelligence (AI) is happening rapidly, changing the way individuals learn, live and work. In recent years, the relationship between fintech innovation and green credit has been of great concern to scholars. Fintech, by virtue of its ability to employ advanced technology in banking business, is playing a key role in promoting green credit, helping financial institutions to direct funds into environmental protection and sustainable development activities.

** Ho Chi Minh University of Banking; email: sangtm@hub.edu.vn*

Green credit are loans provided enable businesses to implement projects, policies, and strategies aimed at reducing emissions and protecting the environment through policies from the point of view of the government (Zhao et al., 2022).

This study by Hasan et al. (2022) shows that fintech has a positive impact on the ability of banks in China to green credit supply, primarily through two avenues: reducing information asymmetry and increasing green credit efficiency. Fintech helps banks to efficiently collect and process information quickly, thereby decreasing risk and enhancing capacity for green firm service. Zhou et al. (2022) also show that fintech not only improves the relief of information asymmetry but also improves green credit allocation efficiency by improving environmental disclosures and media coverage.

In addition to promoting green credit, fintech also assists in increasing bank profitability. Mirza et al. (2023) proved that fintech expansion not only increases green lending operations but also improves risk-adjusted returns for banks, particularly in the Eurozone. Banks that employ fintech can reduce transaction costs and improve risk management, thereby improving their ability to provide credit to green projects while maintaining stable profits. Muganyi et al. (2021) found that Chinese fintech banks are more inclined to provide credit to green companies within the traditional energy sector and regions where there is abundant energy supply. This reflects the strategic realignment of the banks along environmental objectives and government policy support. On the other hand, Tarawneh et al. (2024) research showed that while fintech helps banks in increasing profits, it also creates competition from peer-to-peer lending and digital payment platforms that may affect the credit allocation of traditional banks, including green credit.

The application of Fintech in Vietnam has created a period of rapid technology advancement, creating convenience and speed for users across various sectors. Nhung et al. (2023) investigated how the rise of fintech in Vietnam affects the market power and financial performance of commercial banks. Similarly, Pham et al. (2024) analyzed the effect of fintech on bank performance in Vietnam and concluded that fintech significantly influences profits and net interest margins. In the context of green finance, Van Hoa et al. (2022) conducted a study examining the relationship between fintech and green finance in Vietnamese banks. The study showed that fintech positively impacts green finance, with factors like bank size, leverage, and non-interest income ratio influencing the extent of this relationship.

3. Methodology

The model used in this study aims to analyze the relationship between FinTech activities and green credit (GC) in commercial banks as follow:

$$GC_{it} = \alpha_0 + \alpha_1 FT_{it} + \alpha_2 CAR_{it\,2} + \alpha_3 NPM_{it} + \alpha_4 EM_{it} + \alpha_5 TAT_{it} + \alpha_6 SIZE_{it} + \alpha_7 LDR_{it} + \alpha_8 CIR_{it} + \varepsilon_{it}$$

Table 1. Variable description

Variables	Variables name	Calculation	Expectations of coefficient's sign	Source
Dependent variables				
GC	Green credit	Collected from the financial statements of commercial banks.		Liu & You (2023)
Independent variables				
FT	Fintech	Refer to the explanation of the keyword table related Fintech.	+	Pham et al. (2024)
CAR	Capital Adequacy ratio	$\frac{\text{Total Capital}}{\text{Total risk} - \text{weighted assets}}$	+	Pham et al. (2024)
NPM	Net Profit Margin	$\frac{\text{Net Profit}}{\text{Total Revenue}}$	+	Pham et al. (2024)
Control variables				
SIZE	Asset Size	The natural logarithm of total bank assets.	+	Yin et al. (2021)
EM	Leverage Ratio	$\frac{\text{Total assets}}{\text{Total equity}}$	+	Yin et al. (2021)
TAT	Total Asset Turnover	$\frac{\text{Net revenue}}{\text{Average Total assets}}$	+	Yin et al. (2021)
LDR	Loan to Deposit	$\frac{\text{Total Loans}}{\text{Total Deposits}}$	+	Yin et al. (2021)
CIR	Cost to income ratio	$\frac{\text{Operating Costs}}{\text{Operating income}}$	-	Yin et al. (2021)

Description of the variables presented in table 1. The research sample consists of 28 banks from 2014 to 2023, totaling 280 observations. Data are analyzed and processed through regression estimation methods using three different methods: Pooled OLS regression method, Fixed effects model (Fixed Effective Model-FEM) and random effects model (Random Effective Model - REM). Then use the F- Test and Hausman to choose the most optimal model: F- Test to choose between OLS and FEM, Hausman to choose between FEM and REM, in which the REM model is suitable for the sample. study. Next, use Wooldridge tests to test for autocorrelation with the data and Wald to test for changes in variances. Finally, apply the feasible generalized least squares (FGLS) method to overcome changes in the model.

4. Results

Table 2. Descriptive statistics

Variable	Number of observations	Mean	Standard deviation	Minimum value	Maximum value
GC	280	0.06	0.03	0.01	0.17
FT	280	40.3	49.82	0	0.35
CAR	280	0.12	0.03	0.08	0.25
NPM	280	0.12	0.09	0.01	0.52
SIZE	280	14.25	0.51	13.2	15.36
EM	280	0.13	0.05	0.05	0.25
TAT	280	0.08	0.02	0.05	0.16
LDR	280	0.09	0.01	0.04	0.02
CIR	280	-0.51	0.16	-1.78	-0.23

The data applied in this paper includes various variables for measuring commercial banks' performance and characteristics in Vietnam (Table 2).

Table 3. Correlation coefficient matrix

	GC	FT	CAR	NPM	SIZE	EM	TAT	LDR	CIR
GC	1.0000								
FT		1.0000							
CAR		-0.0943	1.0000						
NPM			-0.0544	1.0000					
SIZE					1.0000				
IN	0.0676					1.0000			
TAT			0.0067				1.0000		
LDR			-0.0560					1.0000	
CIR						-0.1044		0.482	1.0000

The correlation test in table 3 reveals underlying relations between commercial bank variables. All correlation coefficients meet the recommended threshold of Cohen (1988)

Table 4. Multicollinearity test

Variables	VIF	1/VIF
SIZE	2.49	0.402051
EM	2.48	0.403761
CIR	2.02	0.495577
CAR	1.79	0.557836
LDR	1.64	0.608576
NPM	1.48	0.674781
TAT	1.48	0.677368
FT	1.29	0.773685
Mean VIF	**1.83**	

The table 4 shows that the independent variables' variance coefficients (VIFs) range from 1.29 to 2.49, with an average of 1.83. This indicates that the variables are moderately correlated and not significantly so. Virtually none of the independent variables' VIF coefficients are greater than 3. It is evident that this model does not have a multicollinearity issue.

Table 5. Regression results

Variable name	Pooled OLS	FEM	REM	FGLS
FT	0.004*** (0.000)	0.004*** (0.000)	0.004*** (0.000)	0.0004*** (0.000)
CAR	-0.169** (0.009)	-0.105 (0.135)	-0.128 (0.052)	-0.098** (0.012)
NPM	0.028 (0.132)	0.017 (0.506)	0.022 (0.324)	0.042** (0.001)
SIZE	0.016*** (0.000)	0.022** (0.048)	0.019** (0.003)	0.014*** (0.000)
EM	-0.002 (0.967)	-0.091 (0.145)	-0.054 (0.343)	0.065 (0.054)
TAT	-0.014 (0.899)	0.089 (0.556)	0.047 (0.718)	0.086 (0.286)
LDR	3.041* (0.010)	1.903 (0.221)	2.439 (0.065)	2.232** (0.007)
CIR	(0.003)	-0.275 (0.078)	0.001 (0.917)	-0.007 (0.300)
Number of observations	**280**	**280**	**280**	**280**
Coefficient of determination R^2	**0.532**	**0.513**	**0.525**	**N/A**
F statistics	**38.56**	**25.75**	**244.78**	**N/A**
P-value	**0.0000**	**0.0000**	**0.0000**	**N/A**

*Note: GC is green credit, FT is fintech, CAR is capital adequacy ratio, NPM is net profit margin, SIZE is bank size, EM is leverage ratio, TAT is total asset turnover, LDR is loan to deposit, CIR cost to income ratio; *, **, *** represent statistical significance level 10%, 5% and 1%, respectively.*

The results from the Pooled OLS model are that fintech, capital adequacy ratio, asset size, loan ratio, and cost-to-income ratio are significant at a statistical level, with fintech, asset size, and loan ratio having positive coefficients and capital adequacy and cost-to-income ratio having negative coefficients (Table 5). The other variables were insignificant. Under both the FEM and REM specifications, bank size and fintech were also positive to green credit, but others were not yet significant. In implementing the F-test and Hausman test, the FEM was found superior to Pooled OLS and REM superior to FEM when investigating the effects of fintech on green credit.

Despite these findings, both FEM and REM models suffered from heteroskedasticity and autocorrelation issues that could undermine the validity of the model. The Breusch and Pagan test indicated heteroskedasticity in the REM model, and the Wooldridge test validated autocorrelation. The Durbin-Wu-Hausman test also did not find an endogeneity issue in the model. Due to these issues, the study then went on to use the FGLS (Feasible Generalized Least Squares) estimation technique to address these issues and further refine the model.

The study confirms that Fintech (FT) has a significant and positive impact on Green Credit (GC), with the parameter's value being 0.0004 at the 1% significance level. The finding corroborates previous research, which has shown that fintech technologies like big data, AI, and blockchain enable banks to make more informed decisions, reduce risks, and process green credit loans in advance. Also, the Capital Adequacy Ratio (CAR) is negatively associated with green credit, with a coefficient of -0.098. It means that higher CAR can lower green credit issuance, and policies should be introduced to stimulate green credit growth without sacrificing financial safety. Furthermore, the study suggests that bank profitability (NPM), asset size (SIZE), and loan-to-deposit ratio (LDR) have a positive effect on green credit, reflecting that richer, more financially stable banks are better placed to invest in green activities.

On the other hand, EM and TAT are positively related with GC, though not statistically significant in the study. These variables illustrate that banks that have more leverage and asset turnover will be prone to grow green credit since they have more capital and efficiency to invest in such long-term activities. Moreover, even though Cost-to-Income Ratio (CIR) had no prominent part to play in GC in this study, it reflects that the banks with low operating costs are capable of earning more revenue to invest in green credit projects. In general, the results point to the complex interplay between financial stability, operational efficiency, and fintech adoption in playing a role in green credit growth in the banking sector.

5. Discussion

The results indicate that fintech significantly promotes the development of green credit in Vietnam, with positive coefficients that align with previous research. This result

is consistent with previous research, such as that by Liu & You (2023). Fintech technologies, such as big data, artificial intelligence, and blockchain, improve the efficiency and accessibility of green credit by optimizing decision-making and risk management.

In addition, the study found that CAR negatively affects green credit, which is contrary to previous research suggesting a positive impact. This negative relationship reflects the high initial investment costs associated with fintech and the evolving stage of risk management in Vietnam's banking sector. The results suggest that, in the short term, fintech may increase management costs and strain bank resources, hindering green credit growth. On the other hand, factors such as bank size (SIZE) and loan-to-deposit ratio (LDR) positively impact green credit, as larger banks with more resources are better positioned to allocate funds to green credit projects, which often require long payback periods. This results is similar to the research by Yin et al. (2021)

The study also finds that variables like financial leverage (EM), total asset turnover (TAT), and cost-to-income ratio (CIR) do not have a significant impact on green credit. These findings suggest that these factors are not key drivers in promoting green credit in Vietnam. This result is consistent with the research by Duong & Trang (2019). The research provides valuable insights for policymakers and financial institutions, emphasizing the need for a supportive policy framework to foster the growth of fintech and green credit. It also highlights the importance of addressing data limitations and current regulatory challenges to further develop green finance and ESG initiatives in the country.

6. Management Implications

The research has shown that Fintech has a positive impact on green credit, banks can take action to develop resources in building a Fintech ecosystem to support green credit. Banks need to cooperate with companies that specialize in providing financial technology services and have expertise in the field of digital transformation to develop digital platforms to upgrade products and customer care services. Thereby, green credit activities can be improved. The application of blockchain technology and artificial intelligence (AI) can help increase transparency in monitoring and managing projects, while minimizing costs and processing time for lending activities. green area.

Banks need to invest in developing advanced data analysis tools, applying AI and big data to comprehensively forecast and assess risks. Developing effective risk management strategies is an important policy implication in the context of FinTech increasing pressure on risk management costs for banks when deploying green credit. The characteristics of green credit are often associated with long-term, complex projects with potential environmental, market and financial risks, requiring specialized management tools. Building specialized risk management systems, integrating blockchain technology to increase transparency and reduce fraud is a key factor in optimizing operational efficiency.

High-quality human resources in Vietnam in the Fintech field are still modest and knowledge about green credit is not yet widely disseminated. Thus, commercial banks can increase professional knowledge and training on green credit for employees. Banks need to invest in training employees on green credit regulations and standards and how to apply Fintech technology to optimize the lending process.

Thus, the application of Fintech in green credit will help Vietnamese commercial banks not only improve financial indicators but also contribute to the country's sustainable development goals. This is a digital revolution in all fields in general and in the banking sector in particular for the goal of sustainable growth in the future.

7. Research limitation

The research successfully examines the impact of Fintech on green credit in Vietnamese commercial banks and offers policy recommendations to support its development. However, the study has several limitations. First, the selected data does not fully represent all the Fintech factors that could affect green credit, as some relevant variables were not included. Second, the research was limited to data from only 28 commercial banks due to barriers in accessing complete information, which means it does not cover the entire banking system in Vietnam. Lastly, the variables related to Green Credit (GC) and Fintech (FT) are relatively new in Vietnam, and the data was mainly collected from primary sources, which may have led to some gaps or omissions in the information.

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DETERMINANTS OF FINANCIAL DISTRESS IN LISTED FOOD FIRMS IN VIETNAM: MODERATING EFFECTS OF ECONOMIC GROWTH AND QUALITY MANAGEMENT

PhD. Tran Thi Thu Trang* - PhD. Le Thanh Huyen*

Abstract: ***This study examines factors affecting financial distress in food processing firms listed on the Vietnamese stock market from 2018-2023, using OLS and HDFE regressions. Results show that profitability and short-term liquidity positively influence the Z-score, reducing financial vulnerability, while firm size and leverage negatively impact it, increasing risks. Economic growth and quality management moderate these effects: high liquidity aids resilience in favorable conditions, and ISO 22000 certification, combined with profitability, offsets leverage and exchange rate risks. These insights highlight the role of macroeconomic and governance factors in shaping financial distress in Vietnam's food industry.***

• Keywords: *food manufacturing companies, financial distress, economic growth, quality management.*

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1. Introduction

Financial distress remains a critical concern for firms, especially in emerging markets where economic volatility and structural challenges heighten vulnerabilities. In Vietnam, the food processing sector a key driver of growth and exports faced mounting pressures from 2018 to 2023 due to global supply chain disruptions, exchange rate fluctuations, and the lingering impact of COVID-19. Despite its significance, little research has examined the determinants of financial distress in this sector, particularly under moderating influences. Understanding these dynamics is essential for firms to build resilience and for policymakers to craft targeted interventions.

This study addresses this gap by analyzing factors influencing financial distress in 40 food processing firms listed on HOSE and HNX during 2018-2023, using 240 firm-year observations. Based on models like Altman's Z-score, the research applies Ordinary Least Squares (OLS) and High-Dimensional Fixed Effects (HDFE) regressions to assess the roles of profitability, liquidity, leverage, firm size, and exchange rate volatility. It also examines how economic growth and ISO 22000 certification moderate these relationships. The findings aim to offer insights into how macroeconomic conditions and internal governance practices affect financial stability in Vietnam's trade-exposed food industry.

2. Literature review

Extensive global research has examined the determinants of financial distress, contributing to a deeper understanding of corporate financial stability. Prior studies can be grouped into three main areas: (i) firm-level fundamentals, (ii) macroeconomic factors, and (iii) corporate governance each offering complementary insights into financial risk, especially in sectors like food processing that are shaped by both internal and external forces.

Firm-Level Fundamentals: Internal financial health and strategic choices play a crucial role in distress prediction. For instance, large book-tax differences often signal weak financials or aggressive accounting (Noga & Schnader, 2013), though the role of profit quality remains underexplored. Zhang (2015) found that R&D investments increase risk due to uncertainty, especially during downturns. Other stabilizing factors include foreign currency hedging (Magee, 2013), strong employee relations (Kane et al., 2005), transparent disclosures, and effective CSR (Al-Hadi et al., 2017).

Corporate Governance: Governance mechanisms help reduce financial risk by limiting managerial opportunism (Shleifer & Vishny, 1997). While the effects of board size and CEO duality remain debated, independent directors may reduce risk, though their effectiveness varies by firm size (Hsu & Wu, 2014). CEO traits and ownership structure also matter, as leadership experience, overconfidence, and political ties can either mitigate or heighten risk.

Macroeconomic Factors: External economic conditions significantly influence financial risk. Recessions typically

* *Thuongmai University, Hanoi; email: tranthithutrang@tmu.edu.vn - lethanhhuyen@tmu.edu.vn*

reduce revenues and liquidity (Liou & Smith, 2007), as seen in Vietnam's food industry during COVID-19. Inflation, interest rates, and monetary policy also affect firm solvency (Tinoco & Wilson, 2013). Firm responses to economic cycles vary, with governance potentially moderating these effects (Aldamen et al., 2012).

Despite a rich global literature, findings remain inconsistent due to context-specific variables and risk measures. In Vietnam, sectoral research particularly on food firms remains limited, despite their exposure to global supply chains and macroeconomic volatility. Moreover, few studies examine moderating effects. This study addresses these gaps by analyzing the impact of key factors on Z-score among listed food firms, while investigating the moderating roles of GDP growth and ISO 22000 certification.

3. Theoretical basis and model variables

Financial distress (FD) in firms stems from financial and macroeconomic factors. This study examines five key variables Return on Assets (ROA), Liquidity, Financial Leverage (Leverage), Exchange Rate Volatility (ERV), and Firm Size (FirmSize) selected for their relevance to Vietnam's food processing industry (2018-2023). ROA gauges operational efficiency, Leverage reflects debt risk, Liquidity measures short-term solvency, FirmSize indicates financial capacity, and ERV captures exchange rate shocks (Opler & Titman, 1994). Unlike broader models, this focus reduces multicollinearity and aligns with the sector's operational and capital challenges (Beaver, 1966), with ERV added to address import-export dependencies (Nguyen & Doan, 2020).

ROA: As net income over assets, ROA predicts FD inversely due to its shock-absorbing role, critical amid Vietnam's fluctuating input costs (Beaver, 1966; Altman, 1968).

Liquidity: Measured by the current ratio, low liquidity signals FD risk, especially under supply chain pressures (Beaver, 1966).

Leverage: Debt-to-assets ratio heightens FD risk via fixed obligations, relevant given 2018-2023 debt reliance (Merton, 1974).

Firm Size: Larger firms show lower FD risk due to resources, while smaller ones are vulnerable in Vietnam's competitive market (Denis & Mihov, 2003).

ERV: VND fluctuations impact financial distress due to import-export exposure, a unique sector challenge (Nguyen & Doan, 2020).

Additionally, this study also explores moderating effects: Economic Growth (GDP growth) eases Leverage's negative impact and boosts Liquidity's effect on Z-score (Levine, 2005; Le & Tran, 2021), while ISO 22000 enhances ROA's positive link, mitigates Leverage risk, and stabilizes supply chains against ERV (Trienekens & Zuurbier, 2008; Mensah & Adams, 2020), aligning with Vietnam's global trade context (2018-2023).

4. Methodology

4.1. Research model

** Research hypothesis*

Based on the theoretical framework regarding the factors affecting corporate financial distress presented in the previous section, the following hypotheses are proposed:

Hypothesis 1: Return on Assets (ROA) affects the financial distress of food processing firms.

Hypothesis 2: Financial leverage affects the financial distress of food processing firms.

Hypothesis 3: Liquidity affects the financial distress of food processing firms.

Hypothesis 4: Firm size affects the financial distress of food processing firms.

Hypothesis 5: Exchange rate volatility affects the financial distress of food processing firms.

Hypothesis 6: Food safety regulations moderate the relationship between ROA and financial distress of food processing firms.

Hypothesis 7: Food safety regulations moderate the relationship between financial leverage and financial distress of food processing firms.

Hypothesis 8: Food safety regulations moderate the relationship between liquidity and financial distress of food processing firms.

Hypothesis 9: Food safety regulations moderate the relationship between firm size and financial distress of food processing firms.

Hypothesis 10: Food safety regulations moderate the relationship between exchange rate volatility and financial distress of food processing firms.

Hypothesis 11: Economic growth moderates the relationship between ROA and financial distress of food processing firms.

Hypothesis 12: Economic growth moderates the relationship between financial leverage and financial distress of food processing firms.

Hypothesis 13: Economic growth moderates the relationship between liquidity and financial distress of food processing firms.

Hypothesis 14: Economic growth moderates the relationship between firm size and financial distress of food processing firms.

Hypothesis 15: Economic growth moderates the relationship between exchange rate volatility and financial distress of food processing firms.

** Research models*

Based on the research hypotheses, the models proposed in the study are as follows:

$$Zscore_{i,t} = \beta_0 + \beta_1 ROA_{i,t} + \beta_2 LEV_{i,t} + \beta_3 LIQ_{i,t} + \beta_4 Firmsize_{i,t} + \beta_5 ERV_{i,t} + \beta_6 (GDPGrowth_{i,t} \times ROA_{i,t}) + \beta_7 (GDPGrowth_{i,t} \times LEV_{i,t}) + \beta_8 (GDPGrowth_{i,t} \times LIQ_{i,t}) + \beta_9 (GDPGrowth_{i,t} \times Firmsize_{i,t}) + \beta_{10} (GDPGrowth_{i,t} \times ERV_{i,t}) + \beta_{11} (ISO_{i,t} \times ROA_{i,t}) + \beta_{12} (ISO_{i,t} \times LEV_{i,t}) + \beta_{13} (ISO_{i,t} \times LIQ_{i,t}) + \beta_{14} (ISO_{i,t} \times Firmsize_{i,t}) + \beta_{15} (ISO_{i,t} \times ERV_{i,t}) + \epsilon_{i,t}$$

Where:

ROA: Return on Assets - reflects the financial performance of the firm.

LEV: Financial leverage.

LIQ: Short-term liquidity.

Firmsize: Firm size

ERV: Exchange rate volatility

GDP Growth: Economic growth

ISO: ISO 22000 quality management certification

β_0 (Intercept): The intercept - the value of the Z-score when all independent variables are equal to zero.

β_t where t = 1, 2, ..., 15 corresponds to each independent variable or interaction term

ε (Error term): The random error

The variables in the research model are described specifically in the following table:

Table 1: Variables measurement

Variables	Measurement
Dependent variable	
Z score	$Z=1.2X_1+1.4X_2+3.3X_3+0.6X_4+1.0X_5$ Where: - X_1: Working Capital / Total Assets - X_2: Retained Earnings / Total Assets - X_3: EBIT / Total Assets - X_4: Market Value of Equity / Total Liabilities Market Value of Equity (MVE) = Book Value of Equity × Market Adjustment Factor (P/B ratio), with data collected as of December 31 each year, consistent with the balance sheet date. X_5: Sales / Total Assets
Independent variables	
ROA	Return on assets= Net profit after tax / Total assets
LEV	Leverage= Total liabilities / Total assets
LIQ	Short-term liquidity = Current assets / Current liabilities
Firm Size	Logarithm of total assets
ERV	$= \frac{NEER_t - NEER_{t-1}}{NEER_{t-1}} \times 100\%$ **ER_t**: Annual fluctuation in NEER (Nominal Effective Exchange Rate)
Moderator variables	
ISO	Dummy variable (takes the value 1 if the firm holds an ISO 22000 certification, and 0 otherwise).
GDP Growth	$= \frac{GDP_t - GDP_{t-1}}{GDP_{t-1}}$

4.2. Data and summary statistics

Financial data for the sample firms were sourced from 2018-2023 financial statements of food processing companies listed on HOSE and HNX. Quality management data, focusing on ISO 22000 certification, were collected from management reports and company websites for the same period. Economic growth data were obtained from the World Bank, while real effective exchange rate data were sourced from TradingEconomics.com.

