



ACADEMIC JOURNAL RMUTT GLOBAL BUSINESS AND ECONOMICS REVIEW

ISSN: 1905-8446



Vol. 21 No.1 January- June 2026

FACULTY OF BUSINESS ADMINISTRATION #RTBS

RAJAMANGALA OF TECHNOLOGY THANYABURI



RMUTT Global Business and Economics Review

ISSN: 1905-8446

Volume 21, Issue 1 (January – June 2026)

Objectives of the Journal

1. To serve as a platform for disseminating academic work in business administration and economics to scholars and interested individuals from both the public and private sectors. The knowledge presented may be referenced and applied by individuals and organizations at national and international levels.
2. To act as a medium for the exchange of knowledge in the fields of business administration and economics, including theories, modern business concepts, research methodologies, applied knowledge, and experiences among faculty members, academics, researchers, executives, businesspersons, students, and the public, all contributing to national development.
3. To enhance the academic potential of the Faculty of Business Administration, Rajamangala University of Technology Thanyaburi (RMUTT), by publishing research conducted by faculty and graduate students, as well as by providing a platform for creative and impactful research that addresses the needs of entrepreneurs in business and industry.
4. To elevate RMUTT's recognition in the academic and research communities through the publication and dissemination of high-standard academic work that meets international standards.

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This journal is classified as a scholarly journal in the field of social sciences and humanities, with a specific focus on various disciplines in business administration. Submitted articles must meet academic standards and contribute to knowledge creation or its application in a broad context relevant to both the public and private sectors. The RMUTT Global Business and Economics Review (GBER), Faculty of Business Administration, Rajamangala University of Technology Thanyaburi, welcomes articles in the following areas:

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Articles are required to be submitted in English only and are subject to a rigorous academic review process involving both the editorial board and expert peer reviewers in relevant fields. The review process consists of the following steps:

Step1: The editorial board will confirm receipt of the manuscript once it has been submitted in accordance with the journal's submission requirements. The editorial team will then evaluate the topic and content to determine whether it aligns with the journal's aims and scope.

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Academic Articles

Book Review

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Issue 1 January – June

Issue 2 July – December

(Published twice a year)

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Editorial Note

The RMUTT Global Business and Economics Review is an academic journal that has been continuously published for its 20th year by the Faculty of Business Administration, Rajamangala University of Technology Thanyaburi. The journal focuses on the fields of social sciences and humanities, with particular emphasis on business administration. Its scope covers related disciplines including business management, small and medium enterprise management, human resource management and development, international business, logistics management, aviation business management, marketing, digital marketing, accounting, finance and banking, economics, business information technology, and other fields relevant to business administration. The journal has been accredited and indexed in the Thai Journal Citation Index (TCI), Tier 1, for the period 2025–2029.

The journal is published biannually, with issues released from January–June and July–December each year. Its objective is to serve as a platform for disseminating academic research in business administration and economics and as a medium for knowledge exchange. This includes theoretical contributions, modern business perspectives, research techniques and methodologies, applied knowledge, and the sharing of research experiences among faculty members, academics, researchers, executives, entrepreneurs, students, and the public, thereby contributing to broader academic and societal benefits.

For Volume 21, Issue 1 (January–June 2026), this issue comprises 12 articles, including 10 research articles, 1 academic article, and 1 book review. All published articles have undergone a rigorous peer-review process conducted by three qualified reviewers from diverse institutions with expertise in relevant fields, ensuring academic quality and adherence to proper editorial and ethical standards.

The Editorial Board would like to express its sincere appreciation to all academics, researchers, faculty members, and students who have contributed their valuable work to this issue. Their contributions have enriched the journal with knowledge beneficial to readers and members and provide valuable references for future research. The Editorial Board also extends its deepest gratitude to the executive administrators of Rajamangala University of Technology Thanyaburi for their continued support and funding for the publication of this journal and looks forward to ongoing collaboration in promoting and disseminating academic research in the future.

Assoc. Prof. Dr. Sureerut Inmor
Editor-in-Chief

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Decoding the Strategic Role of Internal Control Quality in Market Valuation: Evidence from Real Estate Firms Listed on the Stock Exchange of Thailand

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Received: 7 August 2025 | Revised: 8 December 2025 | Accepted: 16 December 2025

DOI: [10.60101/rmuttgber.2026.292335](https://doi.org/10.60101/rmuttgber.2026.292335)

Abstract

This research aims to explore the impact of internal control quality on the market value of real estate companies listed on the Stock Exchange of Thailand using secondary data of 110 companies over a 3-year period from 2021 to 2023. The price-to-sales ratio (P/S) is set as the dependent variable, while internal control quality (CG) is converted into a categorical variable based on the corporate governance score. In addition, the variables of operating profit to revenue (OPM), business size (Log Total Assets), business age, and financial risk (Debt-to-Equity) are controlled. The data are analyzed by using multiple regression. The model test results indicate that the model is appropriate, as shown by a statistically significant F-statistic. Internal control quality exhibits a significantly negative relationship, suggesting that companies with higher governance scores may be undervalued within the Thai real estate industry. Operating profit has a positive influence on the price-to-sales ratio, while both firm size and financial risk also show significant effects positive for firm size and negative for financial risk. The effect of firm age is not statistically significant. An examination of multicollinearity reveals acceptable variance inflation factor values, and the Durbin-Watson statistic confirms the absence of autocorrelation issues. The findings suggest that operating efficiency, capital structure, and firm size remain key drivers of market valuation, whereas internal control quality may exert a short-term negative impact under Thailand's regulatory conditions. These results have implications for executives in shaping governance policies that balance strict oversight with operational flexibility. From a theoretical perspective, the study contributes to the understanding of internal control's role in

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the real estate sector of developing economies and recommends future research to incorporate ESG disclosure variables and long-term dynamic analysis to validate the observed relationships.

Keywords: Internal Control Quality, Market Value, Price-to-Sales Ratio, Corporate Governance

Introduction

In the context of the current highly uncertain economy, building corporate confidence has become an important factor influencing investors' decision-making, especially in the real estate industry, which is a business that requires a large amount of investment, long project duration, and complex risks. Having a strong internal management system is therefore an essential element for sustainable business operations. An effective internal control system supports risk management, financial data management, and transparent corporate governance. Organizations with quality internal controls can often reduce data discrepancies, reduce opportunities for fraud, and increase credibility in the eyes of investors (COSO, 2013). Such confidence may be reflected through the level of valuation of the company in the capital market. Another important indicator of investor confidence is the price-to-sales ratio (P/S), which is an indicator that reflects the market's expectations of the company's income. If the company can generate consistent income and has a reliable management system, the market will tend to give a higher valuation through an increased Price-to-Sales ratio value (Penman, 2013). This indicator is therefore appropriate for industries that rely on a continuous stream of income to return capital and generate long-term profits.

However, it is important to acknowledge that the Price-to-Sales ratio also has limitations. For example, it does not account for differences in cost structures or profitability across firms, and it may not fully capture short-term market sentiment or firm-specific risks. Recognizing these limitations earlier in the chapter helps to facilitate a more accurate interpretation of later results and strengthens the overall validity of the analysis.

In addition, the Price-to-Sales ratio is particularly appropriate for valuing real estate companies because it focuses on revenue generation rather than accounting profits, which can fluctuate due to depreciation, project delays, or non-cash adjustments common in this industry. By emphasizing sales, the Price-to-Sales ratio reflects the firm's ability to sustain cash inflows from property development and leasing activities, which are crucial for long-term viability and investor confidence.

As mentioned, the real estate industry in Thailand is one of the business groups that plays an important role in the economic system. There are both residential and commercial investments. However, at the same time, it is also faced with the volatility of interest rates, economic conditions, and liquidity constraints. Therefore, enhancing the quality of internal control systems may help increase the potential for project management, reduce structural risks, and build confidence among shareholders and investors in the capital market. Although there is research that studies the relationship between governance and overall enterprise value, there is still a lack of in-depth studies that directly analyze the quality of internal control and the Price-to-Sales ratio in the context of real estate companies listed on the Stock Exchange of Thailand (Krismas & Pongkrapan, 2019). Therefore, this study aims to analyze the relationship between the quality of internal control and market valuation, using Price-to-Sales as the main indicator while controlling for other related variables, including business size, company age, financial risk level, and operating profit margin (OPM). The research results aim to create a deeper understanding of the role of internal control in driving business value and provide guidelines for executives in the real estate industry to design governance strategies to create long-term competitive advantage.

Research Objectives

1. To assess the quality of internal control systems in real estate companies listed on the Stock Exchange of Thailand
2. To study the relationship between the quality of internal control and the price-to-sales ratio (P/S)

Literature Review

1. The Concept of Internal Control

Internal control systems are an important mechanism used by organizations to prevent risks, increase the accuracy of financial information, and promote good governance (Chenhall & Moers, 2015). Organizations with strong internal controls are more likely to detect and prevent potential errors in a timely manner, as well as promote financial discipline and performance in line with set goals. In addition, the study of Ge et al. (2011) found that companies with internal control weaknesses tend to report incorrect financial results, have higher investment risks, and are evaluated by the market at a lower level than companies with good internal controls. In addition, Doyle et al. (2007) proposed that deficiencies in

internal control systems are associated with a decrease in the quality of earnings, which may affect the market valuation of the company. Recent studies such as Wang et al. (2022) and Coates (2015) further support that internal control quality not only enhances financial reliability but also improves firms' ESG performance and stakeholder trust, particularly in emerging markets where institutional monitoring mechanisms are still developing. This suggests that internal control serves as both a governance and sustainability mechanism in corporate valuation.

2. The Concept of the Market Value of a Business

Market value reflects investors' expectations of the company's earnings potential. The Price-to-Sales ratio is one of the tools used to analyze value by comparing the stock price to total sales revenue (Wahlen et al., 2018). Analysts often use Price-to-Sales ratio for businesses with continuous income or in the expansion phase, even though profits are still uncertain. Abarbanell and Bushee (1997) study showed that the company's earnings forecast ability and transparency are factors that the market values in positive valuations, especially when the organization discloses financial information and reports that are consistent with its actual operating conditions. In emerging markets, studies by Wang et al. (2022) and Coates (2015) revealed that valuation metrics such as the Price-to-Sales ratio are increasingly used to capture investor sentiment towards firms with strong disclosure and sustainability performance. The growing influence of ESG transparency reinforces that market value is not solely driven by financial outcomes but also by corporate governance credibility and social responsibility.

3. Signaling Theory

Signaling theory explains that managers send “signals” to the capital market through certain behaviors or information to indicate the quality of the business (Spence, 1973). Having a good internal control system is a positive signal reflecting discipline and readiness in managing the business, which may cause the market to value the business at a higher level. In this context, internal control quality acts as a non-financial signal of managerial integrity and long-term stability. However, when empirical results contradict the expected positive relationship, signaling theory can still explain market reactions, if investors perceive excessive governance or compliance costs as negative signals of reduced flexibility or profitability (Connelly et al., 2011). Thus, the interpretation of “signals” depends on market maturity and investor sophistication.

4. Sustainability and Internal Control Context in Capital Markets

In recent years, the global investment landscape has increasingly emphasized corporate sustainability, governance, and transparency. KPMG (2022) reported that more than 90% of the world's top 250 companies now publish sustainability reports, and investors are paying closer attention to non-financial indicators as part of their valuation decisions. This reinforces the role of internal control as a critical infrastructure not only for financial reporting but also for driving transparent and responsible business practices. In Thailand, the Stock Exchange of Thailand (SET) continues to promote sustainability disclosure frameworks aligned with GRI and integrated reporting models, encouraging listed companies to strengthen governance systems to foster long-term value (The Stock Exchange of Thailand, 2024). These developments suggest that internal control quality should be studied not only in terms of its financial reporting utility, but also in how it signals credibility and sustainability to the capital market. More recent literature (e.g., Deloitte, 2023) indicates that ESG governance mechanisms enhance internal control effectiveness by integrating ethical standards and stakeholder accountability. This is particularly critical in emerging markets, where rapid regulatory changes and lower enforcement levels increase the importance of voluntary governance signaling.

5. Empirical Evidence on Internal Control and Market Valuation in Emerging Markets

Past studies in developing countries suggest that the market response to corporate governance and internal control quality may differ from that in developed economies due to variations in regulatory enforcement, investor perception, and capital market maturity. Ashbaugh-Skaife et al. (2006) found that firms with weak internal control and poor governance tend to receive lower credit ratings and market valuations. However, in contexts where compliance is perceived as formality, high governance scores may not translate into higher market value immediately, especially in capital-intensive sectors such as real estate. This aligns with Krismas and Pongkrapan (2019), who emphasized that in Thailand, the real estate sector tends to weigh project delivery and capital turnover more heavily than rigid internal control adherence in determining firm performance. Therefore, the relationship between internal control and valuation requires further exploration in local regulatory and industry contexts. Moreover, recent comparative research (Li et al., 2016; Wang et al., 2022) shows that in emerging economies, excessive governance or disclosure requirements may impose compliance costs that reduce short-term profitability, a perspective known as the *Regulatory Burden Hypothesis*. This hypothesis suggests that while governance improves transparency, it

can simultaneously constrain managerial flexibility, leading to a negative or insignificant relationship with market valuation. Accordingly, understanding this paradox through both signaling theory and regulatory burden perspectives is crucial for interpreting results in the Thai real estate context, where investor confidence interacts with cost-sensitive business environments.

6. Hypothesis Development

Based on the literature reviewed, this study hypothesizes that internal control quality has a significant relationship with market valuation. Specifically, firms with stronger internal control systems are expected to achieve higher Price-to-Sales ratio ratios due to enhanced transparency and investor confidence. However, considering the Regulatory Burden Hypothesis, the direction of this relationship may vary depending on the cost-benefit balance of compliance within the Thai real estate industry. Therefore, the following hypothesis is proposed:

H1: The quality of internal control has a significant effect on the market valuation (Price-to-Sales ratio ratio) of real estate companies listed on the Stock Exchange of Thailand.

Conceptual Framework

The research conceptual framework is as shown in Figure 1.

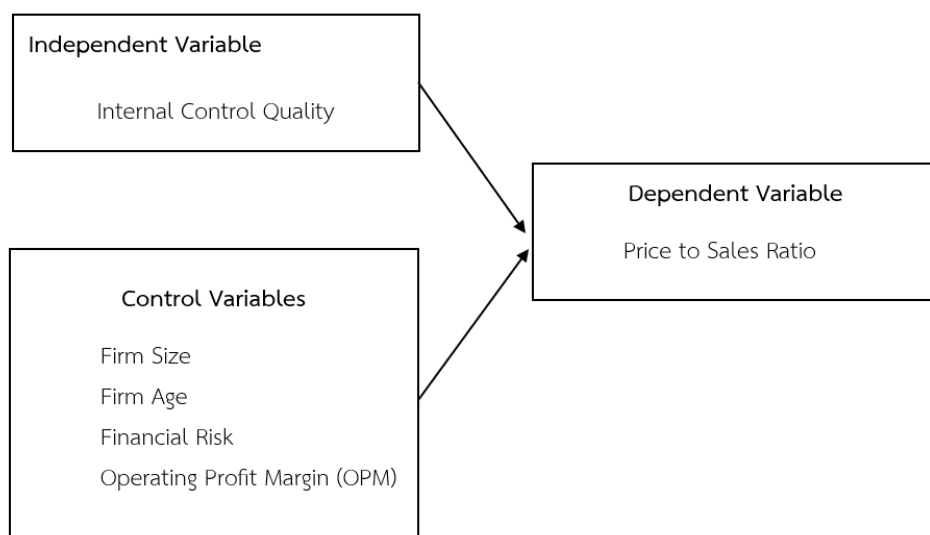


Figure 1 Conceptual Framework

Research Methodology

Research Design

This study is quantitative research using multiple regression analysis to assess the impact of internal quality control on the market value of real estate companies listed on the Stock Exchange of Thailand throughout 2021–2023. The three-year data period is treated as a short-term observation (snapshot) to capture the immediate response of the market to changes in governance quality and financial performance, rather than to establish long-term causality.

Population and Sample

The population consists of 110 real estate companies listed on the Stock Exchange of Thailand (SET) as of April 30, 2025. Data were collected for three consecutive years (2021 – 2023). The sample includes only companies with complete data for all three years, covering share price, revenue, total assets, corporate governance score, and debt-to-equity ratio.

Purposive sampling was adopted to ensure the continuity and completeness of the dataset, as missing data could distort time-series comparability. This sampling approach focuses on firms with consistent disclosure and complete financial data, which allows for more accurate regression analysis. However, it may introduce selection bias, since firms with higher disclosure standards or better governance are more likely to be included. This potential bias will be discussed in the limitation section and controlled by including firm characteristics such as firm size and age in the regression model.

Source of Data

Price and financial data were obtained from the SETSMART database and annual reports (Form 56-1 One Report). Corporate governance scores were sourced from the Thai Institute of Directors Association (Thai IOD), which provides annual corporate governance (CG) assessment reports for listed firms in Thailand.

Variables Used in the Study

This study uses five main variables: one dependent variable, one independent variable, and three control variables, as described below.

1. Dependent Variable

Market Value (Price-to-Sales Ratio) represents the market's assessment of firm value, calculated as the average share price per year divided by total sales revenue in the same year. This variable is a continuous ratio scale.

2. Independent Variable

Corporate Governance Quality (CG Score) used as a proxy for internal control quality. This substitution is based on the argument that CG scores reflect the effectiveness of monitoring and internal control mechanisms, including board oversight, transparency, and risk management practices (Mansour et al., 2022). In emerging markets such as Thailand, the corporate governance assessment conducted by the Thai IOD is widely recognized as a reliable external evaluation of internal control and transparency quality.

The CG score is converted into a dummy (binary) variable to simplify interpretation:

- Value 1 indicates that the company received a “Very Good” or “Good” CG score (level 5 or 4).
- Value 0 indicates a “Fair” or “Satisfactory” CG score (level 3 or below).

Additionally, a robustness check is performed by using the CG score as a continuous variable (ranging from 1 to 5) to test whether the relationship between CG quality and firm valuation remains consistent across different measurement specifications.

3. Control Variables

3.1 Firm Size: Measured by the logarithm of total assets (Log of Total Assets) to solve the problem of non-normal distribution and reduce the impact of large differences in size between companies. This variable is in the form of a continuous quantitative variable.

3.2 Firm Age: Measured by the number of years since the company was founded until the year of study to reflect experience, stability and business cycle. This variable is in the form of a discrete quantitative variable.

3.3 Financial Risk: Measured by the debt-to-equity ratio, which indicates the level of risk in the capital structure of the company. This variable is in the form of a continuous ratio variable.

3.4 Operating profit margin (OPM): Measured by the ratio of operating profit to total revenue, Operating Profit Margin (OPM) reflects the company's efficiency in managing its core operations. This variable is expressed as a continuous ratio variable, indicating how much profit a company generates from its operating activities relative to its sales. All control variables are continuous, except AGE (discrete).

Equational modeling

$$P/S_{it} = \beta_0 + \beta_1(CG)_{it} + \beta_2(Size)_{it} + \beta_3(Age)_{it} + \beta_4(Risk)_{it} + \beta_5(Opm)_{it} + \varepsilon$$

Where

P/S = Price to Sales Ratio

CG = Quality of Internal Control

Size = Size of the Company (may use Log of Total Assets or Revenue)

Age = Age of the Company (number of years since establishment)

Risk = Financial Risk (may be measured by Debt-to-Equity or Current Ratio)

OPM = Operating Profit Margin

ϵ = Error Term

Data analysis steps

Starting from descriptive statistics to describe data characteristics, followed by model hypothesis testing, including normality of error values, homogeneity of variance, relationship problems between independent variables, and checking for Ortho correlation through Durbin-Watson values. Then, multiple regression was performed to interpret coefficients and test the statistical significance of independent variables under the significance level of 0.05.

Research Finding

The data analysis this time was divided into 2 parts: (1) descriptive statistical analysis and (2) multiple regression analysis to answer the research objectives that aimed to study the relationship between the quality of internal control and the market value of the company, with business size, age of the company, and financial risk as control variables.

Descriptive statistical analysis**Table 1** Descriptive statistical analysis table

	Mean	Std. Deviation	N
Price-to-Sales ratio	2.02	3.29	269
OPM	0.16	0.13	269
Age	32.73	14.93	269
Risk	0.49	0.22	269
Size	3.99	0.96	269

Table 1 shows descriptive statistics of 110 companies in the real estate industry group registered in the Stock Exchange of Thailand over a period of 3 years. There were 90

companies with complete data for all three years. The price-to-sales ratio had an average of 2.02 and a standard deviation of 3.29. The operating profit to revenue (OPM) had an average of 0.16 and a standard deviation of 0.13. The age of the company (Age) had an average of 32.73 years and a standard deviation of 14.93 years. Financial risk (Risk) measured by the debt-to-equity ratio had an average of 0.49 and a standard deviation of 0.22. The size of the company (Size) measured by the logarithm of total assets had an average of 3.99 and a standard deviation of 0.96.

Multiple regression analysis

Table 2 Multiple regression analysis table

Variable	Unstandardized Coefficients		standardized Coefficients	t	Sig.	VIF
	B	S.E.	Beta			
(Constant)	-0.388	0.802		-0.484	0.629	
CG	-1.052	0.379	-0.158	-2.775**	0.006**	1.095
OPM	7.505	1.407	0.307	5.332**	0.000**	1.125
Age	-0.019	0.013	-0.086	-1.516	0.131	1.094
Risk	-4.103	1.006	-0.273	-4.079**	0.000**	1.522
Size	1.13	0.243	0.331	4.658**	0.000**	1.715
R=0.474 R ² =0.225 Adjusted R ² =0.210 SE _{Est} =2.922 F=15.260 *p < .05, **p < .01						

From Table 2, it shows the results of the multiple regression analysis between the dependent variable, namely, the price-to-sales ratio and the independent variables, namely, the quality of internal control (CG) and the covariate OPM (operating profit to revenue), along with three control variables, namely, the age of the business (Age), financial risk (Risk), and the size of the business (Size). The analysis results found that the model had an R Square value of 0.225 and an Adjusted R Square of 0.210, indicating that the model could explain the variance of the Price-to-Sales ratio by 21.0 percent, which is at a statistically acceptable level. The F value was statistically significant at the 0.01 level ($F = 15.260$, $p < 0.01$), reflecting that the model had overall appropriateness and was able to significantly predict the dependent variable.

In terms of the independent variables, it was found that the quality of internal control (CG) had a coefficient of B equal to -1.052 and a Beta value equal to -0.158 with a t-statistic value = -2.775 and a Sig. value = 0.006, which were statistically significant at the 0.01 level, indicating that the quality of internal control had a significantly negative relationship with the Price-to-Sales ratio. This finding appears to contrast with the initial research objective, which expected a positive association between governance quality and market valuation, as suggested by previous literature (Ge et al., 2011; Doyle et al., 2007). However, this result aligns with the concept of the Regulatory Burden Hypothesis and Cost of Compliance Theory, which argue that excessive governance or compliance requirements can impose operational and administrative costs that reduce firms' short-term profitability.

In the context of Thailand's real estate sector, where projects are capital-intensive and rely heavily on liquidity, stronger governance mechanisms may temporarily constrain managerial flexibility and increase procedural costs, leading to a short-term decline in valuation ratios such as Price-to-Sales ratio. This explanation is consistent with findings from emerging markets where compliance is sometimes viewed as a regulatory obligation rather than a strategic advantage. Thus, the negative coefficient of CG may reflect an adjustment period in which firms are absorbing the costs of governance implementation before reaping its long-term credibility benefits.

From a theoretical perspective, this finding can also be interpreted through the lens of the *Resource-Based View (RBV)*. Under this framework, governance and internal control systems are considered intangible resources that enhance long-term competitiveness when effectively integrated into firm strategy. However, when these systems are externally imposed or inefficiently managed, they may fail to generate competitive advantage in the short run and instead act as constraints on resource allocation (Barney, 1991; Connelly et al., 2011). Therefore, the short-term negative effect observed in this study does not necessarily contradict the RBV but rather indicates that governance quality must be strategically embedded and cost-effective to contribute to firm value over time.

For the OPM variable, it had a coefficient of B equal to 7.505 and a Beta value equal to 0.307 with a Sig. value = 0.000, indicating that operating profit had a significantly positive relationship with the Price-to-Sales ratio. This result supports the notion that firms with higher operational efficiency and profitability are valued more favorably by the market (Penman, 2013). For the control variables, it was found that the size of the business (Size) had a

coefficient of B equal to 1.130 and a Beta equal to 0.331 with a Sig. value = 0.000, indicating a significantly positive relationship. Meanwhile, financial risk (Risk) had a coefficient of B equal to -4.103 and a Beta equal to -0.273 with a Sig. value = 0.000, which showed a significantly negative relationship. As for the age of the business (Age), no statistically significant relationship was found ($p = 0.131$).

The examination of the problem of the relationship between independent variables (Multicollinearity) found that the VIF values of all variables were in the range of 1.095–1.715, which was lower than the critical criterion of 5, indicating that there was no problem of the relationship between the independent variables. The Durbin–Watson value was 2.12, which was close to 2, indicating that there was no problem of autocorrelation of the error values. This showed that this regression equation model could explain the variance of the Price-to-Sales ratio at a significant level. The variables that affected the market value of the company were the quality of internal control, operating profit, financial risk, and business size, while the age of the company was not statistically significant in this model.

In summary, these results partially support the research objectives by confirming that internal governance quality does influence firm valuation, though in a direction opposite to the initial hypothesis. The findings contribute to the literature by emphasizing the nuanced impact of governance in emerging markets, suggesting that while strong governance enhances long-term sustainability, it may simultaneously create short-term market inefficiencies due to regulatory and compliance burdens. This provides valuable implications for policymakers and managers in balancing governance rigor with operational agility to sustain competitiveness and market confidence in Thailand's real estate industry.

Discussion

The research results found that the quality of internal control (CG) had a significant negative relationship with the Price-to-Sales ratio, which was inconsistent with the concept of Spence (1973) signaling theory, which stated that organizations with good governance or internal control would send positive signals to investors. However, this negative result may reflect short-term market perceptions rather than a true decline in firm value. In the context of Thailand's real estate sector, strong governance frameworks may initially be viewed as increasing administrative burden or delaying investment decisions, which can reduce operational flexibility and short-term profitability. This interpretation aligns with the

Regulatory Burden and Cost of Compliance perspectives, suggesting that governance implementation involves upfront costs that the market may temporarily penalize.

At the same time, such results should not be interpreted as discouraging governance improvement. Instead, they highlight the importance of balancing compliance with efficiency. Over the long term, well-designed corporate governance and internal control systems can enhance transparency, build investor confidence, and reduce financing costs—thereby supporting sustainable growth. Therefore, although the observed relationship is negative in the short run, the policy implications remain positive in the long term, emphasizing the need for proportionate and value-driven governance strategies.

As for the operating profit (OPM) variable, which is a covariate, it was found to have a significant positive relationship with the Price-to-Sales ratio value, which is consistent with the results of the study by Abarbanell and Bushee (1997), who found that profitability affects the valuation of stocks from the capital market and indicates that investors prioritize the quality of earnings when considering the value of the firm. For the control variable, the size of the firm (Size) was found to have a significant positive relationship with the Price-to-Sales ratio, which is consistent with the concept from the Resource-Based View (Barney, 1991) that explains that firm size reflects the ability to access resources, market power, and stakeholder confidence. Financial risk (Risk) had a significant negative relationship with Price-to-Sales ratio, supporting the idea that companies with high leverage are assessed as having higher risk and therefore receive a lower market value (Wahlen et al., 2018). Meanwhile, firm age (Age) did not show a statistically significant relationship, consistent with prior findings that age alone does not determine valuation but rather depends on adaptability and profitability (Díez-Esteban et al., 2017).

These results collectively suggest that while corporate governance may have a short-term cost effect in emerging markets, it remains an essential strategic resource in the long term. From a Resource-Based View, internal governance mechanisms can become unique intangible assets when efficiently integrated into business strategy, yielding sustainable competitive advantage once compliance costs are absorbed.

Contribution

1. Academic Contribution: This research enhances academic understanding of corporate governance and internal control mechanisms by empirically examining their effect

on market valuation through Price-to-Sales ratio. It also addresses a research gap in Thailand by linking governance quality to capital market responses in a specific industry context. The findings contribute to the debate on how governance may create both short-term constraints and long-term value enhancement in emerging markets.

2. **Organizational and Policy Contribution:** The results provide insights for executives and regulators to design governance systems that balance compliance with efficiency. Although the short-term impact appears negative, the findings underline that strong internal control remains vital for long-term transparency, credibility, and investor trust. Policymakers can therefore use these findings to refine corporate governance codes, encouraging proportionate oversight that strengthens competitiveness without overburdening firms.

3. **Investment Contribution:** For investors and analysts, the study suggests that governance quality should be interpreted carefully in the short term. Temporary declines in valuation may reflect transition costs rather than structural weaknesses. Over time, firms with consistent governance practices are more likely to achieve sustainable earnings and lower information risk, aligning with the principles of responsible investment.

Limitations and Future Research

This study has several limitations. First, the observation period covers only three years (2021–2023), representing a short-term snapshot that may not capture the full impact of governance initiatives, which often take longer to influence market performance. Second, the use of the Price-to-Sales ratio as the sole valuation indicator may not fully reflect all aspects of market confidence, particularly in capital-intensive industries like real estate. Future research could apply multi-period (longitudinal) data and additional valuation metrics such as Tobin's Q or market-to-book ratio to validate the robustness of the findings.

In addition, future studies should broaden the scope of governance indicators by incorporating sustainability reporting, ESG disclosure, and board characteristics. Cross-industry comparisons could also reveal whether the short-term negative perception of governance is unique to real estate or shared across other capital-intensive sectors. Finally, combining quantitative and qualitative methods, such as interviews with executives, could provide deeper insights into how governance structures influence strategic decisions and investor sentiment over time.

In summary, while the study finds a short-term negative relationship between corporate governance quality and firm valuation, it provides valuable long-term policy

implications. The findings highlight that governance improvement should be viewed as an investment in future credibility and sustainable value creation, rather than as an immediate financial constraint.

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The Effect of Intangible Assets Value and Transfer Pricing on Tax Avoidance with ESG Performance as a Moderator: Evidence from Thailand

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Received: 27 July 2025 | Revised: 14 October 2025 | Accepted: 3 November 2025

DOI: [10.60101/rmuttgber.2026.291713](https://doi.org/10.60101/rmuttgber.2026.291713)

Abstract

This study examines the relationship between intangible assets, transfer pricing, and corporate tax avoidance, with ESG performance as a moderating variable. Using panel data from 133 firms listed on the Stock Exchange of Thailand during 2020–2024 (665 firm-year observations), multiple regression analysis was employed. Tax avoidance was measured by the effective tax rate (ETR), the ratio of tax expense to operating cash flows (TAX/CFO), and the ratio of tax expense to total assets (TAX/ASSETS). The results reveal that intangible assets are positively associated with TAX/CFO and TAX/ASSETS, indicating lower levels of tax avoidance. ESG performance weakens the relationship between intangible assets and TAX/ASSETS, suggesting reduced tax avoidance in high-ESG firms. Transfer pricing is positively related to TAX/ASSETS, and ESG performance strengthens the relationship between transfer pricing and ETR, thereby enhancing tax compliance. These findings support Stakeholder Theory by highlighting the role of ESG in promoting ethical tax practices. These findings suggest that ESG serves as an effective governance mechanism for mitigating tax avoidance and enhancing tax transparency. Therefore, regulators and tax authorities should incorporate ESG as a central criterion in assessing and managing tax risks.

Keywords: Intangible asset, Transfer pricing, Tax avoidance, ESG performance

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Introduction

In the context of rapidly evolving globalization, international free trade has increased the prominence of multinational corporations (MNCs). These entities play a crucial role in facilitating the transfer of strategic resources such as advanced technologies, production capabilities, and global communication systems from developed to developing countries (Kyove et al., 2021). These corporations are often accused of exploiting cross-border differences in tax regimes to lower their effective corporate tax rates. Common strategies include the use of transfer pricing and the shifting of costs associated with intangible assets, which enable the relocation of profits to jurisdictions with lower tax rates (Sari et al., 2021).

Transfer pricing (TP) refers to the method used to determine the pricing of transactions between affiliated entities or subsidiaries within the same corporate group. In principle, such pricing should align with the arm's length standard, which requires that intercompany transactions be priced as if they were conducted between independent, unrelated parties in a competitive market (Pandey et al., 2024). However, the practical implementation of the arm's length principle faces several challenges, particularly in jurisdictions with underdeveloped legal frameworks or weak regulatory enforcement. These limitations create opportunities for the manipulation of transfer prices, commonly referred to as transfer mispricing, which can result in significant distortions in taxable income and facilitate aggressive tax avoidance (Solikhah et al., 2025). The manipulation of transfer pricing is a commonly employed accounting strategy by MNCs to facilitate tax avoidance and profit shifting to low-tax jurisdictions, with the primary objective of minimizing the overall tax liability of the corporate group. This is typically achieved by inflating reported profits in countries with low tax rates and simultaneously deflating profits in high-tax jurisdictions. The issue has garnered substantial scholarly attention due to its profound implications for international tax policy and global economic equity.

The strategic use of intangible assets has become a key mechanism for multinational corporations (MNCs) to engage in tax avoidance, attracting considerable academic and policy attention following scandals involving major digital firms such as Google and Facebook (Fuchs, 2018). In response, many countries, including Thailand, have introduced measures to strengthen tax collection in the digital economy. Thailand's E-Service tax regime, effective 1 September 2021, requires non-resident digital service providers to remit Value Added Tax (VAT), aiming to close legal loopholes and ensure equitable treatment between domestic and

foreign operators. Similar regulations have been implemented in more than 60 countries. Additionally, some jurisdictions voluntarily enhance governance by incorporating environmental, social, and governance (ESG) practices, consistent with stakeholder theory, to address long-term challenges and mitigate the adverse effects of lost investment benefits, particularly in managing transfer pricing risks in developing economies.

According to the *World Investment Report*, Asian countries have attracted the highest levels of foreign direct investment (FDI) over the past five years, with Southeast Asia receiving 225 billion US dollars in 2025 (UNCTAD, 2025). Despite these inflows, the OECD (2024) *Revenue Statistics* show that in 2022, tax revenues from multinational enterprises in many Asian countries, including Thailand, remained below the OECD average of 34.0 percent of GDP. Thailand's tax-to-GDP ratio was only 16.7 percent, lower than the Asia-Pacific average of 19.3 percent, indicating persistent challenges in tax collection efficiency. Contributing factors include weak enforcement of tax laws, limited adoption of digital technologies, and the absence of integrated inter-agency data systems. These structural deficiencies create opportunities for tax avoidance (World Bank, 2023; OECD, 2024), thereby forming the basis for this study.

This study pursues three primary objectives: (1) to examine transfer pricing practices and profit shifting through intangible assets within the context of Thailand as a developing country; (2) to analyze the influence of these practices on corporate tax avoidance; and (3) to investigate the regulatory role of environmental, social, and governance (ESG) performance in constraining tax avoidance behavior as an alternative to strict legal enforcement. The findings are expected to provide valuable insights for policymakers, practitioners, and stakeholders, while also addressing theoretical gaps in the literature on corporate tax behavior.

Literature Review and Hypothesis Development

Relevant Theories

This study draws on two theoretical perspectives: Agency Theory and Stakeholder Theory. Agency theory (Jensen & Meckling, 1976) highlights the principal–agent relationship, where information asymmetry between managers (agents) and shareholders (principals) can lead to opportunistic behaviors, including tax avoidance through accounting manipulation or transfer pricing that violates the arm's length principle. Stakeholder theory (Freeman, 1984) expands the focus to all parties affected by corporate decisions, such as investors,

employees, customers, governments, and communities, emphasizing that strong stakeholder relationships enhance long-term value, especially through Environmental, Social, and Governance (ESG) initiatives (Rudyanto & Pirzada, 2021). While some tax avoidance practices may be legal, they are often ethically questionable; robust ESG practices can discourage aggressive tax avoidance by fostering ethical conduct, transparency, and accountability in financial reporting.

The relationship between the value of intangible assets and tax avoidance.

Recent studies on intangible assets and tax avoidance show mixed results. Argilés-Bosch et al. (2020) found that e-commerce firms in Europe are more likely to avoid taxes, while Chen and Meng (2023) linked higher digital transformation in Chinese listed companies to greater tax avoidance. In ASEAN, Saputra et al. (2024) reported a significant relationship mediated by earnings management, and Sudaryono and Murwaningsari (2023) found a positive effect moderated by foreign ownership in Indonesia—both supporting agency theory. Conversely, Kim et al. (2020) in South Korea and Sodikin (2024) in Indonesia found a negative association, aligning with stakeholder theory. Triyanto and Tarmidi (2024) reported no significant link for R&D expenditures in Indonesia. Given these mixed findings, this study adopts the agency theory perspective, viewing intangible assets as strategic tools to reduce tax liabilities and proposes the following hypothesis:

Hypothesis 1: The value of intangible assets is hypothesized to be negatively associated with the effective tax rate, ETR/CFO, and ETR/ASSET, indicating a higher degree of tax avoidance.

The relationship between transfer pricing and tax avoidance

Empirical studies on the relationship between transfer pricing and tax avoidance have produced mixed results. Amidu et al. (2019), using data from firms listed on the Ghana Stock Exchange (2008–2015), found a positive association between transfer pricing and tax avoidance. Similarly, Illahia et al. (2022), examining manufacturing firms on the Indonesia Stock Exchange with audit quality as a moderating variable, reported a significant positive relationship. These findings align with agency theory, which views transfer pricing as a tax planning mechanism that serves investor and shareholder interests. In contrast, studies grounded in stakeholder theory highlight ethical considerations and corporate governance. Suwaldiman (2025) found that transfer pricing had a significant negative effect on tax avoidance in various Indonesian industries, suggesting that firms with stronger stakeholder engagement and ethical governance

are less likely to employ aggressive transfer pricing practices. Despite these divergent findings, this study adopts the agency theory perspective, positing that transfer pricing can be strategically employed to reduce tax liabilities and enhance shareholder value. Based on this reasoning, the following hypothesis is proposed:

Hypothesis 2: The intensity of transfer pricing is hypothesized to be negatively associated with the effective tax rate, as measured by ETR/CFO and ETR/ASSET, indicating a higher level of tax avoidance.

The role of ESG performance in moderating the relationship between intangible asset value and tax avoidance

Empirical evidence directly examining the moderating role of ESG performance in the relationship between intangible assets and corporate tax avoidance remains limited. However, related studies offer relevant insights. Chouaibi and Chouaibi (2020) found that CSR practices strengthened the positive relationship between intellectual capital and voluntary accounting disclosure, underscoring the role of socially responsible behavior in enhancing corporate transparency. Similarly, Jorgji et al. (2024) reported that ESG performance positively moderated the relationship between sustainable human resource management and firm performance, indicating that stronger ESG practices amplify the benefits of sustainable initiatives. Li et al. (2022) showed that CSR engagement mitigated the negative impact of tax avoidance on firm performance among SMEs in Pakistan, while Elamer et al. (2024) found that although ESG performance was positively associated with firm value, this effect weakened when tax avoidance was present—suggesting that tax avoidance can undermine the credibility of ESG activities. Grounded in stakeholder theory, which emphasizes ethical responsibility, transparency, and accountability to all stakeholder groups, this study proposes the following hypothesis:

Hypothesis 1A: ESG performance is expected to have a significant negative moderating effect on the relationship between intangible asset value and tax avoidance.

The role of ESG performance in moderating the relationship between transfer pricing value and tax avoidance.

Empirical research generally reports a positive relationship between transfer pricing and tax avoidance, indicating that greater profit shifting is associated with higher levels of tax avoidance (Amidu et al., 2019; Illahia et al., 2022). In contrast, studies examining ESG performance and tax avoidance typically find a negative association, suggesting that firms

with stronger ESG practices are more likely to consider stakeholder interests and engage in ethical, transparent tax behavior (Rashid et al., 2024). However, evidence on ESG's moderating role in the transfer pricing–tax avoidance relationship remains inconclusive. Elmer et al. (2024), studying French firms, found ESG performance had only a marginal effect on tax avoidance, potentially indicating that some companies use ESG initiatives as tax planning tools, consistent with agency theory. Conversely, Amri and Chaibi (2025) reported that ESG practices reduced stock price volatility in the presence of tax avoidance. Grounded in stakeholder theory and the ESG framework, this study proposes the following hypothesis:

Hypothesis 2A: ESG performance is expected to have a significant negative moderating effect on the relationship between transfer pricing value and tax avoidance.

Conceptual Framework

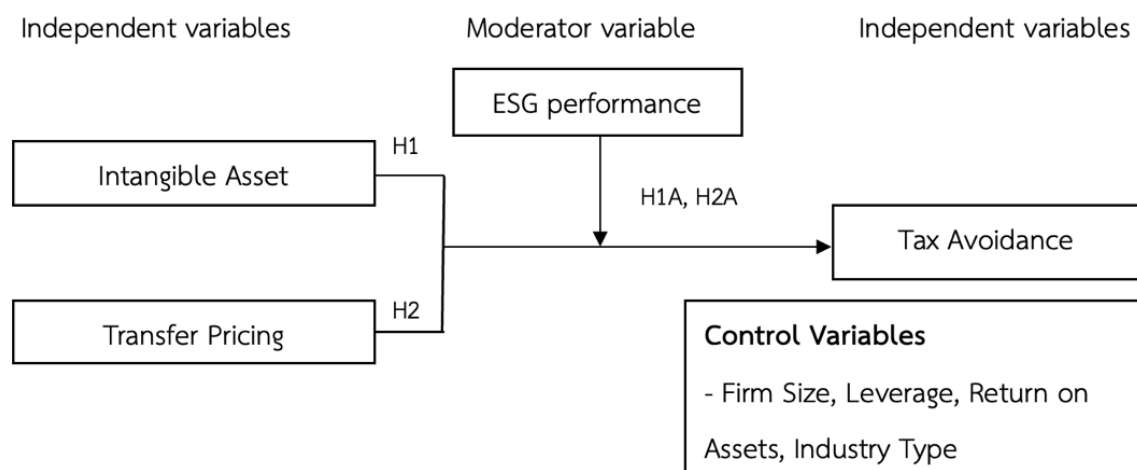


Figure 1 Conceptual Framework

Research Methodology

Sample Selection and Data Collection

In this study, the population comprised companies listed on the Stock Exchange of Thailand (SET) that maintained continuous operations over the five years from 2020 to 2024. To be included in the sample, companies were required to meet specific criteria established by the researcher based on historical data. Applying these selection criteria resulted in a final sample of 133 companies, yielding a total of 665 firm-year observations. The detailed sample selection process is summarized in Table 1

Table 1 Presents the number of firm-year observations Unit: firm-year observations

Sample used in the study	Total
List of companies in the SET100 index as of December 31, 2024	670
Less Company-level annual data from the banking, finance and securities, life insurance, and real estate mutual fund industries.	(109)
Less Companies with incomplete data, outliers *	(140)
Companies reporting pre-tax losses	(207)
Total sample used in the study	133
Number of companies in the study sample over the five years (2020–2024)	665

Note: *Including companies with untraceable data and those that were listed on the Stock Exchange (IPO) after January 1, 2019.

