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- 9 Impact of fintech development on banks' default risk - Empirical evidence from the listed commercial banks in Vietnam

Assoc.Prof.PhD. Tran Thi Xuan Anh - MSc. Nguyen Le Thu

- 13 Does digital transformation reduce stock price crash risk? The evidence from the commercial banks in Vietnam

PhD. Nguyen Thi Truc Anh - PhD. Pham Thi Van Trinh - PhD. Le Thanh Hoa

- 19 Pull-driven configurations of consumers' switching intention from cash to electronic payments in Vietnam: A fsQCA study

PhD. Nguyen Thi Thanh Van

- 24 Governing the digital economy: Fiscal and regulatory challenges in banking digitalization and digital assets

PhD. Pham Duc Anh

- 31 Factors influencing managerial decision-making effectiveness in the digital transformation context: The mediating role of knowledge sharing

PhD. Nguyen Thi Thu Huong

- 38 Strategies for strengthening digital marketing adoption in Vietnamese tourism enterprises

Assoc.Prof.PhD. Dao Thi Minh Thanh - PhD. Pham Thi Ha

Pham Dao Thuy Linh

- 43 The impact of digital transformation on tax accounting systems in small and medium-sized enterprises

MSc. Le Thi Hoa - MSc. Nguyen Thanh Vinh

- 48 Factors influencing the adoption of digital banking services offered by Vietnamese commercial banks among individual customers in the Mekong delta region: The moderating role of government support and demographics

MSc. Nguyen Thai My Anh - Assoc.Prof.PhD. Nguyen Hong Ha

PhD. Bui Thanh Long

**ACCOUNTING, AUDITING AND GOVERNANCE**

- 53 Research on the cost of finance leased assets according to Vietnamese Accounting Standard No. 06 (VAS 06) and the policy impacts on International Financial Reporting Standards (IFRS 16) - a case study of the mining industry

PhD. Bui Thi Thu Thuy - PhD. Pham Thu Huong

- 57 Integrating climate change risks into financial risk management within Vietnamese steel companies: Challenges and implementation strategies

PhD. Dang Phuong Mai - Trinh Hoang Lam - Dinh Gia Hoa

- 63 Using corporate governance to predict the possibility of financial distress of listed companies in Vietnam's mining industry

PhD. Nguyen Thi Kim Oanh - PhD. Duong Thi Nhan - PhD. Hoang Thi Thuy

- 68 The impact of activity-based costing on firm performance: A comprehensive review

MSc. Nguyen Thi My An

- 73 Integrated reporting quality and commercial bank valuation under information opacity and complexity: A signaling perspective

MSc. Nguyen Thi Huong - Assoc.Prof.PhD. Nguyen Ngoc Quang

- 79 The impact of perceived value on brand trust and word-of-mouth of organic food consumers

MSc. Dao Thi Diu - Assoc.Prof.PhD. Nguyen Thi My Nguyen

PhD. Nguyen Phuong Linh

- 83 Empirical research on the relationship between innovative work behaviors, organizational knowledge management and audit firms' performance in Vietnam

PhD. Nguyen Thi Phuong Mai

- 88 Earnings management and accrual quality: A systematic literature review using the ADO model

PhD. Nguyen Phuong Thao

- 92 Factors affecting application of AI in cost management accounting in Vietnam's Textile and Garment Enterprises today

PhD. Nguyen Thanh Trang - PhD. Le Hong Nhung - MSc. Vu Thi Viet Thanh - Nguyen Ba Anh Duy

- 97 The role of environmental uncertainty in the relationship between supply chain resilience and supply chain performance

MSc. Tran Thi Thanh Nhan - Assoc.Prof.PhD. Nguyen Minh Ngoc - Assoc.Prof.PhD. Do Anh Duc - MSc. Doan Thi Kim Dung

- 103 Factors influencing the level of circular economy participation across transportation projects with different profitability levels through EFA analysis

PhD. Nguyen Thi Thuy Dung

- 108 Mapping sustainable entrepreneurship research in the context of climate change: A bibliometric analysis

Assoc.Prof.PhD. Nguyen Thi Hoa Hong - Hoang Minh Hieu

- 115 The impact of accrual-based earnings quality on the cost of capital: Evidence from non-financial firms listed on the Vietnamese stock market

Assoc.Prof.PhD. Nguyen Duc Dung - MSc. Tran Thi Mo

- 120 Literature review on corporate governance: A bibliometric analysis

MSc. Nguyen Thi Phuong Mai - Assoc.Prof.PhD. Do Thi Mai Thom - Assoc.Prof.PhD. Phung Manh Trung

- 124 An integrated risk-based approach to sustainable tourism development: Empirical evidence from Ha Long

Assoc.Prof.PhD. Dinh Hong Linh - MSc. Vu Quyet Tien

- 130 Does business strategy matter for firms' cash holdings?

Assoc.Prof.PhD. Doan Ngoc Phi Anh - Assoc.Prof.PhD. Nguyen Thi Thieu Quang - Prof.PhD. Truong Ba Thanh - Assoc.Prof.PhD. Dang Huu Man

- 130 The impact of financial leverage on firm value: evidence from Coal Joint Stock companies of Vinacomin

PhD. Hoang Thi Thuy - PhD. Dương Thị Nhan - MBA. Phan Minh Quang

- 140 The development strategies for accounting education in artificial intelligence era

PhD. Chu Thi Huyen

- 145 Scale and growth in capital sources of logistics service businesses listed on the Vietnam stock exchange

MSc. Hoang Thi Thuy Hang

- 149 Ownership structure, tax avoidance, and financial performance: Evidence from listed firms in Vietnam

Prof.PhD. Nguyen Huu Anh - Assoc.Prof.PhD. Nguyen Hoan - MSc. Ngo Tuyet Trinh

## BIG DATA AND AI IN FINANCE AND ACCOUNTING

- 156 Business results of the BIG4 banking group - Through numbers

Assoc.Prof.PhD. Tran Xuan Hai

- 160 Artificial intelligence in the telecom sector: Organizational and social impacts with insights from Vietnam

MSc. Nguyen Tung Duong - Assoc.Prof.PhD. Do Quang Hung

- 165 The multidimensional impact of artificial intelligence adoption on digital transformation in small and medium-sized enterprises in Vietnam

MSc. Bui Nhu Hien - MSc. Hoang Mai Phuong

- 170 Artificial intelligence in finance: Opportunities, challenges and management policies

PhD. Pham Quang Huy

- 173 Artificial intelligence-enabled sustainable brand loyalty and its role in advancing climate-resilient development in emerging markets

MSc. Vu Xuan Truong

## POLICY, REGULATION AND GLOBAL FINANCIAL STANDARDS

- 179 Determinants of credit growth in Vietnamese commercial banks

PhD. Dang Thi Thu Hang - Tran Nguyen Xuan Duyen

- 185 Tax avoidance and earnings quality: Evidence from Vietnam

PhD. Cao Tan Huy

- 189 Carbon border adjustment mechanism and Vietnam's exports: Evidence from a market-level event-study design

PhD. Mai Huong Giang - Nguyen Thi Ngoc Anh - Nguyen Thi Hong Anh - Nguyen Le Phuong Nhi  
Pham Thi Minh Phuong - Nguyen Hai Yen

- 195 Budgeting practices for marketing in Vietnamese SMEs: An exploratory qualitative study  
MSc. Mai Mai
- 200 Opportunities, challenges and recommendations for informal labor in Vietnam in the digital era  
MSc. Nguyen Tien Dung
- 205 Research on the relationship between education level and salary of agricultural graduates in Vietnam  
Nguyen Thuy Anh
- 210 The impact of State ownership to the companies' financial performance: Empirical study from listed fertilizer companies in Vietnam  
MSc. Le Hai Anh - PhD. Dinh Thi Thu Ha - MSc. Tran Minh Giang
- 216 Strengthening science and technology activities in the animal feed industry in alignment with Resolution No. 57-NQ/TW  
PhD. Nguyen Duc Hai
- 219 Factors affecting stock prices of listed manufacturing firms on the Vietnamese stock market  
MSc. Nguyen Thi Hong - PhD. Pham Thu Huyen

### CONTEMPORARY ISSUES IN PUBLIC FINANCE AND BUDGETING

- 224 Factors influencing the mobilization of financial resources for the conservation and development of cultural heritage in Huế city  
Assoc.Prof.PhD. Nguyen Trong Than - MSc. To Anh Dung
- 230 Factors affecting foreign direct investment in a provincial level in Vietnam: An integrated theoretical framework and proposed research model  
MSc. Duong Duc Trung - PhD. Nguyen Thanh Vu
- 235 Transformational leadership, institutional pressures, organizational learning, and public Values in the context of public sector reform  
MSc. Tu Thanh Hoai - PhD. Huynh Phuoc Nghia
- 241 Causal and explainable machine learning insights into ROA's impact on bank stability amid liquidity and pandemic shocks  
PhD. Pham Thuy Tu
- 248 Enhancing sustainability in the development of Vietnam's tourism economy  
MSc. Vo Dinh Thuat

### INTERDISCIPLINARY INSIGHTS: FINANCE, ACCOUNTING AND TECHNOLOGY

- 254 Innovating accounting teaching methods in the context of digital transformation to meet ifrs approach requirements according to Circular 99/2025/TT-BTC  
PhD. Do Thi Thu Hang
- 259 The interplay of regret, benefit perceptions and financial well-being in online shopping cart abandonment  
MSc. Tran Ngoc Trang Ninh - PhD. Hoang Phuong Dung - Assoc.Prof.PhD. Vu Huy Thong
- 265 The impact of digital transformation leadership on faculty development at universities in Hanoi  
Assoc.Prof.PhD. Le Manh Hung
- 272 Factors affecting the quality of management accounting information systems in commercial enterprises in Thai Nguyen province  
MSc. Nguyen Thu Ha - MSc. Hoang Thi Nguyet

### GLOBAL TRENDS AND EMERGING MARKETS

- 277 The global minimum tax framework: Implications for international investment and Vietnam's strategic policy response  
PhD. Do Phuong Huyen
- 282 The impact of technology and artificial intelligence investments on economic growth in several countries around the world: Recommendations for Vietnam  
Assoc.Prof.PhD. Dang Thi Thuy Duyen
- 287 Unveiling the impact of chinese manufacturing SMEs' internationalization on performance  
PhD. Candidate. Do Thuy Huong - Assoc.Prof.PhD. Phan Anh Tu
- 292 Foreign direct investment, trade openness, governance and growth in 25 Asia-Pacific countries: Evidence from fixed-effects and panel ARDL models  
PhD. Tran Hoang Vu

298 ESG performance and firm value: Evidence from the Chinese stock market

Tran Thanh Hai - Nguyen Minh An

304 ASEAN-China trade: Patterns, drivers, and challenges in the new context

Nguyen Huy Hoang - PhD. Bui Van Vien - Assoc.Prof.PhD. Tran The Tuan

312 Interest rate spillovers from the United States and Singapore to Southeast Asia: Implications for a layered transmission mechanism

MSc. Nguyen Kim Thai Ngoc - PhD. Vuong Thi Huong Giang - Assoc.Prof.PhD. Le Dinh Hac

#### CASE STUDIES AND PRACTICAL PERSPECTIVES

317 Agency failure, corporate governance collapse and systemic fraud: A case study of the van thinh phat in Vietnam

PhD. Dao Manh Huy

323 Digital transformation and night-time economy in Ho Chi Minh City: Extending UTAUT with nighttime destination image as a mediator

MSc. Bui Xuan Nam

329 The impact of economic uncertainty on Vietnamese real estate firms' agency cost

MSc. Than The Son Tung - PhD. Tran Manh Dung

333 The impact of mobile banking app service quality on customer satisfaction: A sem approach in Vietnam

Bui Thi Dam - PhD. Nguyen Thi Tuan

338 Investigating the purchase intention of counterfeit fashion products among Vietnamese consumers: An application of the theory of planned behavior

PhD. Dang Thi Minh Thuy - PhD. Trieu Dinh Phuong

344 Impacts of local marketing on tourist satisfaction in Tan Cuong traditional tea Village: Applying a structural equation model

MSc. Le Dinh Manh - Assoc.Prof.PhD. Dinh Hong Linh

349 The impact of service factors on tourists' satisfaction with the homestay experience in Moc Chau, Son La province: An SEM approach

MSc. Dong Thi Ha Uyen - PhD. Pham Van Hanh

354 Analyzing the multi-dimensional impact of service quality on customer satisfaction: Evidence from a large-sized bank's mobile app in Vietnam

PhD. Nguyen Thi Nhung - PhD. Do Thi Hoa Nha

360 Research on the relationship between social welfare policies and social diseases in the current Vietnamese context

PhD. Huynh Van Khai - Nguyen Duy Hung - Vuong Minh Phuong - Nguyen Thanh Vinh - Nguyen Hanh Dung - Dang Minh Ngoc

365 Factors affecting e-commerce delivery performance in Ho Chi Minh City

Nguyen My Hong Thi - Duong Thi Ha Giang

370 Determinants of price-to-earnings ratio of non-financial companies on Ho Chi Minh stock exchange

PhD. Le Thanh Huyen - PhD. Le Hai Ha - Le Minh Phuc

375 Factors affecting non-performing loans in Vietnamese joint-stock commercial banks

PhD. Nguyen Thi Ngoc Diep - Nguyen Thi Xuan Viet

380 The impact of capital structure on market valuation: Evidence from listed steel companies on the Vietnamese stock market

PhD. Ho Thi Ngoc Tuyen

#### YOUNG RESEARCHERS' FORUM

385 The influence of supporting factors on the entrepreneurial intention of university students

MSc. Vu Quynh Anh - MSc. Vo Hanh Quyen - MSc. Nguyen Thi Ngoc Minh

388 Development of the innovation and startup ecosystem in Vietnam: The role of government and the private sector

PhD. Dam Thi Hien

394 Factors influencing youth entrepreneurial spirit: Evidence from Lao Cai province

MSc. Nguyen Hai Dang - PhD. Vu Quynh Nam

Printed at Economic - Finance Publishing House, Publishing Licence: 46/GP-BVHTTDL date 07/4/2026  
Prints and deposits completed in April, 2026.