Table 2 summarizes the descriptive statistics for the variables used in the study, based on 240 firm-year observations from 40 food processing firms listed on HOSE and HNX during 2018-2023. The variables include the Z-score (financial distress), ISO 22000 certification (ISO), GDP Growth, ROA, financial leverage (LEV), liquidity (LIQ), firm size (log of total assets), and exchange rate volatility (ERV).

Table 2: Summary of descriptive statistics

Variables	Observation	Mean	Std	Min	Max
Zscore	240	2.328	4.982	-29.293	18.833
ISO	240	0.55	0.499	0	1
GDPgrowth	240	5.583	2.231	2.6	8.1
ROA	240	0.026	0.149	-1.627	0.315
LEV	240	0.942	2.620	0.034	23.179
LIQ	240	2.140	3.250	0.001	29.407
Firmsize	240	27.516	1.598	23.559	32.468
ERV	240	1.106	2.273	-2.067	3.809

Data source: Stata output

The Z-score averages 2.328 (SD = 4.982), ranging from -29.293 to 18.833, indicating wide variation in financial health. ISO certification is present in 55% of firms (mean = 0.55), while GDP Growth averages 5.583%, suggesting a relatively stable macroeconomic environment. ROA has a mean of 2.6%, with large variation (SD = 0.149), highlighting diverse profitability levels. LEV shows high dispersion (mean = 0.942; max = 23.179), pointing to differing debt reliance. LIQ varies considerably (mean = 2.140; SD = 3.250), with some firms showing very low or high short-term liquidity. Firm size ranges from 23.559 to 32.468 (mean = 27.516), and ERV averages 1.106, reflecting notable exchange rate fluctuations during a period marked by global shocks, including the COVID-19 pandemic.

5. Empirical results and discussion

5.1. Panel unit root test

Gujarati (2003) notes that non-stationary data can lead to inaccurate regression results, necessitating panel unit root tests. Given the strongly balanced data in this study, the Levin, Lin & Chu (2002) test is applied, confirming that all five variables are stationary, making them suitable for subsequent analysis.

5.2. Correlation analysis

Table 3: Correlation matrix between variables

	Zscore	ROA	LEV	LIQ	Firmsize	ERV
Zscore	1.0000					
ROA	0.5719*	1.0000				
LEV	-0.8448*	-0.4209*	1.0000			
LIQ	0.5388*	0.0864	-0.1495*	1.0000		
Firmsize	0.0501	0.3290*	-0.3199*	-0.1628*	1.0000	
ERV	-0.0057	-0.0450	0.0028	-0.0048	-0.0168	1.0000

Data source: Stata output

Correlation coefficients marked with an asterisk (*) are significant at the 5% level or lower, reflecting reliable variable relationships. The Z-score is strongly positively correlated with ROA and LIQ, indicating that higher profitability and liquidity reduce financial distress, consistent with Beaver (1966). Conversely, it shows a strong negative correlation with LEV, suggesting that high leverage increases distress risk due to repayment pressures (Andrade & Kaplan, 1998). Correlations with Size and ERV are not significant, implying minimal direct impact on the Z-score in this sample.

5.3. Discussion of regression results

Multicollinearity was evaluated using the Variance Inflation Factor (VIF), with some interaction terms exceeding the threshold of 10. Mean-centering was applied to reduce correlations, lowering all VIF values below 10. Subsequent High-Dimensional Fixed Effects (HDFE) and HDFE with entropy balancing on the adjusted dataset ensured reliable coefficient estimates for 2018-2023.

To assess the impact of independent variables on the dependent variable, the author used OLS, HDFE, and HDFE with Entropy Balancing for robustness. As GDP growth and exchange rate volatility are time-invariant, they were omitted in HDFE with year fixed effects; models were run with and without year effects for a comprehensive 2018-2023 analysis.

The hypothesis that ROA, Leverage, and Liquidity differ between large firms and SMEs (by total assets) was confirmed by a t-test ($p < 0.05$). Entropy balancing adjusted weights to minimize selection bias, enhancing the accuracy of HDFE estimates of financial factors' impact on the Z-score.

Table 4: Regression results on the factors affecting financial distress under the moderating effects of economic growth and quality management certification in listed joint-stock food processing companies

VARIABLES	OLS	HDFE (Year FE)	HDFE (No Year FE)	HDFE with Entropy Balancing Weights (Year FE)	HDFE with Entropy Balancing Weights (No Year FE)
ROA	8.992***	8.977***	8.992***	9.233***	9.239***
	(0.701)	(1.065)	(0.977)	(0.570)	(0.573)
LEV	-1.349***	-1.335***	-1.349***	-1.335***	-1.335***
	(0.0782)	(0.0882)	(0.0602)	(0.033)	(0.033)
LIQ	0.581***	0.589***	0.581***	1.326*	0.587***
	(0.0644)	(0.0290)	(0.0182)	(0.708)	(0.064)
Firmsize	-0.410***	-0.336	-0.410	-0.0190	-0.296**
	(0.104)	(0.417)	(0.263)	(0.175)	(0.112)
ERV	0.0563	-	0.0563	-	0.0374
	(0.109)	-	(0.0527)	-	(0.0437)
GDPgrowth*ROA	-0.320	-0.264	-0.320	-0.612	-0.578
	(0.312)	(0.440)	(0.321)	(0.419)	(0.475)
GDPgrowth*LEV	-0.000262	-0.00285	-0.000262	-0.236	-0.130
	(0.0136)	(0.00907)	(0.00517)	(0.391)	(0.121)
GDPgrowth*LIQ	0.00382	0.00237	0.00382	0.102***	0.1059***
	(0.0111)	(0.0147)	(0.0129)	(0.008)	(0.008)
GDPgrowth*Firmsize	-0.000324	-0.0142	-0.000324	-0.0003	0.004
	(0.00165)	(0.0314)	(0.00176)	(0.002)	(0.006)
GDPgrowth*ERV	-0.00421	-	-0.00421	-	-0.016
	(0.0169)	-	(0.00884)	-	(0.137)
ISO*ROA	1.908	1.976	1.908	9.735**	9.868**
	(1.534)	(2.986)	(2.926)	(4.018)	(4.145)
ISO*LEV	0.248	0.252	0.248	0.772*	0.865**
	(0.233)	(0.254)	(0.254)	(0.406)	(0.420)
ISO*LIQ	0.101	0.101	0.101	-0.322	-0.346
	(0.0939)	(0.155)	(0.155)	(0.251)	(0.254)
ISO*ERV	-0.0133	-0.0105	-0.0133	0.0687**	0.0512*
	(0.0763)	(0.0281)	(0.0270)	(0.0268)	(0.0254)
ISO*Firmsize	0.0732	0.0744	0.0732	-0.133	-0.112
	(0.124)	(0.294)	(0.286)	(0.147)	(0.142)
Constant	13.15***	13.30*	13.15*	8.781***	9.425***
	(2.830)	(7.620)	(7.489)	(3.105)	(2.904)
Observations	240	240	240	240	240
R-squared	0.950	0.950	0.950	0.786	0.778
Year FE	No	Yes	No	Yes	No
Firm FE	No	Yes	Yes	Yes	Yes

Data source: Stata output

The results show that Return on Assets (ROA) positively and significantly ($p < 0.01$) reduces financial distress (Z-score) across OLS, HDFE with and without year-fixed effects, with coefficients ranging from 8.977 to 9.239, highlighting profitability's role in enhancing financial health among 40 listed food firms on HOSE and HNX (2018-2023). This aligns with Altman and Hotchkiss (2006) and Ohlson (1980), emphasizing ROA's importance in liquidity and debt capacity, especially during shocks like COVID-19.

Financial Leverage (LEV) negatively and significantly impacts the Z-score, with higher debt increasing risk, consistent with Merton (1974) and Zmijewski (1984), particularly evident in the food sector's cash flow volatility during 2020-2021.

Short-term Liquidity (LIQ), measured by the current ratio, positively and significantly boosts the Z-score, supporting Beaver (1966) and Altman (1968) on its role in resilience, crucial amid 2020-2021 supply chain disruptions.

Firm Size unexpectedly shows a negative Z-score relationship, possibly due to managerial inefficiencies in large firms (Berger et al., 1993), exacerbated by 2020-2021 exchange rate and demand challenges in Vietnam (World Bank, 2022).

Exchange Rate Volatility (ERV) exhibits no significant effect on financial distress.

Moderating effects reveal that GDP growth × LIQ positively and significantly ($p < 0.01$) enhances Z-scores, suggesting liquidity leverages economic recovery post-2021 (Chordia & Shivakumar, 2005). ISO 22000 × ROA positively and significantly ($p < 0.05$) amplifies profitability's effect, reflecting improved efficiency and credibility (Hasan & Habib, 2017). ISO 22000 × LEV shows a positive effect ($p < 0.10$-0.05), indicating quality management mitigates leverage risks, especially during 2020-2021 disruptions. ISO 22000 × ERV positively and significantly ($p < 0.05$-0.10) reduces ERV's adverse impact, aligning with Magee (2013) on risk management benefits.

6. Conclusions

This study examines financial distress determinants in Vietnamese food processing firms (2018-2023) using OLS and HDFE regressions, finding that profitability and liquidity boost the Z-score, while firm size and leverage heighten risk. Economic growth and ISO 22000 certification moderate these effects, enhancing resilience and mitigating leverage and exchange rate risks.

Recommendations include boosting profitability and liquidity, reducing debt in large firms via refinancing or equity, leveraging economic growth for cash flow, pursuing ISO 22000 for reputation, and encouraging regulatory incentives like tax breaks to strengthen the sector post-2023.

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CORPORATE GOVERNANCE, FINANCIAL DISTRESS AND FIRM PERFORMANCE

Ha Thi Nguyet*

Abstract: ***In an increasingly volatile economic environment, financial distress poses significant challenges to firm sustainability and performance. To mitigate these risks, corporate governance has been extensively studied in the financial sector for its role in enhancing transparency, accountability, and informed strategic decision-making. Therefore, this paper will examine the impact of corporate governance and financial distress on firm performance of Vietnamese manufacturing firms. The data includes 162 firms listed on the Hanoi and Ho Chi Minh Stock Exchanges from 2019 to 2023. The methodology employed in this paper is the Generalized Least Squares method with Fixed effects model on panel data to measure both accounting-based (Return on Assets - ROA) and market-based (Tobin's Q) performance. The results reveal that financial distress has a powerful and consistently negative impact on firm performance. Among the governance components, greater female representation on the board is found to have a significant and negative effect on financial performance (Tobin's Q only); neither board size nor audit quality showed a statistically significant impact on firm performance.***

• Keywords: *corporate governance, financial distress, firm performance, manufacturing firms, Vietnam.*

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1. Introduction

Corporate governance has become more relevant in contemporary times as companies expand and grow both in developed and emerging economies (Freeman, 1983, 2010). However, there is no consensus on the magnitude and signs of several corporate governance provisions in existing studies. Therefore, it is important to further research corporate governance and find out how it affects financial performance. Additionally, it is highly relevant to analyze the impact, especially when firms are under financial distress. The financial distress in this paper will be closer to the practical situation of the business, rather than the unusual global crisis. There is little empirical evidence of the relationship between corporate governance, financial distress, and firm performance in Vietnam. Therefore, the research will contribute to the empirical literature on the association among all the mentioned indicators in emerging countries.

The remainder of this paper is structured as follows. It starts with the literature review and theoretical framework to motivate the studied variables. After that, the paper moves on to present the analysis in the method section. The paper then continues to describe the data, interpret, and discuss the results. It ends with the conclusion of the contributions and limitations.

2. Literature review

2.1. Corporate governance

In recent decades, the nexus between corporate governance, financial distress, and firm performance has attracted considerable scholarly attention. The prevailing evidence supports the notion that effective governance mechanisms are positively associated with firm performance (Stanwick & Stanwick, 2002), although a stream of literature offers divergent findings and emphasizes potential limitations of this relationship (Donaldson & Davis, 1991; Ehikioya, 2009; Jensen & Meckling, 1976). According to Rezaee (2008), good corporate governance can contribute to the health of the companies and can have a positive impact on society, such as by having the board make less risky investment decisions to benefit investors or conducting more pro-social corporate practices to improve firms' reputation and financial returns.

Firms often rely on external financing to undertake expansion projects, and evidence suggests that strengthening corporate governance mechanisms can enhance firm value by approximately 10 to 12% (Stanwick & Stanwick, 2002). According to Weir (1997), firms with weak or "undesirable" governance structures often face greater difficulty in securing funding, such as bank loans. Similarly, Mallin (2016) emphasizes that investors consider factors such as insider ownership, the presence of audit committees, board independence, board size, and CEO duality when evaluating firms. As a result, corporations have increasingly implemented strong governance frameworks to build investor confidence and secure the financial resources required for sustainable growth.

*** Hanoi University; email: nguyethanu17@gmail.com***

2.2. Financial distress

Financial distress is a critical concept in corporate finance, commonly defined as a situation in which a firm experiences difficulties in meeting its financial obligations or sustaining normal operations due to declining revenues, profitability, or asset values (Whitaker, 1999). It is widely regarded as a precursor to bankruptcy, but its implications extend far beyond potential failure. Given these consequences, financial distress has been extensively studied in relation to firm performance, not only to understand its direct negative effects but also to capture the conditions under which firms remain resilient despite financial pressures.

Moreover, most existing studies emphasize the role of corporate governance in predicting or reducing the likelihood of financial distress, rather than evaluating its influence on firm performance once distress has already materialized. Given these theoretical and empirical insights, it is reasonable to expect that financial distress exerts a significant negative influence on firm performance.

2.3. Research gaps

The findings of this study are hoped to contribute to the literature about financial performance in two measures, including ROA and Tobin's Q. To the best of the researcher, this is the first study that tried to find out the impact of corporate governance and financial distress separately on firm performance. In addition, this study is expected to provide managers of firms listed on the Hanoi Stock Exchange (HNX) and Ho Chi Minh City Stock Exchange (HOSE), and other interested parties (e.g., investors, creditors, and financial analysts) with knowledge about the impact of corporate governance on financial performance. This helps them in making different decisions about investing in companies or enhancing the company's performance.

The results can also show the effectiveness of gender equality mandates, in response to the pressure from the press and the public (Adams & Ferreira, 2008), while addressing the skepticism towards the role of board independence in reducing the principal-agent problems with better monitoring and objective perspectives (Klein, 1998). Lastly, it gives recommendations for the board selection procedure, specifically on the education qualifications and experience requirements for directors' appointments. Thus, it also aims to answer the research question: "What is the impact of corporate governance and financial distress on the firm performance of manufacturing firms in Vietnam?".

3. Methodology

In this paper, a sample of 162 manufacturing firms out of the total of 362 listed and collected on the Hanoi and Ho Chi Minh Stock Exchanges from 2019 to 2023 is selected for analysis. The methodology employed in this paper is the Generalized Least Squares method with Fixed Effects model on panel data to measure both accounting-based (Return on Assets - ROA) and market-based (Tobin's Q) performance. Return on Assets (ROA) serves as an indicator of how efficiently a firm utilizes its assets to generate earnings. It is computed by:

$$ROA = \frac{Net\ Income}{Total\ Assets}\ (\%)$$

Tobin's Q is defined as the ratio of a firm's market value, which includes the market value of its outstanding equity and debt, to the replacement cost of its assets, typically approximated by their book value (Christensen et al., 2010).

$$Tobin's\ Q = \frac{Market\ Cap + Total\ Liabilities}{Total\ Assets}$$

A software data analysis package in Eviews was used to test the data along with a multivariate analysis to obtain descriptive statistics of the total variables. Next, the correlation method is applied to estimate the relationship between independent, dependent, and control variables. Multiple linear regressions are "finally" employed to test the impact of corporate governance mechanisms and financial distress on firms' financial performance among selected companies.

This paper will use the Z-score since it is a good indicator for financial distress, and the higher the Z-score, the lower the chance of financial distress (Shahwan, 2015). It is advantageous to utilize the Z-score as it has been used many times in the research surrounding the estimation of financial distress. The firm is in financial distress when the Altman Z-score is under 1.8 since the firm will go bankrupt (Altman, 1968). Therefore, the financial distress is a dummy variable where it takes on 1 if "Distress zone" is recognized and it takes on 0 otherwise. Z-score for manufacturing firms is computed as:

$$Altman\ Z\text{-}score = 1.2*x_1 + 1.4*x_2 + 3.3*x_3 + 0.6*x_4 + 1*x_5$$

Where:

$$x_1 = \frac{Working\ capital}{Total\ assets}$$

$$x_2 = \frac{Retained\ earnings}{Total\ assets}$$

$$x_3 = \frac{Earning\ before\ interest\ and\ tax\ (EBIT)}{Total\ assets}$$

$$x_4 = \frac{Market\ capitalization}{Total\ liabilities}$$

$$x_5 = \frac{Sales}{Total\ assets}$$

Drawing on previous research by Guest (2009), Jackling and Johl (2009), and Alfaraih, Alanezi, and Almujamed (2012), this study proposes two regression

models to determine relations between good corporate governance mechanisms and the financial performance of firms. The two model equations are:

i. Accounting performance will be:

$$ROA = \beta_0 + \beta_1 BS + \beta_2 Female\_BS + \beta_3 Audit + \beta_4 Distress + \beta_5 log(TA) + \beta_6 Leverage + \beta_7 Covid + u_i \quad (1)$$

ii. Market performance will be:

$$Log(Tobinq) = \beta_0 + \beta_1 BS + \beta_2 Female\_BS + \beta_3 Audit + \beta_4 Distress + \beta_5 log(TA) + \beta_6 Lev + \beta_7 Covid + u_i \quad (2)$$

Based on the findings from previous studies, the hypotheses developed are as exhibited below:

H1: Board Size has a positive and significant impact on the Firm Performance.

H2: Female Board Member has a positive and significant impact on the Firm Performance.

H3: Audit Quality has a positive and significant impact on the Firm Performance.

H4: Financial Distress has a negative and significant impact on the Firm's performance.

Table 1: Description of variables

Variable type	Variable name	Definition and measurement
Dependent variables	ROA	Return on assets, measured as Net income/Total assets (%)
	TOBINQ	Tobin's Q, measured as (Market Cap + Total liabilities)/Total assets
Independent variables	BS	Board size, measured as the number of board of directors on the company's board.
	Female_BS	Female board member, measured as the number of female board members over board size.
	Audit	Audit quality, measured as 1 if the company's financial statement is audited by large auditors like Big 4 firms, 0 otherwise
	Distress	Financial distress, measured as 1 if the Z-score gives the result with "Distress zone", 0 otherwise
Control variables	Size	Firm size, measured as the logarithm of Total assets
	Leverage	Leverage, measured as the amount of debt within a firm
	Covid	The effect of the COVID-19 pandemic on financial performance as 1 if year are 2021 and 2022, 0 otherwise

4. Quantitative models

4.1. Descriptive statistics

This section provides a discussion of the descriptive statistics for the variables used in this study.

The profitability of firms, measured by Return on Assets (ROA), shows considerable variation with a mean of 7.4% and a high coefficient of variation (94.6%), while the skewness (2.48) and kurtosis (12.82) indicate a right-skewed distribution with heavy tails, suggesting that a few firms are substantially more profitable than others. In terms of market-based performance, Tobin's Q initially displayed extreme variation, but a log transformation improved normality, reduced outlier effects, and enhanced statistical reliability, yielding a mean of 11.7% with a low coefficient of variation (3.42%) and a moderately skewed, peaked distribution (Skewness = 0.89; Kurtosis = 5.41), consistent with best practices in financial research (Gujarati & Porter, 2009; Wooldridge, 2010). Regarding corporate governance variables, board size averages five to six members with relatively low variation (23.74%), while female board representation remains low at 15.7% on average but highly dispersed (Cov = 114.65%). Audit quality (AQ), measured as a Big 4 auditor dummy, averages 0.293, showing that about 29% of firms employ Big 4 auditors. Financial distress (FD), also a dummy variable, averages 0.167, indicating that 16.7% of firms experienced distress, though its high coefficient of variation (221.56%) reflects its rare occurrence. Among control variables, total assets were log-transformed to mitigate scale differences, reduce skewness, and improve comparability, with the transformed firm size (Size) averaging 27.71, a standard deviation of 1.61, and low variation (5.81%), while leverage averages 46.4% with moderate variability. Finally, the COVID-19 dummy variable records a mean of 0.80, reflecting that most observations fall within the pandemic period.

Table 2: Summary of descriptive statistics

Variable	Min.	Max.	SD	Mean	Cov. (%)	Skew.	Kurt.
ROA	– 0.02	0.65	0.07	0.074	94.60	2.48	12.82
LOG(Tobinq)	– 1.41	2.52	0.40	0.117	3.42	0.89	5.41
BS	3.00	15.00	1.34	5.644	23.74	1.13	5.86
Female_BS	0.00	1.00	0.18	0.157	114.65	1.00	3.53
Audit	0.00	1.00	0.46	0.293	157.00	0.91	1.83
Distress	0.00	1.00	0.37	0.167	221.56	1.79	4.19
LOG(TA)	23.55	32.87	1.61	27.71	5.81	0.36	3.12
Leverage	0.02	0.97	0.21	0.464	45.26	0.06	2.10
Covid	0.00	1.00	0.40	0.80	50.00	– 1.50	3.25

The descriptive statistics reveal substantial variation in firm performance, governance structures, and financial characteristics. The high skewness and kurtosis in ROA highlight potential non-normality, while the logarithmic transformations of TQ and TA effectively improved distributional properties. The binary nature of audit quality, financial distress, and COVID-19 variables is evident, and the moderate to high coefficients of variation emphasize firm heterogeneity, providing a strong basis for subsequent regression analysis.

4.2. Correlation matrix

Table 3 presents the correlations among the dependent variable ROA, the independent variables, and the control variables, while their correlations with Tobin's Q are shown in Table 4. According to Gujarati and Porter (2009), a correlation coefficient above 0.8 may indicate the presence of multicollinearity in the dataset. The results in Tables 3 and 4 suggest that multicollinearity is unlikely to pose a problem in this study.

Table 3: Correlation between ROA and Independent variables

Variable	ROA	BS	Female _BS	Audit	Distress	LOG(TA)	Leverage	Covid
ROA	1							
BS	0.0772	1						
Female_BS	0.1292	-0.0060	1					
Audit	0.0702	0.1704	0.0322	1				
Distress	-0.3206	-0.0569	-0.0697	-0.0535	1			
LOG(TA)	-0.0913	0.3404	-0.0651	0.4101	0.1702	1		
Leverage	-0.5255	0.0069	-0.1700	-0.0044	0.4450	0.3173	1	
Covid	-0.0018	-0.0121	0.0150	-0.0030	-0.0615	0.0427	-0.0360	1

There are mixed results: several variables are negatively correlated to ROA, whereas others have a positive correlation with ROA. The findings indicate that the correlation is negative for Distress = −0.32, LOG(TA) = −0.09, Leverage = −0.53, and Covid = −0.001. All other variables have a positive correlation with ROA: BS = 0.07, Female_BS = 0.13, and Audit = 0.07. This suggests that an increase in any of these variables triggers increases of ROA, whereas variables Distress, Size, Leverage, and COVID-19 pandemic also decrease when ROA decreases.