The regression analysis identified outliers that impaired the accuracy of the estimated relationships between variables. To mitigate this, the Trimmed Means method (Walfish, 2006) was applied, excluding the lowest and highest 1% of values for each variable. This procedure introduced missing data, which were subsequently addressed using mean imputation based on the guidelines of Little and Rubin (2002).

Variables and Measurement

The following section outlines the variables employed in this study, including their definitions and measurement approaches. These comprise the dependent variable, independent variables, and control variables.

Independent variables: Tax avoidance is proxied by three measures: the Effective Tax Rate (ETR), the ratio of corporate income tax to Cash Flow from Operating Activities (TAX/CFO), and the ratio of corporate income tax to Total Assets (TAX/ASSETS). The definitions and measurement methods for these proxies are described as follows:

Measures of Tax Avoidance: The key challenge in tax research is the measurement of tax avoidance behavior, as data on taxable income and actual tax payments typically come from confidential tax returns that are not publicly available. As a result, researchers rely primarily on financial statement data. Commonly used proxies include the ETR Ratio, the TAX/CFO Ratio, and the TAX/ASSETS Ratio. Each proxy reflects different aspects of tax behavior and entails specific strengths and limitations. Using only one measure may lead to misinterpretation; hence, multiple indicators are often recommended to enhance accuracy and reduce measurement bias (Dyreng et al., 2008). These are described as follows:

1. ETR Ratio: ETR is one of the most widely used proxies in empirical research on tax avoidance and is computed as follows: $\text{ETR Ratio} = \text{Total Tax Expense} / \text{Pre-tax income}$ (Dyrenge et al., 2008). The ETR reflects the level of tax planning or avoidance, where a negative value suggests aggressive tax avoidance. However, this measure has limitations. It includes deferred tax expenses, which may not represent actual tax payments, potentially leading to misinterpretation (Hanlon & Heitzman, 2010). Additionally, when pre-tax income is low or negative, the ETR may be distorted, failing to accurately reflect tax avoidance behavior (Henry & Sansing, 2014)

2. Cash flow ETR Ratio: To overcome the limitations of ETR, several scholars have recommended the use of the TAX/CFO ratio, which is computed as follows: $\text{TAX/CFO Ratio} = \text{Total tax expense} / \text{Cash flow of operation}$ (Henry & Sansing, 2014). This ratio captures the actual tax burden paid by a firm relative to its operational cash-generating capacity. As such, it is considered a more accurate and reliable indicator than the ETR for assessing the effects of tax planning on a firm's true cash flows (Koester et al, 2016). A negative TAX/CFO ratio may suggest that a firm is engaging in tax avoidance strategies such as income shifting, tax deferral, or operating in low-tax jurisdictions. However, this measure has certain limitations, particularly when operating cash flows are negative. In such cases, researchers often assume the denominator to be zero or exclude these firms from the analysis, which may lead to biased or inaccurate results due to the exclusion of firms with negative cash flows.

3. TAX/ASSETS Ratio: The TAX/ASSETS Ratio is an alternative proxy that offers greater stability in capturing a firm's tax burden. It is calculated as follows: $\text{TAX/ASSETS Ratio} = \text{Total tax expense} / \text{Total assets}$. This ratio reflects the tax burden relative to the size of the firm (Armstrong et al, 2012) and is particularly useful for comparing firms across different industries or size categories. A negative TAX/ASSETS value may indicate the presence of tax avoidance strategies. However, this measure does not effectively capture a firm's profitability or operational efficiency, especially in cases where firms possess substantial assets but fail to generate adequate income.

Independent variables: Intangible Asset and Transfer Pricing. The value of intangible assets is proxied by the Intangible Asset Ratio $= \text{Intangible assets} / \text{Total assets}$ (Sudaryono & Murwaningsari, 2023). Transfer pricing activity is proxied by Transfer Pricing Intensity $= \text{Related party receivables} / \text{Total receivables}$ (Merle et al, 2019).

Moderator variable: The moderating variable in this study is ESG performance, which is measured using the ESG Rating based on the Stock Exchange of Thailand (SET)'s criteria for selecting firms for inclusion in the Thailand Sustainability Investment (SET, 2025). The assessment consists of three stages, as follows:

Stage 1: ESG performance is assessed based on information disclosed in the company's ESG report submitted to the Stock Exchange of Thailand (SET). The evaluation comprises three dimensions: (1) Environmental (E) – including greenhouse gas management, (2) Social (S) – including gender equality (measured by employee distribution by gender) and employee remuneration, and (3) Governance (G) – including director and executive remuneration. Stage 2: Calculation of the Composite ESG Score. The composite ESG Rating is computed using the following formula: $ESG\ Rating = (E \times w_E) + (S \times w_S) + (G \times w_G)$ Where: E, S, G = represent the scores obtained in each dimension (on a scale of 0 to 100) w_E, w_S, w_G = represent the weighting assigned to each dimension: Environmental (25%), Social (25%), and Governance (50%) Stage 3: Conversion of ESG Rating Levels into Numerical Scores. The final ESG rating is categorized into five levels, with each range assigned a corresponding median score for quantitative analysis, as shown below:

Table 2 Criteria for the Interpretation of Assessment Score Levels

Rating Level	Score Range	Assigned Median Score	Interpretation
4	90-100	95	Excellent
3	80-89	85	Very Good
2	70-79	75	Moderate
1	60-69	65	Below Moderate
0	< 60	50	Poor

Control Variable: This study incorporates firm-level control variables that have been shown to influence tax avoidance. These include firm size, leverage, return on assets, and industry type (Thunputtadom et al., 2022)

Data Analysis Results

This study employed multiple regression analysis (MRA) using the Ordinary Least-Squares (OLS) estimation method to test the research hypotheses, as detailed below:

$$\text{ETR} = \alpha_1 + \beta_1 \ln \text{Asset} + \beta_2 \text{TP} + \beta_3 \text{ESG Rating} + \beta_4 \ln \text{Asset} * \text{ESG Rating} + \beta_5 \text{TP} * \text{ESG Rating} + \beta_6 \text{FS} + \beta_7 \text{LEV} + \beta_8 \text{ROA} + \sum_{n=1}^6 \beta_9 \text{Industry} + \varepsilon_{it} \dots\dots\dots (\text{Model 1})$$

$$\text{TAX/CFO} = \alpha_1 + \beta_1 \ln \text{Asset} + \beta_2 \text{TP} + \beta_3 \text{ESG Rating} + \beta_4 \ln \text{Asset} * \text{ESG Rating} + \beta_5 \text{TP} * \text{ESG Rating} + \beta_6 \text{FS} + \beta_7 \text{LEV} + \beta_8 \text{ROA} + \sum_{n=1}^6 \beta_9 \text{Industry} + \varepsilon_{it} \dots\dots\dots (\text{Model 2})$$

$$\text{TAX/ASSETS} = \alpha_1 + \beta_1 \ln \text{Asset} + \beta_2 \text{TP} + \beta_3 \text{ESG Rating} + \beta_4 \ln \text{Asset} * \text{ESG Rating} + \beta_5 \text{TP} * \text{ESG Rating} + \beta_6 \text{FS} + \beta_7 \text{LEV} + \beta_8 \text{ROA} + \sum_{n=1}^6 \beta_9 \text{Industry} + \varepsilon_{it} \dots\dots\dots (\text{Model 3})$$

Results

Descriptive statistics

Table 3 presents the descriptive statistics of the independent, moderating, and dependent variables. The dependent variable, tax avoidance, is measured using three proxies: ETR, TAX/CFO, and TAX/ASSETS. The mean ETR is 16.56%, with a minimum of 0.02% and a maximum of 85.46%. TAX/CFO has a mean of 9.20%, ranging from 0% to 84.81%. TAX/ASSETS ranges from 0% to 0.43%. These results suggest that most firms in the sample tend to engage in tax planning strategies that reduce taxable income while preserving accounting income, as captured by the ETR measure. In contrast, TAX/CFO reflects differences in firms' cash flow management and budgeting policies, which may be used for tax deferral and vary across firms depending on their operational context. The TAX/ASSETS measure shows that the amount of tax paid relative to total assets is relatively low, indicating a different aspect of tax avoidance behavior. Overall, the differences observed across the three tax avoidance proxies highlight their varying sensitivities to time periods and firm characteristics. These findings are consistent with the arguments presented by Hanlon and Heitzman (2010), who noted that each proxy captures distinct dimensions of tax avoidance behavior.

The moderating variable, ESG performance, is measured by the ESG Rating, which ranges from a minimum of 0.00 to a maximum of 4.00, with a mean value of only 0.77. This relatively low average suggests that most firms in the sample exhibit limited disclosure or implementation of environmental, social, and governance (ESG) practices. This may indicate that these firms are still in the early stages of integrating ESG principles into their operations or are in the initial phases of developing sustainability-oriented strategies.

For the independent variables, which include the value of intangible assets and the intensity of transfer pricing, the results show that the mean value of intangible assets was 2.87, with a maximum of 33.20. The mean value of transfer pricing intensity was 14.17, ranging

from 0 to 87.87. These findings indicate considerable variation in the strategic utilization of intangible assets and the extent of transfer pricing activities, as measured by the intensity of related-party transactions, across firms in different industries.

The control variables in this study include firm size (FS), leverage (LEV), and return on assets (ROA). FS has a minimum value of 13.25, a maximum value of 20.69, and a mean of 16.07, reflecting variation in firm size among the sample companies. LEV ranges from 0.60% to 89.13%, with an average of 38.29%, indicating substantial differences in capital structure and financial risk across firms. ROA ranges from –2.50% to 20.69%, with a mean of 5.47%, reflecting differences in profitability among the companies in the sample.

Table 3 Descriptive Statistic Analysis Results

Variables	Minimum	Maximum	Mean	STD
Panel A: Continuous Variables				
ETR	0.02	85.46	16.56	9.72
TAX/CFO	0.00	84.81	9.20	11.78
TAX/ASSETS	0.00	3.64	0.43	0.43
ESG Rating	0.00	4.00	0.77	1.44
Ing Asset	0.02	33.20	2.87	4.08
TP	0.00	87.87	14.17	18.92
FS	13.25	20.69	16.07	1.44
LEV	0.60	89.13	38.29	19.84
ROA	13.25	20.69	16.07	1.44

Correlation Results

Table 4 presents the Pearson correlation coefficients for the model variables to assess potential multicollinearity. The pairwise correlations among independent variables range from 0.169 to 0.718, all below the 0.90 threshold, indicating no multicollinearity concerns (Hair et al., 2010). This is confirmed by the variance inflation factor (VIF) values from the regression models in Tables 5 and 6, with the highest VIF at 2.937, well below the 8.0 threshold (Black, 2010).

Table 4 Pearson's Correlation Matrix

Variables	In Asset	TP	ESG Rating	ETR	TAX /CFO	TAX/ ASSET	FS	LEV	ROA
In Asset	1								
TP	-.022	1							
ESG Rating	.141**	.098*	1						
ETR	-.029	.051	-.105**	1					
TAX/CFO	.007	-.018	-.022	.163**	1				
TAX/ASSETS	.001	.011	-.005	.249**	.224**	1			
FS	.101**	.203**	.494**	-.018	.009	-.117**	1		
LEV	.167**	.050	.202**	-.053	-.020	-.169**	.325**	1	
ROA	-.039	-.118**	.097*	.021	.271**	.515**	-.097*	-.162**	1

Note: * p-value < 0.10, ** p-value < 0.05, *** p-value < 0.0

Table 5 presents regression results on the relationships between intangible assets, transfer pricing, and corporate tax avoidance, including the moderating effect of ESG performance.

Tax avoidance is measured using ETR, TAX/CFO, and TAX/ASSETS ratios. Intangible assets show a negative but insignificant association with ETR, while positive and significant relationships are found with TAX/CFO ($\beta_1 = 0.084$, $p = 0.054$) and TAX/ASSETS ($\beta_1 = 0.003$, $p = 0.036$). These results indicate that higher intangible asset values are associated with greater tax payments, suggesting lower tax avoidance. In Thailand, this may reflect close regulatory monitoring of intangible assets such as brand reputation, software, and intellectual property, limiting their use in aggressive tax planning. The findings are consistent with Kim et al. (2020) and Sodikin (2024) and align with stakeholder theory, emphasizing accountability and transparency. They also support the role of ESG practices in reducing tax avoidance, consistent with the observed moderating effect. Regarding ESG performance as a moderating variable, the results show negative associations with ETR and positive associations with TAX/CFO, though neither is statistically significant. However, ESG performance has a significant negative moderating effect on the relationship between intangible assets and TAX/ASSETS ($\beta_4 = -0.02$, $p = 0.014$), indicating that higher ESG performance weakens this positive relationship. This suggests that firms with stronger ESG performance are less likely to use intangible assets for

tax avoidance. These findings are consistent with Rashid et al. (2024), and align with stakeholder theory. Based on the results, Hypothesis 1, which posits that the value of intangible assets is negatively associated with the ETR, TAX/CFO, and TAX/ASSETS, indicating a higher level of tax avoidance, is rejected. In contrast, Hypothesis 1A, which proposes that ESG performance has a significant negative moderating effect on the relationship between the value of intangible assets and tax avoidance, is supported.

The results show that transfer pricing is negatively associated with tax avoidance when measured by ETR and TAX/CFO, though these relationships are not statistically significant. However, a positive and significant association is found with TAX/ASSETS ($\beta_2 = 0.002$, $p = 0.034$), indicating that firms with higher transfer pricing activity tend to pay more taxes and thus engage less in tax avoidance. In Thailand, this may suggest that transfer pricing is not primarily used for tax avoidance, possibly due to regulatory requirements for disclosing related-party transactions by the Revenue Department. These findings align with studies by Suwaldiman (2025), as well as stakeholder theory, and may also reflect the role of ESG performance in discouraging tax avoidance, consistent with the moderating effect observed in this study.

The results show that ESG performance is positively associated with TAX/CFO and TAX/ASSETS, though these relationships are not statistically significant. However, ESG performance has a positive and significant moderating effect on the relationship between transfer pricing and ETR ($\beta_5 = 0.033$, $p = 0.002$), indicating that higher ESG performance strengthens this positive association. Firms with stronger ESG performance tend to pay more taxes when engaging in transfer pricing, reflecting lower tax avoidance. This suggests that effective ESG practices reduce the use of transfer pricing as a tax avoidance mechanism. These findings are consistent with Rashid et al. (2024) and align with stakeholder theory. Therefore, with regard to Hypothesis 2, which posits that transfer pricing intensity is negatively associated with ETR, TAX/CFO, and TAX/ASSETS, indicating a higher level of tax avoidance, the hypothesis is supported. Similarly, Hypothesis 2A, which proposes that ESG performance has a significant negative moderating effect on the relationship between transfer pricing intensity and tax avoidance, is also supported.

Table 6 presents the robustness test of the main findings. To verify the consistency of ESG performance as a mediating variable, the ESG Rating was replaced with an alternative proxy, the ESG Dummy, assigned a value of 1 if firm i disclosed ESG information on the SET

and 0 otherwise (Thunputtadom et al., 2024). Regression models were re-estimated for Model 4 (ETR), Model 5 (TAX/CFO), and Model 6 (TAX/ASSETS). The results, shown in Table 5, align with those in Table 6, confirming the robustness and reliability of the findings. This study is consistent with Chelawat and Trivedi (2016), who demonstrated that ESG disclosure can serve as a reliable proxy for examining firms' tax behavior. It also aligns with Thunputtadom et al. (2024), who found that ESG disclosure is significantly associated with firms' tax practices, thereby suggesting that disclosure-based measures can adequately capture key governance mechanisms. Accordingly, the consistent regulatory role of ESG, irrespective of the indicator employed, not only corroborates prior research on its capacity to constrain aggressive tax avoidance strategies but also extends these insights to the Thai context.

Table 5 Results of Multiple Linear Regression Analysis: Moderating Effect of ESG Performance

Variable	Model 1 (ETR)			Model 2 (TAX/CFO)			Model 3 (TAX/ASSETS)		
	b	beta	t_ Value	b	beta	t_ Value	b	beta	t_ Value
(Constant)	6.848		1.196	-.143		-.022	.236		1.073
In Asset	-.030	-.040	-.791	.084	.092	1.926**	.003	.091	2.098***
TP	-.006	-.013	-.275	-.008	-.014	-.301	.002	.089	2.121***
ESG Rating	-1.317	-.196	-3.630***	-.512	-.063	-1.216	.001	.005	.106
In Asset*ESG Rating	.006	.020	.349	-.026	-.069	-1.248	-.002	-.123	-2.463***
TP*ESG Rating	.033	.162	3.101***	.007	.030	.598	.000	.018	.405
FS	.747	.111	2.033***	-.034	-.004	-.079	-.001	-.005	-.098
LEV	-.020	-.040	-.947	.015	.025	.618	-.002	-.071	-1.931**
ROA	.039	.027	.650	.560	.325	8.079***	.031	.488	13.523***
Industry	yes			yes			yes		
F-stat	2.330			6.442			18.247		
Adj. R ²	0.290			0.109			0.280		
Max-VIF	2.303			2.303			2.303		
Durbin-Watson	2.056			1.869			1.996		
n	655			655			655		

Note: * p-value < 0.10, ** p-value < 0.05, *** p-value < 0.0

Table 6 Robustness test: Moderating Effect of ESG Performance

Variable	Model 4 (ETR)			Model 5 (TAX/CFO)			Model 6 (TAX/ASSETS)		
	b	beta	t_ Value	b	beta	t_ Value	b	beta	t_ Value
(Constant)	6.291		1.087	-.064		-.010***	.181		.817
In Asset	-.026	-.035	-.694	.088	.096	1.994	.003	.095	2.180***
TP	-.003	-.008	-.154	-.010	-.018	-.388	.002	.092	2.182***
ESG Dummy	-4.333	-.193	-3.549***	-1.600	-.059	-1.129	-.010	-.010	-.207
In Asset*ESG Dummy	.016	.015	.265	-.099	-.077	-1.394	-.006	-.125	-2.525***
TP*ESG Dummy	.106	.148	2.793***	.032	.037	.722	.000	.010	.225
FS	.777	.115	2.092***	-.040	-.005	-.092	.002	.007	.148
LEV	-.021	-.043	-.995	.014	.024	.589	-.002	-.070	-1.913**
ROA	.040	.028	.675	.559	.324	8.066***	.031	.491	13.607***
Industry	yes			yes			yes		
F-stat	2.190			6.444			18.348		
Adj. R ²	0.296			0.110			0.298		
Max-VIF	2.270			2.270			2.270		
Durbin-Watson	2.057			1.871			1.993		
n	655			655			655		

Note: * p-value < 0.10, ** p-value < 0.05, *** p-value < 0.0

Discussion and implementation

This study investigates the relationship between intangible assets, transfer pricing, and corporate tax avoidance, focusing on the moderating role of ESG performance. Grounded in agency and stakeholder theories, the analysis uses panel data from 665 firm-year observations of companies listed on the Stock Exchange of Thailand (2020–2024). Tax avoidance is measured by three indicators—ETR, TAX/CFO, and TAX/ASSETS ratios—each reflecting a distinct dimension of the firm's tax burden.

This research enhances the understanding of tax avoidance in developing countries, particularly Thailand. The findings show that intangible assets are positively associated with TAX/CFO and TAX/ASSETS, indicating that firms with higher intangible assets tend to pay more taxes, implying lower tax avoidance. This contrasts with evidence from other countries where intangible assets often facilitate aggressive tax planning, and in Thailand, may reflect strong corporate governance and ESG-driven reputation management. ESG performance as a moderating variable negatively affects the relationship between intangible assets and TAX/ASSETS, suggesting that effective ESG practices limit the use of intangible assets for excessive tax benefits. This supports stakeholder theory by emphasizing transparency, sustainability, and long-term credibility over short-term tax gains.

The analysis shows that transfer pricing is positively and significantly associated with TAX/ASSETS, indicating that firms with higher transfer pricing activity tend to pay more taxes and engage less in tax avoidance. This contrasts with evidence from other countries where transfer pricing is a common tool for profit shifting and tax minimization. In Thailand, the result may reflect listed companies' adherence to the arm's length principle, driven by tax authority scrutiny and stakeholder pressure, helping to reduce reputational risk and promote transparency in tax reporting. ESG performance has a significant positive moderating effect on the transfer pricing–ETR relationship, suggesting that higher ESG engagement strengthens this positive link, leading to higher tax payments and reduced tax avoidance. This finding supports stakeholder theory and highlights ESG as a potential mechanism for enhancing corporate tax governance.

Based on the findings, this study offers three main contributions. First, it provides empirical evidence that in Thailand, ESG performance plays a critical role in moderating the relationship between firms' resource utilization and tax behavior, particularly for intangible assets and transfer

pricing. ESG serves as a mechanism to curb aggressive tax avoidance and reinforces its role in corporate tax governance. Second, the results contrast with much prior literature that views intangible assets and transfer pricing primarily as tools for tax avoidance. In Thailand, firms with strong ESG engagement may use intangible assets for strategic investments such as R&D, brand development, and market expansion, while transfer pricing may be influenced by regulatory and stakeholder pressures rather than being solely for tax minimization, and third, This study extends agency theory by showing that ESG practices align managerial incentives with stakeholder expectations and curb opportunistic tax behavior. It also reinforces stakeholder theory by demonstrating that ESG functions as a governance mechanism that constrains aggressive tax avoidance. Collectively, these findings provide a more comprehensive framework for linking ESG practices to corporate tax behavior.

Implications for the Thai capital market include: (1) Policymakers, especially the Stock Exchange of Thailand, should promote ESG disclosure and develop an ESG index incorporating tax governance criteria to assess tax risk. (2) Boards and audit committees should integrate ESG into tax risk management to strengthen accountability and stakeholder trust. (3) Tax authorities should monitor firms with low ESG performance, particularly those engaged in intangible asset and cross-border transactions, to reduce tax avoidance and improve enforcement. This study provides novel insights into corporate tax avoidance in Thailand, highlighting ESG's moderating role in shaping tax-related strategies. The findings have implications for ESG policy development and tax governance, and future research should explore these relationships in other countries with different institutional contexts to broaden the understanding of ESG's influence on tax behavior.

Funding

The work was supported by the National Research Council of Thailand (NRCT) [N42A670843]

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Driving Thailand's Jewelry Exports in The Global Era: Strategies for Innovation, Digitalization, and Sustainability

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Received: 19 August 2025 | Revised: 13 December 2025 | Accepted: 22 December 2025

DOI: [10.60101/rmuttgber.2026.292648](https://doi.org/10.60101/rmuttgber.2026.292648)

Abstract

This research aims to analyze the situation and trends of Thai gem export businesses in order to 1) study the differences in business competitiveness and organizational forms, 2) analyze management factors affecting business competitiveness, and 3) promote business development approaches to develop the potential of Thai gem export businesses. Mixed-method research was used to collect qualitative data through interviews with 17 experts and quantitative data from 403 entrepreneurs using descriptive statistics, inferential statistics, and TOWS Matrix. The results of the research found that Thai gem export businesses continue to grow, with strengths in craftsmanship and production, but challenges in technology and competition from low-cost countries. Business competitiveness depends on the size of the business and the types of products offered. The main management factors are brand strategy ($\beta = 672$), product quality ($\beta = 350$), and marketing and pricing strategies ($\beta = 300$ and 594). These include recommendations in 8 areas: improving product standards, expanding digital markets, and developing supply chains, which will help increase the competitiveness of Thai gem export businesses on the international stage.

Keywords: Competitive Capabilities, Jewelry Export, Development Guidelines, Management

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Introduction

The Thai gem and jewelry industry is one of the key industries that is very important to the country's economy. It is ranked 3rd among Thailand's major export products (Ahmad et al., 2017; Jundahuadong, 2020), generating a significant income for the country of more than 30 billion US dollars per year, accounting for 6.37 percent of the total exports (Panyaroj et al., 2023). Thailand is one of the world's leading exporters of gems and jewelry, especially in the field of colored gemstone cutting, which is internationally recognized. There are more than 10,000 skilled craftsmen (Lawson & Chowdhury, 2022; Pongsena et al., 2020). It is also an industry that creates a tremendous number of jobs, up to 1.30 million people, or 3.31 percent of the total workforce in the country. The key strength of this industry is the wisdom and unique skills of Thai craftsmen who can create products that are delicate and beautiful. This includes handicrafts that are characterized as unique, which cater to a niche market where consumers prefer traditional works (Panyaroj et al., 2023; Phittayanon & Rungreunganun, 2019). In addition, the Thai government has a policy to promote Thailand to be the world's center for gem and jewelry trade (Jitngamplang & Thampitug, 2019; Kotsopa et al., 2023). However, changes in technology and consumer behavior in the digital age, as well as intense competition in the global market, have caused this industry to adapt to maintain sustainable competitiveness.

The Thai gem and jewelry sector is currently facing several challenges that threaten its international competitiveness. One key challenge involves the shortage of domestic materials, which has made manufacturers heavily dependent on imported inputs. This dependency not only increases production costs (Kotsopa et al., 2023; Phittayanon & Rungreunganun, 2019) but also exposes producers to price fluctuations in global markets. Another major concern is the decline in skilled labor and the lack of knowledge transfer. In recent years, the number of workers in the industry has dropped by more than half (Jundahuadong, 2020), and the intergenerational transmission of artisanal skills has weakened (Varasriverachote et al., 2019; Jitngamplang & Thampitug, 2019). Technological obsolescence also remains a significant barrier. Many entrepreneurs continue to rely on traditional production methods, with limited customer-oriented design innovation and outdated management systems (Nithisathian et al., 2012; Ahmad et al., 2017). Moreover, intensifying competition from low-wage countries such as China, India, and other Asian economies further pressures Thai producers (Nithisathian et al., 2012; Ahmad et al., 2017). In addition, changing

consumer behavior in the digital age—particularly among the millennial generation, who increasingly value environmentally and socially responsible products—requires the industry to adapt (Thisupakorn & Sarachart, 2024; Jundahuadong, 2020). Finally, gender inequality continues to exist, with women in informal and home-based jewelry work often receiving lower pay than men (Lawson & Chowdhury, 2022). These challenges highlight significant research gaps concerning sustainable development strategies for Thailand’s gem and jewelry industry in relation to technological, social, and environmental transformations in the digital era.

Considering the aforementioned importance, the author is interested in investigating new strategies to enhance the international competitiveness of the Thai gem and jewelry industry in the context of a digital global market. The specific research goals of this study are (1) to explore the situation and trends of the Thai gem and jewelry industry that are affected by technological and global market shifts; (2) to investigate the factors that have led to a decline in the competitiveness of the Thai gem and jewelry industry in the digital era; (3) to develop and propose an innovative strategy for adapting and sustaining intervention for the promotion of Thai gem and jewelry exports; and (4) to recommend policies and guidelines focusing on developing the Thai gem and jewelry industry to government agencies and entrepreneurs. This study will contribute to bridging the gap in understanding about the uses of digital technology and innovation for sustainable development of the Thai gem and jewelry industry. Anticipated outputs are (1) understanding the Thai gem and jewelry industry’s situation and trend in the global context, (2) a success factor model that enhances the competitiveness of the industry in the digital age, (3) a strategic development framework that encompasses innovation, digital adoption, and sustainability, and the following (4) policy recommendations for the government and best practices for entrepreneurs to take the Thai gem and jewelry industry toward a sustainable global industry leader. The study will be instrumental in the support of the government’s policy in driving Thailand to be the world’s trading hub for gems and jewelry. and support Thai entrepreneurs in transforming to sustainably adapt in the age of the digital economy.

Objectives

The objective of this study is to examine the business profiles, management characteristics, and competitiveness of Thailand’s jewelry export enterprises, identify the key internal and external factors that influence their international performance, and develop

strategic guidelines that enhance sustainable competitiveness and long-term growth of the Thai jewelry industry in the global market.

Literature Reviews

Concept of competitive strategy and competitive capability

The competitive strategy forms the core of building the competitive advantage of the business. Porter (1980), in the Competitive Strategy Theory, argues that there are three fundamental strategies to achieve competitive advantage: (1) cost leadership, which is reducing costs; (2) differentiation, where the company offers identity to its product (or service) in the market; and (3) niche market, which is to serve a need in part of the market. This view has been reinforced by several previous studies that show that the competitive strategy will depend on the increase of the organization's marketing potential and innovation (Farida & Setiawan, 2022; Ali & Anwar, 2021). Moreover, national competitiveness can be incorporated through the Porter's Diamond Model that includes different critical factors of a country's competitiveness, such as factor conditions, domestic demand, related and supporting industries, corporate strategy and national rivalry, the role of government, and chance and uncontrolled external forces (Ha et al., 2019, Rehman et al., 2022; Azeem et al., 2021). All of these things combine to produce a country's competitiveness being tied to a complex set of related circumstances, each of which must be organized and managed as a system to support business growth over the long term. Another reason why the resource-based view (RBV) ought to be related to firm competition is that it takes resources of the firm and how the firm utilizes its potential into consideration while interpreting the firm's RBV (Banmairuoy et al., 2022). PESTEL analysis also assists at the time of determining what environmental factors a business should be paying attention to and then working with these factors. A useful strategic instrument to look into the factors influencing businesses both local and international levels covering politics, economics, social, technology, law, and environment (Wajid & Zafar, 2021; de Sousa & Castañeda-Ayarza, 2022; Li et al., 2021).

The role of innovation in building competitiveness

According to the globalization background, the competitiveness of companies and industries must be strengthened through innovation. Thus, organisations able to incorporate it into their business strategy design are likely to be better positioned to sustain competitive advantages (Tran & Thanh, 2023). Innovation is so important for a number of reasons,

including product innovation, which involves the development of new ideas and new and improved products, services and features to add to the product range as demanded by the market (Bushra, 2022); process innovation or new technology or improved work processes which will reduce cost and time and increase productivity (Kozielski, 2016); organisational innovation, which brings about better management practices, organisational flexibility and optimal utilisation of resources (Gilaninia, 2013); and marketing innovation, where products are sold through the latest product display, branding and using digital technology while dealing with their customers. Furthermore, there is evidence indicating that research and development performance is correlated with trade and export performance. Another strategy that other companies have employed to grow their business beyond borders and widen the product range is strategic adoption of innovation (Jong, 2023). Such a consistent multi-level innovation strategy would enable the companies to stay competitive in the volatile business environment and generate sustainable competitive advantages (Aguilar, 1967). Accordingly, to be resilient, like, as an essential nature for increasing the competitive power of the firm, investment and resource allocation towards innovation, are the efficient means for increasing the competitiveness in a long-term basis.

Factors affecting the competitiveness of Thai gem export business

The gem and jewelry industry in Thailand is a significant part of the country's economy. This sector has this distinct advantage in skilled artisans who are able to produce beautiful pattern and intricate design, particularly when it comes to cutting colored gemstones (Pongsena et al., 2020) and establishing local identification of products, thereby creating the uniqueness of products (Panyaroj et al., 2023). Yet, the competition of growing the value-added of stones can be challenging for the Thai gem industry. Interesting to see this critical on different business factors that are influencing the competitiveness of Thai gem export businesses, such as limited raw material sources that brought about the need to depend on other countries (Kotsopa et al., 2023; Phittayanon & Rungreunganun, 2019), fierce competition from a large number of countries particularly China and India with the labor cost advantage (Ahmad et al., 2017; Nithisathian et al., 2012), limited skilled labor and knowledge transfer (Jundahuadong, 2020; Atsawawongwiwat et al., 2024), as well as the emerging demands of new engage consumer behavior from the millennial-generation digital age (Jundahuadong, 2020) as well as the market expansion of less expensive and environmentally friendly synthetic diamonds (Thisupakorn & Sarachart, 2024). A research

was made on success factors of Thai export gem businesses, these were including development on marketing and sales, one of a kind product design, an improvement of production process (Phittayanon & Rungreunganun, 2019). It is also discovered that entrepreneurial focus, market focus and learning focus, as well as access to financial sources, are very significant for enhancing the efficiency of SMEs in this sector (Ahmad et al., 2017; Shariff et al., 2017). Varasriverachote et al. (2019) emphasized business strategies, product innovation, competitive advantage and service innovation as crucial elements in the success of Thai gem businesses, with Kotsopa et al. (2023) established significant guidelines for business, including enhancing production quality according to international standards, identifying a style of Thai arts and culture, improving knowledge management, removing barriers, upgrading recycling and sustainability, developing personnel's skills, and adopting advanced technology. In short, developing the capacity for absorbing knowledge and the ability to respond to market and technological changes will be vital for the survival and sustainable progress of the Thai gem and jewelry industry in the global competition situation.

Developing the potential for exporting Thai gems in the world market

Thailand is known as one of the global gemstone and jewelry processing and trading centers, especially for expertise in gemstone cutting (Rintanalert et al., 2021), and as the 14th strongest position in the world for skilled technician people who can make fine and delicate work (Pongsena et al., 2020). This sector is among the ten primary items constituting our foreign exchange earner. In 2018, Thai gem and jewelry exports, excluding gold, had a combined value of 7,604.64 million dollars, and the figure represented a 6.96% increase from 2017 (Pongsena et al., 2020). The United States and the European Union are main export markets for Thailand, with growth opportunities in the Middle East and ASEAN markets (Rintanalert et al., 2021). But there are a few rough spots in this industry. Nithisathian et al. (2012) noted that the export share of the Thai gold jewelry industry had a sharp fall from 52.4 percent in 2005 to only 25.5% in 2009 because of the lack of investment in research and development. The threats of potential new entrants with lower wages and the application of traditional production approaches designing that does not encounter the customers. Other important limitations include labor shortages and lack of raw materials. Rintanalert et al. (2021) recommend tackling this through cooperation among the ASEAN countries, in particular Cambodia and its widespread sources of raw materials. Furthermore,

Atsawawongwiwat et al. (2024) also noted that the COVID-19 environment has posed additional challenges related to fewer orders and business liquidity, decreased demand for gemstones from younger consumers, and challenges in creating a new generation of skilled labor. In the meantime, the synthetic diamond market for Thailand wishes that the consumer in the age of 25-30 in Thailand were currently extensive, because the consumers give preference to the environmentally friendly and do not conflict with the ethics (Thisupakorn & Sarachart, 2024). To support export capacity development, there may be a need to emphasize promoting gender equality and reducing inequality, particularly exposing rural women workers in the informal sector to skills and opportunities (Lawson and Chowdhury 2022). Shariff et al. (2017) underscored access to cheap debt for SMEs to enhance competition and stimulate growth, and Kongprasert et al. (2017) proposed to apply affective design to create styles of jewelry relevant to culture and market requirements and Nithisathian et al. (2012) suggested that Thai entrepreneurs adjust by adding value, product innovation, networking, knowledge-sharing among entrepreneurs, and switching from original equipment manufacturer (OEM) to original design manufacturer (ODM) or original brand manufacturer (OBM) to improve competitiveness.

Research Methodology

Population and Samples

A mixed-methods approach, combining quantitative and qualitative techniques, was adopted. For the quantitative phase, the population comprised 579 entrepreneurs engaged in Thailand's jewelry export industry, according to data from the Thai Gem and Jewelry Traders Association (TGJTA). At a 95% confidence level, the required sample size of 234 respondents was determined based on Krejcie and Morgan (1970). This sample size also meets the minimum requirement for a power level of 0.80, which is generally recommended for multiple regression analysis (Cohen, 1992). However, questionnaires were distributed to 549 entrepreneurs, and 403 valid responses were received. Of these, 55.58% were male and 44.42% female. Most respondents were aged between 51–60 years (62.03%), followed by 41–50 years (31.02%). In terms of education, most held a master's degree (61.54%), followed by a bachelor's degree (38.21%) and a doctorate (0.25%). The majority served as deputy managing directors (60.30%), followed by managing directors (29.28%). Regarding work experience, most had 11–15 years (48.39%), while 40.20% had more than 15 years. For the qualitative phase, 17 key informants

were purposively selected based on having at least 10 years of professional experience. The group included one expert from the TGJTA, one from the Thai Goldsmiths Association (TGA), 13 export jewelry manufacturers, and two jewelry industry specialists. This number of informants is considered sufficient for data saturation in qualitative research (Guest, Bunce, & Johnson, 2006). To ensure the trustworthiness of qualitative findings, triangulation of data sources and expert validation were employed.

Research Instruments

The investigation employs three data-gathering tools. First, a 5-part structured questionnaire is used as a quantitative instrument to gather data, such as the respondent's profile, business organization, business management problems, firm competitive capability, and recommendation. The reliability of the instrument was demonstrated by five experts, who calculated an item objective congruence (IOC) value (0.99). Cronbach's alpha reliability coefficient was 0.979. Second, semi-structured interview guide for qualitative approach A semi-structured interview guide is constructed with three main sections: (1) background of the respondent, (2) core questions related to the status, problems, potential, and trends of the industry, and (3) recommendations. The guide was reviewed by five experts in business and qualitative research to ensure content validity using IOC with value higher 0.5. A pilot interview was then conducted with two SME entrepreneurs who were not included in the main study to assess the appropriateness of wording, sequencing, and interview duration. Based on their feedback, the guide was refined to improve clarity and flow. Lastly, secondary data was collected using a secondary source recording form.

Data Collection

Research in this study is used with data collection of two methods, both qualitative and quantitative. Quantitative answers were also collected through an online survey, which was emailed to the entrepreneurs with follow-up, which was made via phone calls for the sake of response rate. This design enabled the efficient collection of data as well as the willing engagement of participants. The qualitative component comprised a set ($n = 17$) of in-depth interviews with key informants and was carried out at three months.

Data Analysis

The current study used a macro-level analysis framework consistent with its objectives. Qualitative approach used content analysis to construct the current industry situation, industry problems, and competitive potential offer insight into industry dynamics.

The quantitative approach explores the relationship between organizational features through descriptive and inferential statistics including t-tests, one-way ANOVAs, and Welch tests. Multiple regression analysis was applied to examine the influence of business management factors on competitiveness. This technique was selected because it allows for assessing both the strength and direction of relationships among multiple independent variables and a dependent variable, thereby identifying how specific management dimensions contribute to overall competitiveness (Hair et al., 2019). Grand strategy patterns, as derived from SWOT and developed in the TOWS Matrix, may be, therefore, considered as relevant strategic advice to guide empirically supported strategies to achieve competitive advantage. The inputs are analyzed data or planned at the integrated settings for the analysis.

Research Results

Quantitative Results

Profiles of Business Characteristics

The study found that most had registered capital not exceeding 100 million baht (54.34%) and were 100% foreign-owned businesses (56.82%), followed by 100% Thai-owned businesses (34.74%). The size of most organizations had no more than 100 employees (79.16%). In terms of product design and research employees, most had 6-10 employees (56.82%) and almost one-fourth had more than 10 employees (23.82%). In terms of length of business operation, most had been in operation for 11-15 years (47.15%) and more than 15 years (43.92%).

Analysis of Management Factors and Competitiveness

Table 1 Analysis of Management Factors and Competitiveness

Factors	$\bar{X}$	S.D.	Level of Opinion
Management Factors			
1. Financial Management	3.48	.424	High
2. Brand Management	3.43	.434	High
3. Product Research and Development Management	3.38	.535	Medium
4. Production Capacity Management	3.36	.490	Medium
5. Product Quality Management	3.29	.479	Medium
6. Human Resource Management	3.28	.483	Medium
7. Change Adaptation Management	3.28	.503	Medium

Table 1 Analysis of Management Factors and Competitiveness (Continued)

Factors	$\bar{X}$	S.D.	Level of Opinion
Customer Relationship Management	3.28	.520	Medium
Marketing and Advertising Management	3.25	.518	Medium
Pricing Management	3.22	.569	Medium
Supply Chain Management	3.09	.654	Medium
Overall Management	3.30	.364	Medium
Competitiveness			
Competitiveness in niche market	3.44	.464	Good
Competitiveness in cost	3.33	.507	Moderate
Competitiveness in differentiation	3.32	.496	Moderate
Competitiveness in rapid response	3.25	.539	Moderate
Overall Competitiveness	3.33	.381	Moderate

From the Table 1, it was found that overall management factors were at a moderate level, except for brand management ($\bar{X}=3.43$) and financial management ($\bar{X}=3.48$) which were at a high level. Other factors such as product quality, pricing, marketing, customer relations, supply chain, research and development, personnel, production potential, and adaptability to change were all at a moderate level. In relation to competitiveness, the overall variable was at a moderate level ($\bar{X}=3.33$). Considering each aspect, only the niche market ($\bar{X}=3.44$) being at a good level, while cost, differentiation, and rapid response were all at a moderate level.

Comparison Analysis of Business Characteristics and Competitiveness

Table 2 Comparison Analysis of Business Characteristics and Competitiveness

Characteristics of Thailand's Jewelry Export Businesses	Results of Comparative Competitiveness by Aspect				Overall Comparative Results	
	Cost	Differentiation	Niche Market	Quick Response	Overall Competitiveness	Hypothesis Test Results
Registered Capital	t = -0.802 (p-value=.423)	t = -0.013 (p-value=.990)	t = -0.007 (p-value=.994)	t = -0.143 (p-value=.886)	t = -0.342 (p-value=.746)	Rejected
Shareholder Nationality	F ^a =2.830 (p-value=.065)	F ^a =8.758 (p-value<.001)**	F=7.107 (p-value=.001)**	F ^a =.364 (p-value=.696)	F ^a =5.969 (p-value=.004)**	Accepted
Total Employees	t = -0.356 (p-value=.723)	t = -0.530 (p-value=.597)	t = -0.686 (p-value=.493)	t = -0.697 (p-value=.486)	t = -0.253 (p-value=.800)	Rejected

Table 2 Comparison Analysis of Business Characteristics and Competitiveness (Continued)

Characteristics of Thailand's Jewelry Export Businesses	Results of Comparative Competitiveness by Aspect				Overall Comparative Results	
	Cost	Differentiation	Niche Market	Quick Response	Overall Competitiveness	Hypothesis Test Results
Number of Employees in Product Design and Research	F=2.758 (p-value=.065)	F=1.347 (p-value=.261)	F=1.476 (p-value=.230)	F=1.477 (p-value=.229)	F=2.882 (p-value=.057)	Rejected
Years in Operation	F=1.031 (p-value=.358)	F ^a =2.440 (p-value=.093)	F=1.998 (p-value=.137)	F=2.058 (p-value=.129)	F ^a =2.502 (p-value=.087)	Rejected

Note: ** Statistically Significant at the .01 Level, F^a= Welch's adjusted F-test

The results in Table 2 indicate that shareholder nationality significantly affects product differentiation, niche market focus, and overall competitiveness at the .01 level, with small-to-medium effect sizes. In contrast, firm characteristics such as registered capital, workforce size, R&D personnel, and years of operation show no significant differences. The effect size analysis suggests that while shareholder nationality does not dominate competitiveness, it has meaningful practical relevance. Specifically, differences in shareholder background may influence access to international networks, market knowledge, and innovation orientation, which moderately enhance export competitiveness.