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- 9 Tác động của sự phát triển công nghệ tài chính (Fintech) đến rủi ro vỡ nợ của ngân hàng - Bằng chứng thực nghiệm từ các ngân hàng thương mại niêm yết tại Việt Nam

PGS.TS. Trần Thị Xuân Anh - ThS. Nguyễn Lệ Thu

- 13 Chuyển đổi số có làm giảm rủi ro sụp đổ giá cổ phiếu không? Bằng chứng từ các ngân hàng thương mại Việt Nam

TS. Nguyễn Thị Trúc Anh - TS. Phạm Thị Vân Trinh - TS. Lê Thanh Hoa

- 19 Cấu hình các yếu tố kéo thúc đẩy ý định chuyển đổi của người tiêu dùng từ thanh toán tiền mặt sang thanh toán điện tử tại Việt Nam: Nghiên cứu fsQCA

TS. Nguyễn Thị Thanh Vân

- 24 Quản trị nền kinh tế số: Những thách thức về tài khóa và quy định trong quá trình số hóa ngân hàng và tài sản số

TS. Phạm Đức Anh

- 31 Các nhân tố ảnh hưởng đến hiệu quả ra quyết định của nhà quản lý trong bối cảnh chuyển đổi số: Vai trò trung gian của chia sẻ tri thức

TS. Nguyễn Thị Thu Hương

- 38 Chiến lược tăng cường áp dụng marketing số trong các doanh nghiệp du lịch Việt Nam

PGS.TS. Đào Thị Minh Thanh - TS. Phạm Thị Hà - Phạm Đào Thùy Linh

- 43 Tác động của chuyển đổi số đến hệ thống kế toán thuế trong các doanh nghiệp nhỏ và vừa

ThS. Lê Thị Hoa - ThS. Nguyễn Thanh Vinh

- 48 Các yếu tố ảnh hưởng đến việc chấp nhận sử dụng dịch vụ ngân hàng số do các ngân hàng thương mại Việt Nam cung cấp đối với khách hàng cá nhân tại khu vực Đồng bằng sông Cửu Long: Vai trò điều tiết của hỗ trợ chính phủ và nhân khẩu học

ThS. Nguyễn Thái Mỹ Anh - PGS.TS. Nguyễn Hồng Hà - TS. Bùi Thanh Long

**KẾ TOÁN, KIỂM TOÁN VÀ QUẢN TRỊ**

- 53 Nghiên cứu về chi phí tài sản thuế tài chính theo Chuẩn mực kế toán Việt Nam số 06 (VAS 06) và tác động chính sách đối với Chuẩn mực Báo cáo Tài chính Quốc tế (IFRS 16): Trường hợp ngành khai khoáng

TS. Bùi Thị Thu Thủy - TS. Phạm Thu Hương

- 57 Tích hợp rủi ro biến đổi khí hậu vào quản trị rủi ro tài chính trong các doanh nghiệp thép Việt Nam: Thách thức và chiến lược triển khai

TS. Đặng Phương Mai - Trịnh Hoàng Lâm - Đinh Gia Hoà

- 63 Sử dụng quản trị công ty để dự báo khả năng kiệt quệ tài chính của các doanh nghiệp niêm yết trong ngành khai khoáng Việt Nam

TS. Nguyễn Thị Kim Oanh - TS. Dương Thị Nhàn - TS. Hoàng Thị Thủy

- 68 Tác động của phương pháp tính giá thành theo hoạt động đến hiệu quả hoạt động của doanh nghiệp: tổng quan toàn diện

ThS. Nguyễn Thị Mỹ An

- 73 Chất lượng báo cáo tích hợp và giá trị của ngân hàng thương mại trong bối cảnh thiếu minh bạch và phức tạp thông tin: Góc nhìn từ lý thuyết tín hiệu

ThS. Nguyễn Thị Hương - PGS.TS. Nguyễn Ngọc Quang

- 79 Ảnh hưởng của giá trị cảm nhận đến niềm tin thương hiệu và ý định truyền miệng của người tiêu dùng thực phẩm hữu cơ

ThS. Đào Thị Dịu - PGS.TS. Nguyễn Thị Mỹ Nguyệt  
TS. Nguyễn Phương Linh

- 83 Nghiên cứu thực nghiệm về mối quan hệ giữa đổi mới trong công việc, quản trị tri thức của tổ chức và hiệu suất của các công ty kiểm toán tại Việt Nam  
TS. Nguyễn Thị Phương Mai
- 88 Quản trị lợi nhuận và chất lượng dồn tích: Tổng quan tài liệu có hệ thống thông qua mô hình ADO  
TS. Nguyễn Phương Thảo
- 92 Các yếu tố ảnh hưởng đến việc áp dụng trí tuệ nhân tạo trong kế toán quản trị chi phí tại các doanh nghiệp dệt may Việt Nam hiện nay  
TS. Nguyễn Thanh Trang - TS. Lê Hồng Nhung - ThS. Vũ Thị Việt Thanh - Nguyễn Bá Anh Duy
- 97 Vai trò của sự không chắc chắn về môi trường trong mối quan hệ giữa khả năng phục hồi chuỗi cung ứng và kết quả hoạt động chuỗi cung ứng  
ThS. Trần Thị Thanh Nhân - PGS.TS. Nguyễn Minh Ngọc - PGS.TS. Đỗ Anh Đức - ThS. Đoàn Thị Kim Dung
- 103 Các yếu tố ảnh hưởng đến mức độ tham gia kinh tế tuần hoàn trong các dự án giao thông với mức sinh lời khác nhau: Phân tích EFA  
TS. Nguyễn Thị Thùy Dung
- 108 Bản đồ hóa nghiên cứu về khởi nghiệp bền vững trong bối cảnh biến đổi khí hậu: phân tích trắc lượng thư mục  
PGS.TS. Nguyễn Thị Hoa Hồng - Hoàng Minh Hiếu
- 115 Tác động của chất lượng lợi nhuận kế toán trên cơ sở dồn tích lên chi phí vốn trong các công ty phi tài chính niêm yết trên thị trường chứng khoán Việt Nam  
PGS. TS. Nguyễn Đức Dũng - ThS. Trần Thị Mơ
- 120 Tổng quan nghiên cứu về quản trị công ty: Ứng dụng phương pháp phân tích thư mục  
ThS. Nguyễn Thị Phương Mai - PGS.TS. Đỗ Thị Mai Thơm - PGS.TS. Phùng Mạnh Trung
- 124 Cách tiếp cận tích hợp dựa trên rủi ro đối với phát triển du lịch bền vững: Bằng chứng thực nghiệm từ Hạ Long  
PGS.TS. Đinh Hồng Lĩnh - ThS. Vũ Quyết Tiến
- 130 Chiến lược kinh doanh có ảnh hưởng đến mức nắm giữ tiền mặt của doanh nghiệp không?  
PGS.TS. Đoàn Ngọc Phi Anh - PGS.TS. Nguyễn Thị Thiều Quang - GS. TS. Trương Bá Thanh - PGS. TS. Đặng Hữu Mẫn
- 130 Tác động của đòn bẩy tài chính đến giá trị doanh nghiệp: bằng chứng từ các công ty cổ phần than đá của Vinacomin  
TS. Hoàng Thị Thủy - TS. Dương Thị Nhân - ThS. Phan Minh Quang
- 140 Chiến lược phát triển đối với hoạt động đào tạo nhân lực ngành kế toán trong kỷ nguyên trí tuệ nhân tạo  
TS. Chu Thị Huyền
- 145 Quy mô và tăng trưởng nguồn vốn của các doanh nghiệp dịch vụ logistics niêm yết trên thị trường chứng khoán Việt Nam  
ThS. Hoàng Thị Thúy Hằng
- 149 Cấu trúc sở hữu, tránh thuế và hiệu quả tài chính của các công ty niêm yết tại Việt Nam  
GS.TS. Nguyễn Hữu Ánh - PGS.TS. Nguyễn Hoàn - ThS. Ngô Tuyết Trinh

## DỮ LIỆU LỚN VÀ TRÍ TUỆ NHÂN TẠO TRONG TÀI CHÍNH VÀ KẾ TOÁN

- 156 Kết quả kinh doanh của nhóm ngân hàng Big4: Góc nhìn qua các con số  
PGS.TS. Trần Xuân Hải
- 160 Trí tuệ nhân tạo trong ngành viễn thông: Tác động đến tổ chức và xã hội với bằng chứng từ Việt Nam  
ThS. Nguyễn Tùng Dương - PGS.TS. Đỗ Quang Hưng
- 165 Tác động đa chiều của việc áp dụng trí tuệ nhân tạo đến chuyển đổi số trong các doanh nghiệp nhỏ và vừa tại Việt Nam  
ThS. Bùi Như Hiền - ThS. Hoàng Mai Phương
- 170 Trí tuệ nhân tạo trong lĩnh vực tài chính: Cơ hội, thách thức và chính sách quản lý  
TS. Phạm Quang Huy
- 173 Lòng trung thành thương hiệu bền vững được thúc đẩy bởi trí tuệ nhân tạo và vai trò trong phát triển thích ứng với biến đổi khí hậu tại các thị trường mới nổi  
ThS. Vũ Xuân Trường

## CHÍNH SÁCH, QUY ĐỊNH VÀ TIÊU CHUẨN TÀI CHÍNH TOÀN CẦU

- 179 Các nhân tố quyết định tăng trưởng tín dụng tại các ngân hàng thương mại Việt Nam  
Đặng Thị Thu Hằng - Trần Nguyễn Xuân Duyên
- 185 Tránh thuế và chất lượng lợi nhuận: Bằng chứng từ Việt Nam  
TS. Cao Tấn Huy

- 189 Cơ chế điều chỉnh biên giới carbon và xuất khẩu của Việt Nam: Bằng chứng từ phương pháp nghiên cứu sự kiện cấp độ thị trường  
TS. Mai Hương Giang - Nguyễn Thị Ngọc Anh - Nguyễn Thị Hồng Anh - Nguyễn Lê Phương Nhi - Phạm Thị Minh Phương - Nguyễn Hải Yến
- 195 Thực hành lập ngân sách marketing trong các doanh nghiệp nhỏ và vừa tại Việt Nam: Nghiên cứu định tính khám phá  
ThS. Mai Mai
- 200 Cơ hội, thách thức và khuyến nghị đối với lao động phi chính thức tại Việt Nam trong kỷ nguyên số  
TS. Nguyễn Tiến Dũng
- 205 Nghiên cứu về mối quan hệ giữa trình độ học vấn và mức lương của người tốt nghiệp ngành nông nghiệp tại Việt Nam  
Nguyễn Thuỳ Anh
- 210 Tác động của sở hữu nhà nước đến hiệu quả tài chính của doanh nghiệp: Nghiên cứu thực nghiệm từ các công ty phân bón niêm yết tại Việt Nam  
ThS. Lê Hải Anh - TS. Đinh Thị Thu Hà - ThS. Trần Minh Giang
- 216 Tăng cường hoạt động khoa học và công nghệ trong ngành thức ăn chăn nuôi phù hợp với Nghị quyết số 57-NQ/TW  
TS. Nguyễn Đức Hải
- 219 Các yếu tố ảnh hưởng đến giá cổ phiếu của các công ty sản xuất niêm yết trên thị trường chứng khoán Việt Nam  
ThS. Nguyễn Thị Hồng - TS. Phạm Thu Huyền