Table 4: Correlation between Tobin's Q and independent variables

Variable	LOG (Tobinq)	BS	Female _BS	Audit	Distress	Size	Levergae	Covid
Log(Tobinq)	1							
BS	0.2270	1						
Female_BS	0.0750	-0.0060	1					
Audit	0.1825	-0.1704	0.0322	1				
Distress	-0.2283	-0.0569	-0.0697	-0.0535	1			
Size	0.1316	0.3404	-0.0651	0.4101	0.1702	1		
Leverage	-0.2057	0.0069	-0.1700	-0.0044	0.4450	0.3173	1	
Covid	0.0733	-0.0121	0.0150	-0.0030	-0.0615	0.0427	-0.0360	1

Concerning TQ and corporate governance mechanisms (Table 5), again, multicollinearity is unlikely to be a problem. Furthermore, only variables, Distress and Leverage have a negative correlation with TQ (-0.22, -0.21, respectively), suggesting that when these corporate governance variables decrease, TQ also decreases. The variables BS, Female_BS, Audit, Size, and Covid have a positive correlation with TQ, suggesting that these variables increase at the same time as TQ.

In summary, the correlation analysis provides several key insights into the factors associated with firm performance. Good corporate governance practices, such as having a more gender-diverse board and higher audit quality, appear to be positively associated with both accounting-based and market-based performance. On the other hand, higher leverage and distress are strongly linked to poorer performance, particularly in terms of profitability. However, it is crucial to acknowledge the limitations of this correlation analysis. Correlation does not imply causation, and these results only indicate the direction and strength of linear associations between variables. A more robust analysis using multiple regression would be necessary to control for the simultaneous effects of these variables and to make more definitive claims about their impact on firm performance.

4.3. Multivariate regression results for ROA and Tobin's Q

This study considered three standard models: Pooled Ordinary Least Squares (OLS), the Random Effects Model (REM), and the Fixed Effects Model (FEM). A comparative analysis and a series of diagnostic tests were performed to identify the most suitable specification. An initial review of the models' explanatory power revealed that the FEM vastly outperformed the others, yielding an adjusted R-squared of 0.6902 for the ROA model and 0.7621 for the TQ model, compared to much lower values for both the Pooled OLS and REM regressions. To formally justify the model choice, two key statistical tests were conducted. Based on the unambiguous results of both the Redundant Fixed Effects and Hausman tests, the Fixed Effects Model (FEM) is selected as the most appropriate and robust estimator for this analysis. The subsequent interpretation of results will be based on the findings from this model.

Table 5: Multivariate regression results for ROA and Tobin's Q

Variable	Coefficients (x100)	t-test	p-value
Multiple regression results for ROA			
Intercept	0.3578	1.501	0.1339
BS	0.0039	1.553	0.1209
Female_BS	0.0102	0.492	0.6231
Audit	0.0149	1.386	0.1661
Distress	-0.0138	-1.769	0.0774
Size	-0.0095	-1.091	0.2755
Leverage	-0.1117	-3.804	0.0002
Covid	0.0102	2.915	0.0037
Regression statistics			
R^2			0.6902
Adjusted R^2			0.6090
DW			2.279
Observations			810

Variable	Coefficients (x100)	t-test	p-value
Multiple regression results for Tobin's Q			
Intercept	3.9188	2.516	0.0121
BS	0.0305	1.841	0.0661
Female_BS	-0.3314	-2.443	0.0149
Audit	-0.0492	-0.701	0.4838
Distress	-0.1327	-2.600	0.0095
Size	-0.1089	-1.920	0.0553
Leverage	0.4403	2.294	0.0221
Covid	0.0771	3.381	0.0008
Regression statistics			
R^2			0.8115
Adjusted R^2			0.7621
DW			1.723
Observations			810

The regression results for both accounting-based performance (ROA) and market-based performance (Tobin's Q) reveal mixed evidence on the influence of corporate governance and financial distress among manufacturing firms. Board size, consistent with H1, shows a positive relationship with performance in both models (β = 0.0039 for ROA; β = 0.0305 for Tobin's Q), but these effects are statistically insignificant (p = 0.1209; p = 0.0661). Thus, larger boards appear to provide some monitoring capacity, but the benefits are not strong enough to translate into measurable performance, leading to the rejection of H1.

Female board representation shows a positive but insignificant effect on ROA (β = 0.0102, p = 0.6231), while Tobin's Q reveals a significant negative relationship (β = –0.3314, p = 0.0149). These findings contradict H2, suggesting that gender diversity is not yet valued by the market and may even be perceived

negatively in Vietnam, consistent with emerging market contexts where institutional support for diversity is limited. Audit quality, proxied by Big 4 auditor engagement, also fails to yield a significant impact ($p = 0.1661$ for ROA; $p = 0.4838$ for Tobin's Q), indicating that external auditing does not significantly influence performance, thereby rejecting H3.

By contrast, financial distress emerges as the most influential variable. The coefficients are negative in both models ($\beta = –0.0138$ for ROA; $\beta = –0.1327$ for Tobin's Q), with marginal significance for ROA ($p = 0.0774$) but strong significance for Tobin's Q ($p = 0.0095$). This provides partial support for H4 and highlights that distress reduces firm value, with investors reacting more strongly in market-based evaluations than accounting returns. Among the controls, leverage shows a negative and significant effect on ROA but a positive effect on Tobin's Q, while firm size is weakly negative in both models. The COVID-19 dummy is significantly positive in both cases, suggesting firms adapted effectively during the pandemic.

Overall, the regression results indicate that corporate governance mechanisms, namely board size, female board representation, and audit quality, do not exhibit statistically significant effects on accounting-based performance (ROA). This aligns with prior research documenting inconclusive relationships between board characteristics and profitability, particularly in emerging markets (Dalton et al., 1999; Guest, 2009). Similarly, audit quality shows no significant impact on firm performance, consistent with Francis and Yu (2009), who suggest that the role of external auditors is more closely tied to earnings credibility than to direct firm outcomes. Interestingly, while in this study, female board representation shows a negative and significant association with market-based performance (Tobin's Q), there are divided opinions about this matter in prior studies, where gender diversity has sometimes been linked to reduced valuation due to potential tokenism or weaker influence in decision-making (Adams & Ferreira, 2009). Overall, these results support the view that the effectiveness of governance mechanisms is context-dependent, and in the case of Vietnam, external factors such as firm size, leverage, and macroeconomic shocks (e.g., COVID-19) appear more influential determinants of performance (Bebchuk & Weisbach, 2010; Claessens & Yafeh, 2012).

5. Conclusion

This study investigates the impact of corporate governance mechanisms and financial distress on firm performance among 162 manufacturing firms listed on the HNX and HOSE during 2019–2023. Firm performance was measured using both Return on Assets (ROA) and Tobin's Q, representing accounting-based and market-based performance. The findings reveal that corporate governance variables such as board size, female board representation, and audit quality do not have significant positive effects on performance. By contrast, financial distress exerts a strong negative influence, particularly on Tobin's Q, underscoring its importance as a determinant of market valuation. Control variables further highlight the contrasting effects of leverage and the positive role of firms' adaptation during the COVID-19 period. From a sectoral standpoint, these results align with the characteristics of Vietnam's manufacturing industry, which is capital-intensive, export-oriented, and highly exposed to financial fragility. In such a context, investors appear more responsive to signals of distress than to governance arrangements, while pandemic-related resilience reflects the sector's adaptability and government support.

Several constraints should be acknowledged in interpreting the findings. The analysis is confined to manufacturing firms, which may limit the generalizability to other sectors where governance mechanisms and performance drivers differ. Governance is also assessed using only three indicators, excluding other potentially relevant dimensions such as ownership concentration, board independence, and executive incentives. Moreover, the study period coincides with the COVID-19 pandemic, which may have influenced firm outcomes in ways not fully captured by the models. Future research should expand the sample to include multiple industries, incorporate a broader range of governance variables, and employ advanced econometric techniques to address issues of endogeneity and dynamic effects. Comparative studies across ASEAN economies could further elucidate how institutional settings influence the governance–performance relationship. Overall, the findings contribute to the existing literature by presenting evidence from Vietnam, demonstrating that although governance remains a significant factor, financial stability appears to be the more immediate determinant of performance, underscoring the importance of strategies aimed at mitigating financial distress while fostering long-term enhancements in governance practices.

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THE RELATIONSHIP BETWEEN ESG PERFORMANCE AND EARNINGS MANAGEMENT: THE EMPIRICAL STUDY IN EMERGING MARKET OF ASEAN

Tran Thanh Tam* - PhD. Do Van Anh* - PhD. Luong Ngoc Minh*

Abstract: ***In the context of increasing global attention for sustainable development, this study investigates the relationship between ESG performance along with its individual pillar (Environment, Social, Governance) and earnings management, with the moderating effects of firm size. Multivariate regressions are conducted on a sample of 596 firm-year observations including listed companies in ASEAN countries from the period from 2019-2023. The results suggest that ESG performance in previous year positively related to real earnings management (REM) in current year. Moreover, among the three pillars of ESG, only governance has a significant positive link with REM and the positive ESG-REM relationship is more pronounced in smaller firms.***

• Keywords: *ESG, earnings management, ASEAN.*

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1. Introduction

Environmental, Social, and Governance (ESG) refEnvironmental, Social, and Governance (ESG) refers to a framework which integrates environmental responsibility, social responsibility, and corporate governance into business strategic management and investment decisions of the investors. Accordingly, stakeholders increasingly recognize that the adoption of ESG principles could safeguard a company's long-term success and create shareholder value, enhance the reputation of the company and open access to new capital sources. In addition, ESG is expected to prevent short-term opportunistic behaviors that prioritize immediate gains over long-term sustainability.

Researchers have traditionally emphasized the direct correlation between ESG initiatives and firm performance or firm value but neglect how the quality of financial reporting interacts with these factors. When firms engage in earnings management (EM) with the intention to manipulate financial statements to a more favorable picture, the true impact of ESG efforts on performance metrics can be concealed. As a result, there is a need to investigate the relationship between ESG and EM, which consequently affects financial reporting quality.

The majority of the existing literatures on ESG-EM relationship have been conducted in developed market, where regulatory frameworks and corporate governance structures are more established (Kim et al., 2012; Velte, 2021). Some research has begun to address ESG issues in Asian countries (Liu et al., 2023; Sun et al., 2024) but studies focusing specifically on the ASEAN region remain scarce.

The focus on ASEAN context is motivated by the fact that, with growing national commitments towards sustainable goals, the region is increasingly integrating ESG practices into their business frameworks. ESG is no longer considered optional but rather an essential framework for transparency and fostering investor confidence.

Therefore, the objective of this study is to examine the relationship between ESG performance in total together with its three main pillars which are Environment, Social, and Governance and two measures of earnings management among ASEAN firms. Additionally, the study will further investigate the mechanism behind it by studying the potential moderating effect of firm size on this relationship.

2. Literature review

2.1. Theoretical framework

The positive relationship between ESG and EM can be explained by agency theory (Jensen & Meckling, 1976). The separation of ownership and management in corporation structure, in conjunction with information asymmetries, generate motivation for opportunistic behaviors by managers (agents) who may have different objectives than

** Hanoi University; email: tamttfmt@hanu.edu.vn - anhdv@hanu.edu.vn - minh@hanu.edu.vn*

the owners (principals). As a result, the motivation for firms to engage in EM may increase. Kim et al., (2012) suggest that ESG acts as reputation insurance, providing a positive signal that allows firms to engage in EM while mitigating the negative consequences of any misconduct. When firms engage in greenwashing, the information asymmetry increases, creating noise and makes it difficult for investors to accurately assess the firm's true value, potentially misleading them about its financial health.

The stakeholder theory (Freeman, 1984) posits a negative ESG-EM relationship. The stakeholder theory, which asserts that firms should consider the impact of their operational activities on their stakeholders, not just their shareholders. By aligning their financial reporting and non-financial reporting such as ESG performance, executives can ensure that both aspects are jointly monitored. Consequently, this perspective assumes that managerial opportunism and agency problems are minimized, which constrains EM.

Various empirical studies focus on the link between ESG and EM. Almubarak et al. (2023) finds that ESG disclosure is positively associated with EM, particularly when firms are under financial distress. The study indicates that managers may use ESG as a tool to cover opportunistic behaviors.

On the contrary, the majority of the empirical studies such as Chouaibi & Zouari (2022); Liu et al. (2023); Sun et al. (2024) have identified a negative correlation between ESG and both types of EM. Recent studies by Vatis et al. (2025) finds negative impact of REM on ESG whereas negative impact of AEM on ESG performance is evidenced in the work of Primacintya & Kusuma (2025).

In further study on how each of the ESG pillars affect EM, Velte (2019) finds that environmental, social, and governance performance negatively influence AEM, with governance having the strongest effect. Similarly, Borralho et al. (2022) reveals that while social and governance disclosures help restraint EM in family firms, environmental disclosure is positively associated with it in non-family firms. Velte (2021) finds that environmental performance significantly reduces AEM but increases REM, suggesting a strategic shift toward less detectable forms of EM in the context of greenwashing.

Given the mixed findings in the recent empirical studies on ESG-EM relationship, it is crucial to explore the moderating effect of firm size on this relationship. It assumes larger companies frequently enjoy scale advantages, which can be challenging for smaller firms to replicate (Velte, 2019). Moreover, larger firms typically produce higher-quality financial information due to their exposure to stricter regulatory oversight and compliance requirements (Borralho et al., 2022). Vatis et al. (2025) finds the negative ESG-EM more pronounced in large firms.

2.2. Hypothesis development

Building on the stakeholder theory and the dominant findings of negative ESG-EM relationship in existing literatures, the following hypotheses are proposed:

H1. ESG is negatively correlated with firms' EM

H2. Environmental performance is negatively correlated with firms' EM

H3. Social performance is negatively correlated with firms' EM

H4. Governance performance is negatively correlated with firms' EM

H5. Firm size significantly enhances ESG-EM relationship.

3. Methodology

3.1. Data

The data set extracted from LSEG Data &Analytics databases has 596 firm-year observations which includes 126 non-financial firms for five-year period from 2019 to 2023 in six ASEAN countries (Indonesia, Malaysia, Philippines, Singapore, Thailand and Vietnam).

3.2. Dependent variables

Earnings management is the dependent variable of the study, proxied either by AEM or REM.

Accruals earnings management

AEM is measured by discretionary accruals using framework developed by Dechow et al. (1995) with lagged return on assets, as suggested by Kothari et al. (2005). AEM is determined by the following equation:

$$\frac{TA_{i,t}}{A_{i,t-1}} = \beta_0 + \beta_1 \frac{1}{A_{i,t-1}} + \beta_2 \frac{\Delta REV_{i,t} - \Delta REC_{i,t}}{A_{i,t-1}} + \beta_3 \frac{PPE_{i,t}}{A_{i,t-1}} + \beta_4 \frac{IBXI_{i,t-1}}{A_{i,t-1}} + \varepsilon_{i,t}$$

Where:

$TA_{i,t}$: Total accruals of the company i in year t, net income after tax minus operating cash flows

$A_{i,t-1}$: Total assets of company i in year t-1

$\Delta REV_{i,t}$: Net change in revenue of the company i in year t from year t-1

$\Delta REC_{i,t}$: Net change in receivables of the company i in year t from year t-1

$PPE_{i,t}$: Value of property, plant and equipment of the company i in year t

$IBXI_{i,t-1}$: Income before extraordinary items of company i in year t-1

$\varepsilon_{i,t}$: Estimated residual (Discretionary accruals)

Real earnings management

Following Cohen et al.(2010), Roychowdhury (2006), REM is calculated using three key metrics as follow:

REM = AB_CFO – AB_PROD + AB_EXP

First, abnormal operating cash flow (AB_CFO) is the residual (εi,t) of the following model:

$$\frac{CFO_{i,t}}{A_{i,t-1}} = \beta_0 + \beta_1 \frac{1}{A_{i,t-1}} + \beta_2 \frac{Sales_{i,t}}{A_{i,t-1}} + \beta_3 \frac{\Delta Sales_{i,t}}{A_{i,t-1}} + \varepsilon_{i,t}$$

Where:

$CFO_{i,t}$: Operating cash flow of company i in year t

$A_{i,t-1}$: Total assets of company i in year t-1

$Sales_{i,t}$: Net sales of company i in year t

$\Delta Sales_{i,t}$: Change in net sales of company i in year t from year t-1

$\varepsilon_{i,t}$: Estimated residual (Abnormal CFO)

Secondly, abnormal discretionary expense (*AB_EXP*) is the residual in the model follow:

$$\frac{DISX_{i,t}}{A_{i,t-1}} = \beta_0 + \beta_1 \frac{1}{A_{i,t-1}} + \beta_2 \frac{Sales_{i,t-1}}{A_{i,t-1}} + \varepsilon_{i,t}$$

Where:

$DISX_{i,t}$: Discretionary expenditures of company i in year t

$A_{i,t-1}$: Total assets of company i in year t-1

$Sales_{i,t-1}$: Net sales of company i in year t-1

$\varepsilon_{i,t}$: Estimated residual (Abnormal discretionary expenditures)

Thirdly, abnormal production cost (*AB_PROD*) is the residual from the following model:

$$\frac{PROD_{i,t}}{A_{i,t-1}} = \beta_0 + \beta_1 \frac{1}{A_{i,t-1}} + \beta_2 \frac{Sales_{i,t}}{A_{i,t-1}} + \beta_3 \frac{\Delta Sales_{i,t}}{A_{i,t-1}} + \beta_4 \frac{\Delta Sales_{i,t-1}}{A_{i,t-1}} + \varepsilon_{i,t}$$

Where:

$PROD_{i,t}$: Production costs of year t-1 to year t (measured by total of cost of goods sold and change in inventory)

$A_{i,t-1}$: Total assets for company i in year t-1

$Sales_{i,t}$: Annual net sales for company i in year t

$\Delta Sales_{i,t}$: Change in annual net sales for company i in year t from year t-1

$\Delta Sales_{i,t-1}$: Change in annual net sales for company i in year t-1 from year t-2

$\varepsilon_{i,t}$: Estimated residual (Abnormal Production Cost)

3.3. Explanatory variables

The independent variable in this study is ESG and its three pillars (E_SCORE, S_SCORE, G_SCORE), which was collected from the LSEG Data &Analytics databases. The higher the ESG score, the better the ESG performance.

Firm size (SIZE), measured by natural logarithm (ln) of total assets, has been identified as a moderating variable. This study incorporates several control variables including Leverage (LEV), Market to Book Equity Ratio (MTB) and Return of Assets (ROA), which are related to firm characteristics and commonly employed in this research area. Table 1 summarizes the variables used in the study.

Table 1. Variables of the study

Variable	Measurement	Expected results
Dependent variables		
AEM	Discretionary accruals (Kothari et al., 2005)	
REM	Sum of REM proxies (Roychowdhury, 2006)	
Independent variables		
ESG	Environmental, social and governance score	(-)
E_SCORE	Environmental performance	(-)
S_SCORE	Social performance	(-)
G_SCORE	Governance performance	(-)
Moderating variable		
SIZE	Natural logarithms of total assets	(+)
Control variables		
LEV	Long-term debt scaled by total assets	
MTB	Market-to-book equity ratio	
ROA	Income scaled by total assets	

3.4. Empirical models

To test the hypotheses H1, whether ESG negatively influences EM, the following regression model is proposed:

$$EM_{i,t} = \beta_0 + \beta_1 ESG_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 X_{i,t} + \varepsilon_{i,t} \quad (1)$$

In accordance with approach done by Velte (2019), additional regressions will be performed to analyze the influence of overall ESG performance reported in prior year to earning management practice in current year. The one-year lagged analysis uses earning management variables in year t for ESG performance in year t-1 (LAG_ESG).

To test the hypotheses H2, H3, H4, whether each pillar of ESG (E_SCORE, S_SCORE, G_SCORE) has a significant impact on earnings management, the following multivariate regression models are proposed:

$$EM_{i,t} = \beta_0 + \beta_1 E\_SCORE_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 X_{i,t} + \varepsilon_{i,t} \quad (2)$$

$$EM_{i,t} = \beta_0 + \beta_1 S\_SCORE_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 X_{i,t} + \varepsilon_{i,t} \quad (3)$$

$$EM_{i,t} = \beta_0 + \beta_1 G\_SCORE_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 X_{i,t} + \varepsilon_{i,t} \quad (4)$$

To verify the effect of firm size on the ESG-EM relationship, a sub-sample approach is employed, whereby equation 1 is re-estimated separately for smaller firms (firm size below median) and larger firms (firm size above median). This approach follows the recent empirical study by Vatis et al., (2025), allows for a direct comparison of the ESG-EM link across different firm scales.

4. Findings and discussion

4.1. Descriptive analysis

Table 2 provides an overview of descriptive statistics for the variables in the study. While AEM has mean value close to zero, the mean value of REM indicates that ASEAN firms manipulate earnings upwards using REM. The standard deviation for REM is larger than for AEM, and its range is much wider, meaning firms exhibit more variation of REM compared to AEM.

The average overall ESG score indicates a good relative ESG performance according to the grading system by LSEG but considerable variation across firms. The minimum ESG score of 3.070 represents an "ESG laggard" and a maximum score of 91.921 represents an "ESG leader". Among its three pillars, the average social score is the highest and the mean of environmental score is the lowest.

Table 2. Descriptive statistics

Variable	Obs.	Mean	Std. dev.	Min	Max
AEM	596	0.00	0.05	-0.20	0.23
REM	596	0.08	0.27	-1.26	1.33
ESG	596	53.73	17.36	3.07	91.92
S_SCORE	596	58.52	19.58	1.58	98.03
G_SCORE	596	51.39	21.79	2.43	95.35
E_SCORE	596	49.84	22.94	0.00	97.13
SIZE	596	21.71	1.30	18.21	25.34
LEV	596	0.18	0.15	0.00	0.67
MTB	596	4.20	7.57	0.25	60.67
ROA	596	0.09	0.07	0.00	0.64

4.2. Correlation matrix

Table 3. Pearson correlation matrix

	AEM	REM	ESG	S_SCORE	G_SCORE	E_SCORE	SIZE	LEV	MTB	ROA
AEM	1.000									
REM	-0.332	1.000								
ESG	-0.150	0.124	1.000							
S_SCORE	-0.111	0.086	0.890	1.000						
G_SCORE	-0.181	0.061	0.693	0.410	1.000					
E_SCORE	-0.035	0.109	0.839	0.762	0.338	1.000				
SIZE	-0.058	0.120	0.253	0.274	0.088	0.297	1.000			
LEV	-0.119	-0.014	0.010	0.023	-0.006	0.002	0.414	1.000		
MTB	-0.106	0.309	0.236	0.196	0.164	0.185	-0.197	0.007	1.000	
ROA	0.042	0.445	0.044	0.010	0.053	0.039	-0.353	-0.410	0.395	1.000

The correlation analysis reveals negative correlation between the overall ESG score and AEM, suggesting a potential constraining effect, following stakeholder theory (Freeman, 1984). Conversely, the matrix reveals a positive correlation between ESG and REM, align with agency theory (Jensen & Meckling, 1976).