Analysis of Influence of Management Factors on Competitiveness

Table 3 Analysis of Influence of Management Factors on Competitiveness

Management Factors	Competitiveness				Overall Competitiveness	
	Cost	Differentiation	Niche Market	Quick Response	Overall Competitiveness	Hypothesis Test Results
Brand Management	2.414 ✓ P=.016*	1.947 P=.052	18.961 ✓ P<.001**	.594 P=.553	9.116 ✓ p<.001**	Accepted
Product Quality Management	-.253 P=.801	.927 P=.355	9.555 ✓ p<.001**	.288 P=.773	3.778 ✓ p<.001**	Accepted
Pricing Management	-1.391 P=.165	1.964 ✓ P=.050*	.961 P=.337	16.540 ✓ p<.001**	7.087 ✓ p<.001**	Accepted

Table 3 Analysis of Influence of Management Factors on Competitiveness (Continued)

Management Factors	Competitiveness				Overall Competitiveness	Hypothesis Test Results
	Cost	Differentiation	Niche Market	Quick Response	Overall Competitiveness	
Marketing and Advertising Management	1.089 P=.277	1.690 P=.092	-1.065 P=.287	7.934 ✓p<.001**	4.209 ✓p<.001**	Accepted
Customer Relationship Management	.146 P=.884	-.029 P=.977	.318 P=.751	-.287 P=.775	.061 P=.951	Rejected
Supply Chain Management	4.742 ✓p<.001**	1.753 P=.080	-1.340 P=.181	1.680 P=.094	3.657 ✓p<.001**	Accepted
Product Research and Development Management	.763 P=.446	2.564 ✓P=.011*	-.612 P=.541	.266 P=.791	1.672 P=.095	Accepted
Human Resource Management	3.187 ✓P=.002**	1.654 P=.099	.082 P=.934	1.635 P=.103	3.250 ✓P=.001**	Accepted
Production Capacity Management	1.027 P=.305	-1.021 P=.308	-1.386 P=.166	1.465 P=.144	.092 P=.927	Rejected
Change Adaptation Management	.532 P=.595	.927 P=.354	.806 P=.421	-.999 P=.318	.670 P=.503	Rejected
Financial Management	5.194 ✓p<.001**	5.163 ✓p<.001**	-.514 P=.608	.023 P=.982	5.365 ✓p<.001**	Accepted

Note: Statistically significant at the .05 level; ** Statistically significant at the .01 level; ✓ Indicates a statistically significant effect

The results in Table 3 show that brand management, product quality, pricing, marketing and advertising, supply chain management, personnel management, and financial management have statistically significant effects on overall competitiveness. These significant factors demonstrate medium-to-large effect sizes, indicating strong practical importance and collectively explaining a substantial proportion of competitiveness variance ($R^2 = 0.68$). In

contrast, customer relationship management, research and development, production capacity management, and adaptability to change were not statistically significant.

Qualitative Results

Development of strategic guidelines

The analysis, combined with SWOT and TOWS Matrix evaluations, led to the development of eight strategic guidelines encompassing aggressive, preventive, corrective, and defensive approaches. The strategic development framework comprises two key approaches.

Table 4 Development of strategic guidelines through TOWS matrix

Internal Factor External Factor	Internal Strengths (S)	Internal Weaknesses (W)
	The company combines advanced automated production, premium branding, innovative design, global quality standards, digital marketing, customer analytics, and strong partner networks.	The company faces weaknesses in supply chain and logistics efficiency, traceability systems, digital production standards, and eco-friendly operational practices.
External Opportunities (O)	SO-Guidelines	WO-Guidelines
The company has opportunities from premium and digital market growth, global quality acceptance, demand for uniqueness, and data-driven digital marketing.	The company leverages production excellence, premium branding, innovation, international standards, and digital marketing analytics to capture premium and digital growth.	The company improves supply chain efficiency, traceability, digital manufacturing, quality control, and eco-friendly processes to overcome operational weaknesses.
External Threats (T)	ST-Guidelines	WT-Guidelines
The company faces threats from intense price competition, economic volatility, supplier dependence, rapid technological change, and organizational rigidity risks.	The company leverages automation, production efficiency, smart controls, and strategic alliances to counter price competition and external market volatility.	The company focuses on human capital development, technological skills, innovation culture, and agile structures to reduce risks and manage uncertainty.

From the Table 4, the analysis highlights the company's strong foundation in high production standards, automation, brand management, premium image, unique product

design, international quality compliance, marketing networks, digital commerce, and strong partnerships. Weaknesses include an underdeveloped supply chain, inventory and logistics systems, lack of traceability, outdated digital production and quality control standards, and limited eco-friendly processes. Opportunities lie in expanding premium and digital markets, leveraging global quality acceptance, meeting demand for unique products, and using data-driven digital marketing. Threats involve intense price competition, market volatility, supplier dependency, rapid technological change, and rigid structures. Strategic directions include using strengths to capture market growth and enhance brand value, improving supply chain and production standards, leveraging automation and alliances to counter competition, and developing human capital and business agility to adapt to change. This integrated approach ensures competitiveness, resilience, and sustainable growth in dynamic markets.

Application of strategies for developing competitive capabilities

Competitive strategies as a whole cover costs, differentiation, focus, and time to react. Costs are saved by automation and good supply chain management. This can be achieved by increasing the level of production and making branded goods. The focus of growth should be on digital assets and micro markets. It needs business models that are agile enough to rapidly respond to the old market modes and the new normal business models.

The success of the strategies depends on full support from every segment, especially the government, which will have to prioritize the development of technology infrastructure and offer investment aids, research and development support, and quality norms that are recognized by the world of business and which, in turn, should be at the service of the local product. And then also the human resource development, not only technical skill and knowledge but also traditional skills and knowledge, which need to be continuously inherited and developed.

The importance of promoting industry proactively is to build a cooperative network of industry, education, research, and government to improve the organizational development level. The result is to improve competitiveness by investing in production technology, marketing, and technical product development. And all these changes come with challenges, ranging from limited technology-adoption budgets, labor shortages in digital skills and research and development sources, and price wars to the increasingly tremendous speed of consumer behaviors changing, but they are all potential challenges. Therefore, the

development of competitiveness should be systematically included with the overall objective of achieving sustainable competitive advantage in the global economy by considering both direct and indirect effects.

Discussion

The analysis of research findings on business characteristics affecting the competitiveness of the Thai gem and jewelry export sector shows that business management factors exert the strongest influence. This aligns with Porter's competitive strategy theory, which emphasizes the role of strategic management in creating competitive advantage (Farida, & Setiawan, 2022; Ali, & Anwar, 2021). Cost competitiveness is primarily driven by supply chain management, followed by financial management, reflecting challenges caused by domestic raw material shortages, dependence on imported materials (Kotsopa et al., 2023; Phittayanon, & Rungreunganun, 2019), and competition from low-labor-cost countries such as China and India (Nithisathian et al., 2012). Differentiation is shaped by financial management and product research and development, consistent with evidence that innovation and the creation of local identity are critical success factors in the Thai gemstone industry (Varasriverachote et al., 2019; Panyaroj et al., 2023). Market attentiveness mediates the influence of brand management and product quality, reflecting shifts in consumer behavior in the digital era (Jundahuadong, 2020) and the expanding market for synthetic diamonds (Thisupakorn, & Sarachart, 2024). Speed of response is driven by pricing strategies and marketing campaigns, corresponding to recommendations for improving production quality to international standards and integrating advanced technology (Kotsopa et al., 2023).

The research found that business management factors significantly influence different dimensions of competitiveness. Cost competitiveness is shaped by supply chain management and financial management, highlighting the importance of raw material management, supplier selection, and cost control. These findings reflect the challenges of relying on imported raw materials and competing with lower labor cost countries such as India and China (Kotsopa et al., 2023; Nithisathian et al., 2012). Differentiation is determined by financial management and product research and development, supporting the view that product innovation leads to sustainable competitive advantage (Tran, & Thanh, 2023) and aligns with evidence that innovation is essential in the Thai gemstone industry (Varasriverachote et al., 2019). Market

focus is influenced by brand management and product quality, consistent with Thailand's strengths in fine colored gemstone cutting and the creation of distinctive local product identity (Pongsena et al., 2020; Panyaroj et al., 2023). Pricing strategies and marketing activities enhance quick response capability, which corresponds to the shifting behavior of digital era consumers (Jundahuadong, 2020) and the growing market for synthetic diamonds (Thisupakorn, & Sarachart, 2024). Overall, the findings support Porter's (1980) competitive strategy theory, emphasizing cost leadership, differentiation, and niche market focus.

The SWOT and TOWS analysis produced eight strategies across proactive, preventive, corrective, and defensive approaches. The proactive strategy focuses on using strengths in manufacturing and brand management to access premium markets and digital platforms, aligning with Porter's (1980) differentiation strategy and reflecting Thai craftsmanship in refined colored gemstone cutting that creates unique product identity (Pongsena et al., 2020). Preventive strategies involve improving production efficiency through semi-automation and developing integrated business partner networks, consistent with process innovation and technological upgrading emphasized by Kozielski (2016) and Kotsopa et al. (2023). Corrective strategies address organizational weaknesses by optimizing supply chains, supporting suggestions that Thai firms move from original equipment manufacturer to original design manufacturer or original brand manufacturer to enhance competitiveness (Nithisathian et al., 2012). Defensive strategies highlight the importance of strategic human capital development and organizational flexibility, in accordance with Jundahuadong (2020) and Atsawawongwiwat et al. (2024). Effective implementation of all strategies requires government support in technological infrastructure, financial mechanisms, research and development, and international standard development, which align with Porter's (1980) view of the state's role in competitiveness and the recommendations of Rehman et al. (2022) and Shariff et al. (2017).

Research Implications

Thai gemstone and jewelry businesses should strengthen brand identity and fine craftsmanship to create products with distinctive Thai character for premium markets. In the short term, firms should enhance supply chain efficiency through better demand forecasting, reliable logistics partnerships, and more flexible pricing and promotional strategies that respond to digital consumer behavior and the growing popularity of synthetic diamonds. Over the long term, companies should shift from contract manufacturing toward original design

development and own-brand creation, supported by continuous investment in innovation, advanced production technologies, and international business alliances to improve efficiency and cost control. Government agencies should support this transition by improving technological infrastructure, innovation systems, and research investment, while also addressing raw material shortages through domestic exploration and international cooperation. In the long term, policies should promote sustainable competitiveness through international standards, long-term financial support for SMEs, and global marketing campaigns that highlight Thai identity. Educational institutions should modernize curricula by integrating traditional craftsmanship with digital skills, while acting as innovation hubs that support research, incubation, and intergenerational knowledge transfer.

Suggestions for future research

New business models that are consistent with the new era of the digital age, such as e-commerce and social commerce for developing export markets and big data and personalized marketing for raising the level of competition and contributing to the competitiveness of the Thai gem business, should be emphasized to some extent. And the future study should also pay attention to automation, intelligent manufacturing technology, and digital supply chain management and track the factors affecting the success of enterprise industry. 4.0 vision from an enterprise perspective. Integrated research and development of eco-materials and of eco-friendly mass-production techniques with reduced waste and no resource theft should be implemented as well, and construction should be targeted at the market following sustainability. Yet another key question to consider is why labor must be manufactured to fit technological change, that is, why skill-building and teamwork situations must be generated in public, private, and institutional organizations. Moreover, value added will have to be determined through qualitative research in the area of design and innovation, for instance, in creative modes of production and in niche production, and brand strategies for high-end market competition.

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Sustainability versus Regenerative Supply Chain Management: A PRISMA-based Systematic Review of Theoretical Evolution and Conceptual Boundaries (2010-2025)

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Received: 26 August 2025 | Revised: 12 December 2025 | Accepted: 16 January 2026

DOI: [10.60101/rmuttgber.2026.292872](https://doi.org/10.60101/rmuttgber.2026.292872)

Abstract

Supply chain management has shifted from a focus on cost efficiency toward sustainability and, more recently, regeneration. Yet the boundaries between sustainable supply chain management, the circular economy, and regenerative supply chains remain unclear. This study conducts a systematic review following PRISMA 2020, covering literature from 2010–2025 across four databases. From 255 initial records, only nine studies met the inclusion criteria. Findings show that sustainability and the circular economy (CE) are well-developed, grounded in frameworks such as Stakeholder Theory, the Resource-Based View (RBV), and Network Theory, supported by measurable indicators. In contrast, regenerative supply chain management (RSCM) lacks clear definition, frameworks, and metrics. Current discussions are mostly normative, emphasizing ecosystem restoration, community well-being, and net-positive outcomes. The study concludes that RSCM requires new frameworks and indicators, including biodiversity gains, soil carbon sequestration, and social equity indices. Integrating regenerative principles into policies and strategies, particularly within ASEAN and Thailand, can help shift supply chains from minimizing harm to creating verifiable net-positive impacts.

Keywords: Sustainability, Regenerative Supply Chain, Circular Economy, PRISMA, Systematic Review

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Introduction

Over the past decades, supply chain management (SCM) has progressively expanded its remit from a narrow concern with cost, speed, and reliability toward broader environmental and social responsibilities. This evolution has been propelled by global imperatives such as the UN Sustainable Development Goals, the Paris Agreement, and escalating expectations around corporate ESG reporting. Within this trajectory, sustainability-oriented approaches have become mainstream in both scholarship and practice. More recently, however, interest has turned to regenerative approaches that aspire not merely to reduce harm but to produce net-positive impacts—restoring ecological and social systems and enhancing the very resources upon which supply chains depend. Yet, despite this growing attention, the conceptual boundaries that distinguish sustainability, circular economy, and regeneration in SCM remain insufficiently articulated, posing challenges for theory development, managerial action, and policy alignment.

The theoretical grounding of Sustainable Supply Chain Management (SSCM) has matured considerably, synthesizing multi-level drivers and calling for deeper theoretical substantiation (Brandenburg & Gruchmann, 2019). Foundational frameworks often rely on Stakeholder Theory and the Resource-Based View (RBV) to explain how and why firms embed sustainability in their inter-organizational processes (Kim & Lee, 2011). Beyond the firm level, Network Theory has been employed to analyze governance and interdependencies across supply networks, framing SSCM as a collective network-level endeavor (McLoughlin, Hines, Nudurupati, & Lascelles, 2015). While these theories provide robust explanations for why and how firms adopt sustainability, they primarily focus on harm reduction and efficiency within existing paradigms (Molamohamadi, Ismail, Leman, & Norzima, 2014), setting the stage for the later emergence of Circular Economy (CE) and regenerative models.

In parallel, the circular economy (CE) has gained prominence as a design logic aimed at closing loops, slowing flows, and narrowing resource use, thereby operationalizing environmental objectives through product-service systems, reverse logistics, remanufacturing, and material recirculation. Recent work has articulated circular models for sustainable supply chain management and explored tensions and complementarities between CE and sustainable development (Muradin, 2022). Conceptual models have connected circular supply chains with CE performance, extending strategy-to-operations linkages and signaling measurement avenues (Shaharudin & Mokhtar, 2022). Methodological advances have

proposed techniques for designing and managing global supply chain operations under CE criteria, including decision support for network configuration and strategy evaluation (Aldas-Salazar et al., 2023). Simulation-based analyses of (reverse) supply chains in circular product-service systems further illustrate operational trade-offs and dynamic effects inherent in CE transitions (Wu, 2023). These developments have sharpened operational toolkits and metrics, yet they predominantly aim at harm reduction and efficiency restoration, not the net-positive aspirations of regeneration.

A third vein of work has interrogated the intersection of digital transformation and sustainability in SCM—mapping how technologies such as IoT, blockchain, and advanced analytics may enhance visibility, traceability, and decision quality to support sustainability outcomes (Stroumpoulis & Kopanaki, 2022). While digital enablers can strengthen execution of sustainability and CE strategies, their theoretical integration has largely focused on improving performance within existing paradigms rather than reconceiving value creation toward restorative ends. In short, the literature has refined how to do sustainability better, but it has not yet clarified what it means to do regeneration at all within supply chains.

This conceptual ambiguity matters. Without a clear theoretical definition and boundary conditions for regenerative SCM, organizations struggle to formulate strategies that move beyond compliance and incremental efficiency to restoration, renewal, and capacity-building of social-ecological systems. Measurement is likewise constrained: widely used metrics target footprint reduction (e.g., emissions, waste, water) and circularity proxies (e.g., recirculation rates), while regenerative metrics—such as ecosystem function enhancement, biodiversity gains, soil carbon sequestration, community capability building, or net-positive social equity outcomes—remain under-specified for supply chains. The absence of middle-range theory hinders cumulative knowledge and comparable empirical testing, and it blurs the policy conversation where governments and coalitions (e.g., ASEAN initiatives on sustainable logistics and circular economy) are searching for levers that can credibly catalyze net-positive transitions in production and trade.

This study addresses these gaps by conducting a PRISMA-guided systematic review of literature published between 2010 and 2025 across multiple databases. We map how sustainability-focused studies have consolidated theoretical foundations; how circular economy work has provided operational models and methods; and where, if at all, regenerative ideas have surfaced in supply chain scholarship. The synthesis confirms that

while sustainability and CE are theoretically and methodologically articulated, regenerative SCM is not yet established as a distinct construct: explicit definitions are scarce, boundary criteria are ambiguous, and regenerative-specific models, metrics, and empirical validations are largely absent (Brandenburg & Gruchmann, 2019; McLoughlin et al., 2015; Kim & Lee, 2011; Molamohamadi et al., 2014; Stroumpoulis & Kopanaki, 2022; Muradin, 2022; Shaharudin & Mokhtar, 2022; Aldas-Salazar et al., 2023; Wu, 2023).

Building on these insights, we position regeneration not as a semantic extension of sustainability or a sub-case of circularity, but as a paradigmatic shift that reorients value creation: from maintenance to enhancement, from harm-reduction to benefit-creation, from efficiency to effectiveness in restoring system health, and from compliance to innovation grounded in socio-ecological outcomes. Conceptually, this requires clarifying (i) ontological foundations—what constitutes a regenerative supply chain and which system boundaries (temporal, spatial, ecological, social) matter; (ii) epistemological approaches—how regenerative outcomes can be known and credibly measured; and (iii) methodological frameworks—what research designs (e.g., longitudinal field studies, intervention experiments, comparative case series, systems simulation) can detect and attribute regeneration. Practically, it invites SCM to expand from enterprise-centric performance to system-centric performance, integrating landscape-level restoration, community capability building, and intergenerational equity into procurement, sourcing, network design, and last-mile strategies.

For policy and managerial audiences—particularly in emerging economies and regional production hubs—the distinction is consequential. In the ASEAN context, logistics and manufacturing corridors (e.g., automotive, agri-food, electronics) are under pressure to decarbonize, reduce waste, and increase resilience while advancing inclusive development. Translating regeneration into supply chain mandates could guide incentives (e.g., blended finance for restorative procurement), de-risk innovation (e.g., pilots on regenerative agriculture sourcing and material recirculation with biodiversity co-benefits), and align metrics (e.g., supply-base biodiversity baselines, community well-being indices) with trade and industrial policy. For Thailand’s sustainability and logistics agenda, articulating what counts as regenerative would help firms and public agencies move beyond circularity alone, orienting roadmaps toward net-positive ecosystem and social outcomes that are auditable and investment-grade.

Accordingly, the aims of this review are threefold. First, to map the theoretical evolution of sustainability and circular economy approaches in SCM, identifying their dominant foundations (stakeholder theory, RBV, institutional and network perspectives) and the operational toolkits that have emerged (Brandenburg & Gruchmann, 2019; McLoughlin et al., 2015; Kim & Lee, 2011; Molamohamadi et al., 2014; Stroumpoulis & Kopanaki, 2022; Muradin, 2022; Shaharudin & Mokhtar, 2022; Aldas-Salazar et al., 2023; Wu, 2023). Second, to clarify the conceptual boundaries of regeneration vis-à-vis sustainability and CE, specifying where existing constructs suffice and where new constructs and metrics are needed. Third, to propose an agenda for theory building and empirical inquiry that enables credible identification, measurement, and governance of regenerative supply chains in diverse sectoral and regional contexts. By consolidating disparate strands and surfacing boundary criteria, the review seeks to provide both scholars and decision-makers with a clearer foundation for advancing SCM from sustainability maintenance toward regenerative enhancement.

To directly address the research objective of clarifying conceptual boundaries, Table 1 provides a detailed comparative framework. The benefit of this framework is to operationalize the distinctions between these paradigms, serving as a 'Boundary Criteria Checklist' that compares sustainability, circular, and regenerative approaches across six key dimensions.

Table 1 Comparative Conceptual Dimensions of Supply Chain Paradigms

Dimension	Sustainability SCM (Harm Reduction)	Circular SCM (Loop Closing)	Regenerative SCM (Net- Positive Enhancement)
Core Objective / Goal	Do less harm; reduce environmental and social footprint ⁴	Resource efficiency: design for reuse, recycle, and close-the-loop systems ⁵	Do more good; restore, renew, and enhance socio-ecological systems ⁶
Primary Logic	Compliance & Efficiency (Meeting standards, minimizing waste)	Industrial Ecology & Decoupling (Slowing/closing resource loops)	Restoration & Co- evolution (Creating conditions for systems to thrive)
Theoretical Anchors	Stakeholder Theory, Resource-Based View (RBV), Institutional Theory ⁷	Industrial Ecology, Systems Thinking, Network Theory ⁸	Socio-Ecological Systems Theory, Resilience Theory, Ecological Economics ⁹

Table 1 Comparative Conceptual Dimensions of Supply Chain Paradigms (Continued)

Dimension	Sustainability SCM (Harm Reduction)	Circular SCM (Loop Closing)	Regenerative SCM (Net- Positive Enhancement)
Core Performance Metrics	Carbon footprint reduction, waste minimization, compliance rates ¹⁰	Recycling/reuse rates, reverse logistics efficiency, circularity indicators ¹¹	Net biodiversity gain, soil carbon sequestration, community well-being indices ¹²
Temporal Focus	Short-to-mid term (Annual reporting, project-based)	Mid-term (Product lifecycle, asset depreciation cycles)	Long-term & Intergenerational (Multi- decade ecological and social health)
System Boundary	Firm & Linear Supply Chain (Focal firm, Tier 1 suppliers)	Product Lifecycle & Reverse Networks (Inter- firm loops, product-as- service)	Socio-Ecological System (Ecosystem, watershed, community, landscape- level)

Note: The table highlights the conceptual distinctions among sustainability, circular, and regenerative supply chain management paradigms. Sustainability focuses on minimizing harm and complying with standards, circular supply chains emphasize closing material loops and resource efficiency, and regenerative supply chains aim at net-positive system enhancement through ecological and social restoration.

Methods

Protocol and Registration

This systematic review was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines (Page et al., 2021), ensuring methodological transparency and rigor. The protocol was developed a priori, specifying the research questions, inclusion/exclusion criteria, and analytic approach.

Search Strategy

A comprehensive literature search was carried out across four databases: SciSpace (200 initial records), Google Scholar (20 records), PubMed (35 records), and additional sources obtained through backward and forward citation searches. The search covered the period from January 2010 to December 2025. Search terms included combinations of: (“sustainability” OR “sustainable”) AND “supply chain management,” “regenerative” AND “supply chain,” and (“sustainability” OR “regenerative”) AND “supply chain management.”

Eligibility Criteria

Studies were included if they met the following conditions: (i) published between 2010–2025; (ii) written in English; (iii) peer-reviewed journal articles, conference papers, or book chapters; and (iv) contained theoretical or conceptual contributions related to supply chain management with a focus on sustainability and/or regenerative approaches. Excluded were grey literature, dissertations, technical reports, non-English publications, and studies lacking theoretical or conceptual content. These inclusion and exclusion criteria, along with their rationales, are summarized in Table .

Table 2 Eligibility Criteria

Criteria	Specification / Rationale
Inclusion Criteria	
1. Publication Period	2010–2025 (Rationale: To capture the theoretical evolution from the establishment of SSCM to the emergence of RSCM.)
2. Language	English (Rationale: To ensure precise interpretation and maintain consistency in the analysis.)
3. Document Type	Peer-reviewed academic literature (Journal articles, conference papers, book chapters) (Rationale: To guarantee academic rigor and the reliability of synthesized concepts.)
4. Content Scope	Must contain theoretical or conceptual contributions (Rationale: Aligns with the primary objective of analyzing 'conceptual boundaries,' thus filtering out empirical or technical studies lacking theoretical grounding.)
Exclusion Criteria	
1. Document Type	Grey literature, dissertations, technical reports (Rationale: Lack of a formal peer-review process.)
2. Content Scope (Primary)	Non-Supply Chain focus (Rationale: To focus only on articles where SCM is the primary unit of analysis.)
3. Content Scope (Depth)	Insufficient theoretical depth or non-conceptual (Rationale: Descriptive or report-style articles without theoretical linkages were excluded.)
4. Content Scope (Regen.)	No regenerative content (Rationale: Applied specifically to the 'Regenerative' keyword search to isolate true RSCM concepts.)

Study Selection Process

The selection process was conducted independently by two researchers to mitigate selection bias. In the first stage (title and abstract screening, n=210), any discrepancies regarding

inclusion were discussed until a consensus was reached. A similar consensus-based approach was applied in the second stage (full-text assessment, n=40). Ultimately, 9 studies satisfied all inclusion criteria and were included in the final analysis. Figure 1 presents the PRISMA 2020 flow diagram detailing this process.

Data Extraction

Data were extracted using a standardized template capturing study characteristics (author, year, publication type), theoretical frameworks employed, methodological orientation, and key findings. Extracted data were organized into comparative tables to facilitate synthesis and thematic analysis.

Risk of Bias Assessment

Risk of bias was evaluated using the Risk of Bias in Non-randomized Studies—of Interventions (ROBINS-I) tool, with adaptations to account for the conceptual and theoretical nature of the included studies. Specifically, three domains were emphasized:

- 1) Study selection bias – whether the inclusion of sources reflected comprehensive coverage of the sustainability–regeneration literature.
- 2) Theoretical framing bias – whether the authors transparently justified their choice of frameworks (e.g., stakeholder theory, RBV, resilience).
- 3) Outcome interpretation bias – whether conclusions were proportionate to the evidence provided.

Other ROBINS-I domains (e.g., intervention classification, deviations from intended interventions) were not directly applicable to conceptual papers and were excluded from the assessment. Ratings were assigned as low, moderate, or serious risk based on transparency and methodological rigor. This adapted use of ROBINS-I aligns with recent practices in conceptual systematic reviews where theoretical contributions, rather than empirical intervention effects, are the unit of assessment.

Results

Study Selection

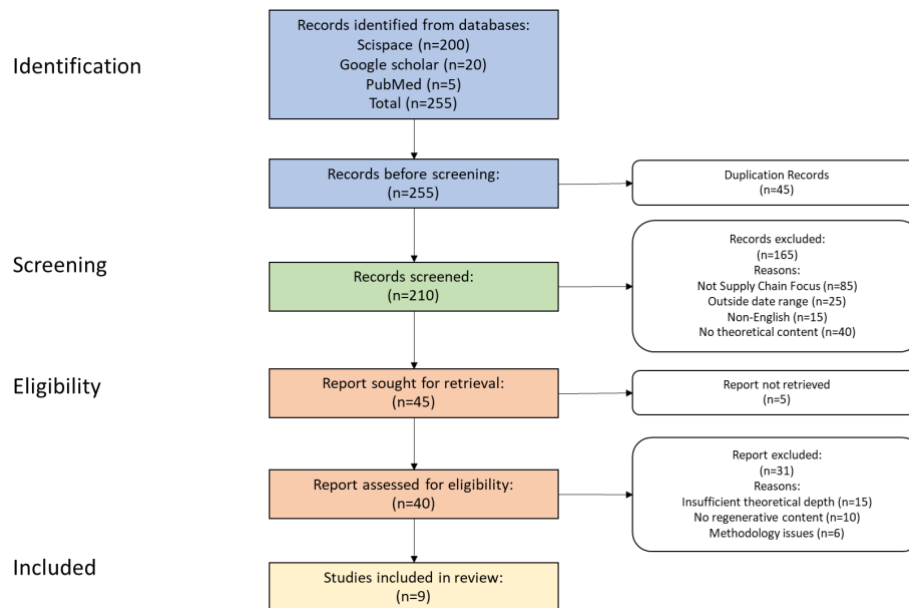


Figure 1 The PRISMA 2020 flow diagram

The PRISMA 2020 flow diagram (Figure 1) illustrates the study selection process. A total of 255 records were identified through database searches and citation tracking. After removing 45 duplicates, 210 records remained for title and abstract screening. Of these, 170 were excluded for not meeting the inclusion criteria. Forty reports were retrieved for full-text assessment, with 31 subsequently excluded due to lack of theoretical focus, non-English language, or inaccessible full texts. Ultimately, nine studies were included in the final analysis.

Study Characteristics

The included studies, published between 2011 and 2023, are summarized in Table 1. Most studies appeared after 2015 ($n = 7$), signaling increasing attention to sustainability and circular economy themes in supply chain research. The distribution by study type was as follows: conceptual frameworks ($n = 3$), literature reviews ($n = 2$), methodological proposal ($n = 1$), simulation study ($n = 1$), empirical study ($n = 1$), and conceptual discussion ($n = 1$). Collectively, these studies demonstrate a progression from early sustainability frameworks to circular economy integration and, more recently, exploratory connections with digital transformation. The characteristics of the nine included studies are summarized in Table .

Table 3 Data Extraction Template for Included Studies in the Systematic Review

Author(s), Year	Study Type	Theoretical Framework(s)	Methodology / Approach	Key Findings	Notes
Kim & Lee (2011)	Conceptual study	Stakeholder Theory, RBV	Conceptual model	Determinants of integrating sustainability into SCM	Early foundation of SSCM
Molamoham adi et al. (2014)	Conceptual framework	Three pillars of sustainability	Framework development	Linked SCM structures with environmental, social, and economic pillars	Integration emphasis
McLoughlin et al. (2015)	Conceptual framework	Network Theory	Theoretical synthesis	Defined SSCM processes grounded in network theory	Governance perspective
Brandenburg & Gruchmann (2019)	Literature review / Framework	Multi- theoretical (Stakeholder, RBV)	Synthesis and conceptual model	Comprehensive SSCM framework, call for stronger theory	Key SSCM reference
Stroumpoulis & Kopanaki (2022)	Literature review	Digital transformation + SSCM	Theoretical review	Link between digital tech and SSCM outcomes	Technology– sustainability nexus
Muradin (2022)	Conceptual model	Circular Economy	Conceptual analysis	Examined tensions/compl ementarities between CE and sustainability	Bridging concepts
Shaharudin & Mokhtar (2022)	Conceptual model	Circular Economy	Model development	Linked circular supply chains with CE performance	Applied to CE practices

Table 3 Data Extraction Template for Included Studies in the Systematic Review (Continued)

Author(s), Year	Study Type	Theoretical Framework(s)	Methodology / Approach	Key Findings	Notes
Aldas-Salazar et al. (2023)	Methodolo gical proposal	Circular Economy	Decision- support methodology	Strategy design for CE-oriented supply chains	Operationaliza tion focus
Wu (2023)	Simulation study	Circular Economy	Simulation- based modeling	Analysis of (reverse) supply chains in CE- based systems	Empirical computational

Note: Table 3 provides extracted metadata from the nine included studies, covering publication details, theoretical anchors, methodological approaches, and key contributions. The template highlights the dominance of sustainability and circular economy frameworks and the relative absence of regenerative supply chain theorization.

Theoretical Evolution

Analysis revealed three dominant streams of theoretical development:

1) Sustainability-focused studies (2011–2019) Foundational works applied stakeholder theory, resource-based view (RBV), and network theory to SCM. Kim and Lee (2011) emphasized determinants of sustainability integration, Molamohamadi et al. (2014) linked supply chain structures with the three sustainability pillars, and McLoughlin et al. (2015) framed key SSCM processes within network theory. Brandenburg and Gruchmann (2019) later synthesized these perspectives into a comprehensive conceptual framework and called for stronger theoretical substantiation.

2) Circular economy integration (2022–2023) Recent scholarship has increasingly emphasized circularity as a design logic for supply chains. Muradin (2022) highlighted complementarities and tensions between CE and sustainability, while Shaharudin and Mokhtar (2022) developed conceptual models linking circular supply chains with CE performance. Aldas-Salazar et al. (2023) advanced methodological proposals for CE-oriented supply chain strategies, and Wu (2023) used simulation-based modeling to analyze reverse supply chains in CE-based product–service systems.

3) Digital transformation integration (2022) Stroumpoulis and Kopanaki (2022) extended SSCM perspectives by integrating digital technologies, emphasizing blockchain, IoT,

and big data as enablers of sustainability outcomes. Although not regenerative in orientation, this signals an expansion of theoretical anchors beyond traditional sustainability frameworks.

Conceptual Boundaries Analysis

Despite emerging interest, none of the included studies explicitly defined or theorized regenerative supply chain management as a distinct paradigm. Regenerative elements were present in four studies but largely embedded within circular economy discourse, often as aspirational notions of restoration or net-positive outcomes. Three boundary issues were identified:

- 1) Lack of definition – No operational definition of regenerative SCM was proposed.
- 2) Boundary ambiguity – Sustainability, circular economy, and regenerative concepts were often conflated.
- 3) Theoretical underdevelopment – Regenerative SCM lacks middle-range theory and remains largely normative.

Risk of Bias Assessment

The adapted ROBINS-I assessment (Figure 2) indicated that most included studies exhibited moderate risk of bias ($n = 8$), primarily due to limited methodological transparency and selective use of frameworks. One study demonstrated serious risk of bias, arising from insufficient justification of theoretical claims. Nevertheless, overall methodological quality was acceptable for conceptual and theoretical contributions.



Figure 2 ROBINS-I Risk of Bias Assessment for included studies

Synthesis of Findings

The synthesis reveals a clear trajectory of theoretical evolution:

2010–2015: Early foundations of SSCM grounded in sustainability frameworks.

2015–2020: Consolidation of sustainability theories (stakeholder, RBV, network).

2020–2025: Integration of circular economy and digital transformation themes.

The review confirms that while sustainability and circular economy are relatively well-developed, regenerative SCM remains underdefined. The findings underscore a critical opportunity for theory building, boundary clarification, and development of regenerative-specific metrics and empirical validations.

Discussion

Principal Findings

This systematic review was guided by three aims: (1) to map the theoretical evolution of sustainability and circular economy (CE) approaches in SCM, (2) to clarify the conceptual boundaries of regeneration vis-vis sustainability and CE, and (3) to propose a research agenda for regenerative SCM. The findings address these aims by revealing a clear theoretical gap.

The review confirms that while sustainability-focused studies (Aim 1) have matured through established theories (e.g., Stakeholder Theory, RBV), and CE approaches have provided operational models, regenerative SCM (Aim 2) remains conceptually underdeveloped. Addressing Aim 3, the analysis identifies a significant boundary problem—the absence of a clear definition, framework, and regenerative-specific metrics—which forms the basis of the proposed research agenda.

Implications for Theory

This review suggests that moving from sustainability and circularity to regeneration requires a paradigmatic reorientation. Theoretical progression can be understood as a continuum:

- **Sustainability** emphasizes *harm reduction* and efficiency gains.
- **Circular economy** emphasizes *resource loops* and systemic efficiency.
- **Regeneration** requires *net-positive outcomes*, shifting the locus of value creation from minimizing footprints to enhancing socio-ecological systems.

Future theoretical development should address three critical areas:

- 1) **Ontological foundations** — What constitutes a regenerative supply chain? Which boundaries (ecological, social, intergenerational) define its scope?
- 2) **Epistemological approaches** — How can regenerative outcomes be credibly identified, measured, and validated?
- 3) **Methodological frameworks** — What research designs (e.g., longitudinal case studies, comparative experiments, systems modeling) are best suited to capture regenerative processes?

Furthermore, this call for regenerative-specific frameworks in SCM aligns with the emerging discourse in regenerative economics. This broader economic perspective argues for shifting economic models from extractive (harm-based) to restorative (net-positive), emphasizing qualitative development over quantitative growth. Future RSCM theory-building should therefore integrate principles from ecological and regenerative economics to provide a robust theoretical anchor for net-positive value creation.

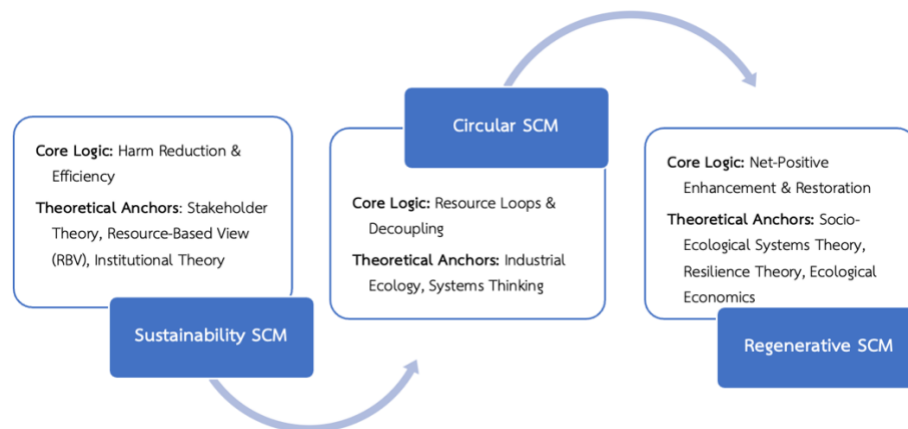


Figure 3 A Visual Synthesis of the SCM Paradigmatic Continuum

Practical and Policy Implications

The lack of regenerative theory has direct consequences for practice. Organizations aiming to transition toward regenerative models face ambiguity in designing strategies, selecting metrics, and aligning with stakeholder expectations. Policy frameworks at global and regional levels—such as the UN SDGs, EU Green Deal, and ASEAN circular economy initiatives—are beginning to demand beyond-sustainability outcomes. Yet without theoretical clarity, firms risk adopting fragmented or symbolic practices.

In emerging economies, including Thailand, the distinction is particularly critical. Logistics and industrial clusters such as the Eastern Economic Corridor (EEC) are under pressure to decarbonize and create inclusive growth. A regenerative SCM perspective could support policy alignment by guiding:

- Incentives for restorative procurement and sourcing (e.g., regenerative agriculture, biodiversity-friendly materials).
- Development of net-positive performance indicators for ecosystems and communities.
- Design of public–private partnerships that promote resilience, equity, and long-term system health.

Equity and Inclusivity Considerations

Current sustainability and circular economy models often emphasize efficiency and compliance, which can privilege large firms while sidelining small, localized actors. A regenerative supply chain paradigm must foreground equity and inclusivity, ensuring that SMEs and marginalized communities share in the benefits of system enhancement. Recent supply chain scholarship has begun to recognize this imperative. For instance, inclusive purchasing capabilities have been linked to more resilient supply chains that embed social inclusion criteria (Silva, 2022). Furthermore, operations and supply chain research is increasingly interrogating justice-oriented frameworks, advocating for public policy regimes that enable diversity, equity, and inclusion (DEI)-anchored practices across supply networks (Bodrožić & Gold, 2025; Matthews, 2025). These insights underscore the necessity for regenerative SCM to adopt metrics that extend beyond ecological outcomes to include DEI indicators, fair transitions in policy mechanisms, and responsive governance structures that do not perpetuate inequalities.

Paradigm Shift and Research Agenda

Collectively, the findings call for a paradigm shift in SCM research: from maintaining system stability to actively regenerating socio-ecological capacity. This requires:

- Development of conceptual models that distinguish regeneration from sustainability and circularity (as proposed in this review)
- Creation of regenerative-specific performance metrics, including biodiversity gains, soil health, and community empowerment indices.

- Empirical validation through longitudinal studies, cross-sector comparisons, and simulation modeling.

By consolidating sustainability, circular economy, and regenerative strands into a continuum framework, this review provides a foundation for advancing SCM theory and informing policy makers. Future research should not only test regenerative principles but also explore how they can be scaled across industries and geographies to achieve genuine net-positive outcomes.

Conclusions

Key Takeaways:

- **Theoretical:** This review maps the SCM paradigmatic continuum, clarifying the conceptual boundaries between 'harm reduction' (Sustainability), 'loop closing' (Circular), and 'net-positive enhancement' (Regenerative), establishing RSCM as a distinct, undefined paradigm.
- **Practical:** For practitioners, the review highlights that current metrics are insufficient for regeneration. New indicators (e.g., biodiversity gains, soil carbon, community well-being) are required to move strategy beyond incremental circularity.
- **Policy:** For policymakers (e.g., in ASEAN and Thailand's EEC), a regenerative framework is crucial for guiding investment and aligning industrial policy with auditable, net-positive ecological and social outcomes.

This PRISMA-based systematic review analyzed the theoretical evolution and conceptual boundaries of sustainability, circular, and regenerative supply chain management (SCM) between 2010 and 2025. The findings demonstrate that while sustainability frameworks have matured significantly, and circular economy approaches have provided concrete operational models, regenerative SCM remains conceptually underdeveloped. No explicit definitions, theoretical frameworks, or empirical validations have yet established regeneration as a distinct paradigm in the SCM field.

Theoretical Contribution

The review advances scholarly understanding by positioning sustainability, circular, and regenerative approaches along a continuum of paradigmatic development. This framework clarifies boundary ambiguities and identifies key theoretical anchors: sustainability (stakeholder theory, RBV, institutional theory), circular economy (industrial ecology, systems thinking), and regeneration

(socio-ecological systems, resilience, ecological economics). By articulating this continuum, the study provides a conceptual foundation for future regenerative SCM theory building.

Practical and Policy Contribution

For practitioners and policymakers, the review highlights the risks of conflating sustainability and circularity with regeneration. Without clear distinctions, organizations face difficulties in strategy design, performance measurement, and policy alignment. In contexts such as Thailand's Eastern Economic Corridor and broader ASEAN logistics development, a regenerative orientation could guide investment in restorative procurement, biodiversity-positive operations, and inclusive community outcomes. These insights underscore the necessity for new metrics, tools, and governance mechanisms that capture net-positive impacts.

Limitations

This review is subject to several limitations. First, the database coverage was restricted to four main sources, potentially omitting recent or regionally published studies. Second, only English-language publications were included, which may bias findings toward Western-centric perspectives. Third, the focus on theoretical and conceptual contributions excluded practice-oriented or technical studies that could offer valuable insights into regenerative principles.