### CÁC VẤN ĐỀ THỜI SỰ TRONG TÀI CHÍNH CÔNG VÀ QUẢN LÝ NGÂN SÁCH

- 224 Các yếu tố ảnh hưởng đến việc huy động nguồn tài chính cho công tác bảo tồn và phát triển di sản văn hóa tại thành phố Huế  
PGS.TS. Nguyễn Trọng Thản - ThS. Tô Anh Dũng
- 230 Các yếu tố ảnh hưởng đến đầu tư trực tiếp nước ngoài vào một địa phương cấp tỉnh tại Việt Nam: Khung lý thuyết tích hợp và mô hình nghiên cứu đề xuất  
ThS. Dương Đức Trung - TS. Nguyễn Thành Vũ
- 235 Bàn về lãnh đạo chuyển đổi, áp lực thể chế, học tập tổ chức và giá trị công trong bối cảnh cải cách công  
TS. Từ Thanh Hoài - TS. Huỳnh Phước Nghĩa
- 241 Kết quả từ học máy có tính nhân quả và có thể giải thích về tác động của ROA đến sự ổn định của ngân hàng trong bối cảnh các cú sốc thanh khoản và đại dịch  
TS. Phạm Thủy Tú
- 248 Nâng cao tính bền vững trong phát triển kinh tế du lịch Việt Nam  
ThS. Võ Đình Thuật

### Góc nhìn liên ngành: TÀI CHÍNH, KẾ TOÁN VÀ CÔNG NGHỆ

- 254 Đổi mới phương pháp giảng dạy kế toán trong bối cảnh chuyển đổi số để đáp ứng các yêu cầu tiếp cận IFRS theo Thông tư 99/2025/TT-BTC  
TS. Đỗ Thị Thu Hằng
- 259 Mối quan hệ tương tác giữa sự hối tiếc, nhận thức lợi ích và mức độ an sinh tài chính đối với hành vi từ bỏ giỏ hàng trực tuyến  
ThS. Trần Ngọc Trang Ninh - TS. Hoàng Phương Dung - PGS.TS. Vũ Huy Thông
- 265 Tác động của năng lực lãnh đạo chuyển đổi số đến phát triển đội ngũ giảng viên tại các trường đại học ở Hà Nội  
PGS.TS. Lê Mạnh Hùng
- 272 Các nhân tố ảnh hưởng đến chất lượng hệ thống thông tin kế toán quản trị trong các doanh nghiệp thương mại trên địa bàn tỉnh Thái Nguyên  
ThS. Nguyễn Thu Hà - ThS. Hoàng Thị Nguyệt

### XU HƯỚNG TOÀN CẦU VÀ CÁC THỊ TRƯỜNG MỚI NỔI

- 277 Khung thuế suất tối thiểu toàn cầu: Hàm ý đối với đầu tư quốc tế và phản ứng chính sách chiến lược của Việt Nam  
TS. Đỗ Phương Huyền
- 282 Tác động của đầu tư công nghệ và trí tuệ nhân tạo tới tăng trưởng kinh tế của một số quốc gia trên thế giới: một vài khuyến nghị cho Việt Nam  
PGS.TS. Đặng Thị Thúy Duyên
- 287 Làm rõ tác động của quá trình quốc tế hóa đến kết quả hoạt động của các doanh nghiệp sản xuất nhỏ và vừa tại Trung Quốc  
NCS. Đỗ Thùy Hương - PGS.TS. Phan Anh Tú
- 292 Đầu tư trực tiếp nước ngoài, độ mở thương mại, quản trị và tăng trưởng tại 25 quốc gia châu Á - Thái Bình Dương: Bằng chứng từ mô hình tác động cố định và mô hình ARDL  
TS. Trần Hoàng Vũ

298 Hiệu quả ESG và giá trị doanh nghiệp: Bằng chứng từ thị trường chứng khoán Trung Quốc

Trần Thanh Hải - Nguyễn Minh An

304 Thương mại ASEAN - Trung Quốc: Mô hình, động lực và thách thức trong bối cảnh mới

Nguyễn Huy Hoàng - TS. Bùi Văn Viễn - PGS.TS. Trần Thế Tuấn

312 Tác động lan tỏa của lãi suất từ Hoa Kỳ và Singapore sang Đông Nam Á: Hàm ý về cơ chế truyền dẫn đa tầng

ThS. Nguyễn Kim Thái Ngọc - TS. Vương Thị Hương Giang - PGS.TS. Lê Đình Hạc

## NGHIÊN CỨU TÌNH HUỐNG VÀ GÓC NHÌN THỰC TIỄN

317 Sự đổ vỡ trong cơ chế đại diện, sự sụp đổ của quản trị công ty và gian lận mang tính hệ thống: Nghiên cứu trường hợp Tập đoàn Vạn Thịnh Phát tại Việt Nam

TS. Đào Mạnh Huy

323 Chuyển đổi số và kinh tế ban đêm tại Thành phố Hồ Chí Minh: Mở rộng mô hình UTAUT với hình ảnh điểm đến ban đêm đóng vai trò trung gian

ThS. Bùi Xuân Nam

329 Ảnh hưởng của bất ổn kinh tế đối với chi phí đại lý của các công ty bất động sản Việt Nam

ThS. Thân Thế Sơn Tùng - TS. Trần Mạnh Dũng

333 Tác động của chất lượng dịch vụ ứng dụng ngân hàng di động đến sự hài lòng của khách hàng: Tiếp cận bằng mô hình SEM tại Việt Nam

Bùi Thị Đàm - TS. Nguyễn Thị Tuấn

338 Nghiên cứu ý định mua hàng thời trang giả của người tiêu dùng Việt Nam: Ứng dụng lý thuyết hành vi có kế hoạch

TS. Đặng Thị Minh Thùy - TS. Triệu Đình Phương

344 Tác động của marketing địa phương đến sự hài lòng của du khách tại làng nghề chè truyền thống Tân Cương: Ứng dụng mô hình cấu trúc

ThS. Lê Đình Mạnh - PGS.TS. Đinh Hồng Linh

349 Tác động của các yếu tố dịch vụ đến sự hài lòng của du khách đối với trải nghiệm homestay ở Mộc Châu, tỉnh Sơn La: Phân tích SEM

ThS. Đồng Thị Hà Uyên - TS. Phạm Văn Hạnh

354 Phân tích tác động đa chiều của chất lượng dịch vụ đến sự hài lòng khách hàng: Bằng chứng từ ứng dụng di động của một ngân hàng quy mô lớn ở Việt Nam

TS. Nguyễn Thị Nhung - TS. Đỗ Thị Hòa Nhã

360 Nghiên cứu về mối quan hệ giữa chính sách an sinh xã hội và các tệ nạn xã hội trong bối cảnh hiện nay ở Việt Nam

TS. Huỳnh Văn Khải - Vương Minh Phương - Nguyễn Hạnh Dung - Nguyễn Duy Hưng - Nguyễn Thành Vinh - Đặng Minh Ngọc

365 Các yếu tố ảnh hưởng đến hiệu suất giao hàng thương mại điện tử tại Thành phố Hồ Chí Minh

Nguyễn Mỹ Hồng Thi - Dương Thị Hà Giang

370 Các yếu tố quyết định tỷ lệ giá trên thu nhập của các công ty phi tài chính trên Sở giao dịch chứng khoán Thành phố Hồ Chí Minh

TS. Lê Thanh Huyền - TS. Lê Hải Hà - Lê Minh Phúc

375 Các yếu tố ảnh hưởng đến nợ xấu trong các ngân hàng thương mại cổ phần Việt Nam

TS. Nguyễn Thị Ngọc Diệp - Nguyễn Thị Xuân Việt

380 Tác động của cơ cấu vốn đến định giá thị trường: Bằng chứng từ các công ty thép niêm yết trên thị trường chứng khoán Việt Nam

TS. Hồ Thị Ngọc Tuyền

## DIỄN ĐÀN CÁC NHÀ NGHIÊN CỨU TRẺ

385 Ảnh hưởng của các yếu tố hỗ trợ đến ý định khởi nghiệp của sinh viên đại học

ThS. Vũ Quỳnh Anh - ThS. Võ Hạnh Quyên - ThS. Nguyễn Thị Ngọc Minh

388 Phát triển hệ sinh thái đổi mới sáng tạo và khởi nghiệp tại Việt Nam: Vai trò của Nhà nước và khu vực tư nhân

TS. Đàm Thị Hiền

394 Các yếu tố ảnh hưởng đến tinh thần khởi nghiệp của thanh niên: Bằng chứng từ tỉnh Lào Cai

ThS. Nguyễn Hải Đăng - TS. Vũ Quỳnh Nam

In tại Nhà xuất bản Kinh tế - Tài chính, Giấy phép số: 46/GP-BVHTTDL ngày 07/4/2026  
In xong và nộp lưu chiểu tháng 4 năm 2026.

# IMPACT OF FINTECH DEVELOPMENT ON BANKS' DEFAULT RISK - EMPIRICAL EVIDENCE FROM THE LISTED COMMERCIAL BANKS IN VIETNAM

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**Abstract:** *FinTech development has become a key driver of financial innovation and stability in emerging banking systems. This study examines the impact of FinTech development on the default risk of Vietnamese commercial banks and differences across ownership structures. Using panel data from 33 banks during 2017-2022, the study employs Pooled OLS, Fixed Effects, Random Effects, GLS, and dynamic GMM to ensure robustness. The results show that FinTech development is positively associated with bank stability: higher FinTech activity significantly increases Z-scores ( $p < 0.05$ ), indicating lower default risk. Descriptive evidence also shows that private and unlisted banks are more stable than state-owned and listed banks. These findings suggest that FinTech enhances operational efficiency and risk management, supporting policies that promote digital innovation while maintaining financial stability.*

• Keywords: *fintech, commercial banks, default risk, fintech start-ups, z-score.*

Date of receipt: 05<sup>th</sup> Jan., 2026

Date of delivery revision: 20<sup>th</sup> Feb., 2026

Date of receipt revision: 08<sup>th</sup> Mar., 2026

Date of approval: 23<sup>th</sup> Mar., 2026

DOI:

## 1. Introduction

Financial Technology (FinTech) is defined as an interdisciplinary field encompassing finance, technology management, and innovation (Financial Stability Board, 2017). This disruptive combination provides both costs and benefits to commercial banks, affecting multiple aspects of the banks' operations and performance, especially the likelihood of default. Fintech can provide diversified, dimensional risk-management innovation for commercial banks (G. Li et al., 2022). Moreover, Fintech significantly improved commercial banks' profitability and risk-taking by addressing issues like information asymmetry, data quality, and data integration (G. Li et al., 2022). Since Fintech integrates advanced technologies into financial services, linking asset and liability sides, and managing transaction data using blockchain and distributed accounting, it addresses challenges in customer assessments through methods such as text mining, cluster analysis, iris recognition, and precision risk control.

However, Fintech can increase the probability of commercial bank bankruptcy by creating market risks and issues stemming from diversification and participants. Risks include micro-level processes,

networks, and rules governing financial institutions, while macro-level risks encompass procyclicality, excessive volatility, and reputational issues (Chen et al., 2023). Commercial banks are finding it more difficult to foresee, assess, and quantify risks due to the ongoing generation and evolution of risks.

Moreover, the boom in Fintech start-ups affects the performance and default risk of commercial banks by competing with them in core activities. Fintech start-ups frequently violate financial regulations and engage in regulatory arbitrage, thereby jeopardizing the stability of the financial system (Hornuf et al., 2020).

The relationship and impact of FinTech on the banking sector have been examined in many previous studies. However, existing literature has emphasized the benefits of FinTech in improving profitability and operational efficiency; there is still little research on the potential risks and challenges it poses to commercial banks. This study aims to fill this gap by providing a comprehensive analysis of both the positive and negative impacts of FinTech on commercial bank default risk. In doing so, it makes a unique contribution to the field by providing a balanced perspective on the impacts of FinTech, thereby informing policymakers, regulators,

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and financial institutions on how to navigate the complexities of FinTech integration.