4.3. Regression analysis

To examine the relationship between ESG performance and earnings management, the study employed a multivariate regression analysis with panel data. Durbin-Wu-Hausman test results in Two-Way Fixed-Effects (TWFE) being the most appropriate for all models. Then, a series of diagnostic test are conducted. First, Modified Wald test reveals heteroskedasticity issue; hence the TWFE model is estimated using robust standard errors clustered at the firm level. Wooldridge test for autocorrelation finds no evidence of a first-order serial correlation problem. Finally, the average Variance Inflation Factor (VIF) of 5.63 suggests a moderate level of multicollinearity.

Table 4 summaries the final regression models with positively significant relationship between previous year's ESG (LAG_ESG) and governance performance (LAG_G_SCORE) with REM.

Table 4. Regression results

	(1) Fixed Effect AEM	(2) Fixed Effect REM	(3) Fixed Effect REM	(4) Fixed Effect REM	(5) Fixed Effect REM
LAG_ESG	-0.000131	0.00141*			
	(0.768)	(0.052)			
LAG_E_SCORE			0.000715		
			(0.168)		
LAG_S_SCORE				-0.00028	
				(0.717)	
LAG_G_SCORE					0.00122*
					(0.050)
SIZE	0.0577**	-0.114*	-0.115*	-0.114**	-0.116*
	(0.045)	(0.051)	(0.053)	(0.050)	(0.053)
LEV	-0.0269	0.189*	0.173	0.175*	0.164
	(0.677)	(0.077)	(0.108)	(0.094)	(0.121)
MTB	0.00156	-0.00821**	-0.00750**	-0.00732**	-0.00739**
	(0.207)	(0.004)	(0.009)	(0.008)	(0.009)
ROA	0.0299	2.440***	2.191***	2.164***	2.180***
	(0.752)	(0.000)	(0.000)	(0.000	(0.000)
_cons	-1.263**	2.317*	2.391*	2.410*	2.394*
	(0.043)	(0.066)	(0.063)	(0.058)	(0.063)
Year dummy fixed effect	Yes	Yes	Yes	Yes	Yes
N	484	484	462	462	462
adj. R-sq	0.056	0.571	0.421	0.419	0.431

p-values in brackets
** p<0.1, ** p<0.05, *** p<0.001*

The coefficient for LAG_ESG is statistically significant at the 10% level in model (2) with adjusted R-squared of the model is 0.571, representing a high overall explanatory power of the model. This result suggests that the better ESG performance reported in the current year is statistically associated with a notable increase in real earnings management in the next year. Further analysis indicates that among the three pillars of ESG, only one-year lagged governance performance is positively related to REM.

The finding is contrary to the majority of recent empirical studies that confirm the negative influence of ESG on REM (Liu et al., 2023; Vatis et al., 2025; Primacintya & Kusuma, 2025) but in line with few research results in positive relationship between ESG-AEM (Almubarak et al., 2023) or environment performance and REM (Velte, 2021).

The positive ESG-REM link is well aligned with Agency theory (Jensen & Meckling, 1976). In a study that exclusively examines the relationship between environmental performance and earnings management, Velte (2021) finds that environmental score restricts AEM but promotes REM. He explains that environmental performance might be used as a mask to conceal the managers' harmful influence on financial reporting. In addition, Almubarak et al., (2023) finds that financial distress significantly enhances the positive ESG-EM relationship.

Table 5. Sub-sample analysis

	(2A) Smaller Firms REM	(2B) Larger Firms REM
LAG_ESG	0.00250**	0.0000664
	(0.032)	(0.922)
SIZE	-0.242**	-0.0900
	(0.023)	(0.179)
LEV	0.205	0.158
	(0.124)	(0.178)
MTB	-0.00991	-0.00872
	(0.223)	(0.390)
ROA	2.490***	2.084***
	(0.000)	(0.000)
_cons	4.756**	2.023
	(0.030)	(0.186)
Year dummy fixed effect	Yes	Yes
N	242	242
adj. R-sq	0.543	0.422
p-values in brackets		
** p<0.1, ** p<0.05, *** p<0.001*		

The result of sub-sample analysis is presented in Table 5. The moderating effect of firm size is confirmed as the positive relationship between lagged ESG and REM is only found in smaller firms. The positive and significant relationship between ESG and REM can only be found in smaller firms because smaller firms are often resource-constrained to undertake expensive ESG investment initiatives while maintaining short-term performance targets. This leads to managers' motivation to increase the use of earnings manipulation.

Regarding AEM, the non-significant negative relation is noted in all models.

5. Conclusion

This study aims to examine the relationship between overall ESG performance together with each pillar (Environmental, Social, and Governance) and earnings management practice among ASEAN companies, also investigating how firm size moderates this relationship.

The study is conducted with the sample of 596 firm-year observations which are listed companies in ASEAN countries from the period from 2019-2023. The dependent variables of the studies are accrual-based earnings management (AEM) and real earnings management (REM) as the proxies for earnings management. Independent variables include ESG overall score and its individual pillar scores.

The final regression models show a significantly positive relationship between prior-year ESG performance and current-year REM, suggesting a one-year lagged effect. Further analysis indicates only one-year lagged governance performance is positively related to REM and the positive relationship between lagged ESG and REM is only found in smaller firms. In conclusion, with one-year delayed impact, ESG performance positively influence only REM in smaller firms, in which governance is main contributing factor.

This study offers significant implications for academics, policymakers, and industry stakeholders. For theoretical standpoint, this study provides empirical evidence about positive ESG-EM relationships that align with agency theory in emerging ASEAN region. In terms of actionable insight for regulators, it is essential to establish guidelines and monitoring mechanisms such as simplified ESG reporting standard and realistic implementation roadmaps that tailor to smaller firms which are in the early stage of ESG adoption. Lastly, the study emphasizes managers and investors to look beyond ESG scores, urging leaders to foster a genuine culture of sustainable performance.

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FACTORS INFLUENCING THE QUALITY OF CREDIT APPRAISAL FOR INDIVIDUAL CUSTOMERS AT JOINT STOCK COMMERCIAL BANKS

PhD. Nguyen Thi Hong Yen*

Abstract: ***In the context where individual lending plays an increasingly important role in the operations of joint stock commercial banks (JSCBs) in Vietnam, credit appraisal has become a decisive factor in determining lending quality and risk management. This paper focuses on analyzing the factors influencing the quality of credit appraisal for individual customers. On that basis, several recommendations are proposed to improve credit appraisal quality, thereby contributing to reducing non-performing loans and promoting sustainable development for JSCBs in the integration era.***

• Keywords: *credit appraisal; individual customers; joint stock commercial banks; credit risk; appraisal process.*

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1. Introduction

In the contemporary banking environment, credit activities remain the most fundamental and profitable operation of commercial banks, especially in developing countries such as Vietnam. Among the different segments of credit, lending to individual customers has been growing rapidly and gradually becoming a strategic business orientation for joint stock commercial banks (JSCBs). The expansion of individual lending not only contributes significantly to banks' income diversification but also plays an important role in stimulating domestic consumption, promoting household investment and fostering inclusive economic growth. However, the individual customer segment is characterized by relatively small loan sizes, large customer numbers and high heterogeneity in income sources, spending habits and repayment capacities. These features make the lending process to individuals inherently more complex and riskier compared to corporate lending (Luu Phuoc Ven, 2022).

Credit appraisal is widely acknowledged as the most crucial stage in the credit process because it provides the foundation for lending decisions and risk control. A high-quality appraisal process enables banks to assess the creditworthiness of borrowers, anticipate potential risks and set appropriate lending terms, thereby ensuring the safety of credit portfolios. Conversely, weak or superficial appraisal may lead to inaccurate lending decisions, increasing the probability of non-performing loans (NPLs), impairing bank profitability and undermining financial system stability. In recent years, although JSCBs in Vietnam have made significant improvements in risk management frameworks, credit appraisal quality remains uneven across institutions and is often challenged by limitations in data transparency, information asymmetry and reliance on manual appraisal practices.

The issue becomes even more pressing in the context of Vietnam's deeper integration into the global financial market. The growing competition among banks, the rapid development of financial technology (FinTech) and the rising expectations of customers for faster and more convenient loan services require banks to balance between lending expansion and risk mitigation. This raises an urgent question: what factors influence the quality of credit appraisal for individual customers at JSCBs and how can these factors be managed to ensure both efficiency and safety? Addressing this question is critical not only for the sustainability of each bank but also for the resilience of the entire Vietnamese banking sector. From the theoretical perspective, previous studies worldwide have identified various determinants of credit appraisal quality, such as the availability of customer information, the capacity and ethics of credit officers, the sophistication of appraisal methodologies, the effectiveness of legal frameworks and the overall macroeconomic conditions. However, in the Vietnamese context, research on credit appraisal has primarily focused on corporate lending, while the individual lending segment - despite its rapid growth and high potential - has received comparatively less academic attention. This creates a research gap that calls for a systematic analysis of the factors affecting credit appraisal quality for individual customers in Vietnam. Therefore, this paper aims to systematize and analyze the key factors influencing the quality of credit appraisal for individual customers at JSCBs in Vietnam. By

** Thai Nguyen University of Economics and Business Administration; email: nguyenyenkt@tueba.edu.vn*

categorizing these factors into internal elements (such as customer information, credit officer competence, appraisal procedures and bank policies) and external elements (such as legal framework, credit information systems and macroeconomic environment), the study seeks to provide a comprehensive theoretical basis for evaluating the effectiveness of current appraisal practices. On that foundation, the paper proposes several recommendations to strengthen credit appraisal quality, thereby reducing credit risks, controlling non-performing loans and supporting the sustainable development of Vietnamese JSCBs in the integration era.

2. Definition and characteristics of credit for individual customers

In the modern banking sector, credit activities are not limited to enterprises and organizations but have expanded significantly to serve individual customers. The development of credit for individual borrowers has become a strategic focus for many joint stock commercial banks, especially as retail banking grows in both scope and sophistication. Credit for individual customers refers to the provision of loans by commercial banks to individuals or households for personal consumption, housing, education, medical treatment or small-scale business activities. This type of credit is typically characterized by relatively small loan amounts, shorter repayment terms and more flexible procedures compared to corporate lending (Le Van Te, 2009). It is governed by general banking regulations and specific provisions concerning consumer credit issued by the State Bank of Vietnam and other regulatory authorities.

According to Circular No. 39/2016/TT-NHNN issued by the State Bank of Vietnam, a credit relationship is established when a financial institution agrees to lend money to a customer based on certain terms and conditions, which include a specific repayment period, a defined interest rate and legally acceptable purposes for using the funds (State Bank of Vietnam, 2016). In the context of individual lending, the sources of repayment typically derive from the borrower's regular income such as salaries, profits from small-scale business operations, rental income or other legitimate personal earnings.

Credit for individual customers is distinct from corporate credit in several key ways. First and foremost, individual customers often lack detailed and verifiable financial statements, making it more difficult for banks to assess their financial capacity objectively. As a result, banks rely heavily on income verification documents (such as salary slips, employment contracts or tax records), credit history from the Credit Information Center (CIC) and in many cases, personal interviews or on-site inspections to evaluate the borrower's creditworthiness.

Another characteristic of individual credit is its relatively highrisk level. Compared to corporate clients, individual borrowers tend to have less financial resilience to economic shocks such as job loss, illness, inflation or changes in interest rates. Moreover, they often possess limited collateral and may have less understanding of financial obligations, which can lead to delayed payments or defaults.

On the other hand, credit to individual customers provides banks with significant benefits. Retail lending contributes to the diversification of the credit portfolio, reduces dependency on a few large corporate clients and typically earns higher interest margins. The volume of individual borrowers also creates opportunities for cross-selling other banking products such as insurance, credit cards, savings and digital banking services.

Despite its advantages, individual credit management requires banks to invest substantially in human resources, risk management systems and modern technologies such as credit scoring models, big data analytics and automation tools. Properly managing and appraising loans to individuals is essential to maintaining credit quality and preventing an increase in non-performing loans (NPLs).

3. Definition, objectives and role of credit appraisal

Credit appraisal is a critical step in the credit granting process. It refers to the systematic assessment of a prospective borrower's financial condition, credit history, repayment capacity and purpose for borrowing, carried out by the bank before approving a loan (Nguyen Minh Kieu, 2009). The primary purpose of this process is to evaluate the level of risk associated with a credit request and to support decision-making regarding whether a loan should be approved, under what terms and to what extent.

In the context of lending to individual customers, credit appraisal involves collecting and analyzing both quantitative and qualitative information. This includes income levels, debt obligations, employment stability, credit history, character references and, where applicable, the value and legal status of collateral. The process aims to determine the borrower's willingness and ability to repay the loan in full and on time.

3.1. Objectives of credit appraisal

The primary objective of credit appraisal is to assess the level of risk associated with lending and to ensure that the credit extended by a bank is both safe and recoverable. In the case of individual customers, the process aims to evaluate the borrower's ability and willingness to fulfill their debt obligations based on a

thorough analysis of income, expenses, employment stability, credit history and overall financial behavior. An important goal is to determine whether the customer possesses adequate and sustainable income to service the loan without creating financial distress. Furthermore, credit appraisal seeks to verify the legality and feasibility of the loan purpose, ensuring that the funds will be used for acceptable and productive purposes aligned with the bank's credit policy. Another critical objective is to minimize the potential for default and credit losses by identifying high-risk applicants early in the process. In doing so, credit appraisal contributes directly to maintaining the quality of the bank's loan portfolio and controlling the level of non-performing loans (NPLs). In addition, the appraisal process ensures compliance with internal regulations and external legal frameworks, thereby reinforcing prudent banking practices. Lastly, it provides a reliable foundation for informed decision-making by loan officers and credit committees, supporting the bank's strategic goals in balancing growth with risk management.

3.2. The role of credit appraisal in personal lending

Credit appraisal plays a vital role in the personal lending process, serving as a foundational tool for risk assessment and decision-making in banks. For individual borrowers-who often lack detailed financial documentation and may have varying levels of income stability-the credit appraisal process provides a structured approach to evaluate their creditworthiness. It enables banks to assess not only the financial ability of borrowers to repay loans but also their intent and reliability, helping prevent potential defaults. Through careful analysis of income, debt obligations, credit history and other personal information, banks can differentiate between high-risk and low-risk applicants and tailor loan conditions accordingly. Moreover, a well-implemented appraisal process minimizes credit risk, ensures the safety of bank assets and enhances the overall quality of the loan portfolio. Beyond mitigating risk, credit appraisal also supports customer segmentation and strategic product offerings, allowing banks to better serve the needs of different client groups while maintaining financial discipline. Additionally, it ensures compliance with regulatory standards and internal credit policies, fostering transparency and accountability in lending practices. In essence, credit appraisal acts as the first line of defense against non-performing loans and plays a strategic role in the sustainable development of retail banking.

4. The credit appraisal process for individual customers

The credit appraisal process for individual customers is a systematic and structured procedure that banks undertake to evaluate loan applications before granting credit (Nguyen Minh Kieu, 2014). While specific procedures may vary slightly across institutions, the general process typically includes the following key stages: information collection, preliminary screening, detailed evaluation and final decision-making. In the first stage, banks collect all relevant documents from the customer, including personal identification, income proof (such as salary slips, bank statements or business records), credit reports and documents related to the purpose of the loan (e.g., purchase agreements, tuition invoices or business plans). The preliminary screening assesses whether the applicant meets the basic lending criteria in terms of age, citizenship, income level and creditworthiness. If eligible, the application proceeds to a more comprehensive evaluation stage.

During the detailed appraisal, the bank analyzes the borrower's financial capacity through income-to-debt ratio analysis, cash flow projection and existing liabilities. The customer's credit history is examined using internal records and external databases like the Credit Information Center (CIC) to identify any prior defaults, overdue payments or behavioral patterns. The bank also evaluates the legality and feasibility of the loan purpose and, if applicable, conducts a valuation and legal verification of collateral. In many cases, banks may also conduct interviews or home/business visits to verify the accuracy of the submitted information.

The final stage involves compiling all assessment results into a credit appraisal report, which includes a recommendation regarding loan approval, proposed terms (loan amount, tenor, interest rate) and risk mitigation measures if needed. This report is reviewed by a credit committee or authorized officer who makes the final lending decision. The thoroughness and objectivity of this appraisal process directly influence the quality of the loan portfolio and play a key role in reducing the incidence of non-performing loans. In an increasingly digital banking environment, many banks are also integrating automated credit scoring systems and data analytics tools into this process to enhance efficiency, consistency and accuracy.

5. Evaluation criteria of credit appraisal effectiveness

Evaluating the effectiveness of the credit appraisal process is essential to ensuring that lending decisions are both sound and aligned with the risk management objectives of the bank. A well-functioning appraisal system should not only reduce the occurrence of bad debts but also enhance operational efficiency, customer satisfaction and regulatory compliance. One of the primary indicators of appraisal effectiveness is the non-performing loan (NPL) ratio within the individual lending portfolio. A consistently low NPL ratio

suggests that the appraisal process has been successful in identifying creditworthy borrowers and filtering out high-risk applicants. Another key metric is the approval rate-the proportion of loan applications approved after appraisal. While a high approval rate may indicate efficiency, it must be balanced with prudent risk control to avoid compromising credit quality.

In addition, the accuracy and timeliness of the appraisal process are critical. Delays in processing loan applications can lead to customer dissatisfaction and lost business opportunities, while inaccurate or overly subjective assessments may result in poor credit decisions. Therefore, banks often monitor the average turnaround time (TAT) for appraisals and implement service-level agreements (SLAs) to standardize procedures. The rate of restructured loans-loans that have to be modified due to repayment difficulties-can also serve as a signal of ineffective credit appraisal if found to be high.

Furthermore, customer feedback and post-disbursement loan performance offer qualitative and quantitative insights into the effectiveness of the appraisal process. Banks may also conduct internal audits and periodic reviews of appraisal reports to ensure compliance with policy and detect errors or inconsistencies. In the context of digital transformation, the integration of automated scoring models and risk analytics tools is increasingly being used to benchmark and improve appraisal effectiveness. Overall, a robust evaluation framework helps banks refine their credit appraisal processes, align them with strategic goals and maintain a strong and resilient retail lending portfolio.

6. Factors influencing the quality of credit appraisal

The quality of credit appraisal for individual customers is influenced by a combination of internal and external factors that determine the thoroughness, accuracy and reliability of the appraisal outcomes (Berger, A. N et al., 2002). Among the internal factors, the most significant is the qualification and professional competence of credit officers. Appraisal quality depends heavily on their ability to analyze financial documents, assess repayment capacity, interpret credit reports and detect potential risks. Insufficient training or lack of experience may lead to subjective or inconsistent evaluations, thereby increasing credit risk. Another key internal factor is the availability and quality of information systems, including access to accurate databases, credit history from institutions like the Credit Information Center (CIC) and modern tools such as credit scoring models and automated underwriting systems. Banks with integrated digital infrastructure tend to perform faster and more accurate appraisals.

Additionally, internal credit policies and risk management frameworks directly shape how appraisal processes are designed and executed (Basel Committee on Banking Supervision, 2000). Institutions with clear lending criteria, well-defined workflows and consistent risk classification systems are better equipped to maintain appraisal quality. Moreover, organizational culture and sales pressure may also affect appraisal integrity. When loan officers are overly incentivized by sales targets, it may result in relaxed appraisal standards and moral hazard.

On the other hand, external factors such as macroeconomic conditions-including inflation, interest rate fluctuations and employment trends-can impact a borrower's future repayment ability and therefore influence the appraisal outcome. Regulatory requirements also play an important role; compliance with national banking laws, consumer protection regulations and central bank guidelines ensures that the appraisal process is legally sound and transparent. Furthermore, the borrower's own characteristics, such as transparency in financial disclosure, income volatility and attitude toward debt, significantly affect the appraisal outcome.

In sum, ensuring high-quality credit appraisal requires not only skilled personnel and robust internal systems but also adaptive policies that respond effectively to economic and regulatory changes. A comprehensive understanding of these influencing factors enables banks to improve their appraisal practices, strengthen their credit risk management and promote responsible lending in the personal finance sector.

7. Some proposals to improve the quality of credit appraisal for individual customers at joint stock commercial banks in Vietnam

In the context of Vietnam's increasingly integrated and competitive economy, lending to individual customers has become one of the key business segments of joint stock commercial banks (JSCBs). However, this is also a segment that contains many potential risks, as individual customers often have unstable income sources, financial capacity and repayment ability compared to enterprises. To improve the quality of credit appraisal, minimize risks and ensure sustainable development, JSCBs in Vietnam should consider the following solutions:

First, improving the customer information system and credit database.

Credit appraisal can only be accurate when banks have access to complete, objective and updated information. JSCBs should strengthen cooperation with the Credit Information Center (CIC) and also

exploit supplementary sources such as tax authorities, social insurance agencies, electricity companies and telecom providers to verify income and consumption behavior of customers. In addition, banks should build an advanced internal database to store credit history, transaction habits and repayment records of customers to support analysis and credit scoring.

Second, applying digital technology and artificial intelligence (AI) in credit appraisal.

The adoption of Big Data, AI and Machine Learning allows banks to analyze financial behavior, forecast repayment capacity and identify risks at an early stage. AI-based credit scoring models can combine traditional data (income, occupation, assets) with non-traditional data (spending patterns, online shopping habits, digital banking usage). This not only shortens appraisal time but also increases accuracy and reduces subjectivity from credit officers.

Third, enhancing the competence and professional ethics of credit officers.

Credit officers play a decisive role in determining credit quality. Banks should regularly organize advanced training programs on financial analysis for individuals, collateral evaluation and recognition of non-financial risks (psychological, behavioral and ethical aspects of customers). At the same time, internal control mechanisms should be strengthened to prevent conflicts of interest and ensure that officers do not bypass appraisal procedures in pursuit of lending growth targets, thereby reducing potential non-performing loans.

Fourth, standardizing the appraisal process and diversifying evaluation criteria.

Banks should design transparent, detailed appraisal procedures tailored to different customer segments (salaried employees, household businesses, freelancers, etc.). In addition to traditional criteria such as income, collateral and credit history, banks should incorporate new factors such as customer loyalty, digital banking engagement and social credibility to achieve a more comprehensive and accurate assessment of repayment ability.

Fifth, strengthening supervision and post-disbursement monitoring.

Credit appraisal should not end at the approval stage but must continue throughout the loan cycle. Banks need to implement mechanisms for regular monitoring through scheduled inspections, automated repayment reminders and mobile banking applications that allow customers to track repayment schedules. In addition, post-disbursement checks should be intensified, especially for loans showing early signs of risk, so that timely recovery measures can be applied.

Sixth, fostering a strong risk management culture across the organization.

Improving the quality of credit appraisal must go hand in hand with establishing a culture of risk management within each bank. This requires strong commitment from top management and assigning responsibility for credit quality control to every department and individual. Banks should balance lending growth objectives with capital safety, considering risk management as the cornerstone for sustainable development.