Future Research Directions

Building on these limitations, future research should:

- 1) Develop clear operational definitions and theoretical frameworks for regenerative SCM.
- 2) Create regenerative-specific metrics, including biodiversity, soil health, and community well-being indicators.
- 3) Conduct empirical validations through case studies, longitudinal analyses, and intervention-based research.
- 4) Explore regional adaptations, particularly in emerging economies, where regenerative approaches could align economic competitiveness with ecological restoration and social equity.

To synthesize the contributions of this review, Table 4 summarizes the theoretical, practical, and policy implications alongside future research opportunities. This matrix highlights how the study

advances scholarly understanding, guides organizational practice, and informs policy frameworks, while setting an agenda for regenerative SCM research.

Table 4 Contribution Matrix of the Systematic Review on Sustainability, Circular, and Regenerative SCM

Dimension	Key Contributions	Future Research Opportunities
Theoretical	- Clarifies conceptual boundaries between sustainability, circular economy, and regenerative SCM. - Positions SCM paradigms on a continuum from harm reduction → resource loops → net-positive regeneration. - Identifies theoretical anchors (Stakeholder Theory, RBV, Network Theory, Industrial Ecology, Socio-Ecological Systems).	- Develop explicit definitions and frameworks for regenerative SCM. - Establish middle-range theory and ontological/epistemological foundations. - Expand theoretical integration with resilience and ecological economics.
Practical	- Provides insights for firms to distinguish sustainability and circular practices from regenerative strategies. - Highlights the absence of regenerative-specific metrics, creating awareness among practitioners.	- Develop regenerative performance metrics (e.g., biodiversity gains, soil carbon, community equity). - Conduct longitudinal case studies to validate regenerative business practices.
Policy	- Identifies the gap between policy ambition (e.g., SDGs, ASEAN circular economy initiatives) and current SCM frameworks. - Suggests that regenerative SCM can serve as a policy framework for inclusive, net-positive supply chains.	- Design public–private partnerships to support regenerative transitions. - Develop policy instruments and incentives aligned with regenerative SCM outcomes.
Research Agenda	- Provides a consolidated evidence base from 2010–2025. - Establishes regenerative SCM as an emerging but underdeveloped paradigm requiring urgent scholarly attention.	- Expand database and language coverage. - Use intervention-based methods, simulation modeling, and comparative studies across industries and regions.

Note: Table 4 synthesizes the contributions of this systematic review across theoretical, practical, and policy

dimensions, while outlining future research opportunities to advance regenerative supply chain management as a distinct paradigm.

In conclusion, this review represents the first PRISMA-based systematic mapping that distinguishes regenerative supply chain management as a nascent but distinct paradigm, rather than merely a rhetorical extension of sustainability or circularity (Oyefusi, 2022).

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The Impact of Perceived Organizational Support on Organizational Performance through Mediating Roles of Organizational Learning Capability and Technology Capability

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Received: 12 August 2025 | Revised: 7 January 2026 | Accepted: 20 January 2026

DOI: [10.60101/rmuttgber.2026.292437](https://doi.org/10.60101/rmuttgber.2026.292437)

Abstract

In the rapidly digitalizing economy, information technology has become vital for businesses to build competitive advantage and survive in increasingly competitive environments. Export businesses must coordinate their planning and operations to meet customer needs effectively. This research examined the impact of perceived organizational support (POS) on organizational performance (OPerf) through the mediating roles of organizational learning capability (OLC) and technology capability (TC) in export enterprises. Using quantitative methodology, data were collected via questionnaires from 385 food manufacturing exporters in the Bangkok Metropolitan Region. Statistical analysis included descriptive statistics (frequency, percentage, mean, standard deviation) and Partial Least Squares-Structural Equation Modeling (PLS-SEM) for hypothesis testing. PLS-SEM was used to analyze complex relationships involving latent variables and estimate cause-effect models with mediators. The findings revealed that POS had positive and significant direct effects on OPerf ($p < .001$), with OLC and TC serving as significant mediators. Both OLC and TC also showed positive and significant effects on OPerf ($p < .001$). Theoretically, the research extends Social Exchange Theory by demonstrating that perceived organizational support enhances learning and technology capabilities that drive organizational performance. Practically, it suggests fostering a supportive organizational climate helps sustain competitiveness through learning and technology adoption.

Keywords: Perceived organizational support, Organizational performance, Organizational learning capability, Technology capability, Export, Export enterprise, PLS-SEM

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Introduction

The business environment today faces increased competition because of global market expansion and digital innovation and unpredictable market fluctuations. Small and medium-sized enterprises (SMEs) operating in export sectors need to build powerful internal capabilities to survive and succeed in their markets. The essential capabilities for success include operational efficiency along with organizational agility, innovation, and the ability to learn and adapt continuously.

Strategic management now prioritizes organizational performance (OPerf) as its main focus. The scholarly community has strengthened their focus on perceived organizational support (POS)—employees' beliefs that organizations value their work and care about their welfare (Eisenberger et al., 1986). POS positively affects organizational commitment and job satisfaction, leading to better firm outcomes. Its significance has increased post-COVID as employees expect greater care, flexibility, and psychological safety. High-POS organizations demonstrate superior crisis adaptability, resilience, and innovation (Jindal et al., 2024), while POS also enhances strategic initiatives' effects on sustainable performance in SMEs (Gazi et al., 2024). However, research shows that POS directly affects OPerf but the specific mechanisms remain unclear, especially for SMEs in export industries. Existing research overlooks organizational learning capability (OLC) and technology capability (TC) as essential mediators between POS and OPerf, despite these capabilities driving adaptation and competitiveness (Ding et al., 2023; Otoo et al., 2025).

In the digital economy era, organizational learning capacity (OLC) has become essential for organizations. OLC represents a systematic process of acquiring and sharing knowledge to enhance performance. Organizations with high OLC can rapidly learn from mistakes, develop new ideas, and modify strategies in response to external disruptions. This knowledge-sharing culture improves employee engagement and decision-making (Pande & Pande, 2024). Technology capability (TC)—the capacity to adopt and integrate digital technologies—is equally vital for organizational performance. TC enables export firms to improve supply chain transparency, process automation, and market responsiveness. Thai SMEs implementing digital tools achieve greater efficiency and competitive advantage (Mekhum, 2020; Akbar et al., 2024).

Despite its theoretical foundation, the model using OLC and TC as mediators between perceived organizational support (POS) and organizational performance (OPerf) lacks empirical

validation. Strategic agility is critical for SMEs in developing countries facing resource constraints and dynamic environments, as these capabilities strengthen the relationship between internal factors like POS and business outcomes (Chahal & Gupta, 2024). Thai SMEs, which form the economic backbone by generating employment and GDP growth, must build agility through learning and technology adoption to survive. Export SMEs face particular pressure to operate efficiently across borders amid global supply chain disruptions while reducing logistics costs and improving reliability.

Therefore, this research investigates how POS affects OPerf by using OLC and TC as mediating factors specifically within SMEs which operate in export industry of Thailand. The research addresses this knowledge gap to develop theoretical contributions by merging dynamic capabilities with the POS–OPerf model and provide practical guidance for performance improvement through learning and technological advancement in SMEs.

Literature Review

Perceived Organizational Support (POS)

Perceived organizational support (POS) refers to employee beliefs about how much their organization values their work and cares about their well-being (Eisenberger et al., 1986). This concept rests on the principle that positive employee attitudes and behaviors emerge when organizations treat them well. Extensive research demonstrates POS's positive impact on organizational performance (OPerf). Rhoades and Eisenberger's (2002) meta-analysis of seventy studies revealed moderate to high positive relationships between POS and organizational commitment, job satisfaction, and job performance. Kurtessis et al. (2017) conducted a meta-analysis in their study which further demonstrated that POS enhances employee performance by increasing job satisfaction and organizational commitment while reducing turnover intentions.

Recent empirical studies reinforce POS's relevance in contemporary work environments. Rahmawati et al. (2023) found that POS enhances employee motivation and involvement, increasing organizational productivity in SMEs. Kim et al. (2022) discovered that organizational-level POS contributes to higher profitability through reduced turnover and improved productivity, extending support theory to the societal level.

POS continues to play a critical role in innovation and adaptability. Yang and Zhou (2022) demonstrated that POS enhances creativity, affective commitment, and innovative

self-efficacy among science and technology professionals. Jindal et al. (2024) found that POS enables psychological safety, which is vital for employee innovation and organizational change adaptation.

Furthermore, POS positively relates to internal organizational capability development. Gazi et al. (2024) found that POS enhances the effect of responsible leadership and green innovation capability, contributing to sustainable environmental performance in SMEs. These findings suggest POS not only influences performance outcomes but also supports capability development, particularly in learning and technology adaptation. This research therefore recognizes POS as a foundational factor influencing employee behavior, organizational effectiveness, and strategic internal capability development.

Organizational Performance (OPerf)

OPerf refers to an organization's success in achieving its financial and non-financial targets (Sriboonlue et al., 2024). Performance measurement encompasses financial metrics such as ROI, ROA, and profit, alongside non-financial indicators including service quality, customer satisfaction, and employee engagement (Restrepo-Morales et al., 2023). Financial performance is evaluated through sales growth, ROI, ROA, return on sales, and earnings per share (EPS), while non-financial performance includes total quality management (TQM), innovation capacity, process efficiency, and customer satisfaction (Al-Juoori et al., 2021; Ngo, 2024). These dimensions provide organizations with comprehensive understanding of their effectiveness and sustainability.

For export SMEs, integrating TQM, innovation strategies, ERP adoption, and organizational learning leads to substantial performance outcomes (Ngo, 2024). Non-financial indicators often serve as early signals for financial success in dynamic environments requiring adaptability and customer orientation. Performance outcomes result from multiple factors including leadership, innovation climate, strategic alignment, market responsiveness, and organizational support mechanisms. Long-term SME sustainability depends on innovation, knowledge sharing, and employee development (Restrepo-Morales et al., 2023). This research defines OPerf as the main dependent variable influenced by POS, OLC, and TC. This leads to the formulation of the following hypothesis:

H1: POS significantly affects OPerf.

Organizational Learning Capability (OLC)

OLC refers to organizational mechanisms that enable generating, acquiring, sharing, and applying knowledge for continuous adaptation and improvement (Chiva et al., 2007). These capabilities support continuous improvement, responsiveness to change, and strategic renewal (Jerez-Gomez et al., 2005; Hailekiros & Renyong, 2016), determining an organization's ability to transform knowledge into performance outcomes. Firms with strong learning capabilities can detect market changes and make better decisions faster than competitors (Pham & Hoang, 2019), making OLC a core intangible resource for innovation and competitive advantage in dynamic environments.

Recent research consistently demonstrates OLC's essential role in organizational success. Allammari et al. (2024) found that OLC positively influences SME performance, strengthened by innovation capabilities. Berndt et al. (2023) demonstrated that organizations with superior learning capabilities achieved better operational results in resource-constrained settings. Agyapong et al. (2024) showed innovation mediates the OLC-OPerf relationship in African SMEs, validating learning's importance in competitive contexts. OLC has also been linked to improved organizational agility, employee development, and innovation performance across various sectors (Sriboonlue et al., 2024). In this research, OLC directly enhances OPerf. Based on these insights, the following hypotheses are proposed:

H2: POS significantly affects OLC.

H4: OLC significantly affects OPerf.

Technology Capability (TC)

TC refers to a firm's ability to obtain, develop, and implement technological resources for product creation, process enhancement, and organizational efficiency improvement (Tsai, 2004). These capabilities include technological literacy, innovation capacity, and infrastructure for effective technology adoption and integration (Teece & Pisano, 1994; Camisón & Villar-López, 2014). Organizations with superior TC achieve better product and process innovation, leading to enhanced differentiation and efficiency in competitive and dynamic environments.

Recent research demonstrates TC's essential role in enhancing firm performance. Nguyen et al. (2024) analyzed 11,000 Vietnamese logistics SMEs, showing technology adoption positively affects performance across different indicators. Kim (2023) established that Logistics 4.0 technology adoption enhances innovation capability, leading to better logistics

performance. Berndt et al. (2023) showed that resource-constrained SMEs achieve superior OPerf when frugal innovation receives strong TC support, confirming internal technological strength as fundamental for innovation and competitiveness.

In addition, TC functions as a complex strategic concept. Singh et al. (2020) revealed that stakeholder pressure response through absorptive capacity and innovation capability improves performance. Changalima et al. (2024) found that technological absorptive capacity enhances SME performance when e-business innovation mediates this relationship. Mursitama et al. (2023) identified external technology sources including licensing and partnerships as essential TC components for high-tech firms, confirming TC as a strategic performance enabler. Therefore, the following hypotheses are proposed:

H3: POS significantly affects TC.

H6: TC significantly affects OPerf.

The Mediating Roles of Organizational Learning Capability (OLC) and Technology Capability (TC)

OLC plays a critical role in enabling firms to adapt to changing environments while innovating and maintaining performance levels. The process of knowledge acquisition, sharing, and application leads to innovation which creates competitive advantage. Recent studies indicated that OLC supports firm performance through direct and indirect mechanisms. Al-Juoori et al. (2021) found that OLC boosts OPerf through its positive impact on innovation capability within Malaysian SMEs. Gomes and Wojahn (2017) discovered that OLC produces varying effects on performance across different settings yet maintains its positive influence on innovation. The research findings support the notion that OLC functions as a mediator between POS and OPerf. Thus, the following hypothesis is proposed:

H7: POS significantly affects OPerf through OLC.

TC represents a firm's power to obtain technology and develop it before implementing it in operations which supports OLC by converting learned knowledge into practical innovation and operational enhancements. Research shows that TC functions as a performance enhancement mediator. The research by Akhtar et al. (2021) shows that TC improves both learning and firm performance in Indonesian pharmaceutical firms and Changalima et al. (2024) proved that technological absorptive capacity enhances SME

performance through e-business innovation. The research supports the idea that TC acts as a mediator between POS and OPerf. Thus, the following hypothesis is proposed:

H8: POS significantly affects OPerf through TC.

The individual effects of OLC and TC also interact with each other because OLC helps create TC. Organizations that spend money on learning become better at adopting new technologies and developing their application (Singh et al., 2020). The sequential process of learning followed by technology adoption and then performance improvement functions as a critical serial mediation mechanism. According to Akhtar et al. (2021), information technology acts as a mediator between OLC and OPerf by converting knowledge into innovative results. Therefore, the following hypotheses are proposed:

H9: POS significantly affects TC through OLC.

H10: OLC significantly affects OPerf through TC.

The combined relationships indicate that OLC and TC function as sequential mediators which connect POS to OPerf. The organization's support system first boosts learning which then enhances technological capabilities to produce better performance results. The integrated mediation model demonstrates how learning and technology resources strengthen the relationship between support structures and firm outcomes. Thus, the following hypothesis is proposed:

H11: POS significantly affects OPerf through OLC and TC.

Conceptual Framework

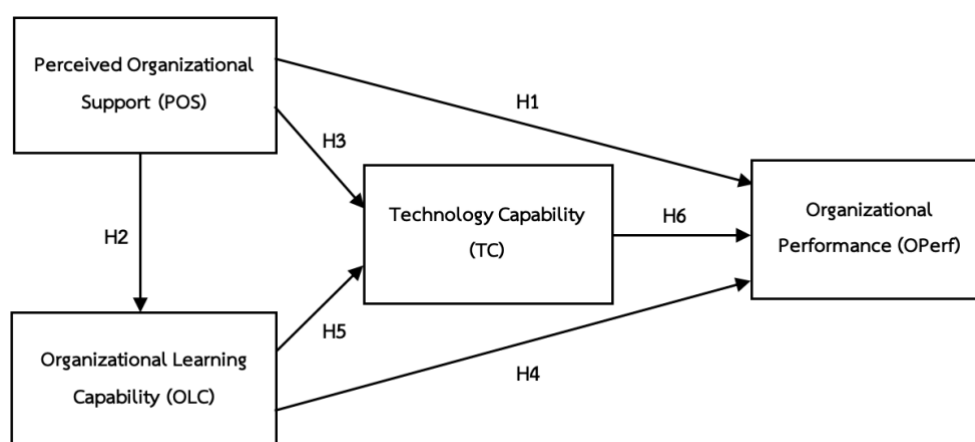


Figure 1 Conceptual Framework

Hypotheses

- H1: POS significantly affects OPerf.
- H2: POS significantly affects OLC.
- H3: POS significantly affects TC.
- H4: OLC significantly affects OPerf.
- H5: OLC affects TC.
- H6: TC significantly affects OPerf.
- H7: POS significantly affects OPerf through OLC.
- H8: POS significantly affects OPerf through TC.
- H9: POS significantly affects TC through OLC.
- H10: OLC significantly affects OPerf through TC.
- H11: POS significantly affects OPerf through OLC and TC.

Research Methodology

Population and Samples

The population used in this research were exporters in the Bangkok Metropolitan Region, Thailand. National statistics from The Office of Small and Medium Enterprises Promotion (OSMEP) in 2024 showed that exporting SMEs contribute substantially to Thailand's total exports, with 11,273 small, 7,483 medium, and 6,132 large exporting firms nationwide. While these figures provide essential macro-level context, no official database offers industry- and region-specific listings for exporters in the food manufacturing sector within the Bangkok Metropolitan Region (Office of Small and Medium Enterprises Promotion [OSMEP], 2024). Consequently, the population size could not be verified, and Cochran's (1953) formula for an unknown population was applied, yielding a minimum sample of 385 firms, resulting in a total sample size of 385 exporters in food manufacturing industry. Samples were selected using non-probability sampling with a purposive sampling technique, selecting exporters with experience in these industries for more than one year. Purposive sampling was employed to ensure that respondents possessed the requisite characteristics for this study. Specifically, eligible firms were required to have active exporting operations and at least one year of experience within the food manufacturing industry. The target respondents were senior managers or executives directly responsible for export operations within each firm. These individuals were selected because they possess the requisite knowledge regarding organizational learning, technological capability, and firm performance, ensuring the accuracy

and relevance of the responses. This approach ensured that the collected data reflected informed perspectives relevant to the research objectives.

Data Collection

The research methodology was quantitative research conducted by using survey method. The questionnaires were used as the research instrument for data collection, and they were distributed to exporters in food manufacturing industry in the Bangkok Metropolitan Region. The questionnaires were divided into four sections. Section 1-4 contained five-point Likert scale questions regarding POS, OLC, TC, and OPerf ranging from 1=strongly disagree to 5=strongly agree. Section 5 consisted of closed-ended questions regarding company general information, such as total employees, and years of experience in the industry. A closed-ended questionnaire was developed based on established concepts, theories, and prior research. All indicators were adopted from validated studies and measured using a five-point Likert scale. To enhance construct clarity, brief descriptions of each variable were provided. POS reflected a firm's commitment to technology adoption, employee training, budget allocation, and the creation of a supportive learning environment. TC captured the use of technology-driven operations, advanced techniques, and investments in process and inventory systems. OLC represented knowledge sharing, team-based and cross-disciplinary training, employee empowerment, and the promotion of continuous learning. OPerf measured customer satisfaction, operational efficiency, innovation and product delivery, sales competitiveness, and inventory turnover. These clarifications ensured that each indicator aligned with its theoretical construct.

Data Analysis

Descriptive statistics used in quantitative data analysis included frequency, percentage, mean, and standard deviation. For hypothesis testing, inferential statistics used Partial Least Squares-Structural Equation Modeling (PLS-SEM). PLS-SEM was utilized across various fields to analyze complex relationships involving latent variables and was used to estimate cause-effect relationship models with mediator, assess measurement and structural models, and provide predictions.

Research Results

The results of the research showed that most of the respondents were export enterprises with approximately 50 - 100 employees (56.4%), and operating in this industry for

approximately 6 - 10 years (56.9%). The research results further revealed that most of the respondents had agreement with POS at the agree level with the mean of 3.86, 3.90 on OLC, 3.77 on TC, and 4.05 on OPerf, respectively.

Validity and Reliability: The researchers had experts in related fields inspect the accuracy and consistency of contents and questions and recommended the improvement and revision. Cronbach's alpha and composite reliability were investigated to measure construct reliability as shown in Table 1.

Table 1 Factor Loading, Cronbach's Alpha Coefficient (CA), Composite Reliability (CR), and Average Variance Extracted (AVE) for Measurement Model

Latent Variables	Indicators	Loadings	CA	CR	AVE
Perceived Organizational Support (POS)	POS1	0.818	0.882	0.893	0.680
	POS2	0.741			
	POS3	0.830			
	POS4	0.855			
	POS5	0.873			
Organizational Learning Capability (OLC)	OLC1	0.890	0.847	0.850	0.766
	OLC2	0.811			
	OLC3	0.825			
	OLC4	0.870			
Technology Capability (TC)	TC1	0.898	0.857	0.860	0.778
	TC2	0.843			
	TC3	0.883			
Organizational Performance (OPerf)	OPerf1	0.789	0.918	0.918	0.710
	OPerf 2	0.832			
	OPerf 3	0.852			
	OPerf 4	0.878			
	OPerf 5	0.855			
	OPerf 6	0.845			

In Table 1, all factor loading values ranged from 0.741 to 0.898, which exceeded the recommended value of 0.50; hence, the constructs in the research model are acceptable (Bagozzi & Yi, 2012). The Cronbach's alpha coefficient (CA) of each construct ranged from 0.847 to 0.918, meaning that all constructs are acceptable according to the recommended

threshold value of 0.70 (Fornell & Larcker, 1981). The value of AVE was in the range of 0.680 to 0.778, which exceeded the minimum threshold value of 0.50, confirming convergent validity. All factor loadings exceeded the recommended threshold of 0.70. Although POS2 (0.741) was slightly lower than other indicators, it remained well within the acceptable range and was therefore retained.

Table 2 Discriminant Validity: Fornell-Larcker Criterion

Variables	OLC	OPerf	POS	TC
OLC	0.850			
OPerf	0.858	0.842		
POS	0.766	0.749	0.825	
TC	0.889	0.835	0.755	0.875

In Table 2, the discriminant validity was tested, and the square roots of AVEs exceeded the minimum threshold of 0.7, and all values exceeded the correlations among the latent constructs (0.749-0.889); thus, discriminant validity was confirmed.

Analysis of Structural Model and Hypothesis Testing

The structural model analysis revealed that R^2 of the dependent variable (OPerf) was 0.773 indicating that 77.3% of the variance of OPerf was explained by independent variables. For the mediating variables, R^2 of OLC was 0.586, and TC was 0.804. The model demonstrated strong explanatory power, accounting for 77.3% of the variance in OPerf, 58.6% in OLC, and 80.4% in TC. These values indicate that the structural model provides a high level of predictive and explanatory adequacy.

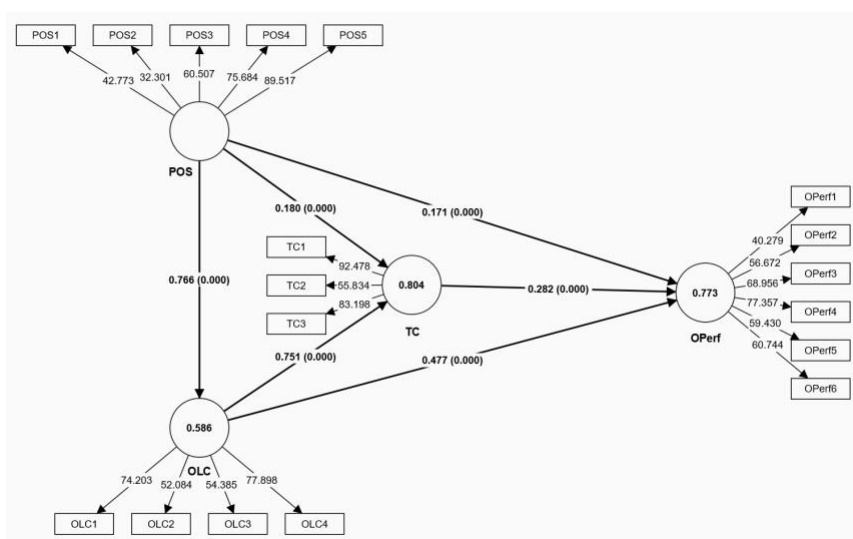


Figure 2 The results of testing the structural model of the theoretical framework

Table 3 Structural Model

Hypothesis	Standardized Estimate (β)	t Statistics	P-Values	Results
H1: POS $\rightarrow$ OPerf	0.198	4.786	0.000***	Supported
H2: POS $\rightarrow$ OLC	0.766	30.99	0.000***	Supported
H3: POS $\rightarrow$ TC	0.180	4.77	0.000***	Supported
H4: OLC $\rightarrow$ OPerf	0.477	8.738	0.000***	Supported
H5: OLC $\rightarrow$ TC	0.751	20.463	0.000***	Supported
H6: TC $\rightarrow$ OPerf	0.282	5.241	0.000***	Supported
H7: POS $\rightarrow$ OLC $\rightarrow$ OPerf	0.365	8.697	0.000***	Supported
H8: POS $\rightarrow$ TC $\rightarrow$ OPerf	0.051	3.51	0.000***	Supported
H9: POS $\rightarrow$ OLC $\rightarrow$ TC	0.575	17.482	0.000***	Supported
H10: OLC $\rightarrow$ TC $\rightarrow$ OPerf	0.212	4.993	0.000***	Supported
H11: POS $\rightarrow$ OLC $\rightarrow$ TC $\rightarrow$ OPerf	0.162	4.974	0.000***	Supported

Note: *** $p < .001$ (two-tailed test)

The results of structural model showed that POS had positive and direct effects on OPerf ($\beta = 0.198$, $p < .001$), OLC ($\beta = 0.766$, $p < .001$), and TC ($\beta = 0.180$, $p < .001$), so hypotheses H1, H2, and H3 were supported. The results also revealed that OLC had positive and significant effects on OPerf ($\beta = 0.477$, $p < .001$) and TC ($\beta = 0.751$, $p < .001$), so hypotheses H4 and H5 were supported. Moreover, TC had a positive and significant effect on OPerf ($\beta = 0.282$, $p < .001$), so hypothesis H6 was supported. Finally, the results also revealed that POS had positive and significant effect on OPerf through OLC ($\beta = 0.365$, $p < .001$) and TC ($\beta = 0.051$, $p < .001$). POS had a positive and significant effect on TC through OLC ($\beta = 0.575$, $p < .001$), OLC had a positive and significant effect on OPerf through TC ($\beta = 0.212$, $p < .001$), and finally POS had positive and significant effect on OPerf through OLC and TC ($\beta = 0.162$, $p < .001$), so hypotheses H7, H8, H9, H10 and H11 were supported respectively.

Conclusion and Discussion

This research aimed to explore how POS impacted OPerf with OLC and TC as mediating variables among Thai export firms. The research findings demonstrate multiple significant relationships which explain the functioning of these organizational factors. The research findings showed POS had a positive significant relationship with OPerf ($\beta = 0.198$, $p < .001$).

This finding supports the principle of the Social Exchange Theory (Rhoades and Eisenberger, 2002), which suggests that when employees feel valued and supported, they respond with greater effort and performance. Rahmawati et al. (2023) also found that POS boosts employee motivation and involvement, thereby improving productivity and performance. Kim et al. (2022) demonstrated that organizational POS leads to higher profitability through reduced employee turnover and increased productivity.

Furthermore, POS had a strong positive effect on OLC ($\beta = 0.766, p < .001$). This suggests that employees perceiving high levels of organizational support are more likely to engage in learning and knowledge sharing, which is consistent with Yang and Zhou (2022), who found that POS influences employee's creativity and innovative self-efficacy. Al-Juoori et al. (2021) also found that OLC acts as an important mediator between POS and innovation performance in SMEs. POS also had a significant positive effect on TC ($\beta = 0.180, p < .001$), indicating that employees who feel supported are more likely to adopt and use technology effectively. This is in line with Nguyen et al. (2024), who reported that internal capability is crucial in realizing the performance benefits of technology adoption in SMEs. Overall, these findings indicate that organizational support enhances employee well-being and facilitates technology assimilation, both of which are vital for competitiveness in dynamic business environments.

OLC had a significant positive effect on OPerf ($\beta = 0.477, p < .001$). This result is in accordance with Hailekiros and Renyong (2016), who found that organizations with strong learning capabilities respond more effectively to market changes. The research by Al-Juoori et al. (2021) also demonstrated that OLC leads to performance improvement in SMEs by promoting innovation. Moreover, OLC strongly influenced TC ($\beta = 0.751, p < .001$). This is consistent with Svetlik et al. (2007) and Pham and Hoang (2019), who emphasized that learning-oriented firms are more successful in adopting and implementing new technologies. The findings of Singh et al. (2020) also showed that knowledge management practices create stronger technology capabilities.

In addition, the results showed that TC had a positive effect on OPerf ($\beta = 0.282, p < .001$). This finding supports the results of Heredia et al. (2022) and Nguyen et al. (2024), indicating that firms with advanced technological capabilities are more efficient, productive, and competitive in today's digital environment.

The mediation analysis further confirms several indirect effects. POS significantly influenced OPerf through OLC ($\beta = 0.365, p < .001$) and through TC ($\beta = 0.051, p < .001$),

indicating that organizational support improves performance both through learning and technology utilization. Moreover, POS also affected TC through OLC ($\beta = 0.575, p < .001$), highlighting that learning capability serves as a key mechanism that enhances technological capability. Finally, the combined mediation of OLC and TC ($\beta = 0.162, p < .001$) confirms that employee support fosters organizational learning and technology use, which together drive performance improvement.

From a theoretical perspective, this research advances the Social Exchange Theory by extending its application from individual-level to organizational-level outcomes. It demonstrates that POS not only motivates employees but also fosters OLC and TC that serve as collective mechanisms for performance improvement. By integrating OLC and TC as mediating variables, this research proposes a comprehensive multi-level framework explaining how supportive environments translate into enhanced performance. This contributes to bridging micro-level (employee perceptions) and macro-level (organizational performance) perspectives in organizational behavior research.

From a managerial perspective, the findings emphasize that managers should view organizational support as a strategic investment, not merely an HR initiative. Encouraging a supportive culture enhances learning, innovation, and technology adoption, which are three critical factors for long-term competitiveness in export industries. Leaders should actively develop systems that promote continuous learning and provide access to technological resources to ensure that employee support is transformed into sustainable performance outcomes.

In summary, this research confirms that POS significantly enhances OPerf, both directly and through OLC and TC. The research contributes theoretically by extending the Social Exchange Theory to the organizational level and practically by offering insights for managers to strengthen firm performance through supportive climates, learning structures, and technology investment.

Limitation

The research examined POS effects on OPerf through OLC and TC of exporters in food manufacturing industry operating in the Bangkok Metropolitan Region. The research findings lack applicability to organizations operating outside different industries and geographic areas. Moreover, since the data were collected from 385 respondents at particular enterprises

restricts the generalizability of the obtained results. Other potential variables, such as organizational commitment, leadership style, organizational culture, or strategic resilience were excluded in this research, which could have limited the explanatory power of the research findings. The research design used a cross-sectional approach which collected data at one point in time thus preventing researchers from establishing cause-effect relationships or tracking temporal changes. Finally, the research employed quantitative methods to test hypotheses but excluded qualitative methods including in-depth interviews and focus groups from its investigation.

Future Research

Future research should expand its focus from exports in food manufacturing sector to other sectors to achieve broader generalization of the findings. The research employed a quantitative approach exclusively but future studies should implement mixed methods or qualitative approaches to study organizational dynamics and employee perceptions. The research focused on POS and OPerf variables while examining the mediating effects of OLC and TC. Future research should investigate additional variables which include organizational commitment and leadership style and organizational culture and digital and innovation capabilities. The inclusion of these variables would provide a more complete understanding of organizational performance determinants in dynamic business environments.

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The Power of Governance: Do Democracy and Corruption Matter for Stock Market Development in Emerging Markets?

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Received: 12 November 2025 | Revised: 31 March 2026 | Accepted: 5 April 2026

DOI: [10.60101/rmuttgber.2026.295542](https://doi.org/10.60101/rmuttgber.2026.295542)

Abstract

This study examines how the Democracy Index and Corruption Perceptions Index, affects stock market capitalization in 24 emerging countries from 2006 to 2022. Using panel data regression, it investigates both the individual and combined impacts of democracy and corruption on market capitalization. The findings suggest that democracy is positively associated with stock market capitalization; however, this relationship is only weakly significant at the 10% level. In contrast, corruption does not exhibit a statistically significant direct effect. When considered jointly, democracy remains marginally significant, while corruption and its interaction with democracy are not statistically significant. Additionally, in high-income emerging markets, democracy play a crucial role in shaping market capitalization, whereas in other markets, neither exerts a meaningful effect. These results underscore the importance of democracy in driving financial market growth, particularly in wealthier economies.

Keywords: Stock market development, Democracy, Corruption, Emerging economies, Market capitalization

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Introduction

The relationship between institutional quality and stock market development is a crucial topic in finance and economics. Democracy, with its emphasis on transparency, accountability, and investor confidence, is often seen as a driver of market growth. In contrast, corruption is widely regarded as an obstacle that distorts resource allocation and weakens trust in financial systems. However, the interaction between democracy, corruption, and stock market development is complex and requires further examination.

A country's political system significantly influences its economic stability, affecting capital flows, investment risks, and market size. Political instability, weak institutions, and corruption scandals have historically led to financial crises, as seen in the 1997 Asian Financial Crisis and Brazil's 2016 corruption scandal. More recently, geopolitical instability from the Russia-Ukraine conflict (2022) has underscored how governance quality directly impacts investor confidence and stock market performance.

Institutional factors such as democracy and corruption play a key role in shaping financial markets. Democratic institutions contribute to financial market development through several institutional channels. Strong democratic governance improves the rule of law, strengthens investor protection, and enhances transparency in financial reporting. These institutional improvements create a more stable legal environment that protects investor rights and increases confidence in financial markets (La Porta et al., 1997). As investors become more confident that their rights are protected and financial contracts can be enforced, they are more willing to supply capital through equity and debt markets. Consequently, firms gain greater access to external finance, leading to more listed companies, increased IPO activity, and higher stock market capitalization. Conversely, corruption imposes hidden costs on businesses, increasing economic inefficiencies (Doh et al., 2003). While some research suggests corruption may help navigate bureaucratic inefficiencies in the short term, it ultimately undermines market integrity and long-term economic stability.

Previous studies have analyzed political risks and stock market performance, showing that democratization positively impacts stock market returns (Lehkonen & Heimonen, 2015). However, limited research explores how democracy and corruption interact to influence financial markets, particularly across countries with different income levels. Since democracy fosters transparency and investor protection, while corruption can erode institutional trust and distort market operations, their combined effects may either reinforce or offset each other.

Therefore, examining both factors together provides a more accurate and comprehensive understanding of their influence on stock market development. This study aims to fill that gap by examining how these two institutional factors jointly shape stock market development in 24 emerging markets from 2006 to 2022. Using panel data regression on 373 country-year observations, the analysis investigates the impact of democracy and corruption on stock market development, measured by market capitalization as a percentage of GDP, the Democracy Index, published by the Economist Intelligence Unit, and the Corruption Perceptions Index, provided by Transparency International. To provide a deeper analysis, the study classifies emerging markets into two groups based on GDP per capita, high-income and low-income countries, to assess whether these two institutional factors have a differential impact depending on economic development levels.

Literature Review

Stock market development is essential for economic growth, serving as a key indicator of financial health and investment climate. A well-functioning stock market facilitates capital raising, investment diversification, and economic stability. Demirgüç-Kunt and Levine (1996) found stock market capitalization to be a reliable measure of financial development, while Garcia and Liu (1999) emphasized its role in tracking financial growth. Given its significance, understanding factors influencing stock market development is particularly important for emerging economies.

Among these factors, democracy plays a crucial role by fostering transparency, investor protection, and political stability. Lei and Wisniewski (2018) argue that democratic environments promote long-term investment. In democratic systems, policies and regulations are generally more predictable, and property rights tend to be better protected. This reduces political and institutional uncertainty for investors, making them more willing to commit capital for long-term investments. While Biglaiser et al. (2008) highlight democracy's role in attracting capital, especially in developing nations. Lehtonen and Heimonen (2015) found that transitioning democracies experience the greatest stock market growth, as improving governance boosts investor confidence. As investor confidence increases, both domestic and foreign investors are more likely to participate in financial markets. Firms therefore gain greater access to external financing through equity issuance and stock market participation. Over time, this process contributes to financial market development by increasing stock market liquidity,

encouraging more firms to list on the stock exchange, and expanding overall market capitalization.

Conversely, corruption hinders stock market development by increasing transaction costs, fostering uncertainty, and weakening institutional trust. Doh et al. (2003) highlight corruption's direct and indirect costs, reducing productivity and discouraging investment. Studies across Greece, Latin America, and Africa show that corruption stifles firm growth and market efficiency (Athanasouli et al., 2012; Faruq et al., 2013; Gaviria, 2002; McArthur & Teal, 2002). Diamonte et al. (1996) found that political instability, including corruption, suppresses market returns, while Lee and Ng (2002) linked corruption to declining firm value and investor confidence.

The impact of corruption varies across income levels. Chowdhury et al. (2023) analyzed 87 economies and found that corruption significantly reduces stock market capitalization in high-income countries, while its effect in low-income economies is minimal. This suggests that macroeconomic fundamentals play a more dominant role in shaping financial markets in less developed regions.

Additionally, good governance enhances information flow within financial markets, further strengthening investor confidence and market efficiency. Dumitrescu and Zakriya (2022) found that well-governed financial systems facilitate transparent information dissemination, reducing uncertainty and enabling more accurate asset pricing. Similarly, Aramonte and Packer (2022) highlight that information governance mechanisms mitigate conflicts of interest, ensuring that market participants receive reliable financial data, which is essential for capital allocation. Mehran and Mollineaux (2012) further emphasize that regulatory disclosure requirements in well-governed economies enhance market discipline, allowing investors to assess risks effectively and promoting financial stability. These findings suggest that good governance plays a crucial role in improving financial markets by fostering transparency, reducing information asymmetry, and reinforcing institutional trust, ultimately supporting sustainable economic growth.

Methodology

Research Question

Emerging markets offer high growth potential but also greater risks due to political uncertainty. Governance structures, election fairness, transparency, and institutional strength,

play a crucial role in attracting investment and determining market stability. Understanding the interplay between political factors and stock market development is essential for investors and policymakers aiming to navigate economic volatility and foster financial growth. This study contributes valuable insights into how governance quality influences stock markets, highlighting the need for strong institutions in emerging economies.

Empirical Model

This study adopts a quantitative research approach, utilizing panel data regression analysis to capture both cross-sectional and time-series variations. The analysis examines the impact of democracy on stock market development, the effect of corruption on stock market development, and the combined influence of the Democracy Index and the Corruption Perceptions Index on market capitalization. To achieve this, the following panel data regression model is specified.

$$\text{Model (1)} : \ln\text{MCap}_{it} = \beta_0 + \beta_1\text{Dem}_{it} + \sum_{j=1}^n X_{jit} + \lambda_{it} + \varepsilon_{it}$$

$$\text{Model (2)} : \ln\text{MCap}_{it} = \beta_0 + \beta_1\text{Cor}_{it} + \sum_{j=1}^n X_{jit} + \lambda_{it} + \varepsilon_{it}$$

$$\text{Model (3)} : \ln\text{MCap}_{it} = \beta_0 + \beta_1\text{Dem}_{it} + \beta_2\text{Cor}_{it} + \beta_3\text{DemxCor}_{it} + \sum_{j=1}^n X_{jit} + \lambda_{it} + \varepsilon_{it}$$

To examine whether democracy and corruption have a greater impact on market capitalization in high-income countries compared to low- and middle-income countries, this study divides the data into two groups based on income levels. The classification is determined according to the World Bank's income classification. The following panel data regression model is then used to analyze these differences.

Low- and Middle-income data and High-income data

$$\text{Model (4), (7)} : \ln\text{MCap}_{it} = \beta_0 + \beta_1\text{Dem}_{it} + \sum_{j=1}^n X_{jit} + \lambda_{it} + \varepsilon_{it}$$

$$\text{Model (5), (8)} : \ln\text{MCap}_{it} = \beta_0 + \beta_1\text{Cor}_{it} + \sum_{j=1}^n X_{jit} + \lambda_{it} + \varepsilon_{it}$$

$$\text{Model (6), (9)} : \ln\text{MCap}_{it} = \beta_0 + \beta_1\text{Dem}_{it} + \beta_2\text{Cor}_{it} + \sum_{j=1}^n X_{jit} + \lambda_{it} + \varepsilon_{it}$$

Where $\ln\text{MCap}_{it}$ represents the natural logarithm of stock market capitalization (normalized by GDP) for country i at time t . Dem_{it} represents the Democracy Index score. Cor_{it} represents the Corruption Perceptions Index score. DemxCor_{it} represents the interaction term between the Democracy Index (Dem) and the Corruption Perceptions Index (Cor). X_{jit} representing Control variables such as income levels, investment activity, banking sector development, and macroeconomic stability. λ_{it} represents the country-specific time-invariant effect. ε_{it} represents the stochastic term (Error Term).

The researchers conducted diagnostic tests to ensure the reliability of the analysis. First, the Breusch-Pagan test was performed to assess the presence of heteroskedasticity. The findings revealed that heteroskedasticity was present in most models. To address this issue and obtain robust and reliable standard errors, cluster-robust standard errors were applied throughout the analysis. Additionally, the Variance Inflation Factor (VIF) was used to examine potential multicollinearity among independent variables. The results showed that all variables across 10 models had VIF values below 5, confirming that multicollinearity was not a concern in the analysis.

Data and variables

In this study, the researcher analyze equity market performance across 24 emerging nations as classified by MSCI spanning the period from 2006 to 2022, including Brazil, Chile, China, Colombia, Czech Republic, Egypt, Greece, Hungary, India, Indonesia, Korea, Kuwait, Malaysia, Mexico, Peru, Philippines, Poland, Qatar, Saudi Arabia, South Africa, Taiwan, Thailand, Turkey, and the United Arab Emirates. However, due to significant data unavailability for Kuwait, Qatar, and Taiwan, these countries were excluded from the analysis. Instead, we included Morocco, Pakistan, and Russia, which have classified as emerging markets for most of the study period. Their classification has changed in recent years. Morocco was reclassified by MSCI from emerging market status to frontier market status in 2013, while Pakistan was downgraded from emerging market to frontier market in 2021. Russia, on the other hand, was removed from the MSCI Emerging Markets Index in 2022 following geopolitical and market accessibility issues. Despite these reclassifications, these countries are retained in the sample because they were part of the emerging market group during most of the study period.