## 2. Literature and hypotheses development

FinTech encompasses a range of digital financial applications, including payments, digital banking, P2P lending, crowdfunding, and credit scoring (Suryono et al., 2020). These innovations improve efficiency, reduce transaction costs, and expand access to financial services, thereby affecting bank stability and default risk. FinTech development has also intensified competition in the banking sector by lowering entry barriers and enabling alternative financial service providers (Romanova & Kudinska, 2016; Zuo et al., 2021). Technologies such as big data and cloud computing enhance credit assessment, improve information sharing, and reduce transaction risks (G. Li et al., 2022). In addition, FinTech-driven lending platforms increase competition in the credit market and expand financing opportunities (Cornelli et al., 2022). These developments suggest that FinTech can improve operational efficiency while reshaping traditional banking models.

FinTech also enhances risk management by improving decision-making, reducing information asymmetry, and lowering fraud and credit risks (Allen & Gale, 2000; Fuster et al., 2019; Gomber et al., 2017). It expands financial services and strengthens risk-sharing mechanisms, contributing to financial stability (Allen & Gale, 2000; Demirguc-Kunt & Huizinga, 2010). Empirical evidence shows that banks adopting financial innovation achieve better risk management outcomes and lower default risk (Norden et al., 2011). However, FinTech may also increase risk-taking incentives due to higher profitability and expanded lending capacity (G. Li et al., 2022; Hu et al., 2022). Overall, its net effect is expected to reduce default risk.

Accordingly, FinTech is expected to reduce commercial banks' default risk through improved efficiency and risk management.

**H1:** *FinTech is negatively associated with the default risk of commercial banks.*

FinTech startups further influence bank stability by introducing innovative technologies that enhance efficiency, improve risk assessment, and diversify revenue streams (Haddad & Hornuf, 2021). These innovations reduce exposure to financial risks and are associated with lower volatility and systemic risk (G. Li et al., 2022). Collaboration between banks and FinTech firms also improves customer

experience and stabilizes revenue, further mitigating default risk.

Therefore, the following hypothesis is proposed:

**H2:** *FinTech start-ups are negatively correlated with the default risk of commercial banks.*

Vietnam provides a relevant context due to its rapid digital transformation and expanding FinTech ecosystem (National Financial Supervisory Commission, 2018; Pham et al., 2023). The coexistence of traditional banking structures and emerging digital innovations creates both opportunities and challenges for risk management. This study contributes to the literature by providing empirical evidence on the relationship between FinTech and bank default risk in emerging economies.

## 3. Data and Methodology

### 3.1. Data

The research sample, collected over the 7-year period from 2017 to 2022, comprises 33 listed commercial banks in Vietnam. The selection of the 2017 to 2022 time period for the research stems from the fact that this is the period during which Vietnam's Fintech market has experienced remarkable growth, and commercial banks are participating in the race to digital transformation. The period 2017-2022 witnessed rapid and significant development of the Fintech market in Vietnam, during which Fintech companies collaborated with banks to bring digital financial services to customers (Dinh, 2022).

### 3.2. Variable measure

**Table 1. Variable description**

| Sign    | Meaning                                                                                                                                                                                                                                    | Formula                                                                            | Sources  |
|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|----------|
| Z-score | Proxy for bank default risk; reflects distance to insolvency. A higher Z-score indicates a lower probability of default. It combines profitability, leverage, and earnings volatility (Sullivan, 2008; Nguyen & Dang 2022)                 | $Z\text{-score}_{i,t} = \frac{ROA + EA}{SD(ROA)}$                                  | FS       |
| FINT    | FinTech development measured by total digital transaction value. Log transformation is applied to reduce skewness. This indicator was chosen because payment sector dominates FinTech landscape in Vietnam (Quang et al., 2022; Dinh 2022) | $\ln(\text{digital payment value})$                                                | Statista |
| FINC    | Number of FinTech firms operating in a given year; reflects FinTech ecosystem development and technological advancement.                                                                                                                   | Number of FinTech firms                                                            | Statista |
| BSIZE   | Size of bank measured by total assets; larger banks may benefit from "too-big-to-fail" effect (Nguyen & Dang, 2022).                                                                                                                       | $\ln(\text{Total asset})$                                                          | FS       |
| AGROW   | Annual growth rate of total assets; rapid growth may increase risk due to aggressive lending (Foos et al., 2009).                                                                                                                          | $\frac{\text{Total asset}_t - \text{Total asset}_{t-1}}{\text{Total asset}_{t-1}}$ | FS       |
| DTA     | Measures funding stability; higher deposits indicate stronger funding base (Ahrend & Goujard, 2012).                                                                                                                                       | $\frac{\text{Deposit}}{\text{Total assets}}$                                       | FS       |
| LEV     | Reflects leverage and risk exposure; higher leverage may increase default risk (Fahlenbrach et al., 2012).                                                                                                                                 | $\frac{\text{Total debt}}{\text{Total assets}}$                                    | FS       |
| OBTD    | Indicates liquidity and credit risk exposure; a higher ratio may imply higher risk (Albanesi et al., 2022).                                                                                                                                | $\frac{\text{Customer deposit}}{\text{Outstanding loan}}$                          | FS       |
| DIVI    | Measures income diversification; higher diversification may reduce risk (Williams, 2016).                                                                                                                                                  | $\frac{\text{Interest income} - \text{Non-interest income}}{\text{Total income}}$  | FS       |
| NIIC    | Reflects income structure; reliance on noninterest income may affect stability (Williams, 2016).                                                                                                                                           | $\frac{\text{Non-interest income}}{\text{Total income}}$                           | FS       |
| NIM     | Profitability indicator; higher NIM may be associated with higher risk-taking (Claenen & Claenen, 2020).                                                                                                                                   | $\frac{\text{Net interest income}}{\text{Earning assets}}$                         | FS       |

### 3.3. Model specifications

We use a panel regression as follows:

$$Z - score_{it} = \beta_0 + \beta_1 \times FINT_{it} + \beta_2 \times FINC_{it} + \beta_3 \times BSIZE_{it} + \beta_4 \times AGROW_{it} + \beta_5 \times DTA_{it} + \beta_6 \times LEV_{it} + \beta_7 \times OBTD_{it} + \beta_8 \times DIVI_{it} + \beta_9 \times NIIC_{it} + \beta_{10} \times NIM_{it} + e_{it}$$

## 4. Results

### 4.1. Descriptive statistics

**Table 2. Summary statistics**

| Variable                     | Mean     | Standard Deviation | Minimum  | Maximum  |
|------------------------------|----------|--------------------|----------|----------|
| <b>Dependent variable</b>    |          |                    |          |          |
| ZSCORE                       | 3.63332  | 0.7367242          | 2.263423 | 5.952973 |
| <b>Independent variables</b> |          |                    |          |          |
| FINT                         | 10.04081 | 0.2010623          | 9.740363 | 10.31429 |
| FINC                         | 27.83333 | 20.54109           | 11       | 71       |
| <b>Control variables</b>     |          |                    |          |          |
| BSIZE                        | 14.23053 | 0.5076598          | 13.20665 | 15.32646 |
| AGROW                        | 0.162247 | 0.2349924          | -0.72489 | 2.978701 |
| DTA                          | 0.785963 | 0.0844553          | 0.509033 | 0.920637 |
| LEV                          | 0.904854 | 0.0752168          | 0.031824 | 0.959382 |
| OBTD                         | 0.910477 | 0.2004858          | 0.214643 | 1.469094 |
| DIVI                         | -0.50023 | 0.7787573          | -5.08401 | 1.29349  |
| NIIC                         | 0.503784 | 0.3399463          | -0.36155 | 2.595376 |
| NIM                          | 0.029509 | 0.0136186          | 0.000552 | 0.0941   |

The average natural logarithm of the Z-score is 3.6333, indicating moderate bank stability. The highest value is observed for PBVN Bank in 2019 ( $\log(Z) = 5.953$ ;  $Z = 384.90$ ), while the lowest is recorded for SeABank in 2017 ( $\log(Z) = 2.263$ ;  $Z = 9.62$ ). FinTech development shows an upward trend, with an average of 27.83 new firms annually during 2017-2022, peaking at 71 firms in 2021. The average log value of electronic transactions is 10.04, reaching a maximum of USD 18.06 billion in 2022.

Regarding bank characteristics, the average bank size (log) is 14.255, with BIDV being the largest and PBVN the smallest. Asset growth averages 16.22%, ranging from 46.33% (KLB, 2021) to -33.38% (ANZB, 2022). Deposits account for 78.60% of total assets on average, while loans represent 90.49%. The loan-to-deposit ratio averages 91.05%, with extremes of 146.91% (VPB, 2021) and 21.46% (ANZB, 2020). The income diversification index averages -0.500, ranging from 1.293 (BaoVietBank, 2020) to -5.084 (KLB, 2019). Non-interest income averages 0.504, while net interest margin ranges from 0.06% (BaoVietBank, 2020) to 9.41% (VPB, 2019).

### 4.2. Regression results

**Table 3. Result of defect tests**

| Defect tests | Wald test                   | Wooldridge test   | Multicollinearity test |
|--------------|-----------------------------|-------------------|------------------------|
| Result       | P-Value > Chi2(33) = 0.0000 | Prob > F = 0.0000 | Mean VIF = 2.31        |

### Testing for endogeneity (two-stage least squares regression - 2SLS)

For a robustness check, a two-stage regression is performed to test the endogeneity of each independent variable and control variable in the model. From the results of the Durbin Wu-Hausman test, reject or accept the hypothesis H0: The variable is not endogenous (H1: The variable is endogenous). Accordingly, there are three endogenous control variables, including DTA, LEV, and NIIC.

**Table 4. Result of the Wu-Hausman test**

| Variable | FINT   | FINC   | BSIZE  | AGROW  | DTA    | LEV    | OBTD   | DIVI   | NIIC   | NIM    |
|----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| P-Value  | 0.9863 | 0.9932 | 0.4672 | 0.9326 | 0.0341 | 0.0109 | 0.7823 | 0.3528 | 0.0406 | 0.3802 |

The GMM method is used to address endogeneity in the model. The GMM method allows the use of instrumental variables to control the correlation between explanatory variables and errors, thereby improving the accuracy and reliability of the estimates (Hansen, 2018).

**Table 5. Result of the GMM method**

|                       | Variables              | Regression coefficient | P-value |
|-----------------------|------------------------|------------------------|---------|
| Independent variables | Z-SCORE <sub>t-1</sub> | 0.7986984*             | 0.000   |
|                       | FINT                   | 0.0635441**            | 0.019   |
|                       | FINC                   | 0.0004205*             | 0.000   |
| Control variables     | BSIZE                  | 0.0270971              | 0.641   |
|                       | AGROW                  | -0.0612078*            | 0.000   |
|                       | DTA                    | -0.5139723*            | 0.000   |
|                       | LEV                    | -2.579308*             | 0.000   |
|                       | OBTD                   | -0.1453956*            | 0.009   |
|                       | DIVI                   | -0.0580609*            | 0.000   |
|                       | NIIC                   | -0.2977282*            | 0.000   |
|                       | NIM                    | -4.208502              | 0.324   |
| Constant              |                        | 2.859631               | 0.000   |
| Observations          |                        | 198                    |         |

Source: Supported by software

Note: \*, \*\*, and \*\*\* represent for the statistical significance of 1%, 5%, and 10% respectively

FinTech significantly improves bank performance and reduces default risk. The coefficient of FinTech transaction value (FINT) is 0.7986 ( $p < 0.05$ ), indicating a positive relationship with the Z-score. This suggests that FinTech enhances operational efficiency, supports revenue diversification, and improves customer experience, thereby reducing insolvency risk (Mahdi et al., 2023; Chhaidar et al., 2022). In Vietnam, mobile banking adoption has been shown to increase fee-based income and overall financial performance, further lowering default risk (Le et al., 2021).

Similarly, FinTech start-ups (FINC) positively affect bank stability, with a coefficient of 0.0004 ( $p < 0.01$ ). Their integration improves efficiency,



expands services, and enhances risk management through technologies such as data analytics and digital platforms (Ha & Nguyen, 2022; Hang et al., 2021; Le et al., 2021).

Regarding bank characteristics, asset growth (AGROW) negatively affects the Z-score (-0.0612), suggesting higher risk due to aggressive lending (Nagel & Purnanandam, 2019). The deposit-to-asset ratio (-0.514) indicates potential liquidity risk (Ruozi & Ferrari, 2012), while leverage (LEV: -2.5793) increases default risk due to higher financial obligations (Fahlenbrach et al., 2012). Similarly, a higher loan-to-deposit ratio (OBDT: -0.1454) increases credit and liquidity risks (Nagel & Purnanandam, 2019).