Conclusion

Credit appraisal plays an essential role in the sustainable development of personal lending activities in joint stock commercial banks. As retail banking continues to expand and diversify, the need for robust, accurate and efficient credit appraisal systems becomes increasingly critical. Through the theoretical foundations discussed in this paper-including the definition, objectives, contents, procedures, evaluation criteria and influencing factors-it is evident that credit appraisal serves not only as a risk mitigation tool but also as a strategic component of credit portfolio management. A comprehensive and well-structured appraisal process enables banks to make informed lending decisions, tailor credit products to individual customer profiles and maintain asset quality in a competitive and dynamic financial environment. Moreover, by understanding and addressing the factors that affect appraisal quality-ranging from staff expertise to technological infrastructure and regulatory compliance-banks can enhance the overall effectiveness of their credit assessment systems. In doing so, they not only reduce the risk of loan defaults but also improve customer satisfaction and operational efficiency. As Vietnam's banking sector continues its digital transformation, the integration of advanced analytics and automated credit scoring tools will further strengthen the credit appraisal process. In conclusion, continuous improvement in credit appraisal practices is vital for joint stock commercial banks to manage risk proactively, comply with evolving regulations and achieve long-term stability in personal lending operations.

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BUDGET IN MANAGEMENT ACCOUNTING TO MANAGE EXPENSES OF CONSTRUCTION ENTERPRISES

PhD. Nguyen Thi Phương Thao*

Abstract: ***Construction budgeting is mandatory and is currently used by enterprises as the primary tool for cost management; however, it remains insufficient for managing all types of costs. Using a comparative case study method, this research explores how budgeting is utilized in cost management within construction enterprises. The study introduces a four-step annual budgeting process based on the Zero-Based Budgeting (ZBB) approach to enhance cost management in these enterprises.***

• Keywords: *budget, management accounting, construction enterprises.*

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1. Introduction

The construction industry is characterized by fixed pricing, which is determined before production begins. This implies that budgeting for cost management in construction enterprises is crucial, as failure to anticipate all cost elements may reduce expected profits. Currently, budgeting is a mandatory requirement for all construction projects.

According to Clause 1, Article 135 of the 2014 Construction Law (amended and supplemented in 2020), the construction project budget represents the necessary costs to execute a construction project, implement bidding packages, and undertake construction activities. These costs are determined based on the quantity of materials calculated from technical designs, detailed construction drawings, work requirements, and construction cost norms and prices. Thus, a construction budget essentially serves as a comprehensive plan covering several technical indicators and production factors.

However, many cost components are not included in construction budgets, such as business management expenses and financial operation costs. Most enterprises use budgetary information primarily for financial accounting purposes, focusing on documentation for final project settlements i.e., accounting for production costs and the cost of goods sold rather than leveraging the budget for managerial accounting (MA) information needs.

By employing a comparative case study method, this research examines how construction enterprises currently utilize budgets in MA practices to control costs. Furthermore, it proposes a budgeting framework tailored to MA functions within these enterprises. The study contributes to the broader dissemination of MA techniques in general and, more specifically, to the budgeting process for cost management in construction enterprises.

2. Literature review

Budgeting plays a fundamental role in management accounting, particularly in cost control and optimizing organizational efficiency. The evolution of management accounting has witnessed the emergence of various tools and techniques aimed at enhancing cost management capabilities, with budgeting being an indispensable method. In particular, competition in the industrial environment has driven the development of increasingly complex and effective cost management strategies. Key techniques such as standard costing, cost-volume-profit analysis, transfer pricing, variance analysis, and responsibility accounting have been widely applied (Lin et al., 2002).

Within the management accounting system, budgeting serves not only as a financial planning tool but also as a crucial mechanism for monitoring and evaluating performance. Klychova et al. (2014) emphasized that budget efficiency is a key factor enabling organizations to allocate resources appropriately, monitor financial performance, and track operational efficiency. Through budgeting, enterprises can define financial objectives, optimize resource utilization, and measure performance against established criteria. Moreover, this process enables managers to make data-driven decisions, detect variances, and implement corrective measures to ensure effective cost control. However, the role of budgeting extends beyond financial management

** Tay Bac University; email: phuongthao@utb.edu.vn*

and is closely tied to organizational incentive mechanisms. Aguiar et al. (2012) highlighted the relationship between managerial reward systems and the application of management accounting methods, particularly responsibility control principles. Their study revealed that reward mechanisms influence the use of budgeting, standard costing, and performance evaluation, thereby ensuring managerial accountability within their respective control domains.

In addition to its general role in management accounting, budgeting has been explored in various industry contexts. Pavlatos, O., & Kostakis, H. (2023) highlights the moderating role of cost accounting information quality in the relationship between crises and budget use. Hospitals that have been most affected by the pandemic and have simultaneously better cost accounting information have increased their use of budgets for planning, resource allocation and cost control more than those whose costing system does not provide superior cost data. Whereas Tănase (2021) proposed functional cost analysis to identify the most effective responsibility centers.

Furthermore, recent studies have expanded the scope of budgeting research in relation to performance and strategic management. Chumak (2023) highlighted that budgeting is not merely a cost management tool but also a foundation for effective strategic decision-making. From a socio-theoretical perspective, Nikidehaghani (2023) provided a critical view on how accounting and budgeting techniques shape individuals into economic neoliberal citizens, using the case of Australia's National Disability Insurance Scheme (NDIS) as an example.

Synthesizing these studies, it is evident that budgeting plays a crucial role in management accounting, not only in cost control but also in decision-making, performance improvement, and addressing economic challenges. Additionally, technological factors, industry environments, and managerial incentives significantly impact the effectiveness of budgeting systems. In the context of an increasingly volatile global economy, continued research and refinement of budgeting methods are essential to ensuring financial efficiency and sustainable organizational development.

3. Research methodology

- Qualitative research and deductive reasoning approach: The purpose of deductive reasoning is to analyze logic based on existing theories rather than creating a new theoretical framework.

- Comparative case study method: To gain a deeper understanding of how budgeting in management accounting is used for cost control in construction enterprises within real-world contexts, a comparative case study approach is adopted. Conducting case studies in three enterprises allows for a comparison, helping to identify differences and similarities.

- Data collection: The cases were selected using purposive sampling, a non-probability technique based on theoretical frameworks and research questions (Ghauri & Gronhaug, 2010). The selection criteria include:

+ Operating in the construction industry.

+ Employing fewer than 300 workers (small and medium-sized enterprises).

+ Having owners or managers directly overseeing daily business operations.

+ Operating within the Northwestern region to ensure consistency in comparisons.

Three companies, labeled A, B, and C, met the above criteria and were contacted via phone to schedule interviews. The interviews were conducted with the owner-managers and lasted between 30 to 45 minutes. A semi-structured questionnaire was used for direct interviews to allow for comparable responses, deeper understanding, further clarification, and richer insights. The interviews were carefully recorded and were conducted in September 2024.

4. Research findings

Case of Company A

The company prepares cost estimates for each construction project and its specific components. This is a mandatory requirement before initiating any construction work. The cost estimates are prepared by technical staff based on the quantity of tasks determined according to the technical design or construction drawings and are calculated using the prevailing price levels at the time of estimation. The standards used in cost estimation are based on the government-issued regulations.

The content of construction project cost estimation is defined in Article 11 of Decree 10/2021/ND-CP, dated February 9, 2021, issued by the Government on Investment Cost Management for Construction Projects. It includes the following cost components: Construction costs, Equipment costs, Project management costs, Consulting costs for construction investment, Other costs, Contingency costs

Essentially, construction cost estimation serves as a preliminary calculation of the project's value before execution. Apart from construction cost estimation, the company does not prepare any other types of cost estimates. All expenses are managed to align as closely as possible with the projected budget. The company typically increases profitability by minimizing costs and accelerating project completion timelines. Below is an example of a construction cost estimate prepared by the company.

Table 1. Construction Cost Estimate for National Highway 12

No.	COST ITEMS	Calculation method	Symbol	Amount
A	**Public service cost for disaster recovery and initial traffic assurance**			
I	**Direct Costs (VL+NC+M)**	**VL+NC+M**	**T**	**702.311.000**
1	Material costs (VL)	VL	VL	440.084.891
2	Labor costs (NC)	NC	NC	199.030.495
3	Construction machinery and equipment costs (M)	M	M	63.195.460
II	**Indirect Costs**		**GT**	**73.040.000**
1	General costs	T x 6,2%	C	43.543.282
2	Temporary housing and site management costs	T x 2,2%	NT	15.450.842
3	Costs of unspecified tasks not determined from design	T x 2%	Ck	14.046.220
III	**Pre-tax taxable income**	**(T + GT) x 6%**	**TL**	**46.521.060**
IV	**Traffic safety assurance costs for construction**	**Chi tiết**	**ĐBGT**	**20.088.843**
	Pre-tax repair costs	***T+GT+TL***	***G***	**841.960.903**
V	**Value-added tax (VAT)**	**G x 8%**	**GTGT**	**67.356.872**
	Post-tax construction costs	***G + GTGT***	***Gxd***	**909.318.000**
B	**PROJECT MANAGEMENT COSTS**	**G x 2,936% x 0,8**	**Gqlda**	**20.369.000**
C	**CONSTRUCTION CONSULTANCY COSTS**	**TV1+TV2+TV3**	**Gtv**	**83.072.000**
1	Survey costs	Bảng tính riêng	TV1	40.243.101
2	Cost of preparing completion documents + cost estimation	G x 1,37% x 1,1	TV2	13.703.422
3	Construction supervision costs	G x 3,203%	TV3	29.125.456
D	**OTHER COSTS**		**Gk**	**196.000**
	Appraisal fee for completion documents + cost estimation	TMĐT x 0,019%	K1	196.074
	TOTAL	**Gxd + Gqlda+Gtv + Gk**	**Vtm**	**1.012.955.000**

Source: Company A

Case of Company B

Initially, when asked about cost estimation practices, the interviewee from Company B stated that the company did not prepare cost estimates. However, upon further clarification, it was explained that while the company does not prepare annual cost estimates, it does prepare cost estimates for individual construction projects.

Each construction team is treated as a cost and profit center, bearing primary responsibility for managing costs and profits of the projects they handle. Before project execution, the company assigns a profit percentage that each cost and profit center must contribute back to the company. Any additional profits or losses beyond this percentage are solely the responsibility of the respective unit.

The interview revealed that construction projects involve many unforeseen factors, requiring flexibility in execution. As a result, actual costs do not always align with the initial cost estimates. Any major deviations must be reported to the company's leadership for guidance, while smaller variations are handled independently by each cost and profit center. There is no formal threshold to distinguish between "major" and "minor" cost deviations; instead, decisions are based on the subjective judgment of the construction managers responsible for each cost and profit center. Periodic cost management reports are conducted between the cost and profit centers and company leadership.

Additionally, each cost and profit center is responsible for collecting and submitting initial financial documents to the company's headquarters for accounting purposes. These documents are collected following the accounting department's guidance, closely aligned with construction cost estimates, with the goal of minimizing discrepancies between actual expenses and projected estimates. This approach facilitates final settlements with investors and ensures that the figures are properly recorded in financial reports and accounting records.

From the perspective of overall enterprise management, cost estimates primarily serve as a basis for financial accounting, rather than a tool for cost management to support management accounting (MA). This is because cost management responsibility is largely delegated to the individual construction teams.

However, cost estimates are frequently used as a cost management tool within the cost and profit centers to monitor and regulate production activities. They also serve as a reference for improving future projects, particularly those within the same geographic area. That said, cost control methods primarily rely on technical analysis and operational experience rather than MA tools, due to limited expertise in management accounting.

Case of Company C

Company C follows a similar approach to Company B, in which cost management is primarily delegated to construction teams. However, these teams mainly manage material and direct labor costs, while the company itself prepares and controls cost estimates for expenses incurred at the enterprise-wide level.

For loan interest expenses, the company borrows funds from banks, plans interest payments, and proactively controls borrowing costs. Bank loan funds are allocated to construction teams based on the company's overall financial plan, taking into account factors such as construction progress, cash flow forecasts, and project timelines.

Table 2. Interest Payment Plan

Month	Beginning Balance (VND)	Interest Rate/ Month (%)	Interest Payment (VND)	Principal Payment (VND)	Total Monthly Payment (VND)	Ending Balance (VND)
1	3,000,000,000	0.4167	12,500,000	50,000,000	62,500,000	2,950,000,000
2	2,950,000,000	0.4167	12,291,667	50,000,000	62,291,667	2,900,000,000
3	2,900,000,000	0.4167	12,083,333	50,000,000	62,083,333	2,850,000,000
4	2,850,000,000	0.4167	11,875,000	50,000,000	61,875,000	2,800,000,000
5	2,800,000,000	0.4167	11,666,667	50,000,000	61,666,667	2,750,000,000
...	...	...	...	...	...	...
60	50,000,000	0.4167	208	50,000,000	50,208,333	-

Source: Company C

For construction equipment costs, as the company owns certain machinery that serves multiple projects simultaneously, equipment usage plans are developed based on proposals from construction teams. The allocation and rental of construction machinery from external providers are carefully assessed and centrally controlled at the enterprise level to ensure efficiency.

Unlike Company B, Company C not only prepares construction cost estimates for each project but also

develops annual cost estimates at the enterprise level to maximize cost control. Different cost management strategies are applied depending on the type of cost and management scope. However, these estimates are not regularly monitored or adjusted; they are typically established once at the beginning of the year or before project commencement.

Thus, it can be observed that construction enterprises primarily use construction budgeting as a tool for cost control, financial management, and business growth. This represents one of the earliest control systems implemented in enterprises (Davila & Foster, 2007; Sandino, 2007). However, construction budgets prepared for individual projects differ from annual budgets established at the enterprise level. Depending on the management approach, some enterprises use project budgets to control direct costs, while annual budgets are utilized to manage company-wide expenses.

Currently, construction firms do not establish comprehensive enterprise-wide budgets to control all incurred costs. The segmentation of cost and profit centers appears to be well-suited to the characteristics of construction activities. However, it is necessary to consolidate budgets from different departments and cost centers into an overall enterprise budget to enhance financial control and decision-making.

Step 1: Identifying Departments and Budgeting Scope

In a construction company, the key departments involved in budgeting include:

- Technical & Construction Department: Responsible for estimating construction costs, equipment costs, project management costs, construction investment consulting costs, miscellaneous costs, and contingency costs (all of which are included in the construction budget).

Other departments estimate costs outside the construction budget, specifically:

- Finance & Accounting Department: Estimates management and financial costs.

- Human Resources Department: Estimates salaries, training expenses, and employee benefits.

- Planning Department (Project Management): Estimates administrative, legal, and bidding costs.

These departments can adopt the Zero-Based Budgeting (ZBB) method, which assumes an initial budget of zero for all departments. Based on this assumption, each activity and its necessary expenditures are reviewed and then added to the initial zero budget.

This approach differs from the traditional budgeting process, which relies on the previous year's budget. Instead, every expenditure is reassessed from scratch, focusing on operational efficiency and determining whether each cost item is truly necessary. If required, unreasonable expenses should be reduced.

Suggested Cost Reduction Strategies: Developing an optimized salary and bonus structure to enhance productivity; Utilizing recycled materials and waste, such as used machine oil and old formwork; Optimizing equipment costs by renting infrequently used equipment; Leasing equipment for projects located far from company headquarters to minimize fuel costs.

Step 2: Collecting Budget Estimates from Departments

Each department prepares its own budget estimate based on actual needs. These estimates are structured according to the categories of expenses incurred within the respective department.

Step 3*:* Consolidating Budget Reports

The budgets are aggregated by major expense categories. During consolidation, it is essential to check for overlapping costs across departments, adjust costs to align with projected total revenue, compare with previous years' budgets to assess reasonableness, propose cost-saving measures if expenses are excessively high.

Step 4*:* Reviewing & Approving Budget Estimates

The Board of Directors and Finance Department review the budget, ensuring its rationality and feasibility. They also compare it with previous projects to optimize the budget and, if necessary, adjust allocations before final approval.

5. Conclusion

Using qualitative research methods, deductive reasoning, and comparative case study analysis, three construction enterprises were selected for the study. The findings indicate that all firms use construction budgeting for cost management, though with varying scopes and methodologies. Notably, only one company prepares an annual budget.

To enhance the role of budgeting in cost management, a four-step company-wide budgeting approach using the Zero-Based Budgeting (ZBB) method has been proposed.

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CHINESE FOREIGN DIRECT INVESTMENT IN VIETNAM IN THE CONTEXT OF SUSTAINABLE DEVELOPMENT

PhD. Dao Duy Thuan*

Abstract: ***This paper analyzes Chinese FDI in Vietnam (2014 - 2024), assessing its effects on growth, environment, and labor. While contributing to industrialization and exports, it also poses sustainability and dependency risks. The study suggests policy directions to enhance benefits and reduce harm. Findings support Vietnam's strategic goals in green and inclusive development.***

• Keywords: *Chinese FDI, sustainable development, private economy,…*

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1. Introduction

Foreign Direct Investment (FDI) is pivotal in Vietnam's economic development, contributing over 23% to total social investment and nearly 70% to export turnover (World Bank, 2024). As a key driver of industrialization, FDI facilitates technology transfer, job creation, and deeper global economic integration.

China has emerged as a strategic partner among foreign investors, ranking third in total FDI with over USD 35 billion invested in the past decade (MPI, 2024). Chinese investment is concentrated in manufacturing, renewable energy, electronics, and infrastructure, with a growing focus on high-tech and green sectors, reflecting a strategic shift from low-value industries to those aligned with sustainable development. However, recent dynamics, including geopolitical tensions, the COVID-19 pandemic, and China's domestic economic reforms, have reshaped Chinese FDI flows. Research by VCCI shows that Chinese enterprises are increasingly embedded in Vietnam's economic fabric, engaging in export-led production, intra-FDI supply chains, and local partnerships.

Given this evolving context, this study examines Chinese FDI's economic, social, and environmental impacts in Vietnam during 2014 - 2024. It aims to assess opportunities and challenges, offering policy recommendations to enhance benefits while mitigating sustainability risks. The findings provide a timely foundation for shaping selective FDI attraction strategies that balance growth with environmental and social priorities.

2. Theoretical frameworks

2.1. Foreign direct investment (FDI)

Foreign Direct Investment (FDI) refers to cross-border investment where an investor from one country acquires a lasting interest and significant control (typically at least 10% voting rights) in a business entity located in another country (IMF, 2009). Key international institutions, including the IMF, WTO, and UNCTAD, emphasize the long-term nature and managerial control of FDI as distinguishing characteristics from other capital flows.

In Vietnam, the Investment Law No. 61/2020/QH14 defines foreign investment broadly, encompassing capital contributions, share purchases, or project-based investments by foreign individuals or organizations. Although the law does not explicitly differentiate FDI from other foreign capital forms, it aligns with global standards by recognizing foreign-controlled enterprises as part of the foreign-invested sector.

FDI enterprises in Vietnam may be wholly foreign-owned firms, joint ventures, or domestic firms with significant foreign equity. These entities operate under Vietnamese law but are often influenced by the strategies of multinational corporations or their parent companies.

In essence, FDI involves the transfer of capital and management from a home country to a host country, creating sustained economic relationships and influencing industrial structure, productivity, and integration into global value chains.

** Academy of Finance; email: daoduythuan@hvtc.edu.vn*

2.2. FDI and sustainable development in the new context

Sustainable development has evolved beyond its traditional three-pillar definition (economic, social, environmental) to encompass broader global challenges such as climate change, inequality, and technological disruption (Sachs, 2015). When aligned with sustainability goals, FDI can contribute positively to infrastructure, technology transfer, and employment generation, especially in developing countries. However, if mismanaged, it can also lead to environmental degradation, social inequality, and overexploitation of resources (UNCTAD, 2024).

The global FDI landscape is shifting due to geopolitical tensions, trade protectionism, and COVID-19-induced supply chain disruptions. Investors increasingly consider environmental, social, and governance (ESG) factors, while recipient countries adopt stricter screening policies. China, for instance, has reoriented its outward FDI strategy toward high-tech, green, and sustainable industries, moving away from traditional heavy industry. Social expectations around transparency, community rights, and equitable benefit-sharing also shape FDI dynamics. Global pressure has compelled host countries to adjust legal frameworks, ensuring that FDI supports inclusive and environmentally responsible development.

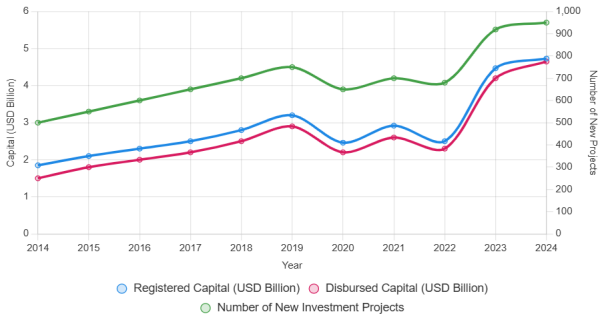
In this context, the link between FDI and sustainable development is conditional, not automatic. For Vietnam, as a key recipient of Chinese FDI, a robust policy framework that encourages green investment, ensures transparency, and enforces environmental and labor standards is essential to maximize long-term benefits while mitigating risks.

3. Current status of Chinese foreign direct investment (FDI) in Vietnam

In the context of shifting global trade dynamics and post-COVID economic restructuring, Chinese FDI into Vietnam has grown in volume and strategic relevance. Vietnam's geographical location, competitive labor force, and improved investment environment have made it an attractive destination for Chinese investors, particularly amid U.S.-China trade tensions. This capital flow meets production demands and promotes technology transfer and industrial transformation.

Chart 1 shows that, between 2014 and 2024, Chinese FDI flows into Vietnam grew substantially. In 2024 alone, Vietnam attracted 919 new Chinese-invested projects, totaling USD 4.73 billion, a 3.1% increase from 2023. By Q1 2025, China ranked third among 73 FDI partners, following Singapore and South Korea, with cumulative investment exceeding USD 35 billion. Notable projects include the Vinh Tan 1 Thermal Power Plant, Victory Giant Technology's PCB facility, and Brotex's fiber plant, reflecting a gradual shift from traditional industries to higher-value sectors such as electronics and precision manufacturing.

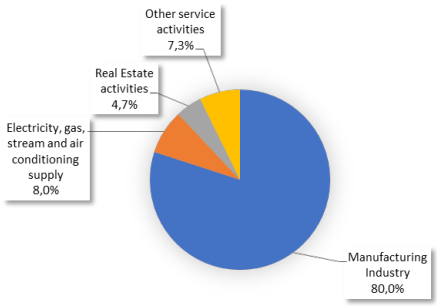
Chart 1. Chinese foreign direct investment (FDI) in Vietnam during the period 2014 - 2024



Source: Compiled by the author from the Ministry of Planning and Investment, General Statistics Office (2024)

Chinese FDI has demonstrated regional concentration, with provinces like Tay Ninh, Bac Giang, and Binh Thuan attracting large capital inflows due to their industrial infrastructure and policy incentives. These provinces alone accounted for over USD 9.6 billion in Chinese FDI as of 2024. Investment also spans 19-21 sectors, with a strong focus on manufacturing and processing (accounting for ~80% of total Chinese FDI projects), particularly in electronics, textiles, and machinery (GSO,2024).

Chart 2. Sectoral composition of Chinese investment in Vietnam by industry in 2024



Source: Ministry of Planning and Investment, 2024 (now Ministry of Finance)

In recent years, a shift towards renewable energy is evident. Chinese solar, wind, and hydropower investment has grown under frameworks such as the Global Clean Energy Partnership (Y. Dawei &

Weiwei, 2025). Favorable regulatory reforms and national energy strategies have facilitated these flows, supporting Vietnam's low-carbon transition.

Infrastructure development is another focal point. Chinese enterprises have participated in ten industrial parks (over 2,000 hectares) and engaged in public-private transport and seaport development partnerships in provinces like Hai Phong and Quang Ninh. These activities enhance Vietnam's logistics capacity and regional trade integration.