Dependent Variable

We measure stock market development using the natural logarithm of stock market capitalization as a percentage of GDP ($\ln\text{MCap}$). This variable is computed by multiplying the share prices of listed domestic companies (in USD) by the number of outstanding shares and dividing the result by the country's GDP (also in USD). The value is expressed as a percentage rather than in currency units. Investment funds, unit trusts, and companies whose primary purpose is to hold shares of other listed firms are excluded. The data, sourced from the World Bank's World Development Indicators (WDI) database, represents end-of-year values.

Independent Variable

This study focuses on two key independent variables, the Democracy Index (Dem) and the Corruption Perceptions Index (Cor), both of which serve as proxies for institutional quality in emerging markets.

The Democracy Index, published by the Economist Intelligence Unit (EIU), was published every two years before 2010 and has been reported annually since then. The index incorporates five interrelated categories, electoral process and pluralism, civil liberties, government functioning, political participation, and political culture. To address the issue that the Democracy Index was published biennially before 2010, we apply a linear interpolation technique by taking the average of the Democracy Index values from the preceding and following years.

Building on prior research (Chowdhury et al., 2023), the Corruption Perceptions Index (CPI) serves as a measure of corruption control, where higher CPI values indicate lower levels of corruption. Transparency International (TI) were reported CPI scores on a scale of 0 to 10 from 1995 to 2011. However, from 2012 to 2022, TI adjusted the scale to range from 0 to 100. To ensure consistency across years, this study applies a conversion by multiplying scores from 2006 to 2011 by 10, aligning them with the later scale. Under this system, a CPI score of 0 represents a highly corrupt environment, while a score of 100 indicates a very low level of corruption. As noted by Papyrakis et al. (2019), the CPI is a widely recognized and frequently used indicator for assessing cross-country variations in corruption.

Control Variable

To account for macroeconomic factors influencing stock market development, this study incorporates annual data on income levels, investment activity, banking sector development, and macroeconomic stability. These data are sourced from the World Development Indicators (WDI) database. Income levels are represented by GDP per capita ($\ln GDP$), while investment is assessed through gross fixed capital formation as a percentage of GDP ($\ln Inv$). The development of the banking sector is captured by the proportion of domestic credit extended to the private sector by banks relative to GDP. Additionally ($\ln Cre$), inflation, measured using the consumer price index ($\ln Inf$), is included as a control variable, often interpreted as an indicator of macroeconomic stability, all logged.

Results and Discussion

Preliminary Data Analysis

Figure 1 illustrates the evolution of stock market development in emerging market economies over time. The figure presents the average stock market capitalization as a percentage of GDP, distinguishing between countries with GDP per capita below the threshold of 11,513.23 and those above it for each year. The graph indicates that, consistently across all years, the average stock market capitalization in higher-income emerging markets is notably lower than that of lower-income emerging markets. This pattern persists throughout the entire study period, highlighting a significant structural difference between the two groups. The 2008 financial crisis led to a sharp decline in stock market capitalization, which fell more rapidly than GDP per capita. This divergence reflects a significant contraction in financial markets relative to the overall economy during that period, as observed in the graph. In contrast, during the COVID-19 pandemic (2019–2022), both stock market capitalization and GDP per capita declined, but at a relatively similar rate. As a result, the ratio between the two metrics remained more stable, and the overall value on the graph appears less volatile compared to the 2008 crisis. This comparison suggests that while both events negatively impacted the economy, their effects on financial markets and real economic indicators differed in magnitude and timing.

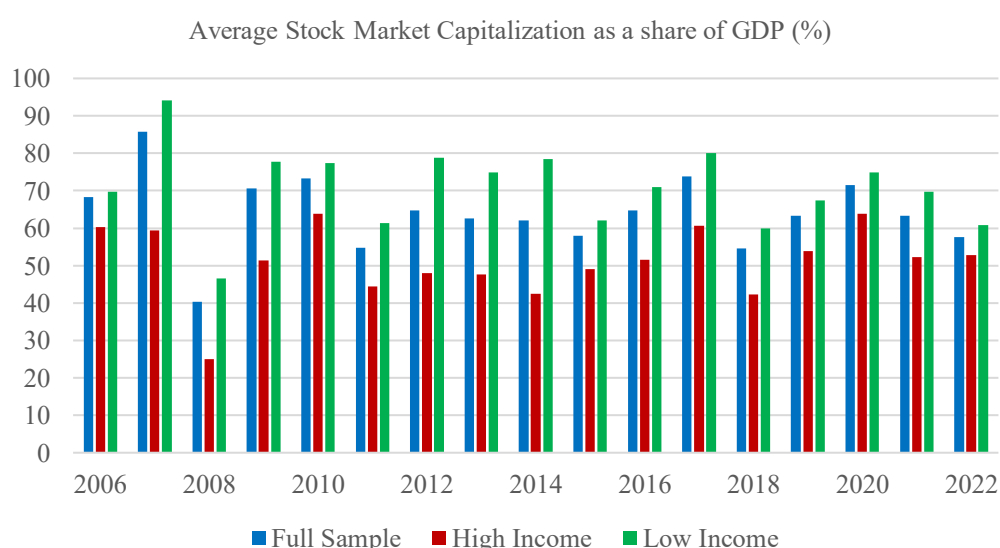


Figure 1 The Evolution of Average Stock Market Capitalization as a Share of GDP Over Time

Descriptive Statistical Analysis

Table 1 presents the descriptive statistics, providing insights into the characteristics of the underlying data. The natural logarithm of stock market capitalization as a percentage of GDP (lnMCap) has a mean value of 3.92, which corresponds to approximately 50.35% of GDP, reflecting a typical feature of emerging markets. The Democracy Index (Dem) has an average of 5.779, indicating a moderate level of democracy, neither particularly high nor low, and suggesting that democratic governance varies widely across the sample of emerging countries. The Corruption Perceptions Index (Cor) has a mean of 42.24 and a median of 39.00, indicating that corruption levels are relatively high among these emerging markets.

Table 2, examining the relationships between the variables in the dataset. The dependent variable lnMCap has a positive correlation with several key variables, including Dem (0.228), Cor (0.182), lnInv (0.221), and lnCre (0.438). lnCre has the highest correlation with lnMCap, indicating that financial sector development plays a crucial role in market capitalization. On the other hand, lnMCap has a negative correlation with lnGDP (-0.054) and lnInfl (-0.154). The weak correlation with lnGDP suggests that stock market capitalization is not strongly linked to a country's GDP per capita. The negative correlation with lnInfl indicates that higher inflation levels tend to be associated with lower market capitalization.

Table 1 Summary Statistics

Variables	N	Mean	Median	S.D.	Min	Max
lnMCap	382	3.92	3.87	0.75	2.04	5.80
Dem	408	5.78	6.49	1.88	1.71	8.28
Cor	408	42.24	39.00	11.75	21.00	73.00
lnGDP	408	8.98	9.11	0.92	6.69	10.89
lnInv	406	3.12	3.13	0.28	2.37	3.80
lnCre	401	3.97	3.95	0.57	2.63	5.23
lnInfl	407	1.91	2.00	0.96	-1.49	4.97

Table 2 Pearson's Correlation Coefficients

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) lnMCap	1.00						
(2) Dem	0.23	1.00					
(3) Cor	0.18	0.20	1.000				
(4) lnGDP	-0.05	0.08	0.686	1.000			
(5) lnInv	0.22	-0.05	0.049	-0.039	1.000		
(6) lnCre	0.44	0.11	0.458	0.433	0.282	1.000	
(7) lnInfl	-0.15	-0.08	-0.358	-0.359	0.025	-0.431	1.000

Inferential Statistical Analysis

Full Sample

Table 3 shows the results of the panel data regression analysis. Column 1 presents the results for Model 1, which examines how democracy affects stock market development. Column 2 shows the results for Model 2, which focuses on the impact of corruption. Columns 3 report the results for Models 3, which analyze both democracy and corruption together to see their individual and combined effects on market capitalization.

The results show that in Model 1, the Democracy Index (Dem) has a positive relationship with market capitalization (lnMCap), with a coefficient of 0.08, significant at the 10% level. This suggests that higher democracy levels are linked to increased market capitalization, but the weak significance level indicates that the effect is not very strong.

In Model 2, the Corruption Perceptions Index (Cor) has a coefficient of 0.00, but it is not statistically significant. This means that corruption alone does not have a clear impact on market capitalization.

In Model 3, where both democracy and corruption are considered together, the Democracy Index (Dem) still has a positive effect on market capitalization, with a coefficient of 0.08, significant at the 10% level. However, the Corruption Perceptions Index (Cor) remains statistically insignificant. The interaction term (DemxCor) has a coefficient of -0.00 but is not statistically significant. This suggests that the combined effect of democracy and corruption does not create a meaningful impact on market capitalization.

Table 3 The Impact of Democracy and Corruption on Stock Market Capitalization

Variables	Model 1		Model 2		Model 3	
	Est.	p	Est.	p	Est.	p
Dem	0.08*	0.080			0.08*	0.092
	(0.05)				(0.05)	
Cor			0.00	0.758	0.00	0.686
			(0.00)		(0.00)	
DemxCor					-0.00	0.853
					(0.00)	
lnGDP	-0.26	0.114	-0.30	0.165	-0.27	0.112
	(0.16)		(0.22)		(0.17)	
lnInv	0.80***	0.008	0.93***	0.003	0.81***	0.009
	(0.30)		(0.32)		(0.31)	
lnCre	0.16	0.429	0.06	0.801	0.16	0.456
	(0.20)		(0.22)		(0.21)	
lnInfl	-0.10***	0.000	-0.10***	0.000	-0.10***	0.001
	(0.03)		(0.03)		(0.03)	
Observation	373		373		373	
F-Statistic	12.31	0.000	12.49	0.000	12.71	0.000
R-Squared	0.16		0.15		0.16	
Adjusted R-Squared	0.14		0.08		0.14	
Breusch-Pagan test	62.86	0.000	50.94	0.000	59.06	0.000
Hausman Test	8.76	0.119	11.83	0.037	9.16	0.242

Low and Middle income

Table 4 presents the results of Models 4, 5, and 6, which analyze the effects of democracy, corruption, and their combined influence on market capitalization in low-income countries. In Models 4 and 5, the coefficients for the Democracy Index (Dem) and the Corruption Perceptions Index (Cor) are 0.06 and -0.01, respectively, but neither is statistically significant. This suggests that democracy and corruption alone do not have a strong direct impact on market capitalization in these economies. Similarly, in Model 6, where both variables are combined, the results remain statistically insignificant, indicating that their combined effect does not significantly influence market capitalization in low-income countries.

Table 4 The Impact of Dem and Cor Across Low-Income Countries

Variables	Model 4		Model 5		Model 6	
	Est.	p	Est.	p	Est.	p
Dem	0.06 (0.08)	0.406			0.07 (0.08)	0.385
Cor			-0.01 (0.01)	0.498	-0.01 (0.01)	0.417
lnGDP	-0.34 (0.26)	0.185	-0.30 (0.28)	0.279	-0.30 (0.27)	0.266
lnInv	0.65** (0.30)	0.030	0.76** (0.37)	0.041	0.66** (0.29)	0.024
lnCre	0.22 (0.30)	0.454	0.17 (0.29)	0.554	0.23 (0.30)	0.440
lnInfl	-0.18*** (0.04)	0.000	-0.18*** (0.05)	0.000	-0.18*** (0.05)	0.000
Observation	266		266		266	
F-Statistic	10.34	0.000	10.05	0.000	8.74	0.000
R-Squared	0.18		0.17		0.18	
Adjusted R-Squared	0.10		0.09		0.10	
Breusch-Pagan test	52.37	0.000	57.31	0.000	53.65	0.000
Hausman Test	12.90	0.024	14.85	0.011	14.08	0.029

High-income

Table 2 presents the results of Models 7, 8, and 9, which examine the impact of democracy and corruption on market capitalization in high-income countries.

In Model 7, the Democracy Index (Dem) has a coefficient of 0.55 and is statistically significant at the 1% level, showing a strong positive relationship between democracy and market capitalization. This suggests that democratic institutions play a crucial role in financial market development in high-income economies.

In Model 8, the Corruption Perceptions Index (Cor) has a coefficient of 0.01, not statistically significant, indicating that Corruption does not significantly influence market capitalization.

In Model 9, where both democracy and corruption are considered together, Dem remains highly significant, coefficient of 0.53 at the 1% level, reinforcing its positive impact on market capitalization. Cor also remains not significant, coefficient of 0.01. These results suggest that in high-income economies, strong democratic institutions enhance stock market development.

Table 5 The Impact of Dem and Cor Across High-Income Countries

Variables	Model 7		Model 8		Model 9	
	Est.	p	Est.	p	Est.	p
Dem	0.55*** (0.16)	0.001			0.53*** (0.17)	0.003
Cor			0.01 (0.01)	0.171	0.00 (0.01)	0.483
lnGDP	-0.22 (0.28)	0.437	-0.34 (0.33)	0.312	-0.24 (0.26)	0.370
lnInv	0.70*** (0.14)	0.000	1.03*** (0.28)	0.000	0.71*** (0.14)	0.000
lnCre	-0.30* (0.18)	0.088	-0.12 (0.21)	0.590	-0.30* (0.17)	0.086
lnInfl	-0.08* (0.04)	0.079	-0.04 (0.04)	0.378	-0.07 (0.04)	0.104
Observation	107		107		107	
F-Statistic	9.01	0.000	5.37	0.000	7.53	0.000
R-Squared	0.33		0.22		0.33	
Adjusted R-Squared	0.23		0.12		0.23	
Breusch-Pagan test	11.04	0.051	14.80	0.011	15.00	0.020
Hausman Test	11.05	0.050	6.21	0.286	13.85	0.031

Effect of Banking Sector Development

Model 10 examines how banking sector development influences the relationship between democracy and stock market development. To do this, an interaction term (DemxlnCre) is included in the analysis. The results, shown in Table 6, focus on emerging economies and reveal that the coefficient for this interaction term is negative and statistically

significant at the 1% level. This means that as domestic credit to the private sector increases, the positive impact of democracy on stock market development weakens. In other words, in economies where banks provide more credit to businesses, democracy has a smaller effect on market growth. From a researcher's perspective, this can be explained by changes in firms' capital structure, when businesses have greater access to bank financing, they are less reliant on raising capital through the stock market. As a result, the importance of stock market development diminishes in economies with a more active and accessible banking sector.

Table 6 The Impact of Democracy and Corruption Across High-Income Countries

Variables	Model 10	
	Est.	p
lnMCap _{t-1}		
Dem	1.09*** (0.30)	0.000
DemxlnCre	-0.24*** (0.07)	0.000
lnGDP	-0.26* (0.15)	0.096
lnInv	0.65** (0.29)	0.026
lnCre	1.50*** (0.47)	0.002
lnInfl	-0.08*** (0.03)	0.003
Observation	373	
F-Statistic	17.45	0.000
R-Squared	0.23	
Adjusted R-Squared	0.17	
Breusch-Pagan test	66.80	0.000
Hausman Test	15.69	0.016

Conclusion and Discussion

The findings provide limited and conditional evidence regarding the role of democracy in stock market development. While democracy is found to be positively associated with stock market capitalization, the relationship is relatively weak and not uniformly observed across all countries. The effect appears to depend critically on country-specific conditions, particularly income level.

When disaggregating the sample, the results show that income level is a key conditioning factor. In high-income emerging markets, democracy exhibits a statistically significant positive association with stock market capitalization, suggesting that stronger democratic governance may support financial market development in these contexts. This finding is consistent with prior studies such as Lei and Wisniewski (2018), Biglaiser et al. (2008), and Lehkonen and Heimonen (2015), which highlight the role of democratic institutions in promoting investment, participation, and market confidence.

In contrast, for low- and middle-income emerging economies, no statistically meaningful relationship is found between democracy and stock market capitalization. This suggests that improvements in democratic governance alone may not be sufficient to stimulate stock market development in these countries, where structural and economic constraints may play a more dominant role.

Similarly, corruption does not exhibit a statistically significant direct effect on stock market capitalization across the sample. Its influence appears to be context-dependent, potentially interacting with broader economic and institutional conditions. This is consistent with Chowdhury et al. (2023), who find that the effect of corruption on financial development varies across income groups and levels of economic development.

Taken together, these findings highlight that the relationship between institutional factors, specifically democracy and corruption, and stock market development is conditional rather than universal. The evidence suggests that institutional quality does not exert a uniform effect across all emerging markets, but instead operates differently depending on the level of economic development.

Accordingly, the implications of this study should be interpreted with caution. For policymakers, the results indicate that strengthening democratic governance and reducing corruption may be more effective in promoting stock market development in higher-income emerging markets, while in lower-income contexts, broader structural reforms may be

necessary. For investors, the findings emphasize the importance of considering income level and institutional context jointly, rather than relying on generalized assumptions about the role of democracy or corruption in shaping market outcomes.

Limitations of the study

This study, while offering valuable insights into the relationship between democracy, corruption and stock market development in emerging markets, has several limitations that should be acknowledged.

First, the analysis relies on secondary data sources, which may contain measurement inconsistencies or missing values across countries and years. Such data quality issues could potentially affect the precision of the estimates. Both the Democracy Index and Corruption Perceptions Index are obtained from single data providers. This reliance on one source for each indicator may limit the robustness of the findings, as alternative measures might capture different dimensions of democracy and corruption.

Second, although the study employed several diagnostic tests to ensure model validity, potential endogeneity between democracy, corruption, and stock market development may still exist in some models. The presence of two-way causality could bias the estimated relationships and limit the ability to draw strong causal inferences.

Finally, the model may omit certain variables that also influence stock market development, such as financial literacy, technological innovation, or investor protection measures. Future research could extend this work by incorporating these additional factors and employing advanced econometric methods, such as dynamic panel estimators, to better address endogeneity concerns.

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Factors Associating Digital Wallet Adoption among Thai Shoppers: An Integration of UTAUT and Perceived Risk Theory

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Received: 5 January 2026 | Revised: 23 March 2026 | Accepted: 28 April 2026

DOI: [10.60101/rmuttgber.2026.297125](https://doi.org/10.60101/rmuttgber.2026.297125)

Abstract

This study examines the factors influencing Thai shoppers' behavioural intention to adopt digital wallet services, drawing on the UTAUT model and perceived risk theory. A quantitative survey method was employed in this study, conducted in Bangkok, Thailand and involved 347 respondents. Structural equation modelling (SEM) was utilized to analyze and test hypotheses. The empirical research revealed that performance expectancy, effort expectancy, and social influence significantly positively impacted Thai shoppers' behavioural intention to use a digital wallet. Additionally, perceived risk significantly negatively impacted Thai shoppers' behavioural intention to use a digital wallet.

Keywords: Digital wallet, Digital payment, SEM, UTAUT model, Perceived risk theory

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Introduction

Currently, the cashless society issue has been widely discussed in the real business world. Most countries are transitioning from a cash to a cashless economy (KPMG, 2020). Cashless societies raise the efficiency and capacity of an economy via cost reductions due to cashless transactions and the increased transparency of the financial service system (Rahman, Ismail, Bahri, and Rahman, 2022). As consumers rapidly accept digitalization and the government drives to transform Thailand into a cashless society, banks are not the only player in mobile payment but also nonbanks who will continue to launch more products and services via online and mobile payment platforms to claim a more extensive customer base through first-mover advantage. Digital payment has been widely adopted by retail customers in Thailand (Chaveesuk, Khalid, and Chaiyasoonthorn, 2021). In addition, the COVID-19 pandemic has prompted the government to implement various defensive measures to control the disease's spread. These measures include widespread lockdowns and the promotion of social distancing, which have rapidly shifted people towards new normal behaviours. One notable impact of these measures is the change in spending habits in terms of the categories and values of products being considered for purchase and the channels through which spending occurs. Many individuals have opted for contactless payment channels to minimise the risk of disease transmission. Statistical data from the Bank of Thailand (2020) regarding the "Volume of Payment Transactions processed through Payment systems and channels" between January 2020 and June 2020 reveals that there has been a significant increase of over 20% in digital payment transactions among Thai people. This surge in spending through digital channels highlights a valuable opportunity that all service providers should consider and capitalize on.

The fast development of Artificial Intelligence (AI) and corresponding emerging digital technologies and devices such as smartphones, robotics, and the Internet of Things (IoT) are fundamentally altering the interplay between customers and service providers. Significantly, the financial service sector has dramatically changed over the past decade by launching new customer technology services such as mobile applications and digital wallets. Recently, Thai commercial banks and non-bank institutes have launched electronic wallets available in online and offline retail stores. For instance, Customers can conveniently make payments through a digital wallet by scanning the store's QR code. Moreover, digital wallets will become a mainstream payment method because the use of digital wallets provides

convenience, fast, and reliable payments (Kaur, Dhir, Bodhi, Singh, and Almotairi, 2020; Namahoot and Jantasri, 2022). Therefore, understanding customers in digital wallet acceptance will enhance financial service providers to gain more an opportunity to be successful and fulfil their customer needs.

On the one hand, consumers' digital acceptance behaviour has been changing over the COVID-19 pandemic. It is the adoption of digital healthcare (Golinelli et al., 2020) and financial technology acceptance (Fu & Mishra, 2022). The previous studies on digital wallets were conducted during the COVID-19 pandemic (Namahoot and Jantasri, 2022; Ponsree, Phongpaew, and Naruetharadhol, 2023; Sharma and Kulshreshtha, 2019; Teo, Law, and Koo, 2020). However, understanding post-pandemic consumer behaviour in digital wallet acceptance will provide valuable customer insights and help fill the knowledge gap regarding the acceptance of digital wallets. This study introduces perceived risk as an essential antecedent in predicting customers' digital wallet adoption. The main goal of the research is to investigate factors influencing Thai shoppers' behavioural intention to use digital wallets.

Theoretical background and hypotheses development

1. Unified theory of acceptance and use of technology

Due to the large number of models dealing with how users come to accept and use technology, researchers have sought a synthesis to unify them into a cohesive framework. In response to this need, Venkatesh et al., (2003) developed a new Unified Theory of Acceptance and Use of Technology (UTAUT) model. The UTAUT combines eight prominent theories and models from IS/IT adoption research, namely Theory of Reasoned Action (TRA) (Fishbein, 1979), Theory of Planned Behavior (TPB) (Ajzen, 1991), TAM (Technology Acceptance Model) (Davis, 1989), motivational model, combined TPB and TAM, diffusion of innovations theory, model of perceived credibility, utilization, and social cognitive theory. The UTAUT incorporates 32 original variables derived from these eight models. These variables are categorized into four exogenous groups: effort expectancy (EE), performance expectancy (PE), social influence (SI), and facilitating conditions (FCs) (Venkatesh et al., 2003).

There are two endogenous variables: behavioural intention (BI) to use technology and use behaviour. The UTAUT has been applied in many aspects, such as communication, general-purpose, office, and specialized business systems (Williams et al., 2015). Moreover,

the model was widely used in business research by both business and non-business organizations, such as mobile/internet/online banking, digital television, e-health service, e-commerce, and e-government services (Williams et al., 2015).

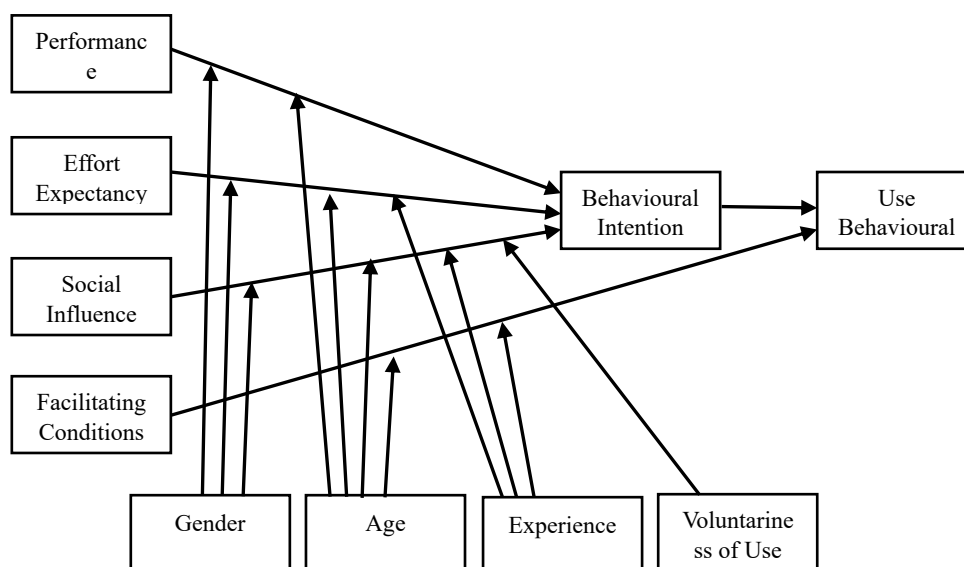


Figure 1 The unified of theory of acceptance and use of technology model (UTAUT)
(Venkatesh et al., 2003)

This study focuses on customers' behavioural intention to use a digital wallet. In addition, the UTAUT suggested three primary constructs: performance expectancy, effort expectancy, and social influence, which directly affect customer behavioural intention (Venkatesh, et al., 2012). Therefore, performance expectancy, effort expectancy, and social influence have been adopted in this research model.

Performance Expectancy (PE) is the degree to which a person believes using technology will benefit their job performance (Venkatesh et al., 2003). A previous study found that performance expectancy is the most influential factor in an individual's behavioural intention to adopt technology (Venkatesh et al., 2003). A recent study investigated Gen Z's intention behaviour of using digital payment, specifically QR code payment, and the result showed that performance expectancy significantly influences Gen Z users (Chaveesuk et al., 2021). In the same vein, the study revealed that performance expectations directly influenced the behavioural intentions of mobile payment users. On the other hand, it did not impact the behavioural intentions of non-users in Taiwan (Lin et al., 2020). The research from

Malaysia shows that performance expectancy has the most significant influence on adopting cashless payments (Rahman, Ismail, and Bahri, 2020). Thus, aligned with prior research in digital payment adoption, it is logical to postulate that Performance expectancy is positively influences with a behavioural intention on digital wallets.

H1: Performance expectancy positively influences behavioural intention on digital wallets.

Effort expectancy (EE) is the ease of technology use (Venkatesh et al., 2003). This factor is associated with perceived ease of use in the technology acceptance model (TAM), which means users' expectation and willingness to adopt new technology or payment method with ease and effortless process (Lin et al., 2020). In the context of digital payment adoption, the previous studies confirmed that perceived ease of use has a direct impact on the behavioural intention to use mobile banking among customers in Vietnam (Le et al., 2020), Thailand (Ponsree et al., 2023), and Malaysia (Wasiul et al., 2020). The study of seniors' intentional online behaviour found that EE positively correlated with internet acceptance among senior customers moderated by education. Especially for higher educated elderly, the expected performance is a good predictor for the intention to use the internet (Niehaves and Plattfaut, 2010). Hence, we propose that effort expectancy positively influences with a behavioural intention on digital wallets.

H2: Effort expectancy positively influences by behavioural intention on digital wallets.

Social influence (SI) is the change in an individual's thoughts, feelings, attitudes, or behaviours resulting from interaction with another individual or a group (Walker, 2007). It means that individual behaviour, such as the adoption of new products, choice of fashion or means of transport, is influenced by others' actions (Pradeliski, 2023). In addition, the viewpoints and expectations of individuals in the user's social circle, including family, friends, and colleagues, significantly influence their intention to adopt a specific technology (Merhi et al., 2021). The existing studies found a significant effect of social influence on digital banking payment behaviour, such as mobile banking in Vietnam (Le et al., 2020) and electronic payment in Indonesia (Rahadi et al., 2021). Research of young Internet users aged 18 to 25 from Vietnam shows social influence significantly predicts behavioural intention to use digital

wallets (Phan et al., 2020). Thus, aligned with prior research, we can claim that social influence is positively influences with the behavioural intention of digital wallets.

H3: Social influence positively influences behavioural intention on digital wallets.

Perceived Risk refers to an individual's subjective assessment or perception of the potential negative consequences or uncertainties associated with a particular action, decision, or situation (Littler and Melanthiou, 2006). In the realm of technology adoption, consumers are inevitably exposed to varying levels of risk. This risk stems from factors that are beyond their control, such as the actions of independent parties like digital wallet providers, hackers, and unfamiliar technologies. As consumers navigate this uncertain environment, they often experience uncertainty regarding their transactions (Kim et al., 2008). In such situations, perceived risk becomes a crucial element in customers' behaviour intention to use technology.

Savas (2017) categorized perceived risk into seven dimensions including; 1. Financial risk can be referred to the possibility of monetary loss linked to a purchase (Laroche et al., 2004); 2. Physical risk is defined as the adoption of the products/services may pose potential harm to users (Jacoby and Kaplan, 1972); 3. Performance risk refers to the potential loss that may occur as a result of product or service failure subsequent to the purchase (Laroche et al., 2004); 4. Social risk involves the possibility of a consumer experiencing a loss in terms of their esteem, respect, or friendship from others (Murray and Schlacter, 1990); 5. Psychological risk entails the feelings of nervousness that arise from post-purchase emotions, including regret, disappointment, worry, and frustration (Dholakia, 2001); 6. Time risk refers to the perception that the adoption and utilization of a product or service will require a significant amount of time to learn and adapt to the service innovation (Stone and Grønhaug, 1993); 7. Privacy risk involves the possibility of losing control over personal information (Featherman and Pavlou, 2003).

According to previous studies indicated that perceived risk has a negative direct effect on a cashless payment system adoption (Hampshire, 2017; Namahoot and Jantasri, 2022; Nuryasman and Warningsih, 2021). In addition, Namahoot and Jantasri (2022) conducted a survey research in Thailand and founded that perceived risk has a negative direct impact on Thai's consumer intention to use cashless payment. Besides, Hampshire (2017) added that customer with a high risk would have negative behavioural intention to use digital payment

systems. However, some previous studies found that customer perceived risk has not a significant effect on intention to use digital payment technology such as customer in Indonesia (Nuryasman and Warningsih, 2021) and Pakistan (Islam et al., 2020). Thus, we propose that perceived risk negatively influences behavioural intention on digital wallets.

H4: Perceived risk negatively influences behavioural intention on digital wallets.

Research framework

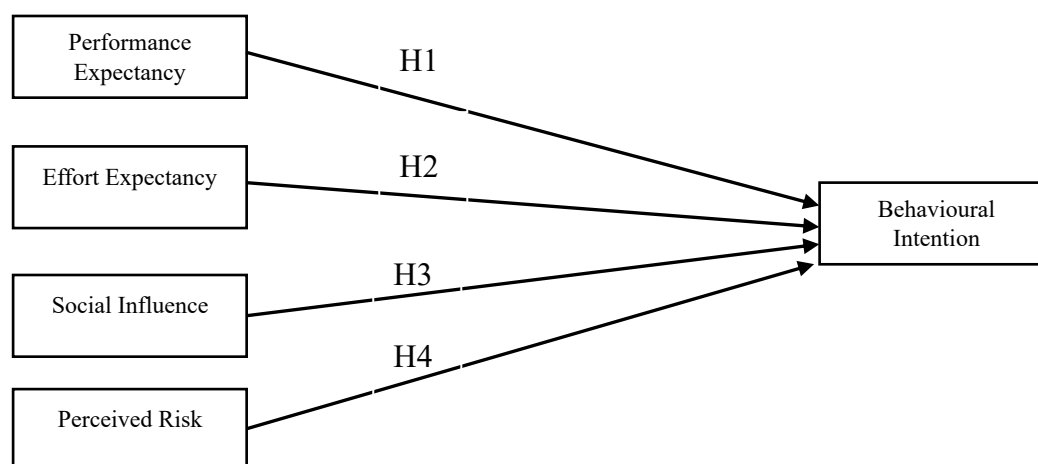


Figure 2 Conceptual framework

Methodology

A quantitative survey method was employed in this research study. A convenience sampling method was used. The data collection process was conducted in Bangkok. For research fieldwork, we used a pencil-and-paper survey to collect data from Thai customers who used digital wallets and/or online payments to purchase products and services. Since this study adopted confirmatory factor analysis to test measurement reliability and validity and the structural equation model to test the conceptual model, the appropriate number of sample sizes should preferably be above 200 (Bagozzi and Yi, 2012). Moreover, Yuan and Hayashi (2010) suggested that the sample size of SEM is between 300 to 400. Thus, the 347 samples in this study are within the sample size recommended by the literature. We offered a Thai northern-style keyring to the participants.

Descriptive statistics were used to describe general information of the sample using frequency and percentage. The total number of respondents was 347 (15% non-response

rate) comprised of 220 female (63.4%) and 127 male (36.6%). Age ranging from 36 – 40 years old (25.07%) was the majority age group, with a bachelor's degree (46.40%), Single (67.7%). Most participants are employed (74.64%). The average monthly income below 15,000 Baht (19.88%)

Questionnaire was used as a research instrument, which was pretested with 20 respondents to ensure clarity and validity. The main questions consisted of the items to measure five constructs shown in the conceptual model. To measure perceived expectancy, we adopted the perceived expectancy scale from Venkatesh et al. (2003), the effort expectancy scale was adopted from Venkatesh et al. (2012), the social influence scale was adopted from Kijsanayotin et al., (2009), perceived risk scale was adopted from Savas (2017), and behavioural intention scale was adopted from Venkatesh et al. (2012). A Likert scale was used in which 1 = "Strongly disagree" and 7 = "Strongly agree" for all questions.

The model was tested using structural equations modelling (SEM), a statistical method measuring complex theoretical relationships between latent and manifest variables (Fornell and Larcker, 1981). SEM is composed of two primary phases. In the first phase, confirmatory Factor analysis (CFA) tests whether the individual rating scales used in the survey are latent variables and whether the data reliability and validity conditions are met. The second phase involves a multilevel regression to determine the validity of relationships between measured latent variables (Zhang et al., 2016). This method's main advantage is the possibility of testing the relationships between exogenous and endogenous variables. Exogenous variables influence the other tested concepts without being influenced on their own. Endogenous variables can be affected by exogenous ideas and other endogenous variables in the system (Nitzl, 2016). In this paper, the SEM analysis is performed with AMOS 21 software.

Common method bias exists when a measurement technique introduces systematic variance into a measure. A careful questionnaire design was implemented to reduce Common method bias before data collection. A single-factor post hoc test for common methods variance also suggested no "same-source" factor in the data (Podsakoff et al., 2003). Thus, Common method bias was not deemed as a threat.

Results

Measurement model assessment. CFA results (Table 1) showed that the model fits the data relatively well: $\chi^2/df = 2.696$, $p < 0.001$, comparative fit index (CFI) = .958, Tucker

Lewis index (TLI) = 0.947, incremental fit index (IFI) = .958, goodness-of-fit index (GFI) = 0.906, adjusted goodness-of-fit index (AGFI) = 0.869, root mean square error of approximation (RMSEA) = 0.070, PCLOSE < .000, and standardized root mean square residual (SRMR) = 0.057. The CFI, TLI, and IFI indicated that the model was parsimonious, because each measure exceeds the recommended threshold of 0.9. Items yield estimates of more than 0.5 and are statistically significant ($p < .001$), indicating they share high variance within the same construct.

The reliability and validity of the resulting model were determined after performance of CFA (Table 1). Reliability was measured using Cronbach α , where the resulting value should be higher than 0.7 for each construct (Cronbach, 1951). Convergent validity was measured using Cronbach Alpha (α) and Average Variance Explained (AVE) provided that the conditions $\alpha > 0.7$, $\alpha > AVE$ and $AVE > 0.5$ are met (Hair, Anderson, Babin, and Black, 2010). Composite reliability above 0.7 (Bagozzi and Yi, 2012; Hair et al., 2010).

Table 1 CFA: measurement model results

Items	Loading
Performance expectancy ($\alpha = 0.885$; CR = 0.887; AVE = 0.723)	
1. I find digital wallet useful in my daily life	.856
2. Using digital wallet helps me to accomplish purchasing process more quickly	.866
3. Using digital wallet increases my productivity	.828
Effort expectancy ($\alpha = 0.758$; CR = 0.882; AVE = 0.621)	
1. Learning how to use digital wallet is easy for me	.752
2. My interaction with digital wallet is clear and understandable	.757
3. I find digital wallet easy to use	.862
Social influence ($\alpha = 0.865$; CR = 0.865; AVE = 0.681)	
1. People who are important to me think that I should use digital wallet	.838
2. People who influence my behaviour think that I should use digital wallet	.817
3. People whose opinions that I value prefer that I use digital wallet	.822
Perceived risks ($\alpha = 0.930$; CR = 0.929; AVE = 0.724)	
1. On the whole, considering all sorts of factors combined, signing up for this service is risky.	.786
2. Using this service exposes me to an overall risk.	.796
3. This service is dangerous to use.	.826

Table 1 CFA: measurement model results (Continued)

Items	Loading
4. Using this service causes me to be concerned with experiencing some kind of loss.	.932
5. All things considered, I think I would be making a mistake by using this service.	.903
Behavioural intention ($\alpha = 0.900$; CR = 0.903; AVE = 0.758)	
1. I intend to use technology service in the future	.891
2. I will always try to use technology service in my daily life	.932
3. I plan to use technology service frequently	.781
Chi-square	293.83
df	109
CFI	.958
GFI	.906
AGFI	.869
RMSEA	.070

Notes: α = Cronbach's alpha; CR = composite (construct) reliability; AVE = average variance extracted. Loadings are standardized; all t-values are significant ($p < .001$).

Structural model and hypotheses testing. The path analysis unveiled factors associated with behavioural intention to use digital wallets by Thai shoppers (Table 2). The most crucial factor influencing behavioural intention to use digital wallets is performance expectancy ($\beta = 0.280$, $p < 0.05$), followed by social influence ($\beta = 0.235$, $p < 0.05$) and effort expectancy ($\beta = 0.153$, $p < 0.00$), respectively. Furthermore, the perceived risks significantly negatively impact behavioural intention to use a digital wallet ($\beta = -0.114$, $p < 0.00$).

Table 2 Structural and path analysis results

Hypotheses	Path relationships	Standardized coefficient (β)	T value	p	Results
H1	PE $\rightarrow$ BI	.280	1.944	.050*	Supported
H2	EE $\rightarrow$ BI	.153	1.665	.000**	Supported
H3	SI $\rightarrow$ BI	.235	1.974	.048*	Supported
H4	PR $\rightarrow$ BI	-.114	3.562	.000**	Supported

Discussion

The research study examines the factors associated with consumers' intention to use digital wallets. The sample consists of 347 shoppers in Thailand. The questionnaire is used as a tool to collect data. Most of our samples are female, aged 36 – 40 years old, single, with an average monthly income below 15,000 Baht and graduated with a bachelor's degree. Most participants are employees.

The research finding aligns with the UTAUT model and confirms that performance expectancy, social influence, and effort expectancy positively influence consumers' intention to use digital wallets. In contrast, perceived risk negatively influences consumers' intention to use digital wallets. In addition, performance expectancy is the most potent predictor of consumers' intention to use digital wallets, which implies that the features and the functions of the digital wallet platform are the most concerning issue for the customer. This is consistent with the finding of (Hoque and Sorwar, 2017) indicated that performance expectancy is the strongest determinant of the elderly's technology adoption in Bangladesh. Besides, the results showed that social influence is the second most crucial factor associated with consumers' intention to use digital wallets. This means the viewpoints and expectations of people surrounding the users, such as family, close-knit friends, and colleagues, lead the users to adopt the technology. These results are similar to Merhi et al. (2021) study found that individuals in the user's social circle, including family, friends, and colleagues, significantly influence their intention to adopt a specific technology.

Similarly, the existing studies found a significant effect of social influence on digital banking payment behaviour, such as mobile banking in Vietnam (Le et al., 2020) and electronic payment in Indonesia (Rahadi et al., 2021). Subsequently, effort expectancy positively affects consumers' intention to use digital wallets. This is consistent with the previous study found that perceived ease of use has a direct impact on the behavioural intention to use mobile banking among customers in Vietnam (Le et al., 2020), Thailand (Ponsree et al., 2023), and Malaysia (Wasiul et al., 2020). It means the users are interested and have adopted digital wallets due to their easy-to-use interface.

On the other hand, the results show that perceived risk negatively impacts consumers' intention to use digital wallets. This means that users will adopt digital wallets when they perceive less risk. Similarly, the previous study found that customers who perceive

risk at a high level would have a negative intention to use electronic payment systems (Hampshire, 2017) as well as Namahoot and Jantasri (2022) found that perceived risk has a negative direct effect on a cashless payment system adoption.

Contribution of the study

Theoretical contributions. This research study offers valuable insights into the adoption of digital wallets among Thai shoppers, contributing to the current theoretical understanding in this field. The study incorporates the concept of perceived risk and utilizes three key constructs, namely performance expectancy, effort expectancy, and social influence, derived from the UTAUT model. The study's empirical findings shed light on the relative importance of these factors in influencing consumers' intention to use digital wallets. Among the factors examined, performance expectancy emerges as the most influential factor, indicating that Thai shoppers are primarily motivated to adopt digital wallets based on their expectations of the benefits and advantages associated with their use. This could include convenience, efficiency, and enhanced shopping experiences. Besides, social influence also significantly impacts consumers' intention to use digital wallets. This suggests that the opinions and recommendations of influential individuals, such as peers, celebrities, or experts, can sway Thai shoppers' decision-making process and increase their propensity to adopt digital wallets. Furthermore, the study reveals that effort expectancy, which refers to the perceived ease of use and user-friendliness of digital wallets, is another critical factor influencing consumers' intention to adopt them. This implies that the more effortless and intuitive the digital wallet interface and functionality are perceived, the more likely Thai shoppers will embrace this payment method.

In contrast, perceived risk negatively influences Thai consumers' intention to use digital wallets. This finding highlights the significance of addressing and mitigating customers' concerns regarding potential risks associated with digital wallet usage. These risks could include security vulnerabilities, data breaches, or fraudulent activities. Implementing robust security measures and effectively communicating them to consumers is crucial to alleviate their fears and building trust in digital wallet services. This research contributes to a comprehensive understanding of the factors influencing digital wallet adoption among Thai shoppers, including the role of perceived risk, performance expectancy, effort expectancy, and social influence. Considering these factors, this study's knowledge contributions can shed

light on Thai customers' behavioural intention to use digital wallets in the post-pandemic era.

Managerial implications. The research results benefit both marketers and digital wallet developers. The feature and interface of digital wallets should be designed to facilitate and increase customer convenience in the payment process. For instance, the quality of digital wallets is easy to log in and pay for goods and services. Moreover, the platform must fit with customers' existing devices, such as iOS and Android.