Finally, income diversification (DIVI: -0.00581) and non-interest income (NIIC: -0.2978) are associated with higher default risk, reflecting the volatility of non-traditional banking activities (Zouaoui & Zoghalmi, 2022; Oanh et al., 2024).

## 5. Conclusion

This study examines the impact of FinTech development on the default risk of Vietnamese commercial banks using data from 33 banks over the period 2017-2022. The results indicate that FinTech development proxied by transaction value and the number of FinTech start-ups significantly reduces bank default risk, as reflected in higher Z-scores. In addition, differences are observed across bank groups: private banks exhibit lower default risk than state-owned banks, and unlisted banks are more stable than listed banks.

This study contributes to the literature by providing empirical evidence on the role of FinTech in enhancing bank stability in a developing economy context. The findings highlight the importance of FinTech in improving bank performance and risk management, offering implications for policymakers in strengthening regulatory frameworks and for banks in developing appropriate digital strategies.

However, the study has several limitations. It does not incorporate ownership structure and macroeconomic factors, such as inflation and exchange rates, which may influence default risk. Future research should extend the analysis by including these variables and expanding the dataset across countries to provide more comprehensive and generalizable insights.

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# DOES DIGITAL TRANSFORMATION REDUCE STOCK PRICE CRASH RISK? THE EVIDENCE FROM THE COMMERCIAL BANKS IN VIETNAM

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**Abstract:** *This study investigates how digital transformation influences stock price crash risk in Vietnamese commercial banks. Using data from 20 listed banks from 2015 to 2022, we find that higher Vietnamese ICT adoption significantly reduces crash risk. The effect, moderated by institutional ownership, remains robust under the 2016 cashless payment policy, underscoring digital transformation as a stabilizing governance mechanism.*

• Keywords: *digital transformation; stock price crash risk; institutional ownership; banking; Vietnam.*

JEL codes: G21; G32; O33

Date of receipt: 25<sup>th</sup> Jan., 2026

Date of delivery revision: 04<sup>th</sup> Feb, 2026

DOI:

Date of receipt revision: 30<sup>th</sup> Mar., 2026

Date of approval: 01<sup>st</sup> Apr., 2026

## 1. Introduction

Digital transformation (DT) has become a strategic imperative for the banking sector, reshaping business models and governance structures worldwide. It refers to the integration of digital technologies, such as big data, artificial intelligence, and blockchain, into core banking operations to enhance efficiency and transparency (Verhoef et al., 2021; Vial, 2021). Through these technologies, banks can improve information flows, operational control, and customer experience, ultimately influencing market stability (Wu et al., 2022).

From a theoretical perspective, digital transformation can mitigate stock price crash risk by reducing information asymmetry and managerial opportunism (Jin & Myers, 2006; Wu et al., 2022). By enhancing transparency and governance efficiency, DT constrains managers' ability to hoard bad news, a key cause of crash risk (Hutton et al., 2009). However, some studies argue that DT implementation entails high transition costs and organizational disruptions that may temporarily increase risk. Therefore, whether digital transformation stabilizes or destabilizes financial markets remains an open question, especially in emerging economies.

This paper investigates the effect of digital transformation on stock price crash risk in Vietnamese commercial banks, an emerging market undergoing

rapid financial digitalization. Prior studies mainly examine the impact of DT on performance or systemic risk (Chen et al., 2023; Tang & Li, 2025), while evidence on its effect on crash risk remains scarce. We further analyze the moderating role of institutional ownership, which may complement DT's monitoring function through enhanced governance oversight.

We employ the database from 20 Vietnamese listed commercial banks from 2015 to 2022, to analyze the influence of digital transformation on stock price crash risk. We estimate a dynamic panel regression model that incorporates a lagged dependent variable in order to account for the persistence of crash risk. Additionally, to address the endogeneity problem, a Difference-in-Differences test is also used to analyze that exploits the 2016 government initiative on cashless payments (Decision 2545/QĐ-TTg) as a quasi-natural experiment.

The findings of this research not only contribute to the literature but also have important practical implications for bank managers and policymakers in Vietnam and other emerging economies in the complexities of the digital transformation trend.

## 2. Literature reviews and Hypotheses development

### 2.1. The theoretical background:

This study is grounded in information asymmetry theory, which posits that managers often possess

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This work is a part of the research project [CSB.2025.074] funded by Saigon University.

superior information about firm fundamentals and may withhold bad news for personal benefit, causing sudden price crashes when such information is eventually disclosed (Hutton et al., 2009; Jin & Myers, 2006). By enhancing transparency and monitoring capacity, digital transformation offers a mechanism to alleviate this asymmetry.

## 2.2. Literature Review about Bank Crash Risk

### 2.2.1. Digital Transformation adoption and Stock Price Crash Risk

Stock price crash risk reflects the accumulation and abrupt release of undisclosed negative information. Digital transformation mitigates this risk through two main channels. First, the information transparency channel: digital tools such as AI and big data analytics improve the accuracy and timeliness of financial reporting, enhancing the information environment for investors (Liang & Zhao, 2024; Wu et al., 2022). This reduces the scope for managerial bad-news hoarding. Technologies like blockchain further ensure data integrity and traceability, reinforcing market confidence (Tang & Li, 2025).

Second, the governance and efficiency channel: digital systems automate compliance monitoring, strengthen internal controls, and improve operational efficiency (Yang & Masron, 2024). Enhanced monitoring limits opportunistic behavior, while efficiency gains stabilize firm performance and reduce volatility. Although digital transformation can entail short-term implementation risks, its long-term effect is expected to reduce crash risk (Tang & Li, 2025).

$H_1$ : Digital transformation (ICT adoption) reduces bank crash risk.

### 2.2.2. The role of Institutional Ownership

Institutional ownership reflects the influence of large, sophisticated investors with the ability and incentive to monitor managerial behavior (Chen et al., 2024). While digital transformation enhances transparency through technological tools, its effectiveness in mitigating crash risk depends on the quality of governance oversight. Common institutional owners, who often hold stakes across multiple banks, possess deep industry knowledge and share a vested interest in maintaining sector-wide stability (Hou & Liu, 2023).

Their monitoring role complements the information environment created by digitalization. By leveraging data generated from digital systems, institutional investors can detect irregularities and constrain opportunistic behavior that could lead to bad news hoarding or excessive risk-taking. Moreover, because

price crashes in one bank can spill over to others in their portfolios, these investors have strong incentives to reinforce prudent governance. The combination of digital transparency and institutional oversight thus produces a governance synergy that strengthens the stabilizing effect of digital transformation.

$H_2$ . The crash-risk reduction effect of ICT is stronger when institutional ownership is higher.

## 3. Methodology

### 3.1. Sample

This study utilizes an unbalanced panel dataset comprising 20 commercial banks listed on the Ho Chi Minh Stock Exchange and the Hanoi Stock Exchange over the period 2005-2022. The sample was selected based on two criteria: continuous share trading and the availability of complete financial and ICT-related data. To proxy for digital transformation, the ICT Index is used as the key explanatory variable, obtained from the Vietnam ICT Index Reports, which have been published annually since 2005 by the Ministry of Information and Communications in cooperation with the Vietnam Informatics Association. This index evaluates banks' readiness to develop and apply ICT, following a United Nations framework that emphasizes technical infrastructure, human resources, and ICT applications. The index ranges from 0 to 1 and reflects the early stages of digital transformation in Vietnam, including the adoption of mobile banking and digital payment systems. Additional financial variables are collected from audited annual reports.

After merging these sources, missing values were addressed through a combination of listwise deletion for incomplete observations and linear interpolation for short-term gaps in the ICT Index, which is consistent with the relatively stable upward trajectory of digital transformation adoption in Vietnam. Approximately 15 percent of the initial observations were excluded due to incomplete ICT data for smaller banks in the early period (2005-2014). The final dataset covers the years 2015-2022 and comprises 107 bank-year observations. All variables were winsorized at the 1st and 99th percentiles to mitigate the impact of outliers.

### 3.2. Variables measurement

#### 3.2.1. Dependence variable - Stock price crash risk

Crash risk is measured using two standard proxies from the literature: negative conditional skewness (NCSKEW) and down-to-up volatility (DUVOL) (Liang & Zhao, 2024). Both measures are derived from firm-specific weekly returns, estimated from the residuals of an expanded market model:



$$R_{i,w} = \alpha_i + \sum_{k=-2}^{+2} \beta_k R_{m,w+k} + \varepsilon_{i,w}$$

where  $R_{i,w}$  denotes the weekly return of bank  $i$  in week  $w$  and  $R_{m,w+k}$  represents the market return (VN-Index) in week  $w+k$ , with  $k$  ranging from  $-2$  to  $+2$ . The residuals from this regression are transformed into abnormal returns as  $W = \ln \left[ \frac{f_0}{f_1} (1 + \varepsilon_{i,w}) \right]$ .

Based on these firm-specific abnormal returns, two crash risk measures are calculated. First, NCSKEW captures the asymmetry of the return distribution. It is defined as:

$$NCSKEW = - \frac{n(n-1)^{3/2} \sum W_{i,w}^3}{(n-1)(n-2)(\sum W_{i,w}^2)^{3/2}}$$

where  $n$  is the number of weekly observations, typically 52. Larger positive values of NCSKEW indicate greater crash proneness, as the distribution of abnormal returns exhibits stronger left skewness.

Second, DUVOL compares the relative variance of returns in weeks with negative abnormal returns to those with positive abnormal returns. It is defined as:

$$DUVOL = \log \left( \frac{(n_d - 1) \sum_{down} W_{i,w}^2}{(n_u - 1) \sum_{up} W_{i,w}^2} \right)$$

where  $n_d$  and  $n_u$  represent the number of “down” and “up” weeks, respectively. Higher values of DUVOL indicate a greater tendency for downside volatility relative to upside volatility. Both measures are computed annually at the bank level, normalized using logarithmic transformation, and are particularly suitable for emerging markets such as Vietnam, where return volatility is relatively high.

### 3.2.2. Independent variables - ICT index

The independent variable is the ICT Index, a composite measure published in the Vietnam ICT Index Reports and standardized on a 0-1 scale. The index is constructed from three pillars that reflect a bank's readiness for digital transformation. The first dimension, technical infrastructure ( $I_{tech}$ ), accounts for about 40 percent of the index and includes the ratio of ICT investment to total assets, measures of network connectivity such as bandwidth per user, and the adoption of digital platforms such as core banking systems. The second dimension, human resources ( $I_{human}$ ), contributes around 30 percent and reflects the proportion of IT staff, the availability of digital training programs, and the prevalence of professional certifications. The third dimension, ICT applications, also contribute about 30 percent and captures the ratio of digital transaction ( $I_{app}$ ).

$$ICT = w_1 I_{tech} + w_2 I_{human} + w_3 I_{app}$$

To address potential simultaneity bias, the one-year lag of the ICT Index is used in the regression models, reflecting the fact that digital transformation initiatives influence crash risk with a delay.

### 3.3. Empirical models

To test the primary hypothesis on the effect of digital transformation on stock price crash risk, we employ a dynamic panel regression model that includes a lagged dependent variable to capture the persistence of crash risk. The baseline specification is expressed as follows:

$$Crash_{i,t} = \beta_0 + \beta_1 ICT_{i,t-1} + \lambda Crash_{i,t-1} + \gamma X_{i,t-1} + \delta_t + \mu_i + \varepsilon_{i,t} \quad (1)$$

where  $Crash_{i,t}$  is measured by either NCSKEW or DUVOL,  $ICT_{i,t-1}$  is the lagged ICT Index, and  $X_{i,t-1}$  is a vector of lagged control variables including bank size, non-performing loans to total loans, leverage, and cash flow to assets. Year fixed effects ( $\delta_t$ ) capture macroeconomic shocks, while bank fixed effects ( $\mu_i$ ) control for time-invariant heterogeneity across banks. Standard errors are clustered at the bank level to account for potential heteroskedasticity and serial correlation within banks.

To test the moderating role of institutional ownership (H2), we extend the baseline specification by introducing both the main effect of institutional ownership and its interaction with the ICT Index. The augmented model is specified as:

$$Crash_{i,t} = \beta_0 + \beta_1 ICT_{i,t-1} + \beta_2 IO_{i,t-1} + \beta_3 ICT_{i,t-1} * IO_{i,t-1} + \lambda Crash_{i,t-1} + \gamma X_{i,t-1} + \delta_t + \mu_i + \varepsilon_{i,t} \quad (2)$$

where  $IO_{i,t-1}$  represents the lagged proportion of shares held by institutional investors in bank  $i$  at year  $t-1$ . The coefficient of interest is  $\beta_3$ , which captures whether the effect of digital transformation on crash risk depends on the extent of institutional ownership. A significantly negative estimate of  $\beta_3$  would indicate that higher institutional ownership strengthens the crash-risk reduction effect of ICT adoption, consistent with the hypothesis that institutional investors enhance monitoring and mitigate managerial opportunism in the digital transformation process.