In summary, Chinese FDI into Vietnam is becoming more diversified and strategically aligned with both countries' industrial and energy agendas. While manufacturing remains dominant, emerging renewable energy and infrastructure trends signal a qualitative shift in investment structure, with implications for long-term sustainable development.

4. The impact of Chinese FDI on sustainable development in Vietnam

4.1. Positive impacts

4.1.1. Promoting industrial growth and economic restructuring

Chinese FDI has significantly contributed to Vietnam's industrial expansion and economic restructuring. Manufacturing, electronics, and infrastructure investments have supported the transition from labor-intensive to capital- and technology-intensive industries. According to MPI (2024), Chinese FDI accounts for 18% of total export turnover, substantially contributing to the electronics and mechanical sectors.

In the renewable energy sector, Chinese firms have invested $1.5-2.3 billion in solar projects from 2020 to 2024, accounting for 10-15% of total FDI in this field (GSO, 2024). Notable projects include Trina Solar's $420 million plant in Thai Nguyen. According to IRENA (2024), Vietnam's installed solar PV capacity increased from about 16.7 GW in 2020 to 17.1 GW in 2023, with market assessments estimating nearly 17.7 GW by the end of 2024 (Mordor Intelligence, 2025).

Additionally, Chinese FDI contributed 35% of Vietnam's $2.5 billion solar panel export value in 2024 (UNCTAD, 2024), reduced CO_2 emissions by 18 million tons annually (World Bank, 2024), and created approximately 40,000 jobs. These outcomes directly support Sustainable Development Goals (SDGs) 7 and 13, reflecting the strategic contribution of Chinese investment to green and inclusive growth.

4.1.2. Technology transfer and enhancing production capacity

Chinese FDI has facilitated technology transfer through modern production lines and cooperation in human resources. Firms like Huawei, ZTE, and TCL have introduced technologies that exceed local industry standards and enhance productivity and product quality. According to OECD (2021), technology transfer occurs via intra-firm operations, supply chains, and training mechanisms, all observed in Chinese-invested projects. However, the depth of transfer remains debated.

Notably, Chinese-invested plants in Bac Ninh and Hai Phong have employed domestic engineers and technicians, enabling skill development and exposure to international practices. These linkages, as emphasized by the World Bank (2024), support the growth of the manufacturing sector and enhance Vietnam's export capacity and global competitiveness through improved industrial quality.

4.1.3. Strengthening supply chain linkages

Chinese FDI has promoted the integration of Vietnamese firms into regional and global supply chains, particularly in electronics and textiles. According to GSO (2024), about 35% of domestic enterprises in industrial zones with Chinese investment are second- or third-tier suppliers. Participation in these supply chains has improved quality standards (e.g., ISO 9001 adoption), labor productivity (up 5-7%), and investment in process upgrading (WTO, 2024; GSO, 2024).

4.1.4. Promoting exports

Chinese FDI-led export-oriented production has elevated Vietnam's trade performance. In 2023, Chinese FDI accounted for USD 67 billion in exports, around 18% of the national total (MPI, 2024). Enterprises leveraged FTAs like CPTPP and RCEP, boosting sectors such as textiles and electronics. Each USD 1 billion in electronics exports is estimated to generate 15,000 direct and 25,000 indirect jobs (Dao et al., 2023).

4.1.5. Employment and human resource development

Chinese investment has made a notable contribution to Vietnam's labor market, generating an estimated 320,000 direct jobs as of 2024 (MPI, 2024). These positions are concentrated in provinces such as Bac Giang, Tay Ninh, and Hai

Phong, particularly within the manufacturing, electronics, and machinery industries. Expanding employment opportunities has significantly helped reduce regional unemployment, from 3.2% in 2014 to 2.1% in 2023 (GSO, 2024; World Bank, 2024).

Beyond the quantitative effect, Chinese FDI has also shaped the qualitative dimension of Vietnam's human capital. Enterprises have introduced training programs in machine operation, safety standards, and production management, enhancing productivity and equipping previously unskilled workers with transferable skills (Dao et al., 2023). This dual impact, both in job creation and workforce upskilling, underscores the strategic role of Chinese FDI in promoting human resource development in Vietnam.

4.1.6. Environmental impact and growth quality

Although concerns about environmental standards persist, Chinese FDI is increasingly shifting toward green sectors. In 2022, China accounted for 25% of FDI in Vietnam's renewable energy, especially solar and wind projects in the Central Highlands (GSO, 2024). These investments support the national energy transition and greenhouse gas reduction targets.

In summary, Chinese FDI contributes to Vietnam's sustainable development by enhancing industrial capabilities, enabling technology transfer, strengthening supply chains, and supporting export growth. It also holds potential in green transformation, provided policies align with long-term strategic goals.

4.2. Negative impacts

4.2.1. Environmental impact: Pollution and resource wastage

Chinese FDI has raised major environmental concerns, particularly in resource-intensive and polluting industries like textiles, metallurgy, and chemicals (GSO, 2024; UNCTAD, 2024). These sectors frequently use outdated technologies, consuming 1.3-1.5 times more energy than industry averages (World Bank, 2024). Violations in wastewater disposal and solid waste management are recurrent, with 7.2 million tons of industrial waste annually generated in Chinese-invested zones (GSO, 2024).

This aligns with the Pollution Haven Hypothesis (PHH), which suggests FDI tends to flow to countries with weaker environmental regulation. Chinese-invested factories in Vietnam also consume more water and energy per unit output than Japanese or Korean equivalents. Inadequate monitoring systems and regulatory enforcement further exacerbate these problems, undermining Vietnam's SDG commitments, especially Goals 6, 7, and 13 (UN, 2023).

4.2.2. Over-reliance on traditional industries

FDI from China remains concentrated in low-value, resource-intensive sectors. In 2023, nearly 72% of total FDI from China was directed to processing and manufacturing (GSO, 2024). This impedes economic diversification and integration into high-value global supply chains. Furthermore, environmental degradation and low technological spillovers burden Vietnam's public health, biodiversity, and long-term competitiveness.

4.2.3. Unfair competition and social impacts

Chinese FDI often benefits from favorable incentives, leading to competitive distortions against domestic SMEs. These firms face capital disadvantages and reduced incentives for innovation. Job quality is also a concern; most positions are low-skilled and underpaid, with only ~9% of workers holding technical or managerial roles, compared to 20-25% in Japanese/Korean FDI (Dao et al., 2023). Moreover, Labor disputes and poor working conditions persist due to cultural clashes, limited training, and a lack of occupational safety standards. Many Chinese firms lack structured upskilling programs or collaboration with vocational institutions, restricting long-term labor development.

4.2.4. Negative impacts on resource management and investment diversification

Vietnam's increasing dependence on Chinese capital, particularly in extractive and labor-intensive sectors, poses risks to resource governance and investment diversification. From 2014 to 2022, 62% of Chinese projects targeted resource-heavy industries. Such concentration heightens exposure to geopolitical risks, including trade tensions and capital flight (UNCTAD, 2024). Moreover, provinces often prioritize quick FDI disbursement over sustainability, distorting investment structure. This undermines long-term development goals, limiting space for high-tech and environmentally responsible industries.

5. Policy recommendations to leverage opportunities and mitigate risks from Chinese FDI in the context of sustainable development in Vietnam

In alignment with Vietnam's Sustainable Development Strategy (2021-2030) and Vision to

2045, a strategic shift in managing Chinese FDI is imperative, moving from passive attraction to proactive governance grounded in sustainability, resilience, and transparency. Six core policy recommendations are proposed:

Firstly, *integrating sustainability criteria in FDI appraisal and oversight,* Vietnam should revise its investment framework by embedding sustainability indicators, such as energy/resource efficiency, emissions intensity, technology spillover potential, and contribution to skilled employment, into FDI screening and licensing. International experiences (e.g., South Korea, Germany, Chile) demonstrate the effectiveness of applying "green filters" to enhance FDI quality.

Secondly, *diversifying investment partners to reduce strategic risk.* Vietnam must expand investment cooperation with the EU, the U.S., Japan, and other OECD countries to avoid overdependence on Chinese capital. Partner diversification enhances supply chain resilience, bargaining power, and long-term economic stability.

Thirdly, *enhancing local institutional capacity in receiving and supervising FDI.* Weak enforcement in environmental and social impact monitoring has allowed regulatory evasion. Thus, Vietnam should: (i) enhance provincial staff training; (ii) mandate environmental audits for high-risk projects; and (iii) improve coordination between investment, environment, and labor agencies.

Fourthly, *promoting technology transfer and domestic linkages.* Vietnam should condition market access for large Chinese FDI projects on clear commitments to local content, knowledge transfer, and workforce training. Policies should also support domestic firms in upgrading their absorptive capacity to capture spillovers.

Fifthly, *advancing green investment standards.* Chinese investment should be guided toward clean energy, green infrastructure, and resource-efficient technologies. Licensing should adhere to global standards (ISO 14001, ESG), while policy tools such as tax incentives and green financing can steer capital into sustainable sectors.

Sixthly, *institutionalizing bilateral dialogue on sustainable FDI.* Vietnam should initiate an institutional dialogue mechanism with China covering transparency, environmental safeguards, grievance redress systems, and a binding Code of Conduct for Chinese investors. Such engagement fosters trust, predictability, and mutual accountability, while aligning cross-border investment flows with sustainability objectives.

In sum, for Chinese FDI to truly catalyze Vietnam's sustainable development, the country must transcend a "passive attraction" model and adopt a paradigm of "strategic governance," systematically integrating economic, social, and environmental dimensions to secure long-term resilience and inclusive growth.

6. Conclusion

Chinese FDI has become increasingly significant in Vietnam's development trajectory, contributing to industrialization, employment generation, and technology transfer. However, it also raises complex challenges related to environmental degradation, labor standards, and strategic overdependence. The dual nature of this capital flow necessitates a selective and governance-driven approach. Maximizing the benefits of Chinese FDI requires Vietnam to move from a passive attraction model to an active shaping model anchored in sustainable development principles. This includes integrating ESG standards into investment policy, enhancing local institutional capacity, promoting bilateral dialogue mechanisms, and diversifying investment partners to mitigate geopolitical risks.

Future research should explore the quantitative impacts of Chinese FDI on Vietnam's economic, environmental, and social pillars, particularly at the sectoral and provincial levels, to inform evidence-based, resilient investment policymaking.

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THE IMPACT OF INFLATION AND REAL EXCHANGE RATE ON BILATERAL TRADE BALANCE: A CASE STUDY OF THE TRADE BALANCE BETWEEN VIETNAM AND JAPAN

PhD. Tran Thi Phuong Mai* - MSc. Tran Viet Trang**

Abstract: ***Amid the recent inflationary fluctuations in Japan following a prolonged period of low inflation, this study aims to examine the impact of Japanese inflation and the real exchange rate (JPY/VND) on the bilateral trade balance between Vietnam and Japan. The research employs monthly time-series secondary data from January 2009 to December 2024, collected from the General Statistics Office of Vietnam, Japan's Statistical Portal, and the International Monetary Fund (IMF). Three research hypotheses are developed and tested through two econometric models using multicollinearity diagnostics, unit root tests, autoregressive distributed lag (ARDL) models, and bound testing procedures. The findings of this study not only contribute to theoretical understanding but also offer practical policy recommendations to mitigate risks, reduce import dependence, enhance competitiveness, stabilize exchange rates, and promote sustainable trade between Vietnam and Japan.***

• Keywords: *inflation, real exchange rate, trade balance, JPY/VND exchange rate.*

JEL codes: E31; F31; F14; F41; C32

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1. Introduction

Inflation, particularly when originating from elevated production costs, can subtly erode the competitiveness of domestic enterprises. In such circumstances, domestically produced goods are likely to face price disadvantages relative to imported goods, causing the real exchange rate to shift in an unfavorable direction and gradually exerting adverse pressures on the international trade balance (Krugman, 2012). In the current context, Japan is experiencing a phase of inflation, driven primarily by surging energy and imported raw material costs. This development not only poses considerable challenges for domestic manufacturing firms but also reshapes the real exchange rate dynamics of the Japanese yen. Consequently, such fluctuations may directly affect the international competitiveness of Japanese goods and, by extension, exert a significant influence on its trade balance with partner economies, notably Vietnam (Thorbecke, 2008).

According to the International Monetary Fund (IMF, 2021), inflation is defined as the rate of increase in the general price level over a given period, while the real exchange rate (RER) between two currencies is calculated as the product of the nominal exchange rate and the relative price level ratio between the two countries. Furthermore, the IMF (2007) states that the trade balance represents the difference between the value of exports of goods and services and the value of imports of goods and services. Drawing on Gustav Cassell's Relative Purchasing Power Parity (PPP) theory, the exchange rate between two currencies, in the long run, is expected to adjust in accordance with the inflation differential between the two countries, thereby ensuring equivalent purchasing power for an identical basket of goods in both economies. In the *Dictionary of Economics*, Nguyen (2012) elucidates the relationship between the real exchange rate and the trade balance, in conjunction with the J-curve theory, stating that initially, the balance of payments tends to deteriorate further into deficit before shifting to surplus when a country devalues its currency.

When these theoretical perspectives are applied to the Japanese context, critical questions emerge: How does inflation influence fluctuations in the real exchange rate? In what manner do changes in the real exchange rate affect the country's trade balance with its trading partners, particularly Vietnam?

While numerous domestic studies have examined the relationship between inflation and the real exchange rate, such analyses are often conducted in isolation or within broad macroeconomic frameworks. Few studies have explicitly addressed the specific impact of Japanese inflation on the real exchange rate and the bilateral trade balance, especially from the perspective of transmission from inflation to trade via the real exchange rate index. Regarding the link between the real exchange rate and the trade balance, both domestic and international scholarship has largely concentrated on multilateral or specific bilateral contexts, such as BCIM-EC, East Asia, or the United States and its major trading partners. In the case of Vietnam and Japan, this bilateral relationship remains underexplored in the literature, despite Japan's role as one of Vietnam's most significant trading partners.

** National Economics University; email: maittp@neu.edu.vn*
*** Hai Phong University; email: trangdhhp@gmail.com*

Accordingly, this study seeks to analyze the impact of Japanese inflation and the JPY/VND real exchange rate on the bilateral trade balance between Vietnam and Japan during the period 2022-2024. Clarifying these dynamics is expected to contribute to the theoretical discourse while offering practical implications for the formulation of Vietnam's trade and exchange rate policies toward Japan. The research objectives are twofold: (i) to examine and evaluate the effects of Japanese inflation and the JPY/VND real exchange rate on the bilateral trade balance between Vietnam and Japan; and (ii) to propose policy recommendations aimed at mitigating the adverse effects of inflation volatility and shifts in the trade balance.

The paper is structured as follows: Section 1: Introduction; Section 2: Literature Review and Development of Research Hypotheses; Section 3: Data and Research Methodology; Section 4: Research Findings; Section 5: Policy Recommendations.

2. Literature review and development of research hypotheses

Fluctuations in the real exchange rate under the J-curve effect are widely believed to cause the trade balance to deteriorate in the short run before improving in the long run. This assertion was supported by Roosaleh and Edison (2020) in their study of Indonesia, where they examined movements in the rupiah and found that domestic currency depreciation can yield export benefits, particularly when the Marshall-Lerner condition holds. Similarly, Dilanchiev et al. (2022), in a study on Georgia using an autoregressive distributed lag (ARDL) model, confirmed that the real exchange rate exerts a positive long-run impact but has a negative short-run effect on the trade balance.

Rahman et al. (2024), focusing on the BCIM-EC region (Bangladesh, China, India, and Myanmar), highlighted the asymmetric nature of real exchange rate effects. They found that depreciation of the Bangladeshi taka stimulated exports to China and India but hindered exports to Myanmar. In the long run, such changes favored exports to major economies but had adverse effects on imports, reflecting the structural characteristics and bilateral trade patterns in the region.

Other empirical evidence also suggests that depreciation of the Vietnamese đồng (VND) can improve the trade balance over the long term via the J-curve effect, although market adjustment and the realization of benefits require time (Ho et al., 2023). Nguyen Thi My Linh and Nguyen Thi Kim Lien (2020) found that the real effective exchange rate can have negative short-run impacts, especially when import costs for raw materials increase. Nevertheless, in the long run, exchange rate flexibility can enhance trade balance outcomes by boosting domestic competitiveness. Nguyen Huu Tuan (2011) similarly emphasized that movements in the real exchange rate are closely linked to trade balance performance, with depreciation yielding long-term improvements but potentially dampening short-term results due to reliance on imported inputs.

Conversely, some studies report less clear evidence of the J-curve. Kim (2009), analyzing East Asia, found only limited trade balance improvements from exchange rate adjustments, as in the cases of Korea-United States trade surplus and Korea-Japan trade deficit. Tunaer Vural (2016), in the case of Turkey, observed that sectors with comparative advantages and low dependence on imported inputs such as textiles tend to improve their trade balance when the lira depreciates. By contrast, industries heavily reliant on imported raw materials suffered adverse effects, thereby weakening the J-curve. Nguyen Thi Van Nga (2024), applying an ARCH model, demonstrated that the exchange rate significantly affects exports but has inconsistent effects on imports, underscoring the importance of a flexible exchange rate policy to stabilize markets and strengthen export capacity.

With respect to the inflation-exchange rate nexus, Kenya et al. (2018) analyzed the influence of interest rate and inflation differentials on Kenya's shilling (KES) against the US dollar between 2000 and 2014. Their findings showed that inflation differentials had a significant positive effect on exchange rate movements, consistent with the Purchasing Power Parity (PPP) theory. Similarly, Ali et al. (2015) found that inflation was positively correlated with exchange rate fluctuations, while money supply exhibited a negative relationship; both short-run and long-run interactions were observed in Pakistan over 2000-2009. Twarowska et al. (2014) further noted that rising inflation rates contributed to the depreciation of the Polish złoty, identifying inflation and the financial account balance as key determinants of the EUR/PLN rate.

Overall, the existing body of literature has examined the relationships among inflation, exchange rates, and trade balances, but predominantly within multilateral settings or selected bilateral contexts. Few studies have analyzed these dynamics in the context of Vietnam-Japan trade relations, despite Japan's role as a major trading partner. While prior studies have clarified the influence of the real exchange rate and documented J-curve effects in both the short and long run, they have often overlooked the role of other macroeconomic variables, particularly inflation. Given Japan's recent experience of complex inflationary pressures after years of low inflation, assessing how this factor interacts with the real exchange rate to shape the bilateral trade balance with Vietnam is both timely and necessary.

Accordingly, this study addresses this research gap by analyzing the impact of Japanese inflation and the JPY/VND real exchange rate on the Vietnam-Japan bilateral trade balance. The study's objectives are threefold:

H1: Japanese inflation has a negative effect on the JPY/VND exchange rate.

H2: The JPY/VND real exchange rate has a positive effect on the Vietnam-Japan bilateral trade balance.

H3: Inflation has a negative effect on the bilateral trade balance.

3. Data and research methodology

This study employs secondary time series data on Japanese inflation (INFJ), the JPY/VND real exchange rate

(RER), and the bilateral trade balance between Vietnam and Japan (BoT). Data are sourced from the General Statistics Office of Vietnam, the Statistics Bureau of Japan, and the International Monetary Fund (IMF). Monthly observations covering the period from January 2009 to December 2024 are utilized, yielding a total of 216 data points.

The empirical analysis comprises several stages, including multicollinearity testing, stationarity testing, estimation using the Autoregressive Distributed Lag (ARDL) model, and the application of the bounds testing approach to examine cointegration relationships. The ARDL methodology, originally proposed by Pesaran et al. (1996) and subsequently developed by Pesaran et al. (2001) and Im et al. (2003), combines elements of vector autoregression and ordinary least squares regression. It is recognized for its flexibility and applicability in the analysis of multivariate time series (Uko et al., 2016). The ARDL framework allows for the assessment of both short-run and long-run effects of independent variables on a dependent variable (Pesaran & Shin, 1998), and can be represented as:

$$Y_t = \alpha_0 + \sum_{i=1}^{p} \beta_i Y_{t-i} + \sum_{j=1}^{k} \sum_{l=0}^{q_j} \delta_{jl} X_{j,t-l} + \varepsilon_t$$

Where:

- Y_t: Dependent variable at time t
- $X_{j,t-l}$: j-th independent variable at lag l
- α_0: Constant term
- β_i: Coefficient of the lagged dependent variable (autoregressive component)
- δ_{jl}: Coefficient of the j-th independent variable at lag l (distributed lag component)
- p: Maximum lag order of the dependent variable
- q_j: Maximum lag order of the j-th independent variable
- ε_t: White noise error term

To ensure the reliability of ARDL estimation, the variables must be stationary, optimal lag lengths should be identified, the model should avoid overfitting, and there should be no issues of autocorrelation or heteroskedasticity, with a correctly specified functional form (Gujarati, 2003).

A stationary time series is defined as one with a constant mean, variance, and covariance over time (Gujarati, 2003). Stationarity is tested using the Dickey-Fuller (DF), Phillips-Perron (PP), and Augmented Dickey-Fuller (ADF) tests.

Model specification

Model 1: Impact of Japanese inflation (INFJ) on the JPY/VND real exchange rate (RER):

$$RER_t = \alpha_0 + \sum_{i=1}^{p} \alpha_i RER_{t-i} + \sum_{j=0}^{\varphi} \beta_j INFJ_{t-j} + \varepsilon_t$$

Given that both RER and INFJ are expressed in percentage terms, the variables are transformed into natural logarithms:

$$\ln RER_t = \alpha_0 + \sum_{i=1}^{p} \alpha_i \ln RER_{t-i} + \sum_{j=0}^{\varphi} \beta_j \ln INFJ_{t-j} + \varepsilon_t$$

Model 2: Joint impact of Japanese inflation (INFJ) and the JPY/VND real exchange rate (RER) on the Vietnam-Japan bilateral trade balance (BoT):

$$\ln BoT_t = \alpha_0 + \sum_{i=1}^{p} \alpha_i \ln BoT_{t-i} + \sum_{j=0}^{\varphi} \beta_j \ln INFJ_{t-j} + \sum_{k=0}^{r} \mu_k \ln RER_{t-k} + \varepsilon_t$$

4. Research results

a) Descriptive statistics

Table 4.1: Descriptive statistics of variables

Variable	Obs	Mean	Std. Dev.	Min / Max
BoT	216	5618.222	178920	-570069 / 481653
RER	216	205.9912	25.7703	158.5884/269.035
INFJ	216	0.0577778	0.2490105	-0.9 / 1.8

Source: Authors' calculations

The trade balance (BoT) has a positive mean value (5618.222), indicating a trade surplus for Vietnam during the study period. However, the large standard deviation (178920) relative to the mean reflects high volatility, with the minimum (-570069) representing a severe trade deficit period and the maximum (481653) indicating a high trade surplus. The real exchange rate (RER) between VND/JPY averages 205.9912 with a standard deviation of 25.7703, suggesting relative stability, as the minimum and maximum range from 158.5884 to 269.035. Japanese inflation (INFJ) averages at a very low 0.057778, reflecting stable inflation, with some periods of deflation (-0.9) and a maximum inflation rate of 1.8, consistent with Japan's inflation control policy.

b) Correlation matrix and multicollinearity test

Table 4.2: Correlation matrix

	BoT	RER	INFJ
BoT	1.0000		
RER	0.0341	1.0000	
INFJ	0.0572	-0.1434	1.0000

Source: Authors' calculations

Table 4.3: VIF Test

Variable	VIF	1/VIF
INFJ	1.02	0.979427
RER	1.02	0.979427
Mean VIF	1.02	

Source: Authors' calculations

The correlation matrix analysis in Table 3 indicates that the relationships among the variables in the model tend to reflect actual economic effects. Specifically, the real exchange rate (RER) and Japanese inflation (INFJ) exhibit a slight negative correlation ($\rho = -0.1434$), suggesting that when inflation in Japan increases, the VND/JPY real exchange rate tends to decrease. This finding is consistent with economic theory on the effect of inflation on exchange rates, whereby higher inflation can reduce a currency's purchasing power, thereby affecting the real exchange rate.