Moreover, the research findings suggest that social influence plays a significant role in shaping the intention of individuals to use digital wallets. In the context of digital wallet adoption, influencers and opinion leaders can leverage their credibility, expertise, and persuasive abilities to motivate and convince shoppers to embrace digital wallet services. By associating their personal experiences and endorsements with digital wallets, these influential individuals can create a positive perception and increase the likelihood of adoption among potential users. The communication strategy employed in marketing efforts should highlight digital wallets' convenience and safety aspects. This approach aims to alleviate customers' concerns and reduce their perceived risks associated with digital wallet usage. Emphasizing the ease of transactions, seamless payment processes, and robust security measures can help instil confidence in shoppers and mitigate any apprehensions they may have. By addressing and alleviating these perceived risks, companies can encourage greater adoption of digital wallets and enhance customer trust and satisfaction.

Limitation and future research

Although this study enriches the understanding of customers' digital wallet adoption, it still has limitations. First, this study is a quantitative research study. Future research should consider employing qualitative methods or a mixed-method approach to understand customers' adoption of digital wallets better. Second, the data were collected through a cross-sectional survey. In future research, longitudinal data collection should be applied to extract insights from customers over time, capturing their perspectives from time A to time B.

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A Structural Model of the Influence of Shareholding Structure and Board Characteristics on Earnings Management of Listed Companies in the Stock Exchange of Thailand: A Multilevel and Industry-Level Analysis

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Received: 17 November 2025 | Revised: 17 April 2026 | Accepted: 27 April 2026

DOI: [10.60101/rmuttgber.2026.295668](https://doi.org/10.60101/rmuttgber.2026.295668)

Abstract

This study investigates the effects of ownership structure and board characteristics on earnings management among firms listed on the Stock Exchange of Thailand (SET) during 2019–2023. Secondary data was collected from annual reports and Form 56-1 of 447 companies (2,235 firm-year observations). The analysis employed multiple regression and multilevel structural equation modelling (SEM) to examine both direct and moderating effects. Research results reveal that institutional and foreign ownership significantly reduces earnings management, while managerial ownership increases it. CEO non-duality was found to mitigate earnings manipulation, whereas the proportion of independent directors and moderating interactions were not statistically significant. These findings suggest that robust governance mechanisms can restrain opportunistic managerial behavior, enhance financial transparency, and strengthen corporate accountability. The study provides theoretical contributions by integrating agency and resource-dependence perspectives and practical implications for regulators and investors seeking to improve financial reporting quality and sustainability in emerging capital markets.

Keywords: Ownership structure, Board characteristics, Earnings management, Thai capital market, Corporate governance

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Introduction

Corporate governance plays a critical role in shaping organizational credibility and the quality of financial reporting, particularly in emerging markets such as Thailand, where ownership structures are typically highly concentrated and dominated by family or individual controlling shareholders. The separation between ownership and control gives rise to agency conflicts, as conceptualized in agency theory, whereby managers may pursue their own interests at the expense of shareholders. Such conflicts can incentivize managerial opportunism, including the discretionary manipulation of accounting figures to present a more favorable short-term financial position practice commonly referred to as earnings management (Alves, 2012). These behaviors undermine the reliability of financial statements, erode investor confidence, and threaten the overall stability of capital markets.

Among the various corporate governance mechanisms, the role of independent directors has been widely recognized as a key factor in mitigating earnings management. Independent directors are expected to provide effective oversight, monitor managerial actions, and balance power within the board, thereby protecting minority shareholders and enhancing financial transparency (Yahaya, 2025). However, empirical evidence from developing economies remains inconclusive. While some studies demonstrate that independent directors significantly reduce earnings management, others fail to find a consistent relationship. These mixed findings may reflect variations in institutional environments, governance practices, and organizational cultures across countries (Nguyen et al., 2022).

In the context of the Stock Exchange of Thailand (SET), although formal governance regulations have been established—such as requirements for a minimum proportion of independent directors and the separation of the roles of board chair and chief executive officer—substantial heterogeneity in board structures and governance practices persists across industries. Moreover, recurring cases of accounting irregularities and financial reporting issues among listed firms continue to emerge (Sangboonnak & Prasertsri, 2019). These observations suggest that existing governance mechanisms may face limitations in effectively constraining managerial opportunism within the Thai capital market, thereby underscoring the need for a more systematic investigation of the determinants of earnings management.

From a theoretical perspective, this study extends agency theory by emphasizing principal–principal conflicts, which arise between controlling shareholders and minority

shareholders—an issue particularly salient in emerging markets characterized by concentrated ownership. In addition, this research integrates resource dependence theory to explain the strategic role of the board of directors, especially independent directors, as boundary spanners who bring valuable external resources, expertise, and legitimacy into the organization. Such contributions can reduce environmental uncertainty and improve the quality of financial reporting (Hillman et al., 2009).

From a practical standpoint, the findings of this study are expected to provide meaningful implications for regulators, including the Securities and Exchange Commission and the Stock Exchange of Thailand, in designing governance frameworks that are better aligned with industry-specific contexts. Strengthening board structures and enhancing governance effectiveness can contribute to greater transparency, accountability, and long-term sustainability in the capital market. Accordingly, this study aims to examine the role of ownership structure in influencing earnings management, under the moderating and monitoring effects of board characteristics, thereby contributing both theoretically and policy-relevantly to the understanding of corporate governance in the Thai context.

Conceptual Framework

This study aims to examine the impact of board characteristics on the relationship between ownership structure and earnings management of firms listed on the Stock Exchange of Thailand (SET), as illustrated in Figure 1.

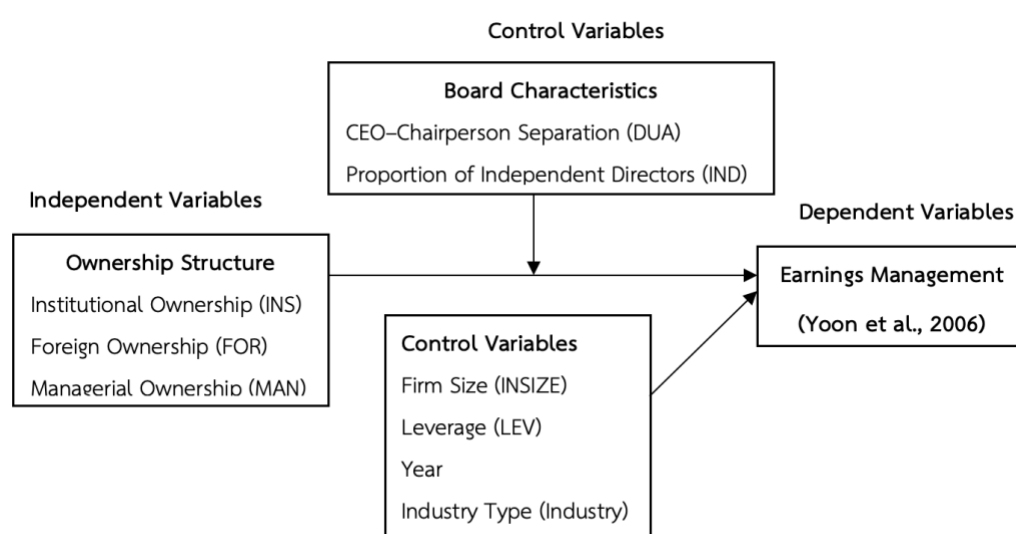


Figure 1 Conceptual Framework of the Study Research Hypotheses

H1: Institutional ownership has a negative effect on earnings management among firms listed on the Stock Exchange of Thailand (SET).

H2: Foreign ownership has a negative effect on earnings management among firms listed on the Stock Exchange of Thailand (SET).

H3: Managerial ownership has a positive effect on earnings management among firms listed on the Stock Exchange of Thailand (SET).

H4: The separation of the chairperson and CEO roles has a negative effect on earnings management among firms listed on the Stock Exchange of Thailand (SET).

H5: The proportion of independent directors has a negative effect on earnings management among firms listed on the Stock Exchange of Thailand (SET).

H6: The separation of the chairperson and CEO roles moderates the relationship between ownership structure and earnings management among firms listed on the Stock Exchange of Thailand (SET).

H7: The proportion of independent directors moderates the relationship between ownership structure and earnings management among firms listed on the Stock Exchange of Thailand (SET).

H8: The relationships among ownership structure, board characteristics, and earnings management differ significantly across industry groups of firms listed on the Stock Exchange of Thailand (SET).

Research Scope

Content Scope

This study examines the relationship between ownership structure, board characteristics, and earnings management (EM). Ownership structure includes institutional ownership (INS), foreign ownership (FOR), and managerial ownership (MAN). Board characteristics are represented by CEO non-duality (DUA) and the proportion of independent directors (IND). Earnings management is measured using discretionary accruals to capture managerial discretion in financial reporting.

Population and Sample Scope

The sample comprises firms listed on the Stock Exchange of Thailand (SET) with complete data during the study period. To ensure comparability and reliability, several exclusions are applied: firms listed on the Market for Alternative Investment (MAI), financial

sector firms, Real Estate Investment Trusts (REITs), and firms that were delisted. These criteria result in a final sample of 447 firms, yielding 2,235 firm-year observations for panel data analysis.

Geographical Scope

The study focuses on Thailand, an emerging economy characterized by concentrated ownership structures, making it an appropriate context for examining principal–principal conflicts between controlling and minority shareholders.

Time Scope

The analysis covers a five-year period from 2019 to 2023 (B.E. 2562–2566), providing sufficient data to capture recent corporate governance dynamics.

Literature Review

This study integrates Agency Theory, Resource Dependence Theory (RDT), and the Institutional Perspective to develop a comprehensive framework for explaining earnings management among firms listed on the Stock Exchange of Thailand (SET). These perspectives jointly explain how corporate governance mechanisms operate at both internal and external levels to shape managerial incentives and financial reporting behavior.

From the perspective of Agency Theory, conflicts between shareholders and managers arise due to information asymmetry and divergent interests, often leading to opportunistic practices such as earnings management (Jensen & Meckling, 1976). Governance mechanisms are therefore necessary to mitigate agency costs. In this context, ownership structure functions as an external governance mechanism, where institutional and foreign investors enhance monitoring and transparency, while managerial ownership may increase incentives for self-serving behavior.

Resource Dependence Theory (RDT) complements this view by emphasizing the role of the board of directors as an internal governance mechanism. Beyond monitoring, the board provides access to critical resources, expertise, and legitimacy, thereby strengthening oversight and reducing managerial opportunism (Pfeffer & Salancik, 1978; Hillman et al., 2009). Board characteristics, such as leadership structure and independence, are therefore essential in improving the quality of financial reporting.

In addition, the Institutional Perspective highlights the influence of external pressures from regulatory frameworks, international standards, and investor expectations in promoting

transparency and accountability (DiMaggio & Powell, 1983; OECD, 2023). In the Thai context, the presence of foreign investors and regulatory oversight from the Stock Exchange of Thailand and the Securities and Exchange Commission reinforces governance practices and constrains earnings management.

The integration of these three perspectives provides a multi-dimensional explanation of corporate governance dynamics, where ownership structure represents external governance, board characteristics represent internal governance, and institutional pressures operate at the market level. Despite extensive prior research, empirical evidence in Thailand remains limited, particularly studies adopting multi-level approaches. To address this gap, this study employs Multilevel Structural Equation Modeling (Multilevel SEM) to examine the effects of ownership structure and board characteristics on earnings management across firm- and industry-level contexts, offering a more comprehensive understanding of governance mechanisms.

Research Methodology

This study adopts a quantitative research design to examine the effects of ownership structure and board characteristics on earnings management behavior, including the moderating roles of the proportion of independent directors and the separation of the chairperson and CEO positions. All data are derived from secondary sources, including annual reports, financial statements, and Form 56-1 (One Report) of firms listed on the Stock Exchange of Thailand (SET, 2024).

The population consists of firms listed on the Stock Exchange of Thailand (SET), excluding those in the Market for Alternative Investment (MAI), financial sector firms, Real Estate Investment Trusts (REITs), and firms undergoing rehabilitation. The dataset covers a five-year period from 2019 to 2023. Firms with complete financial data over the study period are selected using purposive sampling.

The final sample comprises 447 firms, yielding a total of 2,235 firm-year observations in a panel dataset. The sample spans eight major industry groups, allowing for multilevel analysis across both firm-level and industry-level contexts.

Table 1 Measurement and Operational Definition of Variables

Variable Type	Variable / Abbreviation	Operational Definition	Measurement / Unit	Data Source	Key References
Dependent Variable	Earnings Management (EM)	The extent of managerial discretion in adjusting reported earnings to achieve desired outcomes	Measured using discretionary accruals based on the model of Yoon et al. (2006)	Annual reports and Form 56-1 (One Report)	Yoon et al. (2006); Dechow et al. (1995)
Independent Variables	Institutional Ownership (INS)	Proportion of shares held by institutional investors such as funds or corporate entities	(Institutional shares ÷ Total shares) × 100 (%)	SETSMART	Alves (2012); Hadani et al. (2011)
	Foreign Ownership (FOR)	Proportion of shares held by foreign investors	(Foreign shares ÷ Total shares) × 100 (%)	SETSMART	Fan & Wong (2002); OECD (2023)
	Managerial Ownership (MAN)	Proportion of shares held by executives or board members	(Managerial shares ÷ Total shares) × 100 (%)	Annual reports	Jensen & Meckling (1976); Leung & Cheng (2013)
Moderating Variables	CEO Non-Duality (DUA)	Whether the roles of chairperson and CEO are separated	Dummy variable: 0 = Duality, 1 = Separation	Form 56-1 (One Report)	Fama & Jensen (1983)
	Independent Directors (IND)	Proportion of independent directors	Number of independent directors ÷	Annual reports	Yahaya (2025)

Table 1 Measurement and Operational Definition of Variables (Continued)

Variable Type	Variable / Abbreviation	Operational Definition	Measurement / Unit	Data Source	Key References
Control Variables		directors on the board	Total board members (%)		
	Firm Size (INSIZE)	Financial size of the firm	ln (Total assets)	SETSMART	Fama & Jensen (1983)
	Leverage (LEV)	Degree of debt financing in capital structure	Total liabilities ÷ Total assets	Annual reports	Peasnell et al. (2005)
	Year	Fiscal year of data collection	Dummy variable	SETSMART	Hair et al. (2021)
	Industry	Industry classification based on SET categories	Dummy variable	SETSMART	SET (2024)

Data Collection and Data Quality Assurance

All data were collected from the SETSMART database and the website of the Securities and Exchange Commission (SEC) of Thailand. To ensure data accuracy and reliability, a data validation process was conducted. This process involved screening for missing values and identifying and treating outliers in accordance with the guidelines suggested by OECD (2023). These procedures were implemented to enhance the integrity and credibility of the dataset used in the analysis.

Table 2 Data Analysis Procedures

No.	Table / Analysis	Reported Information
Table 4	Descriptive Statistics of Independent, Control, Moderating, and Dependent Variables	Reports minimum (Min), maximum (Max), mean (Mean), standard deviation (SD), skewness, kurtosis, and distribution characteristics of each variable to provide an overall view of the dataset
Table 5	Pearson Correlation Coefficient Analysis among Study Variables	Reports Pearson correlation coefficients (r) among all variables, along with mean and standard deviation,

Table 2 Data Analysis Procedures (Continued)

No.	Table / Analysis	Reported Information
		including statistical significance levels to illustrate preliminary relationships prior to causal analysis
Table 6	Multiple Regression Analysis of Ownership Structure on Earnings Management (Model 1)	Reports regression coefficients (β), t-values, and p-values for each variable, along with F-statistic, p-value, R^2 , and adjusted R^2 to assess the influence of ownership structure on earnings management and model adequacy
Table 7	Multiple Regression Analysis of Main and Interaction Effects of Board Characteristics and Ownership Structure on Earnings Management	Reports β , t-values, and p-values for independent variables, control variables, and interaction terms across two models (Model 2 = main effects, Model 3 = interaction effects), including F, p, R^2 , and adjusted R^2 to evaluate both direct and moderating effects
Table 8	Multilevel Structural Equation Modeling (Multilevel SEM)	Presents the multilevel SEM framework consisting of three models, including analytical equations and key results, demonstrating that ownership structure has a direct effect on earnings management, while certain board characteristics have partial effects but do not significantly strengthen moderating relationships
Table 9	Model Fit Indices of Structural Equation Modeling	Evaluates the goodness-of-fit of the multilevel SEM model to determine whether the proposed model fits the empirical data
Table 10	Summary of Relationships between Independent Variables and Earnings Management (EM)	Provides a concise summary of findings from regression and SEM analyses, indicating that ownership variables and some board characteristics significantly affect earnings management, while interaction effects and independent directors show no clear impact
Table 11	Summary of Hypothesis Testing Results (H1–H8)	Presents an overall summary of hypothesis testing results, showing that most main hypotheses are supported, except for those related to independent directors and moderating interaction effects

General Research Model

$$EM_{it} = \alpha + \beta_1 OWN_{it} + \beta_2 BOARD_{it} + \beta_3 (OWN_{it} \times BOARD_{it}) + \beta_4 CONTROLS_{it} + \varepsilon_{it}$$

Where:

- **OWN** represents ownership structure,
- **BOARD** refers to board characteristics, and
- **CONTROLS** include firm size, leverage, year, and industry (Fama & Jensen, 1983).

Table 3 List of Variable Abbreviations and Descriptions

Abbreviation	Full Name / Description	Meaning in the Study
EM	Earnings Management	The level of earnings management, used as the dependent variable to reflect managerial discretion in financial reporting
INS	Institutional Ownership	The proportion of shares held by institutional investors (e.g., funds or corporate entities) relative to total shares
FOR	Foreign Ownership	The proportion of shares held by foreign investors relative to total shares
MAN	Managerial Ownership	The proportion of shares held by executives or board members relative to total shares
DUA	CEO Non-Duality	Separation of the roles of chairperson and CEO (0 = duality, 1 = separation)
IND	Independent Directors	The proportion of independent directors on the board (number of independent directors ÷ total board members)
INSIZE	Firm Size	Firm size measured as the natural logarithm of total assets (ln Total Assets)
LEV	Leverage Ratio	The ratio of total liabilities to total assets, reflecting the firm's financial risk
Year	Fiscal Year	The fiscal year used for data collection, included as a dummy variable to control for time effects
Industry	Industry Group	The industry classification of firms, used to control structural differences across industries

Table 3 List of Variable Abbreviations and Descriptions (Continued)

Abbreviation	Full Name / Description	Meaning in the Study
INS × IND	Institutional Ownership × Independent Directors	Interaction term used to test the moderating role of independent directors on the relationship between institutional ownership and earnings management
FOR × DUA	Foreign Ownership × CEO Non-Duality	Interaction term between foreign ownership and CEO non-duality
MAN × DUA	Managerial Ownership × CEO Non-Duality	Interaction term between managerial ownership and CEO non-duality

Note: All data were obtained from the SETSMART database and Form 56-1 (One Report) of firms listed on the Stock Exchange of Thailand during 2019–2023 (SET, 2024).

Table 4 Endogeneity Testing and Robustness Analysis

Variables	Model 1 OLS	Model 2 Lagged	Model 3 Multilevel
	Regression	Model (t–1)	SEM
INS	-0.138***	-0.126***	-0.121***
FOR	-0.094**	-0.088**	-0.083**
MAN	0.112***	0.104***	0.097***
IND	-0.019	-0.016	-0.014
DUA	-0.081**	-0.075**	-0.071**
INSIZE	0.058**	0.053**	0.056**
LEV	0.073***	0.069***	0.071***
Industry Control	Yes	Yes	Yes
Year Control	Yes	Yes	Yes
N	2,235	2,235	2,235
R ² / Model Fit	0.31	0.29	0.33

Note: *** p < 0.01, ** p < 0.05, * p < 0.10

Table 4 reports robustness tests addressing endogeneity using multiple regression (Model 1), a lagged model (t–1; Model 2), and multilevel SEM (Model 3). Results are consistent across all models: institutional (INST) and foreign ownership (FOR) negatively affect earnings management, while managerial ownership (MAN) has a positive effect. CEO non-duality also shows a significant negative relationship. The consistency, particularly with lagged variables, supports robustness and mitigates endogeneity concerns from reverse causality.

Research Findings

Based on a sample of 447 firms over a five-year period (2019–2023), yielding a total of 2,235 firm-year observations, descriptive statistics were employed to provide an initial overview of the variables used in this study. The results are presented in Table 5.

Table 5 Descriptive Statistics of Independent, Control, Moderating, and Dependent Variables (N = 2,235 firm-year observations)

Variable	Unit	Min	Max	Mean	SD	Skewness	Kurtosis	Distribution
INS	%	0	96.66	9.54	14.45	1.38	3.14	right skewed
FOR	%	0	77.15	3.12	9.76	1.19	3.36	Moderately right skewed
MAN	%	0	78	10.49	16.27	1.18	3.09	Right skewed
DUA	Dummy (0–1)	0	1	0.17	0.38	1.32	2.67	Right-skewed (low values dominate)
IND	Ratio	0.3	1	0.44	0.1	-0.48	2.78	Slightly left-skewed
INSIZE	ln (Total Assets)	11.96	21.96	15.97	1.56	0	2.97	Approximately normal
LEV	Times	0	1	0.44	0.21	0.29	2.85	Approximately normal
EM	Index (Yoon Model)	-0.29	0.06	-0.016	0.05	-0.78	2.72	Left-skewed

Note: 1. Data was obtained from Form 56-1 (One Report) and the SETSMART database for firms listed on the Stock Exchange of Thailand during 2019–2023.

2. The variable DUA is coded as 0 = CEO duality and 1 = separation of the chairperson and CEO roles.

Table 5 reports descriptive statistics for 2,235 observations. Institutional ownership (INS) averages 9.54% and is right-skewed, while foreign ownership (FOR) is lower (3.12%) with a similar distribution. Managerial ownership (MAN) is higher (10.49%), indicating stronger internal control, though still right skewed.

CEO duality (DUA) averages 0.17, suggesting most firms combine roles, whereas independent directors (IND) average 44% with relatively stable distribution. Firm size (INSIZE) and leverage (LEV) are approximately normally distributed, with means of 15.97 and 0.44.

Earnings management (EM) has a mean of -0.016 , indicating a tendency toward income-decreasing behavior, with slight left-skewness and limited extreme variation.

Table 6 Pearson Correlations Among Study Variables (N = 2,235)

Variable	1	2	3	4	5	6	7	8	M	SD
1. EM	—								-0.016	0.05
2. INS	-.058*	—							9.54	14.45
3. FOR	-.069**	-.001	—						3.12	9.76
4. MAN	.178**	-.206**	.312**	—					10.49	16.27
5. DUA	-.024	-.058**	.097**	.154**	—				0.17	0.38
6. IND	0.022	-.009	0.026	.120**	0.018	—			0.44	0.1
7. INSIZE	0.03	.414**	-.100**	-.182**	-.029	-.016	—		15.97	1.56
8. LEV	0.014	.148**	-.018	-.024	-.012	.069**	.423**	—	0.44	0.21

Note: $p < .05$. $p < .01$ (two-tailed). Correlations are reported below the diagonal. VIF values < 2 and tolerance $> .10$ indicate no multicollinearity (Hair et al., 2021).

Pearson correlation results show that institutional (INS) and foreign ownership (FOR) are negatively and significantly related to earnings management (EM) ($p < .01$), indicating stronger governance reduces opportunistic behavior. In contrast, managerial ownership (MAN) is positively associated with EM, suggesting greater discretionary reporting.

For control variables, firm size (INSIZE) and leverage (LEV) are positively correlated with INS and FOR, reflecting that larger firms attract external investors and have more complex capital structures. VIF and Tolerance values indicate no multicollinearity, supporting the suitability of the data for regression analysis.

Table 7 Multiple Regression Analysis of Ownership Structure on Earnings Management (Model 1)

Variable	β	t	p
Constant	-6.044	—	0
INS	-0.055	-2.650	.008**
FOR	-0.093	-3.584	.000**
MAN	0.188	7.994	.000**
INSIZE	0.051	2.173	.030*

Table 7 Multiple Regression Analysis of Ownership Structure on Earnings Management (Model 1)
(Continued)

Variable	β	t	p
LEV	-0.021	-0.938	0.349
IND1	0.016	0.716	0.474
IND2	0.024	1.057	0.291
IND3	0.043	1.985	.047*
IND4	-0.008	-0.355	0.722
IND5	-0.160	-7.529	.000**
IND6	0.024	1.092	0.275
Y2566	0.216	9.819	.000**
Y2565	0.248	10.586	.000**
Y2564	0.347	13.312	.000**
Y2563	0.321	13.73	.000**

Model Fit: $F = 39.56$, $p < .001$, $R^2 = .232$, Adjusted $R^2 = .226$

Note: $p < .05$. $p < .01$ (two-tailed).

The regression model is significant ($F = 39.56$, $p < .001$) and explains 23.2% of the variance in earnings management ($R^2 = .232$), indicating the importance of ownership structure. Institutional (INS) and foreign ownership (FOR) significantly reduce earnings management, while managerial ownership (MAN) increases it. Among controls, firm size (INSIZE) shows a small positive effect, whereas leverage (LEV) and most industry dummies are not significant. Overall, ownership structure is a key determinant of earnings management in the Thai capital market.

Table 8 Multiple Regression Analysis of Main and Interaction Effects of Board Characteristics and Ownership Structure on Earnings Management

Variable	Model 2 β	t	p	Model 3 β	t	p
Constant	-5.971	—	0	-6.045	—	0
INS	-0.059	-2.837	.005**	-0.056	-2.569	.010*
FOR	-0.090	-3.503	.000**	-0.098	-3.241	.001**
MAN	0.192	8.073	.000**	0.198	7.284	.000**
DUA	-0.055	-2.749	.006**	-0.059	-2.786	.005**
IND	0.023	1.113	0.266	0.024	1.146	0.252
INSIZE	0.051	2.18	.029*	0.053	2.282	.023*

Table 8 Multiple Regression Analysis of Main and Interaction Effects of Board Characteristics and Ownership Structure on Earnings Management (Continued)

Variable	Model 2 β	t	p	Model 3 β	t	p
LEV	-0.021	-0.938	0.348	-0.021	-0.948	0.343
IND1-IND6	...	...	...	...	...	...
Y2566	0.213	9.696	.000**	0.214	9.7	.000**
Y2565	0.249	10.629	.000**	0.248	10.549	.000**
Y2564	0.348	13.354	.000**	0.347	13.239	.000**
Y2563	0.324	13.876	.000**	0.323	13.767	.000**
MCINS_DUA	—	—	—	-0.020	-0.892	0.372
MCFOR_DUA	—	—	—	0.014	0.539	0.59
MCMAN_DUA	—	—	—	-0.014	-0.537	0.591
MCINS_IND	—	—	—	-0.019	-0.965	0.334
MCFOR_IND	—	—	—	0.002	0.101	0.919
MCMAN_IND	—	—	—	0.002	0.108	0.914

Model Fit: Model 2: $F = 10.99$, $p < .001$, $R^2 = .235$, Adjusted $R^2 = .228$

Model 3: $F = 26.31$, $p < .001$, $R^2 = .236$, Adjusted $R^2 = .227$

Note: $p < .05$. $p < .01$ (two-tailed).

Table 8 reports main effects (Model 2) and interaction effects (Model 3). In Model 2, institutional (INS) and foreign ownership (FOR) significantly reduce earnings management ($p < .01$), while managerial ownership (MAN) increases it ($p < .01$). CEO non-duality (DUA) also shows a significant negative effect, whereas independent directors (IND) are not significant. In Model 3, no interaction effects are significant, indicating that internal and external governance mechanisms operate independently rather than synergistically.

Table 9 Multilevel SEM Models Used in the Study

Model	Objective	Analytical Equation	Key Findings
Model 1 (Direct Effects)	To examine the direct effects of ownership structure on	$EM = \beta_0 + \beta_1INS + \beta_2FOR + \beta_3MAN + \beta_4INSIZE + \beta_5LEV$	Institutional ownership (INS) and foreign ownership (FOR) have significant negative effects on earnings management (EM), while managerial

Table 9 Multilevel SEM Models Used in the Study (Continued)

Model	Objective	Analytical Equation	Key Findings
	earnings management	$+ \beta_6 \text{Year} + \beta_7 \text{Industry} + \varepsilon$	ownership (MAN) has a significant positive effect
Model 2 (Add Board Variables)	To examine the effects of board characteristics on earnings management	$\text{EM} = \text{Model 1} + \beta_8 \text{DUA} + \beta_9 \text{IND}$	CEO non-duality (DUA) has a significant negative effect on EM, whereas the proportion of independent directors (IND) shows no significant effect
Model 3 (Moderating Effects)	To test the moderating effects of DUA and IND on the relationships between INS, FOR, MAN and EM	$\text{EM} = \text{Model 2} + (\text{INS} \times \text{DUA}) + (\text{FOR} \times \text{DUA}) + (\text{MAN} \times \text{DUA}) + (\text{INS} \times \text{IND}) + (\text{FOR} \times \text{IND}) + (\text{MAN} \times \text{IND})$	No statistically significant moderating effects are found, indicating that board mechanisms do not strengthen the relationship between ownership structure and earnings management

The three models follow a hierarchical approach: Model 1 tests ownership structure, Model 2 adds internal governance, and Model 3 examines moderating effects. Results show that institutional and foreign ownership effectively reduce earnings management, while managerial ownership increases it due to self-interest. Internal governance mechanisms—CEO non-duality (DUA) and independent directors (IND)—have limited impact, and no significant interaction effects are found, indicating that internal and external governance operate independently rather than synergistically. Model fit was assessed using CFI, TLI, RMSEA, and SRMR based on established criteria (Hu & Bentler, 1999).

Table 10 Model Fit Indices of Multilevel Structural Equation Modeling

Fit Index	Estimated Value	Recommended Threshold	Interpretation
CFI (Comparative Fit Index)	0.961	≥ 0.95	Good model fit
TLI (Tucker–Lewis Index)	0.953	≥ 0.95	Good model fit

Table 10 Model Fit Indices of Multilevel Structural Equation Modeling (Continued)

Fit Index	Estimated Value	Recommended Threshold	Interpretation
RMSEA (Root Mean Square Error of Approximation)	0.043	≤ 0.06	Low approximation error
SRMR (Standardized Root Mean Square Residual)	0.038	≤ 0.08	Good model fit

The results indicate that all fit indices meet the recommended thresholds. Specifically, the values of CFI (0.961) and TLI (0.953) exceed the minimum criterion of 0.95, indicating a good model fit. The RMSEA value (0.043) is below 0.06, suggesting a low level of approximation error, while the SRMR value (0.038) is below 0.08, further confirming good model fit.

Table 11 Summary of Relationships Between Independent Variables and Earnings Management (EM)

Variable	Relationship with EM	Statistical Significance	Direction
INS (Institutional Ownership)	Significant effect on EM	Significant ($p < .01$)	Negative
FOR (Foreign Ownership)	Significant effect on EM	Significant ($p < .01$)	Negative
MAN (Managerial Ownership)	Significant effect on EM	Significant ($p < .01$)	Positive
DUA (CEO Non-Duality)	Significant effect on EM	Significant ($p < .01$)	Negative
IND (Independent Directors)	No effect on EM	Not significant	—
Moderating Effects	No effect on EM	Not significant	—

Table 11 shows that institutional (INS) and foreign ownership (FOR) significantly reduce earnings management ($p < .01$), indicating stronger monitoring by external investors. Managerial ownership (MAN), however, increases earnings management ($p < .01$), suggesting entrenchment effects. CEO non-duality (DUA) is negatively related to earnings management, supporting the benefit of separating leadership roles. In contrast, independent directors (IND) and all interaction effects are not significant, implying limited influence within this model.

Table 12 Summary of Hypothesis Testing Results

Hypothesis	Description	Result	Statistical Significance	Direction
H1	Institutional ownership (INS) affects earnings management	Supported	$p < .01$	Negative
H2	Foreign ownership (FOR) affects earnings management	Supported	$p < .01$	Negative
H3	Managerial ownership (MAN) affects earnings management	Supported	$p < .01$	Positive
H4	CEO non-duality (DUA) affects earnings management	Supported	$p < .01$	Negative
H5	Independent directors (IND) affect earnings management	Not supported	Not significant	—
H6	Independent directors (IND) moderate the relationship between ownership structure and earnings management	Not supported	Not significant	—
H7	CEO non-duality (DUA) moderates the relationship between ownership structure and earnings management	Not supported	Not significant	—
H8	Ownership structure and board characteristics jointly affect earnings management	Supported	$p < .01$	Mixed (positive–negative)

The findings confirm that ownership structure, particularly institutional and foreign ownership, plays a crucial role in reducing earnings management. In contrast, managerial ownership increases the risk of earnings manipulation, reflecting potential opportunistic behavior by executives. Regarding board characteristics, CEO non-duality enhances transparency, while the proportion of independent directors and moderating effects do not show clear or significant impacts. These results highlight the limitations of corporate governance mechanisms within the Thai capital market context.

Discussion of Findings

The findings indicate that institutional and foreign ownership are significantly negatively associated with earnings management, highlighting the role of professional and

external investors as effective monitoring mechanisms. These investors enhance financial transparency and reduce managerial opportunism, consistent with evidence from emerging markets (Fan & Wong, 2002).

In contrast, managerial ownership is positively associated with earnings management, suggesting that higher ownership by executives may lead to entrenchment behavior. Managers with greater control may use accounting discretion to serve personal interests, supporting prior findings that managerial ownership can increase incentives for earnings manipulation beyond certain levels (Alves, 2012).

Regarding board characteristics, CEO non-duality shows a significant negative effect on earnings management, indicating that the separation of leadership roles strengthens internal governance and reduces the concentration of power. This supports the argument that structural independence within the board enhances oversight effectiveness.

However, the proportion of independent directors is not significantly related to earnings management, which may reflect limitations in their actual effectiveness in emerging market contexts such as Thailand. Although firms comply with governance requirements, such compliance may be symbolic rather than substantive (DiMaggio & Powell, 1983). Moreover, measuring independence solely by proportion may fail to capture the quality, expertise, or engagement of directors (Klein, 2002).

Finally, the absence of significant moderating effects suggests that internal and external governance mechanisms do not operate synergistically. This may be due to the highly concentrated ownership structure typical of Thai listed firms, where controlling shareholders exert dominant influence, limiting the combined effectiveness of governance mechanisms (Claessens & Yurtoglu, 2013).

Theoretical Implications

This study contributes to the literature by extending understanding of corporate governance mechanisms in emerging markets, particularly in the context of Thailand's highly concentrated ownership structure. The finding that institutional and foreign ownership reduce earnings management highlights the role of external monitoring and aligns with Institutional Theory, which suggests that firms adapt their behavior in response to pressures from professional investors and global governance standards (DiMaggio & Powell, 1983; OECD, 2023).

From an Agency Theory perspective, the positive effect of managerial ownership supports the presence of principal–principal conflicts, where controlling shareholders (often managers) may act against the interests of minority shareholders (Jensen & Meckling, 1976). This finding is particularly relevant in emerging markets, where ownership concentration differs from the principal–agent focus commonly observed in developed economies.

In addition, the significant effect of CEO non-duality reinforces the importance of board structure in mitigating opportunistic behavior. This result is consistent with Resource Dependence Theory, which emphasizes the role of the board in providing oversight, external linkages, and legitimacy that enhance transparency and reduce uncertainty (Pfeffer & Salancik, 1978; Hillman et al., 2009).

Overall, this study integrates Agency Theory, Resource Dependence Theory, and Institutional Theory to provide a more comprehensive explanation of governance mechanisms. It offers empirical evidence that strengthens theoretical development in corporate governance research within Southeast Asian and emerging market contexts (Claessens & Yurtoglu, 2013).

Practical Implications

From a policy perspective, the findings suggest that institutional and foreign investors play a crucial role in enhancing financial reporting quality and reducing earnings management. Regulatory bodies, such as the Securities and Exchange Commission and the Stock Exchange of Thailand, should therefore encourage greater participation of institutional investors and promote governance standards aligned with international best practices (OECD, 2023).

At the organizational level, the results highlight the importance of CEO non-duality in strengthening internal governance. Firms should design board structures that ensure a clear separation of power, thereby improving oversight effectiveness and reducing opportunities for earnings manipulation (Fama & Jensen, 1983). In addition, efforts should be made to enhance the quality and effectiveness of board governance, beyond mere structural compliance (Klein, 2002).

At the industry and system level, regulators should develop context-specific governance frameworks that reflect differences across industries. More importantly, there is a need to promote an applied governance system that goes beyond formal requirements and fosters a corporate culture emphasizing transparency, accountability, and effective oversight in practice (DiMaggio & Powell, 1983).

Limitations and Future Research Directions

This study has several limitations that should be acknowledged. First, although secondary data from annual reports and Form 56-1 provide reliable and standardized information, they may not fully capture internal organizational behaviors that are not publicly disclosed, such as managerial decision-making processes or real earnings management practices. Future research should therefore incorporate qualitative approaches, such as in-depth interviews with executives and board members, to gain deeper insights into managerial motivations and financial decision-making (Healy & Wahlen, 1999).

Second, this study focuses exclusively on firms listed on the Stock Exchange of Thailand, which may limit the generalizability of the findings to other types of organizations. Future studies could extend the scope to include non-listed firms or specific industry sectors to provide comparative insights into governance structures and earnings management behavior across different organizational contexts.

Third, while the use of Multilevel Structural Equation Modeling (Multilevel SEM) allows for a comprehensive analysis of structural relationships, the model does not explicitly incorporate institutional-level variables, such as regulatory enforcement, government policies, or external investor pressures. Future research is encouraged to integrate these institutional factors to better capture the broader governance environment and its influence on financial reporting quality.

Acknowledgements

The author would like to express sincere gratitude to Rajamangala University of Technology Rattanakosin for its continuous academic support and provision of research facilities that made this study possible.

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Studying the Elements and Factors that Contributed to the Success of South Korea's Hallyu Wave

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Received: 4 April 2026 | Revised: 13 June 2026 | Accepted: 17 June 2026

DOI: [10.60101/rmuttgber.2026.300419](https://doi.org/10.60101/rmuttgber.2026.300419)

Abstract

This research is a documentary study aiming to examine the elements and the interrelationships of factors influencing the success of the Hallyu wave's spread to other countries, from the perspective of political economy and international political economy. The research findings revealed that the success of the Hallyu wave comprised seven components, ranked from most to least impactful, as follows: 1) Culture, 2) Stability, 3) Communication, 4) Public and Private Investment, 5) Finance and Banking, 6) Beliefs, and 7) Knowledge and Technology. This research will be used to provide concrete recommendations for promoting Thailand's soft power internationally.

Keywords: Hallyu wave, South Korean culture, K-pop, Korean songs, Economic growth

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Introduction

According to Nye (1990), the culture of an organization can be mobilized as a form of power known as "soft power" a power that requires no military force but can attract admiration and acceptance, while that culture is transformed into goods that improve the country's economy. Sanjeet Singh et al. (2024) noted that the wealth and income of countries derives from resources converted into goods, whether raw materials, processed products, or other forms, which are sold to bring money into the country. The extent to which revenue is generated depends on good management. Suchat Triphumtamnan (2016) expressed a similar view that entrepreneurs manage differently depending on the strengths and opportunities specific to their organization and country — for example, what Thailand should invest in and where depends on different strengths and opportunities.

However, when examining the economic, political, and social conditions of South Korea, it is found that in 1980, South Korea was a country with economic difficulties. It subsequently developed by relying on the diligence of its people, and after 1980, the economy began to improve. Then in 1997, South Korea experienced another economic crisis caused by monopolization of large industries by certain groups and unjust resource allocation (Wichian Intasi, 2008). Subsequently in 1999, the South Korean government decided to support a cultural wave that young people and citizens in Southeast Asia were following and showing interest in, known as the Korean cultural wave, or Hallyu wave, which garnered a large number of followers (Chatphan Yim-on and Chutimon Fangpong, 2009). It is estimated that South Korea's revenue linked to cultural exports will reach USD 13,761 million by 2030 (Jit Pholin, 2012).

For Thailand, a country with a culture no less rich than South Korea's, there is an opportunity to create a cultural wave extending beyond its borders, with the goal of promoting economic growth. Currently, the Thai government is promoting this in the form of soft power (Jung Hwan Sing, 2015), yet the strength of the wave in reaching target groups has encountered investment problems and other challenges, indicating that further development and promotion of culture is needed (Theerawat Janthuek et al., 2025). This study employs the International Political Economy (IPE) framework proposed by Narong Phetprasert et al. (2022), which comprises seven dimensions: (1) trade and investment, (2) finance and banking, (3) knowledge and technology, (4) communication, (5) culture, (6) trust and ideology, and (7) security. The researcher observes that, despite its comprehensive nature, this framework has

not been extensively applied in examining the Hallyu Wave. This research will serve as one component of a framework for developing Thailand's cultural soft power going forward.

Research Objectives

To study the success of the Hallyu wave's spread internationally by South Korea.

Literature Review

Political Economy Concept

Narong Petprasert et al. (2022) concluded that political economy arises from the interrelationship among politics, economics, and society. Smith (1776) proposed that politics is an important factor influencing the economy with regard to the determination of freedom in the pricing of goods and services, and that the government will intervene only when the prices of goods and services affect the public or society. Accordingly, Narong Petprasert et al. (2022), having conducted academic study based on the political economy concept, concluded that political economy arises from the interrelationship among politics, economics, and society.

However, no country can exist in isolation; countries must interact with one another, which gave rise to the concept of international political economy, which aims at competition for wealth and power (Lairson & Skidmore, 2003). Narong Petprasert et al. (2022), in their study of international political economy in its current state, found that the factors generating national wealth and power consist of seven key components: 1) Trade and Investment, 2) Finance and Banking, 3) Knowledge and Technology, 4) Communication, 5) Culture, 6) Beliefs or Ideology, and 7) Stability.

Research on the Hallyu Wave

Bae et al. (2017) found that people traveling to South Korea and spending money on goods and various services were motivated by the Korean cultural wave (Hallyu wave), causing tourists to South Korea to decide to visit regardless of the consumer price index or cost of living that is, the consumer price index did not have a statistically significant effect, indicating that the cultural wave transcends the consumer price index.

Riela Provi Drianda et al. (2023) found that South Korean investors invested in Indonesia (FDI) in ways related to promoting the Hallyu wave, such as producing television programs, creating VDO content, managing printing, music, and sound recording. This cultural industry has become one of the main sources of revenue flowing from Indonesia into South Korea.

Dal Yong Jin (2023) published an article from a study on South Korea's use of AI to assist in producing cultural goods. The study concluded that South Korea has been promoting the role of AI since 2020, using AI to help produce cultural industry goods — functioning as a producer, searching for Korean historical narratives, helping develop cultural programs in terms of both content and systems, using AI to increase viewership, and using AI to recommend cultural products according to buyer demand, resulting in increased popularity and higher profits.

Giestarks (2023) found that South Korea's success in disseminating culture and generating national revenue stems from four prominent government policies: 1) establishing an Educational Program for intellectual property registration; 2) protecting consumers by safeguarding the creative industry market; 3) supporting Korean content internationally by providing information for content creators; and 4) allocating budgets for personnel development, pushing creators to develop their potential so they can produce work efficiently.