## 4. Empirical results

### 4.1. Descriptive statistics

Table 1. Descriptive Statistics

| Variable     | Obs | Mean  | Std. Dev. | Min    | Max    |
|--------------|-----|-------|-----------|--------|--------|
| DUVOL        | 107 | -.125 | .882      | -2.067 | 2.255  |
| NSKEW        | 107 | -.082 | 1.23      | -2.088 | 4.552  |
| ICT          | 107 | .535  | .123      | .265   | .811   |
| Size         | 107 | 19.79 | .89       | 18.05  | 21.557 |
| NPL/Loans    | 107 | .015  | .03       | 0      | .298   |
| LDebt/Equity | 107 | .952  | .662      | 0      | 2.906  |
| CF           | 107 | .107  | .053      | .017   | .248   |
| State        | 107 | .163  | .317      | 0      | .953   |

Source: Authors' calculation

Table 1 presents the descriptive statistics of the variables employed in this study. The mean crash risk, as measured by DUVOL and NCSKEW, is -0.125 and -0.082, with standard deviations of 0.882 and 1.23, respectively. These values indicate a moderate degree of downside tail risk in the Vietnamese banking sector, consistent with its gradual transition toward greater financial stability. Compared to evidence from other emerging markets, these levels appear relatively low. For instance, studies on Chinese listed firms report mean NCSKEW values ranging from -0.283 (Zhu et al., 2023) to -0.426 (Tang & Li, 2025), while DUVOL means in comparable markets falls between -0.183 and -0.299 (Hou & Liu, 2023). Such differences suggest that Vietnamese banks may exhibit relatively less pronounced crash risk, possibly reflecting distinct regulatory and institutional environments.

The mean value of the ICT Index is 0.535, suggesting that Vietnamese commercial banks have reached a moderate stage of digital transformation. This level is comparable to findings in related studies, such as the composite digital transformation index reported for Chinese commercial banks, with a mean of 0.5744 and a range of 0 to 1.61 (Wu et al., 2022).

#### 4.2. Empirical results

Table 3 reports the baseline regression results from dynamic panel models. In Column (1), the coefficient on the ICT Index is -2.888 and statistically significant at the 5 percent level, indicating that higher digital transformation is associated with lower crash risk as measured by DUVOL. Economically, a one-standard-deviation increase in the ICT Index reduces DUVOL by approximately 0.35 units, a sizeable effect given the distribution of the variable. Column (2) presents results using NCSKEW as the dependent variable. The ICT Index remains negative and significant, confirming that digital transformation mitigates downside risk. These results strongly support H1, indicating that ICT adoption plays a stabilizing role in Vietnamese banks by enhancing transparency and lowering the likelihood of sharp drops in stock prices.

**Table 3. The impact of digital transformation on stock price crash risk**

| VARIABLES | (1)<br>DUVOL         | (2)<br>NCSKEW       |
|-----------|----------------------|---------------------|
| L.DUVOL   | -0.430***<br>(0.109) |                     |
| L.NCSKEW  |                      | -0.350**<br>(0.144) |
| ICT       | -2.888**<br>(1.238)  | -2.597*<br>(1.539)  |
| Size      | 1.310*<br>(0.696)    | 1.486<br>(1.006)    |

|              | (1)                  | (2)                 |
|--------------|----------------------|---------------------|
| NPL/Loans    | 3.493**<br>(1.545)   | -2.169<br>(2.352)   |
| LDebt/Equity | -0.302<br>(0.230)    | -0.227<br>(0.324)   |
| CF/TA        | -2.970<br>(2.261)    | -4.462<br>(3.278)   |
| State        | -6.423**<br>(3.179)  | -3.698<br>(3.610)   |
| Constant     | -22.905*<br>(13.744) | -26.801<br>(19.936) |
| Observations | 107                  | 107                 |
| R-squared    | 0.573                | 0.610               |

Note: Robust standard errors in parentheses, \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

This key finding is theoretically grounded in the concept of Information Transparency. Digital transformation is widely considered to be a mechanism that significantly reduces stock price crash risk by mitigating information asymmetry (Wu et al., 2022). Specifically, DT improves internal data processing and governance, thereby constraining management's ability to conceal adverse news, which is the underlying cause of price collapse (Chen et al., 2024). This result is consistent with prior studies that have documented digital transformation and crash risk have a substantial negative correlation (Liang & Zhao, 2024; Zhu et al., 2023).

For the control variables, crash risk is positively correlated with bank size (1.310), possibly reflecting greater visibility and disclosure pressures for larger banks. NPL/Loans significantly increases crash risk (3.493), consistent with the view that credit risk aggravates information asymmetry and bad-news hoarding. By contrast, leverage and cash flow are not significant predictors, while state ownership exhibits a strong negative effect (-6.423), suggesting that state-affiliated banks benefit from implicit government guarantees that reduce crash risk.

#### 4.3. The role of institutional ownership

Table 4 reports the findings for the moderation analysis of institutional ownership, which aims to examine whether institutional ownership strengthens the effect of digitalization in curbing crash risk. In line with the baseline regression (supporting H1), the coefficient on the ICT Index remains negative and statistically significant, implying that stronger digital adoption consistently corresponds with a lower propensity for crash risk. The variable for Institutional Ownership itself is also negatively and significantly associated with crash risk. This outcome accords with prior evidence indicating that institutional investors, especially long-term or stable holders, enhance oversight and restrict managerial tendencies to delay disclosure of unfavorable information, thus lowering the chance of severe price corrections.



**Table 4. The moderate role of the institutional ownership**

| VARIABLES         | (1)<br>DUVOL         | (2)<br>NSKEW        |
|-------------------|----------------------|---------------------|
| L.DUVOL           | -0.475***<br>(0.110) |                     |
| L.NSKEW           |                      | -0.357**<br>(0.145) |
| ICT               | -4.545**<br>(1.748)  | -4.648**<br>(2.304) |
| Institutional     | -0.286**<br>(0.124)  | -0.272*<br>(0.182)  |
| ICT*Institutional | 0.378*<br>(0.220)    | 0.435*<br>(0.339)   |
| Size              | 1.264*<br>(0.646)    | 1.408<br>(1.065)    |
| NPL/Loans         | 4.282*<br>(2.549)    | -1.226<br>(2.124)   |
| E LDebt/Equity    | -0.391*<br>(0.221)   | -0.293<br>(0.323)   |
| CF/TA             | -1.864<br>(2.484)    | -3.798<br>(3.303)   |
| State             | -7.056*<br>(3.662)   | -4.209<br>(4.061)   |
| Constant          | -20.749<br>(12.762)  | -23.988<br>(21.416) |
| Observations      | 107                  | 107                 |
| R-squared         | 0.619                | 0.623               |

Note: Standard errors in parentheses, \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

However, the key result for H2 lies in the interaction term (ICT\*IO), which is found to be positive and statistically significant (0.378 for DUVOL and 0.435 for NCSKEW). This positive sign of the interact variable, suggesting that the crash-risk reduction effect provided by digital transformation is attenuated (weaker) in banks with higher institutional ownership. This outcome provides empirical support for the substitutionary view, rather than the complementary view.

The substitutionary interpretation suggests that institutional investors already provide an effective governance mechanism that constrains managers from suppressing negative information (Chen et al., 2024), thereby reducing the incremental benefit provided by the digital transparency tools. In environments with strong external monitoring (high IO), the marginal utility of DT in reducing information opacity is limited. Conversely, in banks with lower institutional ownership, digital transformation may play a more critical and non-redundant role in establishing information transparency and constraining opportunistic behavior, resulting in a stronger marginal effect (Wu et al., 2022). This finding aligns with evidence in other contexts where the impact of digital governance tools is found to be more pronounced in firms with poorer existing governance structures or lower information quality.

#### 4.4. Endogeneity and Policy Shock: A Difference-in-Differences (DiD) Test

Table 5 reports the results of the difference-in-differences analysis that exploits the 2016 government

initiative on cashless payments as a quasi-natural experiment. The treatment group consists of banks with higher pre-2016 ICT adoption, while the control group includes banks with lower adoption. The interaction term  $Treat \times Post$  is negative and highly significant, indicating that the post-policy decline in crash risk was substantially more pronounced among digitally advanced banks. The magnitude of the effect is economically meaningful: following the policy intervention, treatment banks experienced a reduction in crash risk that was approximately 1.5 units greater than that of control banks in the DUVOL specification. Considering that the standard deviation of DUVOL is 0.882 (see Table 1), this represents a sizeable effect.

**Table 5. The DiD regression results**

| VARIABLES    | (1)<br>DUVOL          | (2)<br>NSKEW         |
|--------------|-----------------------|----------------------|
| L.DUVOL      | -0.356***<br>(0.106)  |                      |
| L.NSKEW      |                       | -0.540***<br>(0.142) |
| Treat*Post   | -1.493***<br>(0.267)  | -1.216***<br>(0.299) |
| Size         | 1.617**<br>(0.712)    | 1.140**<br>(0.496)   |
| NPL/Loans    | 4.427***<br>(1.508)   | -4.505***<br>(1.656) |
| LDebt/Equity | -0.293<br>(0.242)     | -0.382<br>(0.311)    |
| CF/TA        | -3.447<br>(2.270)     | -5.274<br>(3.733)    |
| State        | -9.544***<br>(2.937)  | -4.203<br>(4.087)    |
| Constant     | -29.518**<br>(13.956) | -20.623**<br>(9.880) |
| Observations | 107                   | 107                  |
| R-squared    | 0.582                 | 0.485                |

Note: Standard errors in parentheses, \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Figure 4.1 illustrates the impact of the 2016 cashless payment policy on stock price crash risk measured by DUVOL. The vertical dashed line marks the policy intervention year. Both treatment and control groups exhibit parallel pre-trends, thereby supporting the parallel trends assumption. After the implementation of the policy, the treatment group experienced a significantly steeper decline in crash risk compared to the control group, consistent with the regression estimates reported in Table 5.

Figure 4.2 presents the DiD results for stock price crash risk measured by NCSKEW. The dashed vertical line denotes the 2016 policy intervention. Prior to the reform, treatment and control banks followed similar trajectories, which is consistent with the parallel trends assumption. After 2016, the treatment group exhibited a markedly sharper reduction in crash risk than the control group, providing visual evidence that digital transformation, facilitated by the government

policy, significantly lowered the likelihood of extreme negative stock price movements.

**Figure 4.1. DiD illustration of crash risk (DUVOL) before and after 2016**

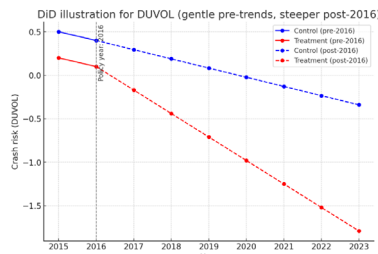
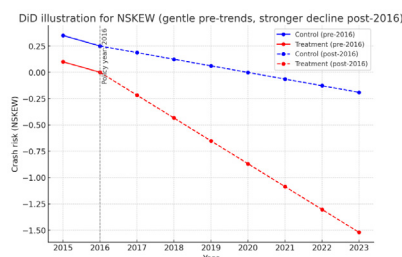


**Figure 4.2. DiD illustration of crash risk (NCSKEW) before and after 2016**



## 5. Conclusion

This study demonstrates that increased digital adoption is closely linked with lower crash risk among Vietnamese commercial banks. The observed inverse relation between the ICT Index and crash indicators suggests that digitalization improves informational openness and reinforces governance capacity, thus diminishing the chance of severe downward price adjustments. Evidence from 107 bank-year data points covering 2015-2022 adds to ongoing research on digital finance and market resilience within emerging economies.

Our results are broadly consistent with theoretical arguments emphasizing the information and governance channels of digital transformation. By improving data transparency, automating reporting, and reducing managerial opportunities to hoard bad news, digital transformation adoption directly lowers crash risk. At the same time, stronger internal risk management systems supported by ICT help stabilize performance and cushion banks against external shocks. However, the evidence also highlights heterogeneity: private banks appear to reap greater benefits compared to state-owned banks, particularly in the post-regulatory push period. This suggests that institutional context and ownership structure shape how digital transformation translates into financial stability.