In addition, the trade balance (BoT) shows a positive relationship with both RER ($\rho = 0.0341$) and INFJ ($\rho = 0.0572$), indicating that changes in the real exchange rate and inflation may influence international trade, although the magnitude of such effects can vary depending on the specific economic context. The fact that none of the correlation coefficients exceed the 0.8 threshold and that the VIF values of all independent variables are below 3 suggests that the research model does not suffer from perfect multicollinearity.

c) Augmented dickey-fuller test

Table 4.4: Augmented dickey-fuller (ADF) test

Series	Prob.	Lag	Max Lag	Obs
BoT	0.0000	0	0	215
RER	0.7960	0	0	215
INFJ	0.0000	0	0	215

1st difference

Series	Prob.	Lag	Max Lag	Obs
D(BoT)	0.0000	0	0	214
D(RER)	0.0000	0	0	214
D(INFJ)	0.0000	0	0	214

Source: Authors' calculations

The Dickey-Fuller test results for the variables in the model indicate that lnBoT (log-transformed) is stationary at level I(0), and the independent variable INFJ is also stationary at level I(0). In contrast, the independent variable RER is stationary only after first differencing, I(1). Therefore, it is necessary to take the first difference of the RER variable.

d) Johansen cointegration test

Table 4.5: Johansen cointegration test

Model	Trace Statistic	Critical Value (5%)	Rank	Lags
Model 1	64.9173	3.76	1	1
Model 2	74.1638	15.41	2	2

Source: Authors' calculations

With a cointegration rank of 1, the Trace Statistic value is 64.9173, exceeding the 5% critical value of 3.76. This indicates the existence of at least one cointegration relationship between the real exchange rate (RER) and Japan's inflation (INFJ). This finding implies that the real exchange rate may be influenced in the long run by fluctuations in Japanese inflation, suggesting a strong long-term link between these two variables. With a cointegration rank of 2, the Trace Statistic value is 74.1638, surpassing the 5% critical value of 15.41. This result indicates the existence of at least two cointegration relationships among the variables: the trade balance (BoT), the real exchange rate (RER), and Japan's inflation (INFJ).

e) ARDL regression results

To construct an accurate and effective ARDL model, determining the optimal lag length for each variable is crucial. The optimal lag length ensures that the model accurately reflects both short-term and long-term relationships between the variables, avoiding the omission or excess of lags that could distort the analysis. Based on the optimal lag length test results, the variables in the ARDL model were selected with corresponding lags: dRER with lag 1, lnBoT with lag 2, and INFJ with lag 1.

Table 4.6: ARDL (1,1) regression results - Model 1

Variable	Coefficient	Std. Error	t-Statistic	P-value
Adjustment (ADJ)				
dRER (L1)	-0.7316	0.0716	-10.22	0.000
Long Run (LR)				
INFJ (L1)	-4.6194	2.4673	-1.87	0.063
Short Run (SR)				
INFJ (D1)	1.0135	1.4429	0.70	0.483
_cons	0.1556	0.3618	0.43	

Source: Authors' calculations

R^2 = 0.3973 indicates that Japanese inflation explains 39.73% of the variation in the real exchange rate VND/JPY. Although the R^2 is not high, this is reasonable because the real exchange rate is typically influenced by many other factors such as monetary policy, investment capital flows, and interest rates.

The ARDL regression results show that the error correction coefficient of RER at the first lag (-0.7316, p = 0.000) is negative and highly statistically significant, confirming the existence of a long-run equilibrium relationship and a rapid adjustment speed back to equilibrium. In the long run, Japanese inflation has a negative impact on the real JPY/VND exchange rate (-4.6194, p = 0.063), although the statistical significance is not strong enough to confirm this relationship. In the short run, the INFJ variable does not have a significant impact on RER (1.0135, p = 0.483). The constant term is not statistically significant (0.1556, p = 0.668), indicating no evidence of fixed factors outside the model. Overall, the results suggest that although there may be a relationship between Japanese inflation and the real JPY/VND exchange rate, this impact is not strong in the short run and is only marginally significant in the long run.

Table 4.7: ARDL (2,1,1) regression results - Model 2

Variable	Coefficient	Std. Error	t-Statistic	P-value
Adjustment (ADJ)				
lnBoT (L1)	-0.4295	0.0830	-5.17	0.000
Long Run (LR)				
dRER (L1)	-0.2239	0.4610	-0.49	0.628
INFJ (L1)	11.0211	9.2438	1.19	0.235
Short Run (SR)				
lnBoT (LD)	-0.3794	0.0689	-5.50	0.000
dRER (D1)	0.4039	0.1633	2.47	0.014
INFJ (D1)	-5.3982	3.2550	-1.66	0.099
_cons	-0.2547	0.7924	-0.32	

Source: Authors' calculations

R^2 = 0.4881 indicates that 48.81% of the variation in the Vietnam-Japan trade balance is explained by the real VND/JPY exchange rate and Japanese inflation. This suggests that these two factors play an important role in influencing changes in the trade balance. However, the remaining 51.19% of the variation is unexplained, reflecting the influence of many other factors. The error correction coefficient of lnBoT at the first lag (-0.4295, p = 0.000) is highly statistically significant, indicating the existence of a long-run equilibrium relationship, but with a slower adjustment speed compared to the real exchange rate in Model 1.

In the long run, the real exchange rate does not have a significant effect on the trade balance (-0.2239, p = 0.628), while Japanese inflation has a positive but statistically insignificant effect (11.0212, p = 0.235). This indicates that exchange rate and inflation fluctuations in Japan are not the main determinants of Vietnam's trade balance in the long run. In the short run, the dRER variable has a positive and statistically significant impact on the trade balance (0.4039, p = 0.014), suggesting that the depreciation of JPY/VND can improve the trade balance in the initial period. However, Japanese inflation has a negative short-term effect (-5.3982, p = 0.099), but only marginally significant. Additionally, the lnBoT variable at the first lag has a strong negative effect on itself in the short run (-0.3794, p = 0.000), reflecting the stability of the trade balance over time. These

results confirm that, in the short run, the depreciation of JPY/VND can support Vietnam's trade balance, but in the long run, other factors beyond exchange rates and Japanese inflation may play a more important role in determining trade trends between the two countries.

f) Bounds test

Table 4.8: Bounds test results

Model	Statistic	Value	Critical Values (I(0))	Critical Values (I(1))	Conclusion
Model 1	F-statistic	52.917	4.04 - 6.84 (10%-1%)	4.78 - 7.84 (10%-1%)	Reject H0 (long-run relationship exists)
	t-statistic	-10.219	-2.57 - -3.43 (10%-1%)	-2.91 - -3.82 (10%-1%)	Reject H0 (long-run relationship exists)
Model 2	F-statistic	8.958	3.17 - 5.15 (10%-1%)	4.14 - 6.36 (10%-1%)	Reject H0 (long-run relationship exists)
	t-statistic	-5.175	-2.57 - -3.43 (10%-1%)	-3.21 - -4.10 (10%-1%)	Reject H0 (long-run relationship exists)

Source: Authors' calculations

In Model 1, the Bounds Test within the ARDL framework provides strong evidence of a long-term relationship among the variables. Specifically, the F-statistic value of 52.917 far exceeds the critical thresholds for both I(0) and I(1) at all significance levels (1%, 5%, 10%), allowing rejection of the null hypothesis (H_0) of no long-run linkage. Similarly, the t-statistic value of -10.219 is far below the smallest critical value, further confirming the existence of a long-run relationship. This indicates that the Real Effective Exchange Rate (RER) and Japan's inflation rate (INFJ) are cointegrated, meaning that despite short-term fluctuations, these variables maintain a long-run equilibrium. When deviations from equilibrium occur, adjustment mechanisms act to restore stability, highlighting the close link between the JPY/VND real exchange rate and Japan's inflation rate.

In Model 2, the F-statistic value of 8.958 also clearly exceeds the I(0) and I(1) critical thresholds at all significance levels, allowing rejection of the null hypothesis of no long-term relationship among variables. The t-statistic value of -5.175, well below the smallest critical value, further strengthens this conclusion. These results confirm that the Balance of Trade (BoT), Real Exchange Rate (RER), and Japan's inflation rate (INFJ) maintain a long-run equilibrium despite short-term fluctuations. When deviations occur, the adjustment mechanism helps return the variables to equilibrium, emphasizing the role of the real exchange rate and Japan's inflation in the dynamics of the trade balance.

g. Discussion

The study results have confirmed the hypotheses regarding the relationships between Japan's inflation (INFJ), the real exchange rate (RER), and the balance of trade (BoT) between Vietnam and Japan.

Hypothesis 1 (H1), which posits that Japan's inflation negatively affects the JPY/VND exchange rate, is confirmed in the long run, with a negative regression coefficient (-4.6194) and statistical significance at the 10% level. This aligns with macroeconomic theory, where high inflation reduces a currency's purchasing power, leading to a lower real exchange rate. However, in the short run, this effect is not statistically significant, indicating that exchange rate adjustments take time to fully reflect inflation factors.

Hypothesis 2 (H2), regarding the positive effect of the JPY/VND real exchange rate on Vietnam-Japan trade balance, is confirmed in the short run, with a positive regression coefficient (0.4039) and statistical significance at the 5% level. This suggests that JPY depreciation against VND can enhance the competitiveness of Vietnamese goods in Japan, thus improving the trade balance. However, in the long run, this effect is not statistically significant, possibly due to other factors such as trade structure, tariff policies, or shifts in consumer demand.

Hypothesis 3 (H3), on the negative effect of inflation on the trade balance, is confirmed in the short run, with a negative regression coefficient (-5.3982) and statistical significance at the 10% level. This implies that high inflation in Japan may reduce consumer purchasing power, thus decreasing imports from Vietnam and exerting negative pressure on the trade balance. In the long run, this effect is not statistically significant, suggesting that other factors such as trade policies, international competition, or business adjustments may play more important roles.

Among the three hypotheses, all are supported; none is rejected. The key takeaway is that: (1) Japan's inflation negatively affects the JPY/VND exchange rate in the long run; (2) the real JPY/VND exchange rate positively affects the Vietnam-Japan trade balance in the short run, though without statistical significance; (3) inflation has a statistically significant negative effect on the trade balance in the short run. Furthermore, the study affirms the importance of the real exchange rate and inflation to the bilateral trade balance.

Regarding the impact of Japan's inflation on the real exchange rate (JPY/VND), these findings align with prior international studies such as Ali et al. (2015). Regarding the effect of the real exchange rate on the Vietnam-Japan trade balance, the results are consistent with earlier works such as Roosaleh and Edison (2020) for Indonesia and Kim (2009) for Korea. Additionally, we confirm the short-run negative effect of inflation on the trade balance. This mirrors prior findings in Vietnam, such as Nguyen Thi My Linh and Nguyen Thi Kim Lien (2020), who also observed that inflation can reduce both exports and imports, thereby negatively influencing the trade balance.

A novel aspect of this study is its detailed assessment of the impact of inflation on the real exchange rate and the impact of the real exchange rate on the trade balance within the Vietnam-Japan context. The research highlights that the real exchange rate does not have a long-run effect on the trade balance a notable finding given that prior studies such as Bahmani-Oskooee (2008) found a positive long-run effect. This difference may reflect other macroeconomic factors influencing the relationship, such as tariff policies, trade structure, and external policies of major trade partners.

5. Recommendations and conclusion

Bilateral trade relations between Vietnam and Japan have undergone more than 50 years of robust development, evolving into one of the most comprehensive and extensive strategic partnerships. By 2030, the development orientation for trade between the two nations will focus on strengthening economic cooperation, diversifying areas of collaboration, and enhancing the quality of trade exchanges, based on

the plans and policies currently being implemented by the Government of Vietnam (Prime Minister, 2021).

The research findings indicate that fluctuations in inflation, exchange rates, and the continual shifts between deficits and surpluses in the Vietnam-Japan trade balance have posed significant challenges for Vietnamese enterprises, particularly those investing in and conducting international business in Japan.

The first challenge stems from the rising Consumer Price Index (CPI) in Japan, combined with the depreciation of the Japanese yen (JPY) caused by the Bank of Japan's accommodative monetary policy, exerting upward pressure on the prices of Vietnam's key export products to Japan and undermining their competitiveness. The second challenge lies in the unpredictable volatility of the JPY/VND exchange rate, influenced by both BOJ's monetary policy and global macroeconomic factors such as U.S. interest rate changes and international capital flows. Such instability exposes Vietnamese exporters and importers to substantial risks in business planning.

The third challenge arises from the structure of bilateral trade. Vietnam's exports to Japan primarily consist of labor-intensive, low value-added goods such as textiles, garments, footwear, agricultural produce, and seafood items highly susceptible to competition and reliant on cheap labor. In contrast, imports from Japan largely comprise high value-added industrial products, machinery, equipment, and electronic components that require advanced technologies not yet domestically produced in Vietnam. This disparity not only reflects the technological gap between the two countries but also results in Vietnam incurring trade disadvantages, as export revenues fail to offset the rising costs of imports.

Based on these identified challenges from Japan's economic developments, the authors propose several policy recommendations for Vietnam to mitigate risks and strengthen its position in bilateral relations. These measures not only aim to address current conditions but also seek to build a sustainable economy, gradually reducing dependence and enhancing long-term competitiveness:

Firstly, mitigate cost-push inflation from Japanese imports by selectively controlling imports through non-tariff barriers and encouraging domestic production. Strengthening R&D for import-substituting products, supported by targeted policies, will help reduce dependence and stabilize prices.

Secondly, improve the trade balance by diversifying export markets and increasing the value-added content of products (through deeper processing and high technology) to reduce trade deficits. Developing domestic supporting industries is also crucial to decreasing reliance on imported components.

Thirdly, enhance competitiveness and reduce dependency by prioritizing technological improvement and human resource development through technology transfer with Japan and by upgrading the quality of education and training. Promoting industrial clusters and leveraging trade agreements such as the CPTPP will strengthen national economic and trade positions.

While this study has provided valuable findings, certain limitations remain. First, the ARDL model examines relationships among a limited set of macroeconomic variables, whereas the trade balance is also influenced by other factors such as trade policy, investment climate, supply chain development, and consumer demand in Japan. Second, the research relies on historical data and does not account for the impacts of unexpected economic shocks, such as pandemics, financial crises, or political instability, which could significantly affect exchange rates and international trade. Finally, due to data and methodological constraints, the results may be specific to the study period and may not be fully generalizable to the future.

These limitations suggest avenues for further research. The model could be expanded to incorporate factors such as trade policy, investment environment, and supply chain structure to better capture influences on the trade balance and real exchange rates. Moreover, future research should evaluate the impacts of major economic shocks (e.g., the COVID-19 pandemic, global financial crises, or political disruptions) and employ methods such as structural models or dynamic data models to analyze how such shocks affect exchange rates and international trade balances.

In conclusion, this study contributes to clarifying the relationships between inflation, real exchange rates, and the trade balance in the context of Vietnam-Japan bilateral trade. The findings not only complement existing macroeconomic theories but also enhance understanding of the factors influencing international trade in both developed and developing economies.

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EXPORT AND TECHNOLOGICAL INNOVATIVENESS AT SMALL AND MEDIUM ENTERPRISES IN VIETNAM

Ho Ngoc Hong An* - PhD. Nguyen Quynh Huong**
Assoc.Prof.PhD. Dao Ngoc Tien - Mai Thi Quynh Anh****

Abstract: ***Technological innovativeness is of utmost importance for enabling enterprises to adapt and grow in the global market. This paper investigates the causality between export activities and technological innovativeness among Vietnamese Small and medium enterprises (SMEs). In this study, we utilized a dataset covering 7,639 small and medium enterprises in Vietnam. We employed Spearman's correlation analysis, Variance Inflation Factor (VIF) tests, and a logit regression model to process and analyze the data. Our findings demonstrate that export participation significantly increases Vietnamese SMEs' probability of technological innovativeness, the introduction of new products, the enhancement of existing products, and the application of novel production processes.***

• Keywords: *export; technological innovativeness; SME; Vietnam*

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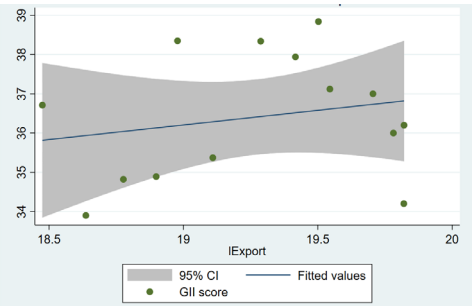
1. Introduction

Though there still exist a few obstacles, export activities in Vietnam do bring benefits to the economy, one of which is increasing innovativeness. As depicted in Figure 1, Vietnam's active exportation has shown some positive impacts on its Global Innovation Index (GII) score, the measurement of innovativeness performance of a country, over the past few years.

Figure 1: Vietnam's GII score as a function of export values, 2011- 2024



Source: Authors' own compilation using data from the General Statistics Office of Vietnam (2025), the International Trade Center (Trade Map), and World Intellectual Property Organization (WIPO) (2011 - 2024)

In Vietnam, SMEs constitute a major part of all active enterprises. Vietnamese SMEs embody great potential for their growth rate of revenue, promising to be at the heart of Vietnam's socioeconomic development strategy. Statistically speaking, performance is positively correlated with the presence of innovation both on the regional and national scale (Long and Anh, 2017). Technological innovativeness can improve the enterprise's performance. Meanwhile, the Vietnamese government has been supporting firms enthusiastically in technological innovation by enacting the Intellectual Property Rights, regulation on Science and Technology Enterprises, and Decree 80/2021/ND-CP, which provides technological assistance for SMEs. However, these policies do not focus on improving the firm's innovation capacity and seem to rule out a great number of SMEs that are not part of clusters or value chains (OECD, 2021). Export and technological innovation had a two-way causal relationship (Filipescu et al., 2013). Further investigation into the causal relationship between export and technological innovativeness is vital. This study presents the effect of export engagement on the initiation of tech-driven innovativeness at Vietnamese SMEs.

2. Literature review

2.1. Overview of technological innovativeness

There are 5 main forms which innovativeness takes: "(1) the launch of a new product or upgraded version of an already existing one; (2) the application of a new production process or commercial handling; (3) the opening of new markets; (4) the creation of a novel input supply source; and (5) the creation of new market organizations through the emergence or

** R.E.E M&E company, Vietnam*
*** Foreign Trade University, Hochiminh city campus, Vietnam; Corresponding author: nguyenquynhhuong.cs2@ftu.edu.vn*

collapse of a monopoly" (Schumpeter, 1942, 1934). The definition of innovativeness is "an introduction of a product, or process, or method that is new or considerably improved and related to marketing, organization in business practices, workplace organization, or external relations" (OECD and Statistical Office of the European Communities, 2005).

Empirical studies have showcased the important role of technological innovativeness at both national and firm scales. Initially, increasing production productivity was prioritized over environmental quality in developing countries (Mughal et al., 2022). To achieve sustainability in socioeconomic development, technological innovativeness is crucial to mitigating environmental pollution and fostering economic growth (Ahmad et al., 2023). The labor market has also benefited from the implementation of innovation activities, which generate employment prospects and considerably influence the employment structure (Goos et al., 2019). Besides, the causality between technological innovation and export practices is proven to be positive but non-linear (Márquez-Ramos and Martínez-Zarzoso, 2010). These innovations allow exporting firms to catch up with global advances (Azar and Ciabuschi, 2017) as well as "facilitate the firm's export intensity", regardless of the propensity to export (Fonchamnyo and Wujung, 2016). The importance of innovativeness encourages "the research and development of new technologies and processes, more efficient production techniques, and improved products", which, accordingly, enhances the enterprise's competitiveness (Kafouros et al., 2008).

2.2. Overview of small and medium enterprises (SMEs)

According to Article 6, Decree 39/2018-ND-CP (the official guide to the Vietnamese government's classification of SMEs), SMEs are classified by size, including micro, small, and medium-sized enterprises. Detailed indicators are shown in Table 1 below.

Table 1: Classification of SMEs in Vietnam

Sector	Indicators	Firm size		
		Micro	Small	Medium
Agriculture, forestry, and aquaculture Industry and construction	Annual average quantity of staff participating in social insurance	1-10	11-100	101-200
	Total revenue of the year (billion VND) Or Total capital (billion VND)	≤ 3 ≤ 3	≤ 50 ≤ 20	≤ 200 ≤ 100
Trade and services	Annual average quantity of staff participating in social insurance	1-10	11-50	51-100
	Total revenue of the year (billion VND) Or Total capital (billion VND)	≤ 10 ≤ 3	≤ 100 ≤ 50	≤ 300 ≤ 100

Source: Decree 39/2018-ND-CP

SMEs' entrepreneurs have the willingness to take risks and great adaptation capabilities (Ong et al., 2010). SMEs' overdependence on customers imposes certain constraints on their R&D activities, productivity, and, in turn, profitability (Laforet and Tann, 2006; Raymond and St-Pierre, 2004; Shouyu, 2017).

2.3. Theoretical background and proposed model

Entering the international market and selling goods and services abroad motivates firms to innovate, whilst export involvement helps them spread the market risk and better allocate resources for innovation activities (Wang et al., 2020). As firms enter the export market, there is a high likelihood that they will execute technological innovation. According to Hadjimanolis (2000), export engagement was positively associated with small firms' innovativeness practices. Similar findings were also recorded in research by Hue (2019), with an empirical framework for decisions made by Vietnamese firms to innovate. Our research question is whether participating in export activities can have a positive effect on Vietnamese SMEs' implementation of technological innovativeness.

3. Methodology

3.1. Model specification

Following Hadjimanolis (2000) and Hue (2019), we divide Technological innovativeness into 4 types: technological innovativeness is applied in SMEs (techinn in Model 1), SMEs introduce a new product (newproduct in Model 2), product modification (productimp in Model 3), or new process (new process in Model 4). Then, the proposed research model can be transformed into 4 equations as follows:

Model 1:

$$techinn_{i,t} = \beta_0 + \beta_1 export_{i,t} + \beta_2 fsize_{i,t} + \beta_3 ownership_{i,t} + \beta_4 gender_{i,t} + \beta_5 age_{i,t} + \beta_6 competition_{i,t} + \beta_7 govast_{i,t} + \varepsilon_{i,t}$$

Model 2:

$$newproduct_{i,t} = \beta_0 + \beta_1 export_{i,t} + \beta_2 fsize_{i,t} + \beta_3 ownership_{i,t} + \beta_4 gender_{i,t} + \beta_5 age_{i,t} + \beta_6 competition_{i,t} + \beta_7 govast_{i,t} + \varepsilon_{i,t}$$

Model 3:

$$productimp_{i,t} = \beta_0 + \beta_1 export_{i,t} + \beta_2 fsize_{i,t} + \beta_3 ownership_{i,t} + \beta_4 gender_{i,t} + \beta_5 age_{i,t} + \beta_6 competition_{i,t} + \beta_7 govast_{i,t} + \varepsilon_{i,t}$$

Model 4:

$$newprocess_{i,t} = \beta_0 + \beta_1 export_{i,t} + \beta_2 fsize_{i,t} + \beta_3 ownership_{i,t} + \beta_4 gender_{i,t} + \beta_5 age_{i,t} + \beta_6 competition_{i,t} + \beta_7 govast_{i,t} + \varepsilon_{i,t}$$

Where:

Techinn: Dummy = 1 if the firm participated in at least 1 of 3 forms of innovativeness activities (new process, new product, or product development)

0: otherwise.