Chai and Lee (2024) found that South Korea has been disseminating its culture through Korean-language books, embedding Korean culture in Korean-language textbooks used at universities in Thailand. The study also allows Thai students to interpret the various ideologies appearing in these books and compare them with Thai culture or the cultures of the countries those students come from.

Piti Srisaengngam (2018) found that the popularity of South Korean culture through all types of cultural products was achieved because the government had serious policies, driven by the establishment of the Korea Culture and Content Agency (KOCCA) as a mechanism to support and develop strategies for promoting Korean culture abroad, making cultural products distinctive and continuously developing. Currently, the strategy of disseminating the Korean language is used so that people can access Korean culture through language.

The Strategic and Security Studies Division (2014) found that South Korean culture constitutes a highly successful cultural industry that generates substantial national income, advances the economic system, and has been able to transform an unfavorable geography into a subject of global interest, elevating the country to a position of importance at the Asian and European levels. The success of South Korean culture internationally as a product is due to: 1) maintaining generational nationalism, 2) public-private cooperation, and 3) identifying what exists within the country and bringing it out to the world.

Nantipa Pushsapavardhana and Nawin Wongsomboon (2020) studied and summarized the roles of South Korea's public and private sectors in driving the Korean cultural wave into four areas: 1) The government establishes cultural dissemination organizations; television companies create and produce programs reflecting culture; music companies create artists and musical works. 2) The government organizes cultural exchange activities; television companies create various programs to disseminate abroad; music companies export music internationally. 3) The government supports the entertainment media industry; television companies manage the appearances of Korean actors; music companies organize special activities related to Korean music. 4) The government establishes specialized educational institutions; music companies expand distribution of music and culture. These actions are the causal factors that allowed South Korea to successfully channel cultural waves into economic value.

Apasana Assawarangsithaeng (2021) explained that South Korea succeeded in exporting cultural products through the Hallyu wave to the point of becoming a national product, because the government provided support and worked closely with the public sector, while also using international policy-driven approaches alongside policies for exporting cultural products.

Kulwadee Lim-usanno (2023) found that Thai people who favor traveling to South Korea cite three main reasons: 1) to appreciate various cultural aspects, 2) because the cities are clean and attractive for tourism, and 3) because there is communication about South Korean culture in Thailand in the Thai language through digital media. This is consistent with Dhanakorn Srisooksai (2022), who found that digital communication leads people who consume media to adopt behaviors more quickly, wanting to return after visiting, and that today's online media reaches groups of people easily and rapidly, possibly in the form of music videos with both visual and audio elements, creating a distinctive identity for products that people remember (Phattarawat Kraipiyaset et al., 2025).

Anurak Bandasak (2024) summarized from an in-depth symposium on the success of South Korea's soft power that it derives from the dissemination of culture at the appropriate time and circumstances specifically, during a financial crisis requiring revenue generation, the cultural wave or Hallyu was released to society in sequence: first through drama series, then through the production of musical works, and third through online games. The overall success formula is "private sector leads, government supports."

Wanijpas Kanyaphong (2023) found that South Korea's strategies for promoting cultural content include adapting Korean culture to align with external consumer demand, investing heavily in developing personnel for cultural promotion, regulating communications between the public and private sectors to foster cooperation in various activities. The expected success is that by 2030, or possibly sooner, the export of South Korean culture will employ up to 1,604,880 people and generate no less than 13,761 million USD for South Korea. The media channels used to disseminate culture include YouTube, Facebook, music festivals, and digital television broadcasting.

Suthawee Paiboon and Porracha Yodnarn (2023) found that the characteristics of Korean artists and the content of reality talent search programs in South Korea involve the following practices: 1) live shows, such as Produce X 101; 2) producers who have different expertise depending on the season and competitive mission; 3) a multi-stage song selection process. The characteristics of Korean artists physique, personality, dancing skills, acting skills, facial expressions combined with dedication, perseverance, effort, responsibility, and special skills such as modeling and performing, allow them to branch out to other work such as variety shows.

Korn Rojjanawongsakul (2022) found that the success of South Korea's entertainment industry stems from the creation of a cultural wave called Hallyu, establishing it as part of consumers' daily lives through television dramas, series, and music. Furthermore, the Thai people of South Korea play a high role in developing the culture outwardly to Thailand and other countries until the Korean wave phenomenon emerged, and the government pushed for world-class competition.

Furong Jin et al. (2024) found that the Korean cultural wave, or Hallyu, had a positive impact on the production of goods and exports to China during the period 2011–2020. Cultural products including Korean dramas, Korean films, Korean music, and Korean entertainment also had a positive spillover effect on other goods, particularly processed foods and beverages favored by Chinese consumers.

Thitaree Phaksirijayanon and Parawan Phaetyanon (2025), in a study searching for success factors of Korean series analyzing narrative elements and social reflections found that the key factors contributing to the success of Korean cultural dissemination include performance management, soundtrack and narrative structure, and character placement, all

of which are important. Social reflection, government funding, and the power of stars also emerge as factors in the success of Korean series.

Research Methodology

1. Research Method

This research is a documentary study using academically published documents. Documentary research is considered one of the popular types of research, conducted to identify conceptual frameworks and practical guidelines (Thitiwat Thongkaew and Prasopchai Phasunon, 2018). This documentary research focuses on bringing academic documents about South Korea's Hallyu wave and related theories and concepts as secondary data to be synthesized. A theoretical framework is used as a basis for the synthesis, consistent with Alongkot Kotsarn (2024), who proposed that data synthesis may employ a conceptual framework as issues for synthesis, a view shared by Thitiwat Thongkaew and Prasopjai Phasunon (2018).

2. Data Synthesis and Analysis Method

Documentary research begins by synthesizing data, grouping similar or identical issues together, then analyzing the documents used as data comprising articles and research articles related to the Hallyu wave of South Korea ensuring that the data are reliable. Studies included in the synthesis were selected from national and international peer-reviewed journals published within the last decade. The ten-year period was adopted to examine the developmental trajectory of the phenomenon under investigation. The review process was terminated when the findings repeatedly converged on similar themes and patterns, suggesting that sufficient evidence had been accumulated to achieve analytical saturation.

3. Conceptual Framework Used in the Documentary Research and the coding method

The conceptual framework used for documentary research serves as the subject for synthesizing data on the Hallyu wave. The researcher selected the seven-component framework of factors creating national wealth and power developed by Narong Petprasert et al. (2022). The issues derived from the synthesis will then be discussed in relation to: the political economy concept (the interrelationship among politics, economics, and society) and the international political economy concept (competition for wealth and power), for presentation going forward.

Table 1 Conceptual Framework for Seven-Component Synthesis

Hallyu Researchers	Trade & Investment	Finance & Banking	Knowledge & Technology	Communication	Culture	Beliefs	Stability

Table 1: Conceptual Framework for Synthesis Source: Narong Petprasert et al. (2022)

For the coding procedure, the researcher examined and interpreted the findings reported in each study to identify which of the seven dimensions outlined in Table 1 were represented in the content. A finding could be coded into a single dimension or multiple dimensions when appropriate. The presence of a dimension was indicated by a check mark (✓), as presented in Table 2.

4. Literature Used for Analysis

The literature used for analysis was drawn from 16 academic articles and research articles, or until data saturation was reached. The data must be no older than 10 years, published and traceable to the original source. The search method was purposive.

Research Findings

Table 2 Synthesis of literature According to the Seven-Component International Political Economy conceptual framework.

	Bae et al. (2017)	Riela Provi Drianda et al. (2023)	Dal Yong Jin (2023)	Kitstars (2023)	Chai and Lee (2024)	Piti Srisaengngam (2018)	Strategie and Security Studies Division (2014)	Nantipa Pushapavardhana and Nawin Wongsomboon (2020)	Apasana Assawarangsitthaeng (2021)	Kulwadee Lim-USanno (2023)	Anurak Bandasak (2024)	Wanijpas Kanyaphomg (2023)	Sulthawee Paiboon and Porracha Yodhern (2023)	Korn Rojjanawongsakul (2022)	Furong Jin et al. (2024)	Thitaree Phaksirijayaron and Parawan Phaetyanon (2025)	Total
1. Trade & Investment		✓	✓	✓	✓	✓	✓					✓		✓		✓	10
2. Finance & Banking	✓	✓	✓			✓	✓				✓	✓					7
3. Knowledge & Technology		✓	✓														2
4. Communication	✓	✓	✓		✓		✓			✓	✓	✓		✓		✓	11
5. Culture	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	16
6. Beliefs			✓		✓	✓		✓	✓					✓			5
7. Stability		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		13
Total	3	6	7	3	5	4	5	5	3	2	4	5	2	5	2	3	

Table 2: Synthesis Results of Hallyu Wave Success Factors Source: Compiled from 16 works of literature.

Based on the synthesis table, the 16 articles studying the Hallyu wave, when synthesized, cover all 7 components that are factors contributing to the success of the Hallyu wave in accordance with the characteristics of the international political economy concept, as follows: the Trade and Investment component (public and private sectors) was mentioned in 10 articles; the Finance and Banking component was mentioned in 7 articles; the Knowledge and Technology component was mentioned in 2 articles; the Communication component was mentioned in 12 articles; the Culture component was mentioned in all 16 articles; the Beliefs component was mentioned in 5 articles; and the Stability component was mentioned in 13 articles. To the best of the researcher's knowledge, this is the first study to systematically examine the Hallyu Wave using a clearly defined International Political Economy (IPE) framework. The study not only identifies the seven dimensions associated with the phenomenon but also evaluates the relative emphasis placed on each dimension, highlighting those that are more prominent and those that receive less attention. While previous research has acknowledged the existence of seven key driving factors of the Hallyu Wave, it has not explicitly assessed their relative significance or degree of emphasis (Dal Yong Jin, 2023).

Discussion

The synthesis results for all seven components are as follows:

1. Investment Component: The South Korean government cooperated with the private sector to invest in transforming South Korean culture into cultural products for sale abroad. The government invested in creating Educational Programs, registering intellectual property, developing cultural personnel such as promoting creators, and establishing organizations to drive culture and assist the private sector. The private sector invested both domestically and internationally: domestically in AI bringing AI to help develop culture, investing in producing all types of cultural products, investing in bringing domestic assets to the international market, investing in producing television programs reflecting culture, creating music, and creating artists; and also traveling abroad to invest in producing cultural products in Indonesia. As a result of this public-private cooperation in cultural investment, it is projected that by 2030, 1,604,880 South Koreans will be employed in the cultural sector. This is consistent with the Bank of Thailand (2017), which provided political economy guidance that in solving poverty, the government and private sector should jointly invest, and consistent with Chainnarong Khrua-nawn and Pimpaphai Sanitwong na Ayutthaya (2021), who found that driving a good

economy requires investment from both the government and private capital groups working together.

2. Finance and Banking Component: Regarding South Korea's cultural products, buyers do not consider the consumer price index, and such products generate substantial foreign exchange earnings for South Korea. It is estimated that by 2030, cultural product revenues flowing into South Korea will amount to 13,761 million USD, enabling cultural products to effectively resolve financial crises. As the development of cultural products using AI as an aid will increase profits, South Korean cultural products continue to grow. This is consistent with Nattawut Rattana et al. (2022), who found that the more products grow, the higher the profits, and consistent with international political economy principles that free trade means whoever has better opportunities will earn more profit, and trade is inherently unequal (Kassamaporn Raksorn, 2020).

3. Knowledge and Technology Component: South Korean cultural products utilize knowledge in technology to create VDOs, print music, and record audio, and use AI in the production of cultural products, increasing interest and profit advantage over other countries. This is consistent with Zarifhonarvar (2023), who concluded that countries that use technology will have an advantage over those that do not use it or are inferior in this regard.

4. Communication Component: The dissemination of South Korean culture to foreign markets uses multiple forms of communication, including AI and various digital media, books that disseminate the Korean language while embedding culture, with the government assisting and regulating communications between the public and private sectors, and maintaining continuous communication like a wave a cultural wave. The content of communication expresses culture, such as soundtracks within narratives, with emphasis on communication at the right time and place. This is consistent with Dhanakorn Srisooksai (2022), who found that digital communication leads people to adopt media behaviors more quickly, and consistent with Phattarawat Kraipiyaset et al. (2025), who found that communication through music videos with both visual and audio elements creates a distinctive identity for products that people remember.

5. Culture Component: The Hallyu wave, the South Korean cultural wave has been presented in a form where the private sector produces it as industrial-scale products, i.e., mass production, through public-private cooperation, including drama series, musical works, and online games. Culture is adapted to align with external consumer demand and may be

embedded in Korean-language textbooks. Currently, AI helps search for, develop cultural programs, and produce cultural content. Furthermore, high-influence culture can be produced in foreign countries, sold in foreign markets such as Indonesia, and consumers are able to transcend the consumer price index. This is consistent with Nye (1990), who concluded that culture is a soft power with great potency.

6. Beliefs Component: The Hallyu wave going abroad embeds the beliefs of Korean people and foreigners. Specifically, the South Korean government and private sector have created culture as a national product, with nationalism transmitted from generation to generation, and opportunities for foreign students to debate and express comparative cultural views. Currently, AI is being used to research history, further strengthening beliefs. When consumers develop trust, this leads to increased sales (Jaruporn Tangpattanagit et al., 2024).

7. Stability Component: The Hallyu wave is international political economy with stability. South Korean cultural products are produced abroad, sold abroad; the government protects consumers and safeguards the creative industry; culture is disseminated to students who will grow into purchasing power in the future; the government establishes organizations specifically to drive culture; and there is a rigorous multi-stage process for selecting artists. Currently, it is widely accepted across Asia and Europe, with vast market opportunities. This sustainability occurs in the model of "private sector leads, government supports" going abroad, consistent with Chatphan Yim-on and Chutimon Fangpong (2009), who also made this finding.

From the findings of the Hallyu wave covering all seven components, it is found to be consistent with the political economy concept, which has three components: 1) the political sector (the state), 2) the economic sector, and 3) socio-cultural sector (the public benefits) (Smith, 1776), and consistent with international political economy, which requires: 1) wealth (making the state and people economically prosperous) and power (people follow and trust) (Lairson & Skidmore, 2003).

To the best of the researcher's knowledge, this is the first study to systematically examine the Hallyu Wave using a clearly defined International Political Economy (IPE) framework. The study not only identifies the seven dimensions associated with the phenomenon but also evaluates the relative emphasis placed on each dimension, highlighting those that are more prominent and those that receive less attention. While previous research has acknowledged the existence of seven key driving factors of the Hallyu Wave, it has not explicitly assessed their relative significance or degree of emphasis (Dal Yong Jin, 2023).

Conclusion

The factors contributing to the success of driving the Hallyu wave abroad and generating revenue for South Korea, within the framework of political economy and international political economy concepts, drawn from 16 research articles, reveal that the success of South Korea's Hallyu wave according to the seven-component success factor framework of political economy and international political economy encompasses all seven components.

It can be seen that the findings above constitute a study aimed at analyzing causal factors or components and their impacts as the primary analytical approach. In the author's study, knowledge will be extended by analyzing the processes and interconnections between various dimensions including policy, economic and social environment, political conditions at various periods in South Korea, policy implementation, as well as impacts and interactions among various factors, under the seven-component political economy and international political economy concepts, ranked from most to least utilized: 1) the Culture component, 2) the Stability component, 3) the Communication component, 4) the Public and Private Investment component, 5) the Finance and Banking component, 6) the Beliefs component, and 7) the Knowledge and Technology component. In conclusion, the contribution to the academic community is that the Hallyu Wave can be explained through the seven dimensions of the International Political Economy framework. It can also be used as a model for cultural development, indicating which of the seven dimensions of the International Political Economy framework should be emphasized more and which should be emphasized less.

Policy Recommendations

For the Thai government, if it seeks to drive soft power worldwide, it should issue policies for the Ministry of Culture to adopt the political economy and international political economy frameworks as the basis for driving Thailand's soft power (regardless of whether the focus is on all 5 or 11 types of cultural capital). It should implement all seven components, as follows:

1. Trade and Investment: The state must invite the private sector to jointly invest both domestically and internationally.
2. Finance and Banking: Must focus on highly profitable cultural products and produce and sell them in foreign countries.

3. Develop soft power personnel with knowledge in technology and apply it to cultural products.
4. Communication: Must use all forms of tools and communicate in a wave-like manner frequently and consistently.
5. Cultural products related to soft power must be subject to multi-stage selection; for performing arts, performers must go through rigorous multi-stage selection.
6. Must build confidence in Thai soft power among both Thai people and foreigners in the cultural products being promoted.
7. Establish stability by creating a directly responsible organization, cultivating customers from school and university age, and cooperating in the model of "private sector leads, government supports."

Practical Recommendations

For the private sector, it may not be necessary to wait for the government to act within all seven components first. Instead, it can proceed within its own private sector capacity, following the approach of "private sector leads."

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Human and Social Capital in Platform-Based Freelancing: The Mediating Role of Digital Engagement in Freelance Success

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Received: 22 November 2025 | Revised: 4 April 2026 | Accepted: 24 April 2026

DOI: [10.60101/rmuttgber.2026.295804](https://doi.org/10.60101/rmuttgber.2026.295804)

Abstract

The rapid expansion of global digital labor platforms has increased opportunities for Thai freelancers to access cross-border work. However, success in algorithmically governed labor markets depends on more than technical competence alone. It involves the interplay of individual capabilities, relational networks, and platform-based engagement behaviors. This quantitative study develops and tests a structural model examining the effects of human capital, social capital, and digital engagement on freelance success. Data were collected from 459 Thai freelancers with verified cross-border experience and analyzed using Structural Equation Modeling (SEM). Research results indicate that human capital has significant direct effects on social capital, digital engagement, and freelance success. Social capital emerges as the strongest predictor of freelance success and positively influences digital engagement. Bootstrap mediation analysis confirms that both social capital and digital engagement transmit the effects of human capital to career outcomes. Research findings suggest that freelance success in platform economies is shaped by the interaction between competence, network embeddedness, and digital engagement behaviors. These results provide empirical evidence from an emerging economy context and offer implications for strengthening workforce capability development in global digital labor markets.

Keywords: Human capital, Social capital, Digital engagement, Freelance success

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Introduction

The emergence of digital labor platforms has accelerated the expansion of freelance markets across the world by creating a new environment of location-independent work arrangements, algorithmic work coordination, and international transactions (Wood et al., 2018). Platforms such as Upwork and Fiverr have changed the dynamics of labor matching and evaluation by creating an algorithm-based environment for evaluating workers' performance based on factors such as visibility, responsiveness, and reputation.

Thailand has also witnessed a change in the freelance market with the expansion of cross-border freelancing in creative industries, information technology services, and digital services with the implementation of digital strategies and integration of the country's service sectors into the global service sectors (Sattayathamrongthian et al., 2023). However, Thai workers face difficulties in maintaining cross-border freelance work arrangements due to a lack of cross-cultural capabilities and a fragile professional network.

The extant literature has provided partial explanations on how human capital, social capital, and digital engagement might be related to each other and how they, in turn, might be related to freelance success. Human capital theory has focused on skills and competencies as drivers of productivity (Becker, 1993), whereas social capital theory has focused on networks and trust as enablers of access to opportunities under uncertainty (Coleman, 1988; Putnam, 2000).

Digital engagement has been studied from the perspective of algorithmic governance, wherein visibility, responsiveness, and reputation have been identified as critical factors influencing market outcomes (Burtch et al., 2018). However, most of these perspectives have been studied independently, without adequately accounting for how human capital, social capital, and digital engagement might be related as a system of interrelated mechanisms. The relevance of this study is further underscored by the fact that, unlike in Western economies, institutional protection for freelancers is not well developed in Southeast Asian economies, wherein social networks are critical drivers of economic exchange.

The objective of this study, therefore, is to develop and test a structural model of Human Capital, Social Capital, Digital Engagement, and Freelance Success among Thai freelancers engaged in cross-border platform work. The study contributes to the literature by providing a structural model of human capital, social capital, and digital engagement as drivers

of freelance success, wherein capital-based resources are integrated with algorithmically mediated systems of labor.

Research Questions

- 1) How does human capital shape social capital and digital engagement among Thai freelancers engaged in cross-border platform work?
- 2) How do social capital and digital engagement influence freelance success in algorithmically mediated labor markets?
- 3) Do social capital and digital engagement mediate the relationship between human capital and freelance success?

Research Objectives

- 1) To examine the effects of human capital on social capital and digital engagement in cross-border freelance platforms.
- 2) To investigate the influence of social capital and digital engagement on freelance success.
- 3) To test the mediating roles of social capital and digital engagement in the relationship between human capital and freelance success.
- 4) To validate an integrated structural model explaining freelance success through competence, relational capital, and platform engagement mechanisms.

Hypotheses Development

- H1: Human Capital (HC) positively affects Social Capital (SC).
- H2: Human Capital (HC) positively affects Digital Engagement (DE).
- H3: Human Capital (HC) positively affects Freelance Success (FS).
- H4: Social Capital (SC) positively affects Digital Engagement (DE).
- H5: Social Capital (SC) positively affects Freelance Success (FS).
- H6: Digital Engagement (DE) positively affects Freelance Success (FS).
- H7: Social Capital (SC) mediates the relationship between Human Capital (HC) and Freelance Success (FS).
- H8: Digital Engagement (DE) mediates the relationship between Human Capital (HC) and Freelance Success (FS).
- H9: Digital Engagement (DE) mediates the relationship between Social Capital (SC) and Freelance Success (FS).

H10: Social Capital (SC) and Digital Engagement (DE) sequentially mediate the relationship between Human Capital (HC) and Freelance Success (FS).

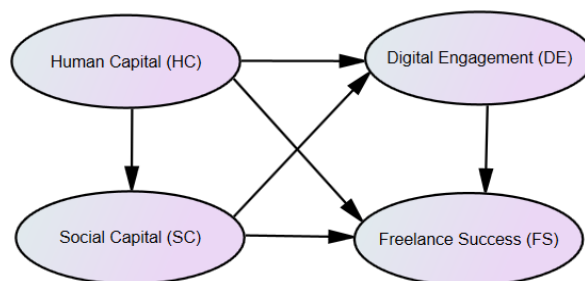


Figure 1 Conceptual Framework

This model illustrates the structural relationships among Human Capital (HC), Social Capital (SC), Digital Engagement (DE), and Freelance Success (FS) in platform-based labor markets. Human Capital directly influences Social Capital, Digital Engagement, and Freelance Success, indicating that skills and competencies form the foundation of performance. Social Capital also affects both Digital Engagement and Freelance Success, highlighting the importance of professional networks and trust-based relationships. Digital Engagement directly contributes to Freelance Success by enhancing visibility and reputation within algorithm-driven platforms.

Literature Review

The rapid growth of digital freelancing has fueled interest in performance management in digital labor markets, where matching algorithms and rating systems influence opportunity distribution (Wood et al., 2018). In algorithmic management systems, worker visibility is governed by platform-generated signals, such as ratings, responsiveness, and activity levels, which shape performance outcomes independently of underlying competence (Duggan et al., 2019; Newlands, 2020). This highlights the need to understand how performance management systems convert individual capabilities into market-recognized outcomes.

Human capital theory posits that knowledge and skills enhance individual productivity and economic value (Becker, 1993). In digital labor markets, freelancers require multidimensional capabilities, including technical, digital, and adaptive skills (Kuhn & Maleki, 2017). However, such capabilities must be made observable through platform signals—such as portfolios, ratings, and feedback—to influence opportunity access (Lehdonvirta et al., 2019).

This suggests that human capital alone is insufficient unless it is effectively communicated within platform-mediated environments.

Social capital provides access to networks and relationships that mitigate uncertainty in remote and transaction-based interactions (Granovetter, 1985; Coleman, 1988). In platform economies, social capital is manifested through repeat clients, referrals, and professional communities, which enhance income stability and opportunity continuity. In transnational contexts where formal institutional protections are limited, these relational structures function as informal governance mechanisms that facilitate trust, coordination, and risk reduction (Lehdonvirta, 2022). More importantly, social capital extends beyond opportunity access by serving as a mechanism of relational validation, through which freelancers establish credibility and legitimacy within platform ecosystems. In this sense, social capital not only reduces uncertainty but also transforms individual capability into socially recognized and economically actionable value.

Digital engagement represents the behavioral capacity to interact strategically with platform infrastructures and algorithmic systems. Active engagement—through profile updates, timely responses, and content visibility—enhances ranking and client attraction (Burtch et al., 2018; Duggan et al., 2019). More critically, digital engagement serves as a transmission mechanism through which human and social capital are transformed into algorithmically recognizable signals of professionalism and reliability (Newlands, 2020), thereby linking latent resources to observable performance.

Freelance success is inherently multidimensional, encompassing income stability, client satisfaction, and sustained access to opportunities (Kässi & Lehdonvirta, 2018). Within platform economies, performance is best understood as the outcome of an integrated process in which competence (human capital), relational embeddedness (social capital), and algorithmic visibility (digital engagement) interact dynamically. This perspective provides a theoretical basis for examining social capital and digital engagement as key mediating mechanisms through which human capital is translated into performance outcomes in digitally governed labor markets.

Research Methodology

1) Research Design and Sample

This study employed a quantitative, cross-sectional research design to examine the relationships among Human Capital (HC), Social Capital (SC), Digital Engagement (DE), and

Freelance Success (FS). Structural Equation Modeling (SEM) was applied using the two-step approach, separating measurement and structural model evaluation (Anderson & Gerbing, 1988; Rex B. Kline, 2016).

Ethical approval was obtained from the Human Research Ethics Committee of Rajamangala University of Technology Rattanakosin (RMUTR). Participation was voluntary, and informed consent was secured prior to data collection, ensuring confidentiality and anonymity in accordance with established research ethics guidelines (John W. Creswell & J. David Creswell, 2018).

Data were collected between January and May 2024 in Bangkok, Thailand. The target population consisted of Thai freelancers engaged in cross-border platform work. A purposive sampling technique was employed to ensure respondents possessed relevant experience, including individuals aged 18 years or above who had completed at least one international freelance project within the past six months. Survey distribution was conducted through online freelancer communities and offline professional networks. A total of 459 valid responses were obtained, exceeding recommended thresholds for SEM analysis (Kline, 2016).

2) Measurement and Data Collection

Four latent constructs (HC, SC, DE, FS) were operationalized using established scales adapted from prior literature. All items were measured using a five-point Likert scale (1 = strongly disagree to 5 = strongly agree).

Human Capital (HC) was measured using 15 items adapted from Becker (1993) and Kuhn and Maleki (2017), capturing skills, knowledge, and professional capability. Social Capital (SC) was measured using 15 items adapted from Coleman (1988) and Granovetter (1985), reflecting network strength, trust, and professional relationships. Digital Engagement (DE) was measured using 15 items adapted from Burtch et al. (2018) and Newlands (2020), capturing platform activity, responsiveness, and visibility-enhancing behaviors. Freelance Success (FS) was measured using 15 items adapted from Kässi and Lehdonvirta (2018) and Wood et al. (2018), reflecting income stability, satisfaction, and opportunity quality.

Content validity was ensured through scale adaptation and expert review. Internal consistency reliability was confirmed with Cronbach's α values exceeding .90 (Nunnally & Bernstein, 1994). Convergent validity was assessed using Composite Reliability (CR) and Average Variance Extracted (AVE), while discriminant validity was evaluated using the Fornell-

Larcker criterion and the Heterotrait–Monotrait (HTMT) ratio (Fornell & Larcker, 1981; Henseler et al., 2015).

To reduce common method bias, procedural remedies were applied, including anonymity assurance, scale separation, and careful questionnaire design (Podsakoff et al., 2011). Data collection followed the tailored design method to enhance response quality and reliability (Dillman et al., 2014).

3) Data Analysis

Data analysis was conducted in three stages using covariance-based SEM. First, Exploratory Factor Analysis (EFA) was performed to assess dimensionality and initial construct structure. Second, Confirmatory Factor Analysis (CFA) using Maximum Likelihood Estimation (MLE) was conducted to validate the measurement model. Model fit was evaluated using multiple indices, including χ^2/df , CFI, TLI, RMSEA, and SRMR, based on established cutoff criteria (Hu & Bentler, 1999; Kline, 2016).

Finally, the structural model was estimated to test hypothesized relationships. Direct and indirect effects were examined using standardized path coefficients and bias-corrected bootstrapping with 5,000 resamples, providing robust estimates of mediation effects (Preacher & Hayes, 2008). This approach enhances statistical rigor and reduces bias in indirect effect estimation.

Research Result

The sample (N = 459) consists of 60.8% male and 39.2% female respondents, with the majority aged 18–30 years (83.4%) and the remainder aged 31–45 years (16.6%). Most participants are highly educated, with 77.8% holding a bachelor's degree, followed by postgraduate (11.3%), senior high school (5.9%), and diploma (5.0%) qualifications. Income levels are generally moderate, with 60.6% earning between 15,001 and 50,000 Baht per month, 27.7% earning below 15,000 Baht, and 11.8% earning between 50,001 and 100,000 Baht.

In terms of freelance fields, respondents are primarily engaged in photo/video and animation (30.3%), tutoring/education (26.8%), and graphic design (21.1%), followed by lifestyle and health (10.5%), web development and programming (5.4%), and other fields (5.9%). Regarding work characteristics, 50.3% are hybrid workers combining full-time employment with freelance work, while 33.6% are long-term freelancers and 16.1% are new freelancers.

Table 1 Construct-Level Descriptive Statistics (N = 459)

Construct	Items	Mean	SD	Skewness	Kurtosis	Mean Range	SD Range
Human Capital (HC)	15	4.288	0.489	0.466	-.744	4.207–4.344	.431–.532
Social Capital (SC)	15	4.273	0.524	0.154	-.580	4.196–4.442	.493–.566
Digital Engagement (DE)	15	4.303	0.467	0.78	-1.049	4.255–4.344	.443–.483
Freelance Success (FS)	15	4.301	0.51	0.292	-.650	4.222–4.381	.470–.537

All constructs show high mean scores with low variability, indicating consistently positive perceptions among freelancers. Skewness and kurtosis values fall within acceptable ranges, supporting the normality assumptions required for SEM.

Table 2 Descriptive Statistics and Pearson Correlations Among Study Variables (N = 459)

Variable	M	SD	1	2	3	4
Human Capital (HC)	4.288	0.489	1			
Social Capital (SC)	4.273	0.524	.691**	1		
Digital Engagement (DE)	4.303	0.467	.739**	.642**	1	
Freelance Success (FS)	4.301	0.51	.821**	.683**	.693**	1

Note: Pearson correlation coefficients are reported. $p < .01$ (two-tailed).

All correlations are positive and significant ($p < .01$), indicating strong and consistent relationships among the constructs.

Table 3 KMO, Bartlett's Test, and Exploratory Factor Analysis Results (N = 459)

Construct	Items Retained	KMO	Bartlett's χ^2 (df)	Variance Explained (%)	Factor Loadings
Human Capital (HC)	10	0.904	3267.951 (45)	58.21	.718–.958
Social Capital (SC)	8	0.902	2103.815 (28)	59.11	.776–.885
Digital Engagement (DE)	9	0.884	3321.919 (36)	61.27	.825–.954
Freelance Success (FS)	10	0.933	3017.213 (45)	59.68	.703–.954

All KMO values exceed .80 and Bartlett's tests are significant ($p < .001$), indicating strong factorability.

Factor loadings exceed .70 and variance explained is above 50%, supporting unidimensionality and suitability for CFA.

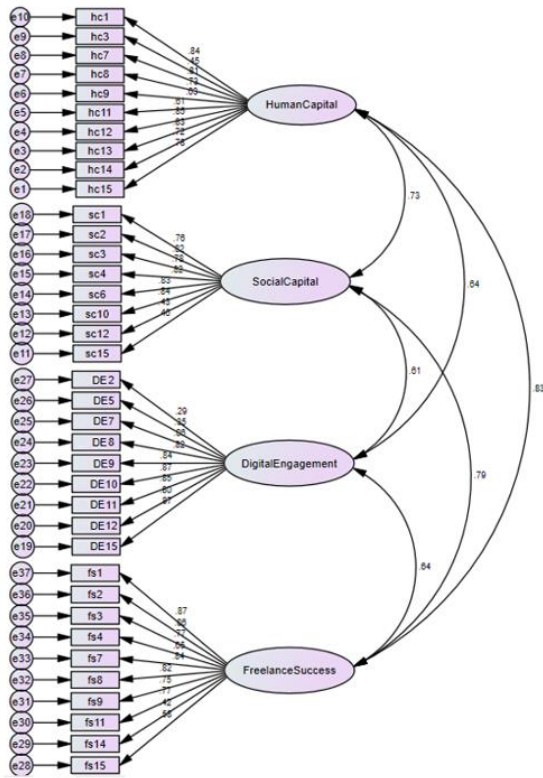


Figure 2 CFA Figures

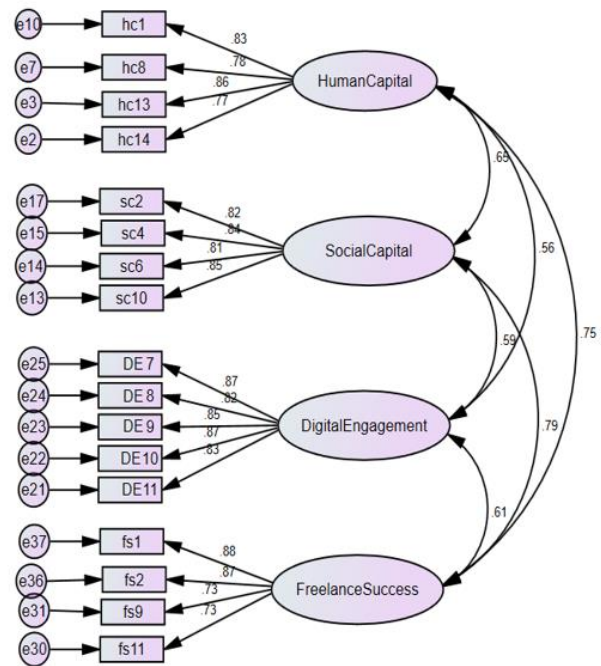


Figure 3 CFA Figures After Refinement

The original CFA model contained many indicators, some with weak loadings, resulting in unnecessary complexity. After refinement, only high-loading items were retained, improving convergent validity, reducing measurement error, and significantly enhancing overall model fit. The final model is more parsimonious, stable, and suitable for SEM.

Table 4 Standardized Factor Loadings and Measurement Properties (CFA Results) (N = 459)

Construct	Item	Loading
Human Capital (HC)	HC13	0.86
	HC1	0.83
	HC8	0.78
	HC14	0.77
Social Capital (SC)	SC10	0.85
	SC4	0.84
	SC2	0.82

Table 4 Standardized Factor Loadings and Measurement Properties (CFA Results) (N = 459)
(Continued)

Construct	Item	Loading
Digital Engagement (DE)	SC6	0.81
	DE7	0.87
	DE9	0.87
	DE10	0.83
	DE8	0.82
Freelance Success (FS)	DE11	0.79
	FS1	0.88
	FS2	0.81
	FS9	0.73
	FS11	0.73

Table 4 reports on the CFA results for all retained items. Standardized loadings range from .73 to .88, indicating strong indicator reliability. Error variances are within acceptable limits, supporting measurement precision.

Table 5 Construct Reliability and Validity Assessment

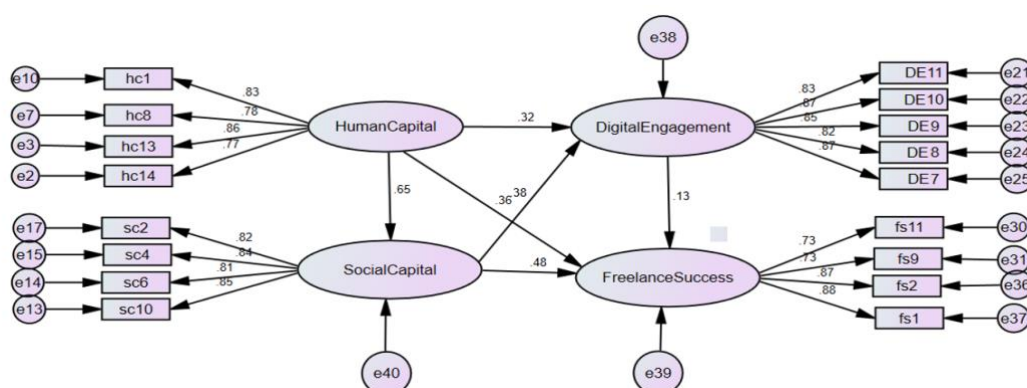
Construct	α	CR	AVE	$\sqrt{\text{AVE}}$	Correlations (DE / HC / SC / FS)	HTMT
Human Capital (HC)	0.941	0.877	0.658	0.811	DE (.630), SC (.560), FS (.610)	0.742
Social Capital (SC)	0.931	0.884	0.690	0.830	DE (.590), HC (.560), FS (.750)	0.693
Digital Engagement (DE)	0.943	0.926	0.722	0.849	HC (.630), SC (.590), FS (.790)	0.736
Freelance Success (FS)	0.947	0.869	0.651	0.807	DE (.790), HC (.610), SC (.750)	0.784

The CFA results show that all items load strongly on their intended constructs, with standardized loadings ranging from .73 to .88, exceeding the recommended minimum threshold of .50. Error variances are low and consistent, demonstrating good measurement precision.

Table 6 Goodness-of-Fit Indices for the Confirmatory Factor Analysis Model

Fit Index	Value	Threshold	Interpretation
χ^2/df	1.542	< 3.000	Excellent
RMSEA	0.034	< 0.060	Excellent
SRMR	0.007	< 0.080	Excellent
CFI	0.989	> 0.950	Excellent
TLI	0.987	> 0.950	Excellent
GFI	0.957	> 0.900	Good
AGFI	0.941	> 0.900	Good
PCLOSE	0.997	> 0.050	Excellent

All constructs demonstrated excellent internal consistency ($\alpha = .931-.947$; CR = .869–.926) and strong convergent validity (AVE = .651–.722). The square roots of AVE ($\sqrt{AVE} = .807-.849$) exceeded inter-construct correlations, and all HTMT ratios (.693–.784) remained below the .85 threshold, confirming robust discriminant validity.



Note: Standardized path coefficients are shown. All paths are statistically significant at $p < .05$

Figure 4 Structural Equation Model of Freelance Success

Figure 4 presents the final SEM results, showing strong indicator reliability with standardized loadings ranging from .71 to .88. Human Capital significantly predicts Social Capital ($\beta = .65$), Digital Engagement ($\beta = .32$), and Freelance Success ($\beta = .36$), while Social Capital further influences Digital Engagement ($\beta = .38$) and Freelance Success ($\beta = .48$), confirming its central role. Digital Engagement also has a smaller but significant effect on Freelance Success ($\beta = .13$), indicating partial mediation. The model demonstrates excellent fit (CFI = .989, TLI = .987, RMSEA = .034, SRMR = .007), with additional indices supporting model adequacy ($\chi^2/df = 1.542$; GFI = .957; AGFI = .941; PCLOSE = .997).

Table 7 Standardized Regression Weights for Structural Paths (N = 459)

Hypothesis	Structural Path	β	p-value	Result
H1	HC $\rightarrow$ SC	0.654	< .001	Supported
H2	HC $\rightarrow$ DE	0.317	< .001	Supported
H3	HC $\rightarrow$ FS	0.360	< .001	Supported
H4	SC $\rightarrow$ DE	0.379	< .001	Supported
H5	SC $\rightarrow$ FS	0.481	< .001	Supported
H6	DE $\rightarrow$ FS	0.128	0.003	Supported

Human Capital significantly predicts Social Capital ($\beta = .654$), Digital Engagement ($\beta = .317$), and Freelance Success ($\beta = .360$), while Social Capital also influences Digital Engagement ($\beta = .379$) and Freelance Success ($\beta = .481$). Digital Engagement shows a smaller but significant effect on Freelance Success ($\beta = .128$), supporting its mediating role.

Table 8 Discriminant Validity Using Fornell–Larcker Criterion

Construct	HC	SC	DE	FS
HC	0.811			
SC	0.565	0.83		
DE	0.599	0.586	0.85	
FS	0.747	0.792	0.614	0.807

Table 8 presents the Fornell–Larcker assessment of discriminant validity. The square root of AVE for each construct exceeds its correlations with other constructs, indicating that each construct shares more variance with its indicators than with other variables. These results confirm adequate discriminant validity across all constructs.

Table 9 Bootstrap Indirect and Serial Mediation Effects (5,000 Resamples)

Hypothesis	Mediation Path	Indirect β	Boot SE	95% CI (LL–UL)	p	Result
H7	HC $\rightarrow$ SC $\rightarrow$ FS	0.315	0.042	.234 – .401	< .001	Supported
H8	HC $\rightarrow$ DE $\rightarrow$ FS	0.041	0.019	.012 – .079	0.004	Supported
H9	SC $\rightarrow$ DE $\rightarrow$ FS	0.049	0.021	.015 – .091	0.006	Supported
H10	HC $\rightarrow$ SC $\rightarrow$ DE $\rightarrow$ FS	0.032	0.015	.009 – .066	0.006	Supported

According to Table 9, the results indicate that Human Capital influences Freelance Success through both Social Capital and Digital Engagement. The strongest indirect pathway operates via Social Capital ($\beta = .315$), followed by sequential mediation through Social Capital and Digital Engagement ($\beta = .032$). All confidence intervals exclude zero, confirming the presence of significant mediation effects.

Table 10 Total Effects and Explained Variance (R^2) of Endogenous Constructs (N = 459)

Panel A. Total Effects				
Predictor	Outcome	Direct β	Indirect β	Total β
HC	SC	0.654	—	0.654
HC	DE	0.317	0.248	0.565
SC	DE	0.379	—	0.379
HC	FS	0.36	0.388	0.748
SC	FS	0.481	0.049	0.53
DE	FS	0.128	—	0.128
Panel B. Explained Variance				
Endogenous Construct		R^2		
Social Capital (SC)		0.428		
Digital Engagement (DE)		0.516		
Freelance Success (FS)		0.672		

Note: Indirect effects were derived from bias-corrected bootstrap procedures. R^2 values indicate the proportion of variance explained in each endogenous construct. Higher R^2 values reflect stronger explanatory power of the model.

According to Table 10, Human Capital shows the strongest overall impact on Freelance Success (total $\beta = .748$), reflecting both direct and mediated pathways. Social Capital also demonstrates a substantial influence ($\beta = .530$), while Digital Engagement contributes a smaller but significant effect ($\beta = .128$). The model explains 42.8% of the variance in Social Capital, 51.6% in Digital Engagement, and 67.2% in Freelance Success, indicating strong explanatory power of the proposed framework.