The findings yield several important implications for regulators, banks, and investors. First, the State Bank of

Vietnam should prioritize cybersecurity and regulatory oversight in the rollout of fintech initiatives to ensure that the stability-enhancing benefits of digitalization are fully realized, especially in state-owned commercial banks that may face implementation gaps. Second, policies that encourage private investment in ICT infrastructure can accelerate the stability dividend of digital transformation across the sector. Third, banks exhibiting more advanced digital adoption tend to face reduced downside volatility, enhancing the overall robustness of investors' portfolios. This provides an additional dimension for portfolio screening and risk management in emerging markets.

This study is not without limitations. The sample size is constrained by the number of listed banks in Vietnam, and the ICT Index, while widely used, may only partially capture the multidimensional nature of digital transformation. Future research could extend this framework by incorporating machine learning-based indicators of dynamic risk forecasting or exploring cross-country comparisons to test whether the stabilizing role of digital transformation is generalizable beyond Vietnam. Additionally, further work could examine potential nonlinearities, whether the benefits of digital transformation follow diminishing returns or vary depending on the stage of regulatory development.

Taken together, the findings suggest that within Vietnam's ongoing digital transformation, fintech adoption functions as a net stabilizing force, reducing stock price crash risk and contributing to a more resilient and sustainable banking sector. In an era of accelerating technological change, these results reinforce the view that digital finance is not merely an engine of efficiency and inclusion but also a cornerstone of systemic stability in emerging markets.

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# PULL-DRIVEN CONFIGURATIONS OF CONSUMERS' SWITCHING INTENTION FROM CASH TO ELECTRONIC PAYMENTS IN VIETNAM: A fsQCA STUDY

PhD. Nguyen Thi Thanh Van\*

**Abstract:** *This study aims to investigate how pull factors interact to shape Vietnamese consumers' intention to switch from cash based payments to electronic payments. Drawing on the Pull dimension of the Push Pull Mooring framework, the study adopts fsQCA as the primary methodological approach. Empirical analysis is conducted using 105 valid survey responses. The fsQCA results confirm that all four conditional variables, namely Economic Benefit Expectancy, Performance Expectancy, Effort Expectancy, and Critical Mass, are associated with consumers' intention to switch from cash based payments to electronic payments. However, high switching intention is explained by multiple distinct configurational or causal pathways rather than a single dominant effect. Based on these findings, the study derives managerial implications aimed at strengthening Vietnamese consumers' intention to transition from cash payments to electronic payments.*

• Keywords: *electronic payments, fsQCA, switching intention, Vietnam*

JEL codes: *D12, L81, M31*

Date of receipt: 08<sup>th</sup> Feb., 2026

Date of delivery revision: 27<sup>th</sup> Feb., 2026

DOI:

Date of receipt revision: 10<sup>th</sup> Mar., 2026

Date of approval: 30<sup>th</sup> Mar., 2026

## 1. Introduction

In recent years, the promotion of cashless payments has become a major policy priority within Vietnam's national digital transformation process. Driven jointly by the widespread adoption of mobile technologies, the expansion of digital financial infrastructure, and government-led incentive programs, both the volume and frequency of electronic payment transactions have grown rapidly. According to Vietnamnet, the total value of cashless transactions in 2024 reached approximately VND 295 quadrillion, while the number of transactions increased by 56% compared to the previous year. These trends suggest that electronic payments are progressively becoming an established and routine mode of transaction in Vietnam's consumer landscape. However, cash transactions remain prevalent, particularly for low value purchases, in rural areas, and among older consumers with limited technological proficiency. Consequently, identifying effective approaches to strengthen consumers' intentions to shift from cash to electronic payments across diverse demographic groups, across different geographic contexts, and in a sustainable manner for future transactions constitutes a critical challenge in

Vietnam's national digital transformation journey.

Electronic payment has been extensively examined in both domestic and international literature. Nevertheless, the majority of prior studies have concentrated on keywords such as usage intention or actual usage behavior of digital payment methods. As a result, this body of research primarily emphasizes the acceptance or initial experience of new payment technologies rather than consumers' intentional and sustained choice of a particular payment method. Motivated by this research gap, the present study adopts the Pull factors of the Push Pull Mooring (PPM) theoretical framework and applies the fuzzy set Qualitative Comparative Analysis (fsQCA) method to examine how different combinations of Pull factors jointly shape Vietnamese consumers' intention to switch from cash based payments to electronic payments. This approach allows for the identification of complex, asymmetric, and equifinal causal configurations, which is consistent with the inherently multidimensional nature of switching behavior in real world settings. Based on the empirical results, the study derives policy and managerial implications aimed at promoting the development of a cashless society in Vietnam.

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## 2. Literature and Configurational Propositions

### 2.1. Switching intention in the context of electronic payments

Switching intention refers to consumers' tendency or willingness to move from a traditional method, service, or provider to a new alternative solution (Hsieh, 2021). Switching intention represents an individual's attitudinal disposition, indicating the extent to which they are willing and intend to adopt a new technology (Latupeirissa et al., 2020). Unlike the concepts of initial acceptance or first time usage, switching intention reflects a higher level of cognitive evaluation, whereby consumers go beyond mere trial and consciously consider replacing an established habitual behavior with a new and more enduring form of behavior.

### 2.2. The Push Pull Mooring (PPM) framework

The Push Pull Mooring framework originates from migration theory proposed by Lee (1966) and was later extended by Moon (1995) through the incorporation of the mooring component, thereby establishing a comprehensive analytical model in migration studies. This framework was subsequently adapted to the consumer behavior domain by Bansal et al. (2005). The PPM framework comprises three core elements, namely Push, Pull, and Mooring factors. Push factors refer to negative influences that drive individuals away from their current state or behavior. Pull factors capture positive attributes that attract individuals toward a new alternative. Mooring factors encompass personal, social, or cultural conditions that either hinder or facilitate the switching process by acting as stabilizing forces (Chang et al., 2023). Within the context of electronic payments, the PPM framework is particularly relevant as it conceptualizes switching behavior as a process of comparison and trade off between cash and digital payment methods. Importantly, the transition toward electronic payments in Vietnam is largely voluntary and encouraged rather than mandated. Accordingly, focusing on Pull factors enables a clearer understanding of the perceived benefits and positive motivations that encourage consumers to alter their behavioral tendencies. For this reason, the present study adopts a Pull factor oriented perspective within the PPM framework.

### 2.3. Configurational Propositions

In contrast to linear studies that assume each factor exerts an independent and symmetric effect on switching intention, this study adopts a configurational logic. From this perspective, switching intention from cash to electronic payments can emerge through multiple distinct combinations of Pull related conditions rather than a single net effect of individual factors.

Economic Benefit Expectancy (EBE) is conceptualized as a Pull factor that attracts users to switch to an alternative service due to the financial advantages it offers (Purwandari et al., 2022). This construct encompasses two primary dimensions. The first relates to the financial incentives and economic benefits provided by electronic payment services, such as price discounts, cashback programs, and reward points associated with online transactions in e commerce environments. The second concerns the costs incurred when using electronic payment services, including fees and other related expenses (Lu & Wung, 2021). A higher level of economic benefit expectancy reflects a stronger tendency among consumers to move away from cash based payments toward electronic alternatives (Purwandari et al., 2022). Accordingly, economic benefit expectancy is regarded as a key component within pull based configurations that give rise to switching intention.

*Proposition 1. A high level of consumers' economic benefit expectancy leads to an intention to switch from cash payments to electronic payments.*

Performance Expectancy (PEX) is a key construct commonly employed to explain both technology adoption and switching intention (Purwandari et al., 2022). It refers to the extent to which an individual believes that using a technological system will enhance the completion of specific tasks (Islam et al., 2024). In the context of cashless payments, performance expectancy captures the perceived advantages offered by the new technology, including its usefulness, transaction speed, reliability, and time saving potential. When electronic payment services are perceived as delivering superior functional benefits to users, they become more attractive and thereby encourage consumers to alter their payment behavior (Purwandari et al., 2022).

*Proposition 2. A high level of consumers' performance expectancy leads to an intention to*



*switch from cash payments to electronic payments.*

Effort Expectancy (EEX) refers to the degree of ease associated with using a system (Venkatesh et al., 2003). This construct integrates perceptions of ease of use, system complexity, and actual ease of use (Islam et al., 2024). In the transition from cash based payments to electronic payments, effort expectancy emphasizes the simplicity and convenience of the payment process. When effort expectancy is perceived to be high, users are more likely to feel comfortable with the technology and display a stronger willingness to move away from cash toward electronic payment methods during transactions (Purwandari et al., 2022).

*Proposition 3. A high level of consumers' effort expectancy leads to an intention to switch from cash payments to electronic payments.*

Critical Mass (CMS) refers to the social influence exerted on users' decisions to adopt or switch technologies. This concept captures the idea that an individual's decision to use a particular application or service, such as electronic payment, is shaped by the behavior of other users. In the context of transitioning toward electronic payments, critical mass implies that when the majority of one's friends or relatives move from cash based payments to electronic alternatives, the individual is more likely to follow this shift (Purwandari et al., 2022). As the number of users of a service increases, it further attracts additional users while encouraging the abandonment of traditional methods, thereby highlighting critical mass as a distinctly social Pull factor.

*Proposition 4. A high level of consumers' critical mass leads to an intention to switch from cash payments to electronic payments.*

Taken together, these configurational propositions provide the theoretical foundation for applying fsQCA to explore alternative causal pathways leading to Vietnamese consumers' switching intention in the electronic payment context.

### 3. Research methodology

Following Ragin (2008), fsQCA is a methodological approach that provides a robust explanation of the relationships between conditions and outcomes by examining necessity and sufficiency relationships.

#### 3.1. Data and sample

A structured questionnaire was developed and distributed to consumers in Vietnam who possess adequate experience and understanding of both cash based and electronic payment methods. Data collection was conducted between March and April 2025. A total of 105 fully valid responses were obtained, which is considered sufficient for fsQCA analysis in line with prior methodological guidance (Pappas & Woodside, 2021).

#### 3.2. Measurement scales

The measurement items for Economic Benefit Expectancy, Performance Expectancy, Effort Expectancy, and Critical Mass each consist of four observed variables, while Switching Intention is measured using five observed variables. All measurement scales were adapted from Purwandari et al. (2022). Each item was assessed using a five point Likert scale ranging from 1, strongly disagree, to 5, strongly agree.

### 4. Research results

First, the reliability and validity of the measurement scales were assessed using SmartPLS 3 software. The results indicate that three observed variables, namely CMS3 (outer loading = 0.577), EBE4 (outer loading = 0.680) and PEX4 (outer loading = 0.664), did not meet the recommended threshold of 0.7 and were therefore removed from the model. The remaining constructs satisfied reliability requirements, with the lowest Cronbach's alpha value reaching 0.740. Based on these results, the condition variables and the outcome variable were constructed by calculating the mean scores of their respective observed indicators.

Subsequently, the analysis was continued using fsQCA software. The first step involved calibrating the raw data into fuzzy set membership scores ranging from 0 to 1 (Ragin, 2008). In this calibration process, values of 1 and 0 represent full membership and full non membership in a set, respectively, while a value of 0.5 indicates the crossover point. Under the direct calibration approach, three qualitative anchors are required to determine the degree of fuzzy set membership for each case, corresponding to full membership, partial membership, and full non membership. In this study, threshold values of 0.90, 0.50, and 0.05 were adopted as the three anchors to transform the data into log odds scores bounded between 0 and 1 (Ragin, 2008). Following calibration,

threshold values were further identified using SPSS software, as reported in Table 1.

**Table 1: Compute thresholds at SPSS**

|             |         | EBE      | PEX      | EEX      | CMS      | SWI     |
|-------------|---------|----------|----------|----------|----------|---------|
| N           | Valid   | 105      | 105      | 105      | 105      | 105     |
|             | Missing | 0        | 0        | 0        | 0        | 0       |
| Percentiles | 5       | -1.29600 | -1.96740 | -1.58000 | -1.66000 | -1.4797 |
|             | 50      | 0.06600  | 0.01500  | -0.14100 | 0.22400  | 0.0890  |
|             | 90      | 1.42700  | 1.28000  | 1.29800  | 1.16300  | 1.4700  |

Source: Authors' calculations based on survey data.