Newproduct: Dummy = 1 if the firm launched new product groups, = 0 otherwise.

Productimp: Dummy = 1 if the firm conducted any improvement to their product, = 0 otherwise.

Newprocess: Dummy = 1 if the firm introduced a new production process or technology, = 0 otherwise.

Export: Dummy = 1 if the SME participates in at least 1 type of export (either directly or indirectly), = 0: otherwise.

fsize: Natural logarithm of the SME's total assets.

Ownership: Dummy = 1 if the SME is a household establishment/business, = 0 otherwise

Age: Age of the owner or manager

Gender: Dummy = 1 if the SME's owner or manager is male, = 0 otherwise.

Competition: Dummy = 1 if the SME responds that they face competition, = 0 otherwise

Govast: Dummy = 1 if the SME has received any support from the government, whether it is financial, technical, or other types, = 0 otherwise.

4. Data description and pre-estimation tests

4.1. Descriptive statistics

The study derived firm-level secondary data from UNU-WIDER (hereafter, namely Vietnam SMEs survey). This survey was carried out biannually and covered the enterprise's employee and economic accounts. The Vietnam SME data covers 18 sectors, 9 provinces of Vietnam, in three years: 2011, 2013, and 2015. The data set contains 7,639 observations in total[1]. Table 2, and Figures 3,4, 5, and 6 provide the data description.

Overall, technological innovativeness was widely carried out among surveyed SMEs; about 32.6% of SMEs participated in at least 1 innovativeness activity. The mean value of new product introduction (newproduct) indicates that only 9.8% of the companies launched new products within the time surveyed. The most common innovativeness activity, remarkably, is product modification, with approximately 22.4% of 7,639 observations indicating improvements to their goods and services. In contrast, only 8% of firms innovated their processes within 5 years of the survey.

[1] *The dataset is available online at : https://www.wider.unu.edu/database/viet-nam-sme-database*

Table 2: Summary of data

A. Descriptive statistics of variables					
Variable	Observations	Mean	Standard deviation	Min	Max
Dependent variables					
techinn	7,639	0.326	0.469	0	1
newproduct	7,639	0.098	0.297	0	1
productimp	7,639	0.224	0.417	0	1
newprocess	7,639	0.080	0.271	0	1
Independent variables					
export	7,639	0.062	0.240	0	1
fsize	7,639	14.095	1.743	6.908	20.039
ownership	7,639	0.637	0.481	0	1
gender	7,639	0.607	0.488	0	1
age	7,639	46.140	10.853	17	94
competition	7,639	0.871	0.335	0	1
govast	7,639	0.113	0.316	0	1
B. Number of observations					
Year			**Total Observations**		
2011			2,481		
2013			2,530		
2015			2,628		

Source: Author's summary using Vietnam SME survey data (2011, 2013, and 2015)

4.2. Correlation coefficient matrix

Table 3: Spearman's rank correlation coefficients

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) *techinn*	1.000										
(2) *newproduct*	0.474	1.000									
(3) *productimp*	0.772	0.005	1.000								
(4) *newprocess*	0.423	0.025	0.273	1.000							
(5) *export*	0.096	0.027	0.091	0.103	1.000						
(6) *fsize*	0.126	-0.005	0.155	0.144	0.249	1.000					
(7) *ownership*	-0.122	-0.015	-0.139	-0.127	-0.262	-0.563	1.000				
(8) *gender*	0.008	-0.005	0.018	-0.022	-0.041	-0.064	0.136	1.000			
(9) *age*	-0.055	0.027	-0.075	-0.061	-0.066	-0.090	0.181	0.160	1.000		
(10) *competition*	0.082	-0.007	0.103	0.050	0.031	0.136	-0.107	0.003	-0.077	1.000	
(11) *govast*	0.096	0.002	0.106	0.092	0.096	0.114	-0.103	-0.021	-0.029	0.033	1.000

Source: Author's compilation using Vietnam SME survey data (2011, 2013, and 2015)

Table 3 displays the correlation among variables affecting technological innovativeness activities at Vietnamese SMEs, with a significance level of 10%. The threshold suggests that a coefficient below 0.8 means no serious multicollinearity is detected. It is also notable that the correlation between *techinn* and *newproduct*, *productimp*, *newprocess* is r1,2 = 0.474, r1,3 = 0.772, r1,4 = 0.423 since *techinn* is reconstructed from the other three variables and they are not included in the same model.

5. Regression results

Table 4: Logit regression results

	Model 1 *techinn*	Model 2 *newproduct*	Model 3 *productimp*	Model 4 *newprocess*
export	0.0996*** (0.024)	0.0346** (0.016)	0.0524** (0.021)	0.0380*** (0.013)
fsize	0.0180*** (0.004)	-0.0033 (0.002)	0.0216*** (0.003)	0.0166*** (0.002)

	Model 1 *techinn*	Model 2 *newproduct*	Model 3 *productimp*	Model 4 *newprocess*
ownership	-0.0521*** (0.013)	-0.0150* (0.008)	-0.0485*** (0.012)	-0.0189** (0.007)
gender	0.0275** (0.011)	-0.0045 (0.007)	0.0394*** (0.010)	0.0031 (0.006)
age	-0.0013** (0.001)	0.0009*** (0.000)	-0.0020*** (0.000)	-0.0009*** (0.000)
competition	0.0877*** (0.016)	-0.0046 (0.010)	0.1038*** (0.013)	0.0256*** (0.009)
govast	0.1081*** (0.017)	0.0004 (0.011)	0.1034*** (0.016)	0.0507*** (0.011)

Source: Author's compilation using Vietnam SME survey data (2011, 2013, and 2015)

Note: The symbols (*), (**), and (***) represent the significance level of 1%, 5%, and 10% respectively.

4.4.1. Export

The independent variable export has positive coefficients in all four regression models at the significance of 1% - 5%, evidently proving that export positively impacts technological innovativeness activities at Vietnamese SMEs. The coefficient in Model 1 is 0.0996, which means participation in export increases the probability of SMEs applying technological innovativeness by around 9.96%. Therefore, for the purpose of competing abroad, exporting SMEs will tend to implement technological innovativeness in order to enhance their effectiveness and efficiency.

Model 2 shows the coefficient of 0.0346 at the significance level of 5%, meaning that Vietnamese SMEs engaging in export activities are motivated to create new products, with the probability of this event being almost 3.5%.

The coefficient of export in Model 3 is 0.0524 at the significance level of 5%. It explains that export participation increases the probability of Vietnamese SMEs' technological innovativeness by about 5.2%. The positive correlation shows that the benefits gained from export involvement primarily cover product design from customers and feedback from consumers in overseas markets.

At 1% significance level, the coefficient is 0.0380 in Model 4, implying that taking part in exporting markets increases the probability of Vietnamese SMEs' introduction of new processes by approximately 3.8%. Accordingly, extending market coverage motivated the application of a new process.

Overall, participating in export activities has a positive effect on Vietnamese SMEs' capacity for technological innovativeness.

5. Conclusions & recommendations

5.1. Conclusions

Statistical evidence supports the hypothesis that engagement in export activities stimulates technological innovativeness, which are, particularly the launching of new products or upgraded versions of present offerings, or new processes and techniques. The coefficient of export in the model concerning product improvement has the highest value, indicating that export has the most striking effect on SMEs' product improvement, compared to other types of technological innovativeness. Besides export, firm size, competition, and government support are positively correlated with the product upgrade and the launching of new products.

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FINANCIAL SOLUTIONS TO ENHANCE THE ATTRACTION OF FOREIGN DIRECT INVESTMENT IN VIETNAM'S AGRICULTURAL SECTOR

MSc. Nguyen Thanh Thao*

Abstract: ***Foreign direct investment is playing an increasingly important role in promoting the growth and development of Vietnam's economy, as well as its various economic sectors. In addition, the agricultural sector is one of the key pillars of the economy. It has great potential and development advantages, but the inflow of foreign direct investment (FDI) in this sector is still limited. While the FDI inflows into Vietnam has been increasing, this capital inflow into the agricultural sector is too small in terms of scale, proportion, as well as quality of investment capital compared to the total FDI of the country. The following article examines the current situation and proposes financial solutions to enhance the attractiveness of foreign direct investment in Vietnam's agricultural sector over the coming years.***

• Keywords: *foreign direct investment, financial solutions, agricultural industry.*

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1. Introduction

In Vietnam, rural areas are an important driver of economic development, closely associated with natural resources, cultural and social foundations, and ensuring national security and defense. The current deep and broad integration process is a favorable condition for foreign direct investors to invest in Vietnam to expand production and export to markets with which Vietnam has trade relations in economic sectors, including agriculture. FDI plays a very important role, especially supplementing capital for agricultural and rural development, contributing to promoting the restructuring of agricultural production and rural economy in the direction of producing quality goods. In fact, although Vietnam has much potential for agricultural development, the amount of FDI into this industry is still very limited. Currently, FDI in agriculture remains limited, accounting for less than 1% of total investment capital in this sector. Therefore, assessing the socio-economic situation at home and abroad in recent years is extremely necessary to have effective financial solutions to attract FDI to the agricultural sector in Vietnam.

2. The current situation of attracting foreign direct investment in Vietnam's agriculture in recent years

2.1. Results achieved

Extensive international cooperation supports the expansion of agricultural markets

Vietnam has signed many trade agreements of great significance since then, improving competitiveness, creating conditions to increase incomes and jobs for farmers, and contributing to the sustainable development goals of Vietnam and the world. To date, Vietnam has participated in 15 Free Trade Agreements (FTAs), and is negotiating new FTAs with Israel and Canada. Up to now, Vietnam has signed FTAs with all key agricultural, forestry, and fishery export markets, helping businesses have a competitive price advantage (due to tax reduction) when exporting to the world market.

The scale and structure of foreign investment in the agricultural sector have changed positively.

Table 1: Foreign direct investment in Vietnam licensed by the agricultural sector from 2018 to 2024 (Million USD)

Year	Number of projects (projects)		Total registered capital(*)		Average FDI of 1 project in agriculture
	Amount	Agriculture	Amount	Agriculture	
2018	3.147	11.0	36.368,6	180,6	16,418
2019	4.028	18.0	38.951,7	104,1	5,783
2020	2.610	13.0	31.045,3	228,6	17,584
2021	1.818	15.0	38.854,3	161,4	10,760
2022	2.169	12.0	29.288,2	73,9	6,158
2023	3.314	19.0	39.390,3	68,5	3,605
2024	3.375	11.0	38.231,0	77,6	7,054
First 3 months of 2025	2.061	2.0	10.978,62	5,103	

(*) Including newly granted capital and additional capital of projects that have been granted licenses from previous years. From 2016, it includes contributed capital and share purchases of foreign investors.

Source: General Statistics and Calculation Office of the author

Over the past time, the inflow of foreign direct investment (FDI) into the agriculture, forestry, and fishery sectors in Vietnam has recorded encouraging signals. FDI projects not only contribute to creating jobs for farmers but also promote the process of modernizing

** Academy of Finance; email: nguyenthanhthao@hvtc.edu.vn*

agricultural production, improving competitiveness, and expanding the export market for agricultural products. By the end of 2024, the country will have 537 valid FDI projects in the agricultural sector. If you include supporting industries such as processing, material supply, and trade, the total FDI of the whole industry reached more than 26 billion USD, equivalent to about 6% of the total FDI into Vietnam.

The State implements many financial solutions to increase FDI attraction in agriculture

Vietnam has gradually perfected the legal corridor to promote the attraction of FDI investment in the agricultural sector. In addition to the Law on Investment and the Law on Enterprises, many related legal documents have been issued. For example, Decree No. 210/2013/ND-CP on encouraging enterprises to invest in agriculture; Decree No. 57/2018/ND-CP on mechanisms and policies to encourage enterprises to invest in agriculture and rural areas... In particular, Vietnam's active participation in the signing of free trade agreements is a favorable condition for Vietnam to rise to become a center for the production and processing of agricultural products and a green environment of the region, thereby contributing to attracting FDI in the agricultural sector.

The structure of foreign investment in the agricultural sector, according to investment partners and localities receiving investment, is more diversified

By the end of 2024, there were more than 110 countries and territories investing in our country's agricultural sector. The leading countries are: South Korea, Japan, Taiwan, Hong Kong, and Malaysia. Japan is the country with the highest level of investment, which has had successful projects in the application of science and technology to agriculture in Vietnam. In addition to countries that invest a lot of FDI in Vietnam's agriculture, several investment partners with technological strengths have also paid certain attention through a few projects, such as Singapore, France, South Korea, Taiwan, etc. Currently, the country has about 30 high-tech agricultural zones planned in 12 provinces and cities, of which 7 have been put into operation. The current number of high-tech agricultural enterprises is 35 high-tech agricultural enterprises. Agricultural production activities have applied modern technologies instead of traditional methods. Most FDI projects in agriculture are concentrated in localities with advantages in infrastructure, resources, agricultural products, favorable natural conditions, and many incentives for foreign investors when investing in this field, such as Lam Dong, Binh Dinh, Vinh Phuc, Mekong Delta...

Although Vietnam's agriculture is gradually asserting its position in the global value chain, more solutions are still needed to improve the attractiveness of international investors, especially in areas with high added value and associated with sustainable development.

2.2. Limitations

In terms of scale and quality, FDI in Vietnam's agricultural sector still accounts for a modest proportion compared to the whole, not commensurate with the sector's potential and importance to the economy, and has not created a rapid development in the production of goods with the desired high quality.

Firstly, the scale of FDI in agriculture is still quite modest. Although Vietnam has the advantage of being an agricultural country, FDI inflows into this sector only account for about 5-6% of total FDI. International investors still prioritize pouring capital into the processing, manufacturing, or real estate industries - sectors that are said to be more profitable and stable than agriculture. The majority of FDI projects in agriculture are small-scale, mainly less than 10 million USD. Not many large corporations bring modern and advanced technology. Therefore, the spillover impact of technology and governance in the agricultural value chain is still limited. In the period 2018-2024, FDI into Vietnam's agriculture is in an unstable state. The scale and structure of projects in the whole period of continuous change (Table 1): sharply decreased by 06 projects in 2018 compared to 2017, then increased by 07 projects in 2019, then decreased in the next 3 years due to the impact of the Covid-19 epidemic, by 2023 increased by 07 projects, and then decreased again in 2024. The total registered capital is also unstable, reaching a peak in 2020 and then gradually decreasing in recent years. Up to 95% of small and medium-sized agricultural enterprises, agricultural investment attracts less than 1% of foreign direct investment, while the world average is about 3%. Instability also occurs in the agricultural sector of Vietnam's economic regions.

Second, difficulties in accessing and accumulating land, as well as market fluctuations. Although the Government has many preferential policies, the regulations on attracting FDI in agriculture are still not attractive enough compared to other industries. In addition, investors are also concerned about risks from natural disasters, climate change, epidemics, and unpredictable fluctuations in global agricultural prices. The current land policy has not really created favorable conditions for foreign investors. Many projects encounter problems in site clearance and long-term land use rights, making it difficult to form large-scale, concentrated raw material areas.

Third, there is a shortage of high-quality human resources in agricultural and rural development. Although our country has an abundant labor source, the workers in the agricultural sector are mainly unskilled, lacking in-depth skills in agricultural technology, product management, and processing. This reduces the region's

attractiveness to foreign investors who need highly qualified human resources and professional skills to implement high-tech projects. Moreover, this shortage makes the implementation of high-tech FDI projects not as effective as expected.

Fourth, the infrastructure and supply chain are not synchronized. The logistics, cold storage, and post-harvest preservation systems of Vietnam's agriculture are still weak. The transportation system is not synchronized, and the transportation of agricultural products from production areas to export ports faces many difficulties, increasing costs, and affecting the competitiveness of agricultural products in the international market, making investors afraid to pour capital.

Fifth, the structure of FDI by locality is only concentrated in a few provinces and cities, causing unbalanced development between regions. FDI is invested in agriculture in many localities, but most of the projects are concentrated only in some localities such as Binh Dinh, Hanoi city, Vinh Phuc, Lam Dong, etc. On the other hand, even localities that are considered to have attracted quite a lot of FDI projects are still a modest number in terms of both the number of projects and investment capital compared to localities that attract many projects and FDI in the country. Thus, under the impact of FDI, it can not only cause an imbalance in the development of the agricultural sector between regions, but at the same time, not take advantage of and promote the agricultural advantages of each region in the country.

2.3. Causes of limitations

First, the unique characteristics of the agricultural sector. Investment in agriculture is high-risk, significantly affected by climate, weather, epidemics, and factors related to natural resources, such as weather conditions, unpredictable climate changes, epidemics, seasonal agricultural products, etc, easily perishable, so it is not as attractive to foreign investors as the industry or real estate. This is the core reason why large corporations are less interested in investing.

Second, the policy of attracting FDI is not consistent, prioritizing the agricultural sector as well as the agricultural development policy is still limited. Currently, Vietnam has not developed a general strategy in attracting FDI into the agricultural sector, so that, on that basis, it can be deployed to localities, and a clear attraction strategy can be determined. The legal framework and land policy are still overlapping and not really open. Preferential policies and investment protection in agriculture are still limited. Tax incentives, credits, as well as investment guarantee mechanisms are not attractive enough to compete with other countries in the region. In a study on industry restructuring, through the I-O model, Bui Trinh and his colleagues pointed out that the agricultural sector is an industry that needs to be prioritized for investment. With the calculation results of the research team, it can be seen that the Agriculture sector has a good economic spillover index (greater than 1), but does not stimulate high imports (less than 1). For industries such as consumer goods processing, raw material processing, machinery, and equipment, if there is a focus on development, it will also have to import more.

Table 2. Economic spillover index and import stimulus index of some industries

Field	Economic spillover index	Import Stimulus Index
Cultivation and animal husbandry	1.0293	0.9643
Aquatic products	1.3505	1.0276
Forestry	0.8934	0.9959
Mining	0.7774	1.0039
Food Processing Industry	1.4492	0.9564
Consumer Goods Processing Industry	1.2093	1.3754
Material Processing Industry	1.2644	1.3595
Machinery and equipment	1.2475	1.3279
Electricity	0.7220	0.9011

Source: Bui Trinh and collaborators

Table 2 shows that it is very noteworthy that most of the service industry groups have a low spillover index to output, but a spillover to added value higher than the general average. Thus, only the final product group of the cultivation industry, the agricultural and fishery product processing industry, and the service industry have a high spillover to the added value of the economy. Therefore, in the industry structure, Vietnam's agricultural industry is a priority industry and needs to attract investment for this industry.

Third, rural infrastructure has not developed synchronously, lacking high-quality human resources to meet the demand for digital technology application in operation management from farm to finished product... Although Vietnam's rural infrastructure is generally well evaluated, there are still some points that have not created direct conditions for agricultural production, because there is no synchronous development investment, so the advantages of the region and territory cannot be promoted. In terms of road quality, compared to many cities and countries around the world, Vietnam's road system has not been highly appreciated. Moreover, the proportion of trained workers in Vietnam's agriculture is very small compared to the total workforce; agricultural labor productivity is also lower than that of other sectors and compared to other countries in the region. This limits FDI attraction as well as the competitiveness of the agricultural sector compared to other industries.

Fourth, fierce international competition in attracting FDI into agriculture. On the international scale, Vietnam's investment environment is still considered less competitive. According to the Provincial Competitiveness Index (PCI) survey, 54% of foreign-invested enterprises in Vietnam in the agricultural sector have considered other countries when investing in Vietnam, of which China is the most popular (11.1%), Thailand (10.6%), and Cambodia (7.7%).

Fifth, the trend of climate change in the country. Recently, the climate change situation has had a great impact on our country, as Vietnam is one of the 6 countries most affected by climate change in the world. The clearest proof of the impact of climate change in Vietnam is the phenomenon of early heat, reduced rainfall, and very clear climate changes, leading to drought and a very high risk of forest fires in some areas of the country. In that condition, agriculture will be directly affected very badly, crop production will decrease, plant ecosystems and marine ecosystems will also be greatly affected

3. Several financial solutions to increase the attraction of foreign direct investment in Vietnam's agriculture in the coming time

The Ministry of Agriculture and Rural Development has set a target that by 2030, registered FDI in the agricultural sector will reach 25 billion USD. In particular, focusing on investment projects with high-tech and environmentally friendly content, Vietnam's agricultural products have the strengths to meet socio-economic requirements. To do that, in addition to general solutions, it is necessary to implement several financial solutions to increase FDI attraction into Vietnam's agricultural sector, as follows:

- Infrastructure financing solutions for agricultural development. It is necessary to balance the budget capital for investment and synchronously complete technical infrastructure items. Expand access to credit for agricultural producers to build facilities, expand scale, and improve production capacity. To meet the investment needs of foreign enterprises, Vietnam needs to invest more in the road and bridge system... only then can it attract many FDI sources. The Government should also implement policies related to logistics, power grid systems, information technology systems, irrigation systems, policies related to support for plant varieties, livestock, etc., to create a foundation for the development of high-tech agriculture, helping to increase the ability to attract FDI capital to this field.

- Land financing solutions for agricultural development. In the context and requirements of new tasks, the agricultural sector needs to quickly establish strategic goals and policies, such as shifting from agricultural production thinking to agricultural economic development, perfecting mechanisms and policies to promote and diversify forms of land accumulation. This policy framework needs to specify the preferential levels based on the sectors and capital sources that these enterprises will invest in agriculture, taking into account the benefits of the project on the domestic socio-economic development situation. In the process of implementing land accumulation and concentration, local authorities need to make efforts and actively promote their role to mobilize farmers to see the effectiveness and actively cooperate. At the same time, local authorities act as a bridge between farmers and businesses, ensuring the rights and interests of all parties in the process of land accumulation and concentration.

- Financial solutions for human resources for agricultural development. The State and localities need to pay attention to the issue of improving the labor quality of farmers so that they can meet the requirements of high-tech agriculture, as well as other industries, when changing agricultural production methods. Vietnam needs to strengthen training, vocational training, and high-skilled labor transfer activities with advanced countries. In particular, it is necessary to focus on providing information to farmers through application programs and websites to help farmers be proactive in renewing their production thinking.

- Financial solutions on agricultural product consumption markets for agricultural development. Increasing investment in improving the capacity to forecast agricultural product market information, supporting the provision of information on the demand situation, and market forecasting is a necessary factor to expand the market for agricultural producers to take the initiative in production. Promote activities to attract FDI and build infrastructure in the agricultural sector. Strengthen investment promotion conferences in the field of attracting FDI in high-tech agriculture, and at the same time, survey and learn from the experiences of countries in the field of high-tech agriculture, especially countries in the ASEAN bloc.

- Group of other solutions: The State in general and FDI enterprises in particular need to implement solutions for environmental protection. Due to climate, weather, and environmental conditions that greatly affect production and business activities in the agricultural sector, it is necessary to have an agricultural insurance policy in case of natural disasters and crop failures,... This is a policy that is not only beneficial for farmers, but also for investors to reduce risks caused by weather, natural disasters, and climate. Proactively monitor the climate with the modernization of the monitoring system and hydrometeorological forecasting technology to ensure early warning and forecasting of extreme weather and climate phenomena; consolidating the construction of natural disaster prevention and control works. At the same time, attracting FDI is associated with climate, green growth, and ecological security in the context of climate change and the requirement to reduce global emissions.

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