Conclusion

This study demonstrates that human capital, social capital, and digital engagement jointly shape freelance success, with social capital exerting the strongest direct effect. Mediation analysis shows that social capital and digital engagement partially transmit the influence of human capital on performance outcomes. These findings reaffirm that competencies generate value when embedded in relational networks (Granovetter, 1985) and made visible through platform-based signals of credibility and professionalism (Burtch et al., 2018).

Theoretically, this study integrates human capital, social capital, and digital engagement into a unified framework explaining performance in platform-mediated work. It extends human capital theory (Becker, 1993) and broadens digital labor market research beyond Western contexts (Lehdonvirta, 2022). The findings suggest that success in algorithmically governed freelance markets depends on the interaction of competence, connectivity, and digital visibility rather than technical skill alone.

Practically, the results highlight the importance of strengthening digital literacy, cross-cultural communication, client management, and strategic platform engagement among Thai freelancers. These priorities align with research on adaptive professional development and collaborative practices (Sattayathamrongthian & Vanpetch, 2023). Policymakers, universities, and workforce agencies can use these insights to design integrated capacity-building strategies that enhance Thailand's competitiveness in global digital labor markets.

Discussion

The findings provide a more precise explanation of freelance performance by demonstrating that success in platform-based labor markets is not driven by isolated competencies, but by a sequential process of capital activation. While human capital forms the foundational resource, it becomes economically valuable only when socially validated and algorithmically amplified, shifting the analytical focus from static resource possession to dynamic resource activation within digitally mediated environments. This finding challenges the conventional assumption that human capital directly translates into economic returns, highlighting instead the conditional nature of value realization in algorithmically governed markets.

The strong effect of Human Capital on Social Capital ($\beta = .65$) suggests that skills function not only as productivity-enhancing assets but also as relational signals that enable

trust formation and network embeddedness. Extending human capital theory (Becker, 1993), the results indicate that competence must first be recognized and legitimized within a social structure before it becomes monetizable. This positions human capital as a latent resource whose economic value depends on relational validation.

Social Capital emerges as the dominant predictor of Freelance Success ($\beta = .48$), reinforcing its central role in governing opportunity access under conditions of institutional uncertainty. Building on prior work (Coleman, 1988; Granovetter, 1985), the findings suggest that social capital operates as an informal governance mechanism within platform economies. In contexts such as Thailand, where formal institutional protections are limited, relational networks substitute for formal coordination mechanisms, stabilizing income, enabling repeat transactions, and facilitating access to higher-quality opportunities.

Although Digital Engagement exhibits a smaller direct effect ($\beta = .13$), its theoretical significance lies in its role as an algorithmic transmission mechanism. Platform-based markets allocate opportunities through visibility systems, where performance depends on observable signals such as responsiveness, reputation, and activity (Burtch et al., 2018; Newlands, 2020). Digital engagement transforms both competence and relational trust into algorithmically legible signals, thereby linking latent resources to platform-recognized outcomes. In this sense, digital engagement functions as the operational interface between capital and performance.

Taken together, the findings support a four-stage mechanism of freelance performance: competence $\rightarrow$ embeddedness $\rightarrow$ visibility $\rightarrow$ success. This mechanism extends existing perspectives by demonstrating that performance is co-produced through the interaction of human capital, social capital, and digital engagement, rather than being determined by skill accumulation alone. It reframes value creation in platform economies as a sequential and interdependent process of capital activation.

Importantly, the study introduces the concept of “algorithmic activation of capital,” which extends human and social capital theory into digitally governed contexts. In such environments, value realization depends on the ability to convert resources into signals recognized by platform ranking systems, positioning algorithmic visibility as a critical mediating layer between capability and outcome.

Finally, by situating the analysis within a Southeast Asian context, the findings highlight that capital activation processes are context dependent. In environments

characterized by weaker institutional protections and greater reliance on informal coordination, social capital becomes disproportionately central, while digital engagement is essential for overcoming visibility constraints. This challenges the Western-centric bias of existing gig economy research and underscores the importance of institutional embeddedness in shaping platform-based outcomes.

Theoretical Implications

This study advances human and social capital theory by demonstrating that human capital achieves its strongest performance impact when transmitted through relational mechanisms, particularly social capital. The findings reinforce the argument that skills alone are insufficient unless embedded within trust-based networks that facilitate information exchange and opportunity access (Becker, 1993). In emerging digital economies, human capital becomes performance-relevant only when activated through relational structures.

The study further conceptualizes digital engagement as an operational form of capital that transforms competencies and networks into algorithmically visible outcomes. Engagement behaviors enhance visibility and credibility within platform governance systems, extending theories of algorithmic visibility and digital market coordination (Burtch et al., 2018).

Methodologically, the research demonstrates the robustness of Structural Equation Modeling for examining interdependent resource-based and platform-mediated relationships. The strong model fit supports the integration of human capital, social capital, and digital engagement within a unified framework and provides a foundation for future studies exploring algorithmic management and cross-context comparisons (Anderson & Gerbing, 1988).

Practical Implications

The findings provide multi-level implications for enhancing Thailand's competitiveness in global digital freelancing. At the individual level, freelancers should strengthen digital literacy, cross-cultural communication, project management, and specialized technical skills—core components of human capital that improve adaptability and long-term performance in international environments (Becker, 1993).

At the community and platform level, structured online communities, mentorship systems, and peer-learning networks can strengthen social capital. Trust-based exchanges and referral relationships reduce uncertainty and enhance income stability in digital labor markets, particularly within collectivist contexts such as Thailand (Granovetter, 1985).

Strategic digital engagement is also essential. Activities such as profile optimization, portfolio development, responsiveness, and data-driven adjustments enhance algorithmic visibility and client acquisition on platforms such as Upwork and Fiverr effectively translating human and social capital into observable performance signals (Burtch et al., 2018).

At the policy and educational level, universities and public agencies should develop integrated programs that combine skill development, network-building, and platform strategy training. Such initiatives can strengthen Thailand's digital workforce and improve its competitiveness in global online labor markets (Kuek et al., 2015; Sattayathamrongthian & Vanpetch, 2023).

Limitations, Future Research Directions, and Recommendations

This study has several limitations. First, the cross-sectional design limits causal inference and does not capture the dynamic evolution of freelance careers; future research should adopt longitudinal or panel designs to examine how human capital, social capital, and digital engagement co-evolve (Bryman, 2016). Second, reliance on self-reported data raises potential common method bias; future studies should incorporate multi-source and behavioral data (e.g., platform analytics, client evaluations) to enhance measurement accuracy (Podsakoff et al., 2011). Third, further theoretical development is needed, and future research could extend the model by incorporating contextual moderators such as algorithmic governance intensity, institutional support, and cross-national differences.

Acknowledgement

The researchers would like to express sincere gratitude to all Thai freelancers who generously contributed their time and insights to this study. Appreciation is extended to Rajamangala University of Technology Rattanakosin (RMUTR) for ethical approval and academic support

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Preserving the Intangible, Enhancing the Experience: A Conceptual Framework for Sustainable Digital Heritage Tourism in Southeast Asia

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Received: 28 April 2026 | Revised: 9 June 2026 | Accepted: 17 June 2026

DOI: 10.60101/rmuttgber.2026.301359

Abstract

Digital technologies are reshaping intangible cultural heritage (ICH) tourism in Southeast Asia by expanding opportunities for cultural interpretation, enhancing visitor engagement, and supporting destination competitiveness. However, their use may also intensify commodification, weaken community control, and decontextualize living traditions when cultural safeguards and governance arrangements are inadequate. This article addresses the absence of an integrative framework for examining how digital strategies influence the sustainability of ICH tourism in the region. Drawing on an integrative conceptual review, it synthesizes scholarly and policy literature together with published case evidence on ICH safeguarding, sustainable tourism, smart tourism, co-creation, experience management, immersive technologies, digital storytelling, AI-assisted visitor management, and heritage governance. The analysis identifies five recurring digital strategy typologies: immersive AR/VR, Smart Tourism Technologies, dedicated ICH digital platforms, digital storytelling, and AI-assisted visitor management. The findings indicate that these strategies contribute to sustainable tourism and business value when they preserve cultural meaning, support community participation, align with local technological capacity, and operate within accountable governance. The article therefore proposes the Digital Cultural Heritage Sustainability (DCHS) Model, comprising Cultural Integrity, Community Agency, Technological Responsiveness, and Governance Alignment, as an integrative framework for assessing culturally grounded and sustainably competitive digital heritage tourism in Southeast Asia.

Keywords: Intangible cultural heritage, Digital heritage tourism, Sustainable tourism, Southeast Asia, Cultural authenticity

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Introduction

Southeast Asia offers an unusually rich setting for heritage tourism. Living traditions, rituals, crafts, oral histories, performing arts, festive events, foodways, and shared community knowledge continue to attract visitors who are looking for cultural depth rather than spectacle. These traditions are not simply tourism products. They are the social practices through which communities hold on to identity, memory, and the transmission of knowledge from one generation to the next. The central question for destinations, then, is how to expand cultural tourism without undermining the living cultural systems that give it meaning in the first place.

That question has grown more pressing as digital transformation reworks the tourism sector. Smart tourism systems now draw on digital infrastructure, data, and mobile services to improve destination management and the visitor experience (Gretzel et al., 2015). Augmented and virtual reality are being taken up to enrich heritage interpretation and engagement (Lee & King, 2025), and technology-enhanced experiences can support personalization and memorable encounters when they are aligned with what visitors need and what destinations can offer (Neuhofer et al., 2014). The same tools, though, carry real risks: cultural knowledge can be stripped of its context, sacred practices can circulate without consent, and authority over how heritage is represented can drift away from the communities that hold it.

A paradox sits at the heart of digital heritage tourism. Technologies that make culture more visible can also intensify its commodification. Platforms that amplify community narratives can expose those narratives to appropriation. Data-driven management can quietly concentrate authority in agencies, firms, or technology providers. The tension matters most for intangible cultural heritage, which stays viable only as long as communities keep practising, reinterpreting, and transmitting it under conditions they themselves regard as meaningful.

Existing scholarship offers valuable but scattered insight. Lee and King (2025) read immersive technologies as a means of safeguarding intangible heritage through richer interpretation, and Nguyen et al. (2026) trace the same potential in immersive reconstructions at Vietnamese heritage sites. Smart tourism research takes a different angle. Buhalis and Amaranggana (2015) foreground personalization and destination performance, while Neak (2025) links smart tourism technologies to heritage site image and visitor loyalty. ICH

scholarship, in turn, keeps its attention on community participation and the risks of commodification: Kim et al. (2019) argue the point from the perspective of heritage practitioners, and UNESCO (2015) codifies it in its ethical principles for safeguarding. Much of this literature, though, gives precedence to technological effectiveness or visitor experience and treats cultural integrity, community agency, and governance accountability as secondary. This article responds by developing the Digital Cultural Heritage Sustainability (DCHS) Model as a way of evaluating sustainable digital heritage tourism in Southeast Asia.

Methodological Approach

This study uses an integrative conceptual review to synthesize knowledge on sustainable digital intangible cultural heritage (ICH) tourism in Southeast Asia. The approach is appropriate for developing a conceptual framework by connecting literature from heritage studies, tourism management, digital transformation, cultural governance, and business theory.

The review involved three stages. First, academic and policy sources were identified from scholarly databases, journal websites, conference proceedings, institutional repositories, and policy archives. The search covered ICH, digital heritage tourism, smart tourism, immersive technologies, digital storytelling, AI-assisted visitor management, sustainability, authenticity, co-creation, stakeholder theory, experience management, and heritage governance. Regional documents were included to situate the analysis within ASEAN's digital and creative economy agendas (ASEAN Secretariat, 2025), Southeast Asia's smart tourism readiness (Weltman et al., 2024), and UNESCO's heritage and sustainable development framework (UNESCO, 2025a).

Second, the sources were screened for relevance, regional applicability, and analytical value. Third, the selected materials were analyzed through thematic synthesis, focusing on digital strategy types, authenticity, community participation, technological appropriateness, governance, digital inequality, cultural intellectual property, value creation, and sustainability outcomes. Published cases from Thailand, Indonesia, Vietnam, Malaysia, and Cambodia were used as illustrative evidence. This synthesis informed the Digital Cultural Heritage Sustainability (DCHS) Model, comprising Cultural Integrity, Community Agency, Technological Responsiveness, and Governance Alignment.

Literature Review and Theoretical Foundations

Intangible cultural heritage (ICH) refers to the practices, expressions, knowledge, skills, and cultural spaces that communities recognize as part of their heritage, including oral traditions, performing arts, rituals, festive events, knowledge of nature, and craftsmanship (UNESCO, 2003). Unlike tangible heritage, ICH lives through practice, memory, apprenticeship, and community recognition. In tourism, its sustainability therefore depends not only on visitor satisfaction or economic return, but also on the continuity of cultural meaning and intergenerational transmission (ICH NGO Forum, 2024; Kim et al., 2019). Authenticity theory adds an important caution: tourism can turn living culture into staged or commodified representation (MacCannell, 1973), a risk that becomes sharper in digital contexts where heritage may be compressed into short-form content, immersive simulation, or marketable narratives detached from social context (Song et al., 2025).

Digital transformation has expanded the tools available for heritage interpretation, visitor engagement, destination management, and cultural communication. Smart tourism relies on digital infrastructure and data systems to enhance destination performance and visitor experience (Buhalis & Amaranggana, 2015; Gretzel et al., 2015). In heritage settings, AR, VR, digital platforms, storytelling, and AI-assisted systems can broaden access and deepen engagement. However, these technologies often prioritize efficiency and visitor satisfaction over cultural ownership, ethical representation, and community governance, which are central to ICH sustainability.

Co-creation and experience management perspectives explain how value is produced in heritage tourism. Value emerges through interaction between providers, visitors, and other actors (Prahalad & Ramaswamy, 2004; Vargo & Lusch, 2008). In ICH tourism, this process shapes both the visitor experience and the representation of heritage itself. Experience economy perspectives further show how cultural encounters become memorable when they are staged as meaningful experiences (Pine & Gilmore, 2011; Richards, 2001), but such staging should not reduce ICH to entertainment or consumption.

Stakeholder theory and governance perspectives extend the analysis to power, rights, and accountability. Digital heritage tourism involves communities, tourists, governments, cultural agencies, destination organizations, and technology developers, whose interests may differ (Freeman, 1984). Effective governance therefore requires coordination, institutional capacity, and accountability in managing heritage destinations (Rivero-Moreno et al., 2021),

especially in Southeast Asia, where governance arrangements remain uneven (Bui, 2025). Taken together, these perspectives support the need for an integrative framework. The DCHS Model responds by linking Cultural Integrity, Community Agency, Technological Responsiveness, and Governance Alignment in a single account of sustainable digital heritage tourism.

Comparative Synthesis of Theoretical Perspectives

The reviewed perspectives each explain part of digital heritage tourism, but none is sufficient on its own. ICH safeguarding, cultural sustainability, and authenticity theory emphasize cultural continuity, community recognition, ethical representation, and the risks of commodification and decontextualization. Experience management explains how meaningful visitor experiences are created through engagement and participation (Pine & Gilmore, 2011), while co-creation theory highlights how value emerges through interactions among multiple actors (Prahalad & Ramaswamy, 2004).

Stakeholder theory broadens the analysis to actors, interests, rights, and power relations (Freeman, 1984). Smart tourism further highlights the role of digital infrastructure and data systems in tourism development, as discussed by Gretzel et al. (2015). Rivero Moreno et al. (2021) extend this perspective by emphasizing institutional coordination and accountability within smart governance. Together, these perspectives justify the DCHS Model as an integrative framework linking Cultural Integrity, Community Agency, Technological Responsiveness, and Governance Alignment in sustainable digital heritage tourism.

Table 1 Comparative Theoretical Foundations for the DCHS Model

Theory / Perspective	Main Focus	Contribution to This Study	Related DCHS Dimension
ICH safeguarding	Living heritage, community recognition, transmission	Protects cultural meaning and community-defined heritage	Cultural Integrity
Cultural sustainability	Continuity of cultural practice	Positions ICH as central to sustainable tourism	Cultural Integrity; Community Agency

Table 1 Comparative Theoretical Foundations for the DCHS Model (Continued)

Theory / Perspective	Main Focus	Contribution to This Study	Related DCHS Dimension
Authenticity theory	Commodification, decontextualization	Highlights risks of staging and digital spectacle	Cultural Integrity; Technological Responsiveness
Experience management	Memorable and meaningful experience	Explains culturally grounded visitor experience	Technological Responsiveness
Co-creation theory	Interactive value creation	Supports participatory design and shared interpretation	Community Agency; Technological Responsiveness
Stakeholder theory	Actors, interests, rights, power	Supports inclusive governance and benefit-sharing	Community Agency; Governance Alignment
Smart tourism governance	Digital systems and coordination	Explains technology management and accountability	Technological Responsiveness; Governance Alignment

Digital Strategies in Southeast Asian Heritage Tourism

Regional Context

ASEAN has increasingly prioritized digital transformation in tourism, the creative economy, and cultural heritage management. The ASEAN Digital Masterplan 2025 frames digitalization as a regional development priority (ASEAN Secretariat, 2021), while the ASEAN Tourism Outlook and the ASEAN Tourism Sectoral Plan 2026–2030 emphasize recovery, competitiveness, regional cooperation, and sustainability (ASEAN Secretariat, 2026; Rillo et al., 2025). Digitalization can improve visitor services, destination competitiveness, cultural access, and tourism resilience (Weltman et al., 2024). However, uneven digital infrastructure, literacy, and institutional capacity continue to shape which communities can benefit from digital heritage tourism (Sefrina, 2024).

In heritage tourism, digital transformation changes how cultural information is produced, interpreted, circulated, governed, and monetized. For ICH, these changes are especially significant because cultural knowledge is often tacit, embodied, sacred, community-specific, and transmitted through practice. Digital strategies should therefore be assessed not only by technical performance or visitor appeal, but also by their effects on cultural meaning, community authority, and long-term sustainability.

Five Digital Strategy Typologies

Five digital strategy typologies commonly appear in ICH tourism across Southeast Asia. Each supports heritage interpretation and destination management, while also creating specific trade-offs and risks.

Immersive experience technologies (AR/VR/XR): Immersive technologies extend engagement with ICH beyond physical access. Vietnam’s “Finding the Lost Imperial Palace” at Hue’s Ngo Mon Gate, for example, uses AR glasses to reconstruct Nguyen Dynasty court ceremonies and deepen heritage interpretation (Nguyen et al., 2026). These tools can enhance education, memorable experience, destination differentiation, and perceived value, but their benefits decline when technological spectacle overshadows living cultural practice.

Smart Tourism Technologies (STTs): STTs improve visitor experience and destination management. Evidence from Cambodia’s UNESCO World Heritage Sites links STT adoption to better visitor experience and destination loyalty (Neak, 2025), while Thailand’s smart city initiatives show how digital infrastructure can support cultural economy development and visitor services (Digital Economy Promotion Agency, 2024). STTs can strengthen accessibility, personalization, safety, and competitiveness, but may concentrate data and decision-making in institutions or firms rather than heritage-bearing communities.

Dedicated ICH digital platforms: Dedicated platforms support cultural education, documentation, and visibility. Indonesia’s iWareBatik demonstrates how a platform can function as a cultural tourism guide, e-learning tool, and preservation instrument (Permatasari, 2022; Permatasari et al., 2020). Such platforms can connect heritage products, learning, creative industries, and tourism markets, but they also raise concerns over cultural intellectual property, data sovereignty, platform dependency, and community control.

Digital storytelling: Digital storytelling strengthens community voice and interpretive depth by turning heritage from a passive attraction into a relational experience. UNESCO’s work on sustainable tourism with ICH in ASEAN waterway cities shows how community-driven

digital tools can amplify local traditions while supporting heritage safeguarding (UNESCO, 2025a). Runchavanont (2024) similarly links digital storytelling to local voice and visitor interpretation in community-based tourism, while Bin Azizan et al. (2025) show its role in reframing authenticity and heritage branding in Melaka. Its success, however, depends on communities retaining editorial authority over how their culture is represented.

AI-assisted visitor management: AI-driven systems can support monitoring, crowd analytics, demand forecasting, and personalized services, improving operational efficiency, destination responsiveness, and visitor satisfaction at cultural sites (Ask Mona, 2025). However, they also raise ethical and representational risks, particularly where governance, bias control, and regulatory readiness remain uneven (Rajah, 2026). UNESCO (2025c) likewise emphasizes the need for safeguards in cultural applications of AI. For ICH tourism, AI must therefore be carefully governed so that predictive efficiency does not reduce complex, embodied, and community-specific cultural meanings to algorithmic.

Critical Perspectives and Conflicting Evidence

Digital strategies can support visitor experience and ICH safeguarding, but their effects remain conditional. Malekar et al. (2026) emphasize technology–context fit, Song et al. (2025) highlight cultural memory, and Wang et al. (2026) stress community participation.

Immersive tools may deepen interpretation, but weak design can turn culture into spectacle. STTs can improve efficiency, yet uneven digital capacity may reproduce inequality (Sefrina, 2024). Community-based heritage approaches are therefore needed to keep cultural tourism under local control (Thavorn & Charoensuk, 2025).

Platforms, storytelling, and AI-assisted systems can strengthen visibility and responsiveness, but they also raise risks around ownership, consent, bias, and ethical representation. These tensions show that digital heritage tourism should be governed as a cultural and institutional process, not merely as a technical intervention.

Selected Digital Heritage Tourism Initiatives in Southeast Asia

Table 2 Selected Digital Heritage Tourism Initiatives in Southeast Asia

Country/ Region	Initiative/ Case	Main Technology	ICH/ Heritage Focus	Community Involvement
ASEAN Regional	UNESCO Waterway Cities ICH Project	Digital storytelling, social media	High	Community voice and cultural storytelling
Cambodia	UNESCO World Heritage Sites Smart Tourism Initiatives	Smart Tourism Technologies	Moderate	Visitor experience and destination management
Indonesia	iWareBatik Platform	Mobile/web platform, e-learning	High	Heritage learning, documentation, promotion
Malaysia	Melaka UNESCO Heritage City Digital Branding	Social media, digital branding	High	Destination branding and community storytelling
Thailand	DEPA Smart City Initiatives	IoT, data analytics, mobile services	Moderate	Smart destination and cultural economy support
Thailand	Amazing Thailand Application	AI-supported mobile services	Moderate	Visitor service integration and market access
Vietnam	Finding the Lost Imperial Palace, Hue	AR glasses, VR reconstruction	Moderate	Immersive interpretation
Vietnam	Quang Tri Heritage Digitization	AR/XR, digital content	Moderate	Digital heritage access and interpretation

Table 2 shows that Southeast Asian initiatives vary in strategic purpose, technological intensity, and community involvement. Immersive and smart tourism initiatives mainly strengthen visitor experience and destination competitiveness, but require higher investment and institutional capacity. In contrast, digital storytelling and dedicated ICH platforms are more closely linked to community agency and cultural interpretation, though they require careful governance of cultural IP and narrative control. Overall, short-term competitiveness often comes from convenience and novelty, while long-term value depends on co-creation, authenticity, trust, cultural differentiation, and inclusive local benefit.

Comparative Analysis of Five Digital Strategies

The five typologies differ in technological form, cultural risk, managerial demand, and business implication. No single strategy fits every ICH tourism context; each involves trade-offs among experience enhancement, cultural safeguarding, cost, community control, scalability, and destination competitiveness.

Table 3 Comparative Analysis of Five Digital Strategies in ICH Tourism

Digital Strategy	Main Value Proposition	Key Benefits	Trade-offs and Risks
Immersive AR/VR/XR	Engaging and immersive interpretation	High cost, maintenance, spectacle risk	Supports differentiation but needs investment and cultural review
Smart Tourism Technologies	Efficient visitor service and management	Data control, exclusion, weak community influence	Improves competitiveness but needs inclusive governance
Dedicated ICH digital platforms	Documentation, learning, visibility	Cultural IP risk, platform dependency, loss of control	Builds brand and market access but needs data sovereignty
Digital storytelling	Community voice and visitor connection	Narrative simplification, editorial bias	Strengthens identity but needs community control

Table 3 Comparative Analysis of Five Digital Strategies in ICH Tourism (Continued)

Digital Strategy	Main Value Proposition	Key Benefits	Trade-offs and Risks
AI-assisted visitor management	Personalized and adaptive management	Bias, privacy risk, cultural stereotyping	Enhances responsiveness but needs ethical AI safeguards

Read as a whole, the comparison suggests that digital strategies create lasting business value only when they are culturally grounded and well governed. Technology-driven satisfaction may carry short-term competitiveness, but it is community agency and cultural authenticity that are more likely to sustain differentiation, trust, repeat visitation, branding, and inclusive local benefit over time.

Discussion: Enablers, Barriers, and the DCHS Model

Key Enablers

Sustainable digital heritage tourism depends on five connected enablers. First, policy coherence and institutional alignment are needed because digital heritage tourism cuts across tourism, culture, digital economy, education, local development, and creative industries. Without coordination, even strong initiatives can remain fragmented.

Second, community-centered co-design supports authenticity and sustainability. Communities should help set goals, select content, shape interpretation, retain narrative control, and share benefits. Third, equitable digital infrastructure is essential so that rural and indigenous communities are not excluded by weak connectivity, limited devices, low digital skills, or unaffordable access.

Fourth, cultural intellectual property and data sovereignty frameworks are needed to prevent digital extraction by clarifying ownership, reuse, benefit-sharing, and continuing consent. Fifth, SDG alignment anchors digital heritage tourism in wider accountability for decent work, reduced inequality, sustainable communities, cultural continuity, and partnerships. Ibrahim et al. (2025) show the growing importance of SDG-related digital heritage tourism, while the UNESCO World Heritage Centre (2026) links heritage management to sustainable development goals.

Key Barriers

Five barriers limit sustainable outcomes. The digital divide restricts community participation through weak infrastructure, limited devices, high data costs, and uneven digital literacy. High implementation costs also keep advanced tools such as AR, VR, smart platforms, AI systems, and high-quality digital content beyond the reach of many community actors.

Cultural authenticity can be weakened when technologies are used without genuine community agency. Digital tools may simplify complex traditions, highlight only marketable elements, or detach practices from ritual, social, and historical contexts. Weak institutional capacity and fragmented governance further reduce accountability, especially when responsibilities among cultural agencies, tourism authorities, technology providers, local governments, communities, and businesses are unclear.

Ethical and legal ambiguity around AI-generated content, digital reproduction, and cultural data ownership creates additional risk. AI may produce inaccurate or stereotyped interpretations, while platforms may enable commercial reuse of community knowledge without adequate consent. These barriers show that digital heritage outcomes are conditional. Digital strategies safeguard ICH only when grounded in community authority, cultural safeguards, appropriate design, and accountable governance.

Framework Development Process

The DCHS Model was developed through integrative conceptual synthesis rather than from a single theory or case. Malekar et al. (2026) sharpened the focus on technology–context fit in rural tourism. Suseno et al. (2025) informed the link between ICH preservation and digital governance. Wang et al. (2026) reinforced the importance of community participation and cultural authority.

The synthesis followed three steps. First, the reviewed sources were coded for recurring concerns, including cultural representation, community participation, technology use, institutional coordination, data governance, and visitor experience. Second, these themes were compared across five typologies: immersive AR/VR, Smart Tourism Technologies, dedicated ICH platforms, digital storytelling, and AI-assisted visitor management. Third, they were consolidated into four conditions for sustainable digital heritage tourism: Cultural Integrity, Community Agency, Technological Responsiveness, and Governance Alignment.

These dimensions reflect the most persistent theoretical and practical concerns across the literature and cases. Cultural Integrity draws from ICH safeguarding, authenticity,

and cultural sustainability. Community Agency draws from participatory governance, co-creation, stakeholder theory, and community-based tourism. Technological Responsiveness draws from smart tourism, experience management, task–technology fit, and digital interpretation. Governance Alignment draws from smart governance, cultural policy, data sovereignty, ethical AI, and cross-sector destination management.

The Digital–Cultural Heritage Sustainability (DCHS) Model

The DCHS Model provides practical guidance for policymakers, destination managers, and technology developers. ASEAN Secretariat (2025) offers a regional creative economy framework, while Leong et al. (2024) show how smart tourism can support sustainable development in ASEAN. UNESCO (2003) and UNESCO (2015) establish safeguarding principles for community-informed heritage representation. UNESCO World Heritage Centre (2026) further links heritage management to the SDGs, and Ibrahim et al. (2025) show the growing importance of SDG-aligned digital heritage tourism.

Dimension 1: Cultural Integrity. This dimension treats ICH as a living practice rooted in community meaning, social relationships, ritual context, and intergenerational transmission. Digital representation should therefore remain accurate, contextualized, ethical, and faithful to community-defined meaning.

Dimension 2: Community Agency. This dimension emphasizes communities as co-designers, co-owners, co-interpreters, and co-beneficiaries. It requires participatory decision-making, editorial control, benefit-sharing, cultural IP protection, and local capacity building.

Dimension 3: Technological Responsiveness. This dimension argues that technology creates value only when it fits local needs, capacities, infrastructure, cultural norms, and interpretive goals. Digital tools should enhance interpretation and visitor experience without overwhelming communities or distorting cultural meaning.

Dimension 4: Governance Alignment. This dimension requires cross-sector coordination, transparent accountability, cultural data sovereignty, intellectual property protection, ethical technology governance, and alignment with the SDGs.

Theoretical Relationships among the Four Dimensions

The four dimensions are interdependent rather than additive. Cultural Integrity depends on Community Agency because communities define, protect, and transmit ICH meanings. Community Agency also shapes Technological Responsiveness, since technology is

appropriate only when communities influence its design, content, and governance. Technological Responsiveness requires Governance Alignment because platforms, AI systems, and data-driven tools need accountability, transparency, privacy protection, and fair benefit-sharing. Governance Alignment, in turn, protects Cultural Integrity through cultural policy, ethical regulation, IP protection, and safeguards against digital extraction.

The DCHS Model therefore functions as a dynamic system, not a checklist. Weaknesses in one dimension can undermine the others: AR may fail without community agency, storytelling may stall without appropriate technology, and smart tourism may erode cultural integrity if governance is weak. Sustainable digital heritage tourism requires all four dimensions to work together.

Dimension 1 CULTURAL INTEGRITY FPIC-based design Contextual embeddedness Intergenerational vitality	$\updownarrow$ Integrity–Agency	Dimension 2 COMMUNITY AGENCY Co-design & co-ownership Benefit sharing IP protection
$\leftrightarrow$ Integrity–Responsiveness	DCHS Model (Sustainable Digital Heritage Tourism)	$\leftrightarrow$ Agency–Governance
Dimension 3 TECHNOLOGICAL RESPONSIVENESS Task technology fit Cultural appropriateness Ongoing evaluation	$\updownarrow$ Responsiveness–Governance	Dimension 4 GOVERNANCE ALIGNMENT Cross-sector policy Transparent governance SDG accountability

Figure 1 The Digital–Cultural Heritage Sustainability (DCHS) Model

Comparison with Existing Frameworks and Novelty of the DCHS Model

Existing frameworks explain digital heritage tourism only in part. Smart tourism frameworks emphasize infrastructure, data, personalization, and visitor experience, but give less attention to cultural ownership, community consent, cultural IP, and digital commodification. UNESCO-based safeguarding frameworks stress community participation, cultural continuity, and ethical safeguarding, but remain less explicit about digital platforms, AI, and smart destination systems in tourism management (UNESCO, 2025b).

Community-based and experience-oriented frameworks add further insight. Richards (2001) explains how cultural attractions generate memorable experiences. Thavorn and Charoensuk (2025) show how community-based heritage supports coastal cultural tourism.

Zhu et al. (2025) link authenticity to the experience economy in heritage settings. The novelty of the DCHS Model lies in integrating these perspectives into a digitally specific framework for sustainable ICH tourism. Rather than assessing digital heritage tourism through sustainability, visitor experience, smart destination performance, or participation separately, the model evaluates it through four interrelated dimensions: Cultural Integrity, Community Agency, Technological Responsiveness, and Governance Alignment.

Table 4 Comparison between the DCHS Model and Existing Frameworks

Existing framework	Main limitation in digital ICH tourism	Contribution of the DCHS Model
Sustainable tourism / triple bottom line	Culture may be treated as a secondary social issue and may not capture living heritage continuity	Positions Cultural Integrity as a core dimension
Smart tourism framework	Often prioritizes efficiency and visitor experience over cultural rights and consent	Links technology with cultural appropriateness and community agency
UNESCO ICH safeguarding framework	Less explicit about digital platforms, AI, and smart tourism systems	Extends safeguarding into digital tourism governance
Community-based tourism framework	May understate data ownership, platforms, and AI-mediated representation	Strengthens Community Agency through co-design, co-ownership, and data sovereignty
Experience economy / experience management	May treat heritage as consumable experience content	Connects experience with cultural meaning and integrity
Stakeholder theory	Too broad without digital ICH-specific guidance	Specifies governance, accountability, and value-sharing roles
DCHS Model	Requires empirical validation	Provides an integrated framework for sustainable digital ICH tourism

The DCHS Model offers a theory-grounded framework for sustainable digital heritage tourism in digitally mediated ICH contexts. It assesses digital heritage tourism not only through visitor engagement, competitiveness, or innovation, but also through cultural continuity, community authority, ethical representation, and governance accountability.

Policy, Business, and Managerial Implications

Digital heritage tourism should be integrated into tourism planning, cultural policy, AI governance, digital economy strategy, and sustainable development frameworks. At the regional level, the ASEAN Tourism Sectoral Plan 2026–2030 supports alignment between tourism development, sustainability, and regional cooperation (ASEAN Secretariat, 2026). UNESCO (2025c) emphasizes AI governance that protects cultural diversity and cultural rights, while the UNESCO World Heritage Centre (2026) links heritage management to the SDGs. Governments should therefore strengthen cultural data sovereignty, community free, prior, and informed consent (FPIC), intellectual property protection, ethical AI use, and support for digitally constrained rural and indigenous communities.

For destination managers and local governments, digital investment should be treated as a strategic decision rather than a promotional tool. Technologies should be selected according to destination positioning, cultural fit, visitor needs, community capacity, and long-term sustainability. AR and VR may support immersive interpretation, digital storytelling may suit community-based destinations, and STTs or AI may assist congestion management and service integration. Community-centered co-design, digital literacy, benefit-sharing, and evaluation beyond visitor numbers remain essential to culturally sustainable competitiveness.

For tourism businesses and technology developers, digital heritage tools should operate as systems of value co-creation. Communities should participate not only as content sources but also as co-designers and co-beneficiaries through community licensing, revenue-sharing, local content production, cultural IP agreements, and training. These measures function as both ethical safeguards and strategic assets. Technology design should prioritize cultural appropriateness, accessibility, low-bandwidth usability, transparency, and maintainability, especially where AI may introduce bias or misrepresentation.

Limitations of the Study

This study rests on an integrative conceptual review of secondary literature, policy documents, and published case evidence, without primary data from heritage communities,

destination managers, tourists, policymakers, or technology providers. Community perspectives are therefore not represented directly, and the DCHS Model remains a conceptual framework awaiting empirical validation. The selected cases also reflect the availability of documented English-language evidence rather than full coverage of every ASEAN member state, so the examples from Thailand, Indonesia, Vietnam, Malaysia, and Cambodia are illustrative rather than representative. The study does not, finally, offer a quantitative assessment of the effectiveness of particular technologies or of visitor outcomes.

Conclusion

Digital transformation brings both opportunity and risk to Southeast Asian ICH tourism. It can enrich interpretation, deepen visitor engagement, lift destination image, widen cultural visibility, and improve tourism management; without cultural safeguards and accountable governance, it can just as easily intensify commodification, weaken community authority, simplify living traditions, and skew the capture of value. The main contribution of this article is the DCHS Model, which draws Cultural Integrity, Community Agency, Technological Responsiveness, and Governance Alignment into one framework for evaluating digital heritage tourism. The model holds that digital strategies should be judged not by adoption or visitor satisfaction alone, but by whether they sustain cultural meaning, strengthen community authority, fit local context, and operate within accountable governance. Alongside that conceptual claim, the study sets out practical implications for policymakers, destination managers, tourism businesses, and technology developers. Future research should test and refine the model across diverse ASEAN contexts, drawing on qualitative, comparative, quantitative, and participatory approaches.

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Book Review



Research and Statistical Data Analysis with SPSS and AMOS

Authored by Professor Dr.Thanin Silpcharu

Published: 2026 Length: 570 pages

ISBN: 9786169123903

Review by

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DOI: 10.60101/rmuttgber.2026.303427

A book that provides a formative experience in the world of research, regardless of the reader's prior background. This book is a highly valuable academic textbook on research methodology. Its content is comprehensively structured, covering everything from fundamental research concepts to advanced statistical analysis using statistical software.

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It explains the use of both SPSS and AMOS within a single volume. Despite being an academic text, it is engaging and highly readable, making it difficult for readers to put down.

The content is presented in a clear and accessible manner, with a logical progression from basic to advanced topics. It systematically integrates research methodology knowledge with the application of statistical tools. This book can be regarded as a masterpiece by Professor Dr. Thanin Silpcharu, as evidenced by its more than 20 reprints. It consists of 15 chapters.

Chapter 1: Concepts of Research

This chapter explains the meaning, importance, and types of research, including Historical Research, Experimental Research, and Descriptive Research, which are commonly used in social science research. The chapter establishes a solid conceptual foundation that helps readers understand the research process systematically.

Chapter 2: Selecting a Research Topic and Defining the Research Problem

This chapter presents principles for selecting meaningful research topics that align with real-world contexts, along with methods for logically formulating research problems. Essential characteristics of a good research topic include usefulness, feasibility, and value.

Chapter 3: Setting Research Objectives and Defining Variables

Research objectives should be stated clearly and separately to facilitate the interpretation. Objectives, hypotheses, and variables are generally interrelated.

Variables are categorized into Independent Variables and Dependent Variables. There are four levels of measurement:

- Nominal Scale: Used for classifying variables into categories.
- Ordinal Scale: More detailed than the Nominal Scale, allowing categorization and ranking.
- Interval Scale: Provides more detailed measurement than the previous two levels.
- Ratio Scale: The highest and most precise level of measurement.

Chapter 4: Defining Population and Sample

A population refers to the entire set of data units under study, while a sample refers to a subset selected to represent the population. A good sample should closely resemble the population, adequately cover its characteristics, have an appropriate size, and

be selected using suitable sampling methods. Sampling methods are classified into Probability Sampling and Nonprobability Sampling.

Chapter 5: Research Instruments

This chapter discusses various research instruments, including interviews, observations, tests, and questionnaires - the latter being the most commonly used tool in social science research.

Chapter 6: Data Collection

Data refers to facts or information that may exist in numerical form (quantitative data) or non-numerical form (qualitative data). Therefore, appropriate data collection methods must be selected according to the nature of the data. This chapter also discusses the Delphi Technique, which gathers opinions from a panel of experts, typically 29–33 participants (with a margin of error of 0.01), to achieve consensus.

Chapter 7: Hypotheses and Hypothesis Testing

Hypotheses are classified into two categories: Research Hypothesis and Statistical Hypothesis (including Null Hypothesis and Alternative Hypothesis). Generally, statistical hypothesis testing utilizes the p-value. In social science research, a significance level of 0.05 is commonly adopted.

Chapter 8: Statistical Data Analysis

This chapter is one of the book's highlights, providing detailed explanations of statistical calculations along with illustrative examples. The content is divided into:

- Descriptive Statistics: Mean, Median, Mode, Percentage, Standard Deviation, and Quartile Deviation.
- Inferential Statistics: t-test, ANOVA, and Chi-Square.

Chapter 9: Writing Research Reports

A research report is a document used to present completed research findings. Although formats may vary according to institutional requirements, research reports generally consist of three sections: 1. Preliminary Section, 2. Body of Report, and 3. Referenced Material. Details are as follows:

- Abstract: A concise summary of the entire research project, generally not exceeding two pages.
- Acknowledgements: Expressions of gratitude to individuals who contributed to the completion of the research.

- Table of Contents: A structured list of topics and page numbers that facilitates information retrieval.
- Introduction: Includes background, objectives, scope, assumptions, operational definitions, and significance of the study.
- Literature Review: A synthesis of theories and concepts relevant to the research topic.
- Research Methodology: Describes the population and sample, research instruments, data collection procedures, and statistical methods used.
- Research Findings: Presents statistical analysis results in narrative, tabular, or graphical form.
- Conclusion and Discussion: Interprets and discusses the research findings.
- References: A list of cited books, articles, and publications, commonly in APA style .
- Appendices: Supplementary materials that are important but too extensive for inclusion in the main text.

Chapter 10: Introduction to SPSS

This chapter explains how to use SPSS, a software package widely employed in research and utilized by more than 70% of educational institutions in many countries. Topics include launching the software, customizing the interface, defining variables, and creating variables.

Chapter 11: Data Management in SPSS

This chapter explains various methods of entering data into SPSS, setting variable properties, and performing basic data management tasks before proceeding to advanced analytical procedures discussed in Chapter 12.

Chapter 12: Data Analysis and Interpretation Using SPSS

This chapter demonstrates actual data analysis procedures and the correct interpretation of output results. The explanations are clear and supported by practical examples, enabling readers to follow the procedures easily.

Chapter 13: Reliability and Discrimination Analysis

This chapter focuses on evaluating the quality of research instruments through:

- Reliability Analysis, with Cronbach's Alpha values greater than 0.80.
- Discrimination Analysis, using Standard Deviation values greater than 0.30.

Chapter 14: Shortcuts and Research Examples

In this chapter, the author summarizes key statistical concepts for research and provides illustrative examples. It serves as an effective concluding chapter that helps readers apply statistical techniques in practice and reduce the time required to conduct research.

Chapter 15: Structural Equation Modeling with AMOS

This chapter introduces the use of AMOS for Structural Equation Modeling (SEM), an advanced analytical technique that has gained widespread popularity. SEM is particularly suitable for research aimed at generating new knowledge, especially in business administration studies.

Model fit evaluation is based on four criteria:

- Chi-Square Probability Level > 0.05
- Relative Chi-Square < 3
- Goodness of Fit Index (GFI) > 0.90
- Root Mean Square Error of Approximation (RMSEA) < 0.08

Reference

Silpcharu, T. (2026). *Research and Statistical Data Analysis with SPSS and AMOS*. 21th edition. Bangkok: Business R&D.

Journal Guideline

Author Guidelines

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The journal's language of publication in English.

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Manuscripts must be printed on A4-sized paper, single-sided, using single line spacing. Page margins must be set to 2.54 centimeters on all four sides: top, bottom, left, and right. The total length of the manuscript should be between 12 and 20 pages. Page numbers must appear on all pages, centered at the bottom of the A4 sheet, using the **TH Sarabun PSK** font in **16 point** size.

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