In the subsequent step, a truth table was constructed to enumerate all logically possible combinations of causal conditions and their corresponding case configurations. The truth table was then refined based on two criteria, namely frequency and consistency (Pappas et al., 2019b; Ragin, 2008). Given a sample size of 105 observations, the minimum frequency threshold was set at three cases, while retained configurations were required to account for more than 80 percent of the total observations. Configurations with a proportional reduction in inconsistency (PRI) value of 0.5 or lower were further excluded from the analysis (table 2).

**Table 2: Analysis of sufficiency**

| Solutions                      | Raw Coverage | Unique Coverage | Consistency |
|--------------------------------|--------------|-----------------|-------------|
| EBE_C*~EEX_C*CMS_C             | 0.351695     | 0.0324244       | 0.885436    |
| EBE_C*PEX_C*CMS_C              | 0.618091     | 0.298821        | 0.955024    |
| Solution Coverage: 0.650516    |              |                 |             |
| Solution Consistency: 0.928478 |              |                 |             |

Source: Authors' calculations based on survey data.

The fsQCA results identify two sufficient configurational pathways leading to the presence of switching intention toward electronic payments (SWI\_C). The first configuration indicates that the joint presence of Economic Benefit Expectancy (EBE\_C) and Critical Mass (CMS\_C) is sufficient to trigger switching intention even when Effort Expectancy (~EEX\_C) is low, with high consistency, suggesting a compensatory pathway in which perceived benefits outweigh perceived costs. The second configuration shows that when Economic Benefit Expectancy (EBE\_C), Performance Expectancy (PEX\_C), and Critical Mass (CMS\_C) are simultaneously high, switching intention emerges in a strong and stable manner, as reflected by very high consistency and substantial coverage. At the overall level, these two configurations account for the majority of cases exhibiting high switching intention and demonstrate strong consistency, underscoring the robustness of the model's explanatory power.

Notably, Economic Benefit Expectancy (EBE\_C) and Critical Mass (CMS\_C) consistently appear across both configurations, indicating their central role in shaping switching intention, whereas Performance Expectancy (PEX\_C) and low Effort Expectancy (~EEX\_C) function as substitutable conditions, thereby reinforcing the configurational logic of equifinality inherent in the fsQCA approach.

Following the approach proposed by Pappas et al. (2019b), this study explicitly distinguishes between core and peripheral conditions within each configuration to facilitate result interpretation. Specifically, a filled circle (●) indicates the presence of a condition, whereas a crossed circle (⊗) denotes the absence or negation of that condition. In addition, the size of the symbols reflects the role of each condition, with large circles (●) representing core conditions and small circles (●) indicating peripheral ones, while blank cells signify conditions that are not relevant to a given configuration. Accordingly, Table 3 presents the causal configurations identified by the fsQCA analysis that are sufficient for the presence of high switching intention toward electronic payments.

**Table 3: Configurations Leading to the Presence of Switching Intention**

| Configuration               | Solution |   |
|-----------------------------|----------|---|
|                             | 1        | 2 |
| Economic Benefit Expectancy | ●        | ● |
| Performance Expectancy      |          | ● |
| Effort Expectancy           | ⊗        |   |
| Critical Mass               | ●        | ● |

Source: Authors' calculations based on survey data.

## 5. Conclusion and managerial implications

### 5.1. Conclusion

This study aims to examine how pull related factors interact to shape Vietnamese consumers' intention to switch from cash based payments to electronic payments. The fsQCA results confirm that all four conditional variables, namely Economic Benefit Expectancy, Performance Expectancy, Effort Expectancy, and Critical Mass, are associated with switching intention. However, rather than operating in isolation, these factors combine into multiple distinct configurational or causal recipes that predict high switching intention. The findings highlight causal asymmetry, indicating that the presence or absence of the same conditions, such as Performance Expectancy or Effort Expectancy, may lead to high switching

intention depending on how they are configured with other causal factors. Notably, Economic Benefit Expectancy and Critical Mass emerge as central causal conditions, as they consistently appear across all identified configurations leading to high switching intention. Based on these results, the study provides important insights for developing managerial strategies aimed at strengthening Vietnamese consumers' intention to shift from cash payments to electronic payments.

### 5.2. Managerial implications

The findings indicate that Economic Benefit Expectancy and Critical Mass function as core conditions across both configurational pathways leading to switching intention toward electronic payments. This suggests that, for electronic payment service providers, perceived economic value should occupy a central position in user acquisition and retention strategies. Incentive mechanisms such as cashback schemes, transaction fee reductions, reward accumulation, or promotional linkages within broader consumer ecosystems should be designed in a consistent and sufficiently attractive manner to ensure that users clearly perceive tangible financial advantages over cash payments. The recurrent role of Critical Mass across configurations underscores the importance of network effects in shaping switching behavior. From a managerial perspective, this implies that firms should move beyond an exclusive focus on individual users and actively foster collective adoption dynamics. Strategies such as encouraging simultaneous participation by merchants and consumers, implementing referral programs, or offering community based rewards can accelerate diffusion. As electronic payment usage becomes more visible within users' social and commercial surroundings, psychological resistance to switching is likely to diminish substantially.

Second, the alternating presence of Performance Expectancy and Effort Expectancy across configurations indicates that these factors act as peripheral and substitutable rather than jointly necessary conditions. This finding implies the need for a differentiated and flexible strategic approach across user segments. For technologically experienced or early adopter users, emphasizing superior functionality, transaction speed, and overall efficiency may be sufficient to stimulate switching, even if the user interface is not fully optimized for simplicity. In contrast, for users who

are more sensitive to learning effort, streamlining procedures, enhancing interface usability, and providing supportive guidance can compensate for weaker perceptions of performance or long term efficiency.

### 5.3. Policy implications

From a public policy perspective, regulatory authorities may consider implementing financial incentive oriented measures, such as tax preferences, transaction fee subsidies, or co funding for promotional programs during the initial stages, in order to enhance citizens' Economic Benefit Expectancy when transitioning to electronic payments. In addition, mandating or actively encouraging the use of electronic payments in public services, education, healthcare, and public transportation can help generate a Critical Mass tipping point, which may subsequently stimulate broader adoption in the private sector and in everyday transactions.

Furthermore, policies aimed at promoting digital payment transformation should be structured in a multi layered and adaptive manner. Such policies need to balance efforts to improve system performance, including infrastructure development, processing speed, and reliability, with initiatives that lower user effort, such as interface standardization and process simplification. This flexible policy design allows interventions to be tailored to the characteristics of different population groups and to the varying stages of market development.

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# GOVERNING THE DIGITAL ECONOMY: FISCAL AND REGULATORY CHALLENGES IN BANKING DIGITALIZATION AND DIGITAL ASSETS

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**Abstract:** *The rapid expansion of digital technologies has profoundly influenced financial systems and economic governance in emerging and transition economies. Banking digitalization enhances efficiency and accessibility but introduces vulnerabilities in cybersecurity and workforce adaptation. Similarly, the emergence of digital financial assets and currencies challenges existing legal frameworks, creating ambiguities in classification and turnover regulation. Fiscal policies must adapt to capture revenues from digital transactions while supporting infrastructure and innovation, yet misalignment risks exacerbating inequalities. Drawing on experiences from Kazakhstan's banking reforms, Russia's regulatory approaches, and international fiscal strategies, this paper examines these interconnected challenges. It highlights how uneven access to digital tools and skills - encompassing both first-order divides in infrastructure and second-order divides in usage - can widen income disparities unless addressed through targeted interventions. In fast-growing emerging markets pursuing ambitious digital agendas, such as those in Southeast Asia, coordinated fiscal and regulatory measures are essential to ensure inclusive growth. Findings underscore the need for redesigned tax systems, enhanced legal clarity, and investments in human capital to mitigate risks and harness digital dividends equitably.*

• Keywords: digital economy, banking digitalization, digital financial assets, fiscal policy, regulatory challenges, emerging economies

JEL codes: G23, G24

Date of receipt: 06<sup>th</sup> Jan., 2026

Date of delivery revision: 22<sup>th</sup> Jan., 2026

DOI:

Date of receipt revision: 06<sup>th</sup> Feb., 2026

Date of approval: 26<sup>th</sup> Mar., 2026

## 1. Introduction

In emerging markets, the old economic script in the financial sectors is being reshaped, line by line, by the swift hand of digital change. Access to information and communication technologies (ICTs) enables greater efficiency in banking operations and transaction processing, yet it also amplifies disparities depending on individuals' skills and infrastructure availability (Litvishko et al., 2020; Zhang et al., 2025).

In Kazakhstan, for example, initiatives like the "Digital Kazakhstan" program have driven widespread adoption of remote banking services. Non-cash payments have surged, with platforms such as Kaspi Bank integrating payments, credits, and e-commerce to meet diverse consumer needs (Litvishko et al., 2020). This shift broadens financial inclusion for underserved groups, allowing remote access to services and reducing traditional barriers. However, proficient ICT usage requires a baseline of digital literacy; without these, lower-income or less-educated segments struggle to benefit, potentially widening gaps (Bùi & Lê, 2025).

Digital financial assets and currencies further complicate governance. These instruments, often leveraging distributed ledger technologies, offer decentralization and cost reductions but lack clear legal definitions in many jurisdictions (Bashilov et al., 2021). Turnover remains unpredictable, exposing systems to risks of evasion and instability. Regulatory lags - particularly in defining ownership and enforcement - hinder balanced development, especially where digital markets expand quickly.

Fiscal policy plays a pivotal role in addressing these dynamics. Governments must redesign tax regimes to accommodate digital transactions and allocate budgets toward infrastructure, innovation, and skill enhancement (Mai & Nguyễn, 2025; Horobet et al., 2025). Targeted spending can promote educational development and labor adaptability in knowledge-intensive digital industries. Yet, preferential policies favoring high-skilled talent may inadvertently intensify agglomeration in urban centers, raising incomes there while constraining mobility for low-skilled workers (Mu et al., 2025). Capital-intensive

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digital sectors tend to reward skilled labor more generously than traditional ones, further influencing income distribution.

Digital divides thus encompass unequal infrastructure access (first-order) and varying abilities to utilize technologies effectively (second-order). At early digitalization stages, these divides often exacerbate disparities; in mature phases, they may narrow them through broader skill diffusion and inclusive platforms (Zhang et al., 2025; Trần & Trần, 2025).

In fast-growing emerging markets across Southeast Asia - where national strategies emphasize comprehensive digital integration - these challenges carry particular weight. Coordinated reforms are needed to mitigate risks and ensure equitable participation in digital dividends.

This paper examines fiscal and regulatory hurdles in digital economy governance, focusing on banking transformations, asset regulation, and policy adaptations. Insights from Kazakhstan (Litvishko et al., 2020), Russia (Bashilov et al., 2021), and international experiences (Mai & Nguyễn, 2025) inform implications for emerging economies advancing digital agendas. The analysis proceeds as follows: Section 2 explores banking digitalization and its challenges; Section 3 addresses regulatory frameworks for digital assets; Section 4 assesses fiscal adaptations; and Section 5 synthesizes findings with recommendations.

## 2. Banking Digitalization: Challenges and Transformations in Transition Economies

The integration of digital technologies into banking operations has accelerated markedly in transition economies, where structural reforms coincide with the need for enhanced financial efficiency. Access to reliable ICT infrastructure enables banks to expand services beyond traditional branches, yet the benefits depend heavily on customers' and institutions' abilities to utilize these tools effectively (Litvishko et al., 2020; Bui & Lê, 2025).

In Kazakhstan, the "Digital Kazakhstan" state program, approved in 2017, has served as a primary driver of this process. The initiative prioritized informatization across sectors, with banking emerging as a frontrunner due to its inherent linkage to IT infrastructure (Litvishko et al., 2020). Remote banking services - internet

and mobile applications - have become central, registering over 9 million users, of whom more than 30% conduct regular transactions. Transaction volumes through these channels now exceed those via POS terminals, reflecting a clear shift toward non-cash mechanisms.

This transformation yields several operational advantages. First, digital channels reduce costs associated with physical branches and manual processing, allowing banks to achieve economies of scale. Second, 24/7 availability extends reach to remote or underserved populations, promoting financial inclusion. Third, personalized services - such as biometric authentication, contactless payments, and tailored credit products - enhance customer satisfaction and retention (Litvishko et al., 2020; Ngô, 2025).

Leading institutions illustrate these gains. Kaspi Bank, for instance, has developed an integrated ecosystem encompassing online payments, e-commerce, transfers, and branch services, generating substantial profits while maintaining low overheads. Similarly, Halyk Bank and ForteBank introduced features like Apple Pay, facilitating secure and rapid transactions (Litvishko et al., 2020). Empirical data underscore the scale of non-cash growth. By 2019, card-based non-cash payments reached 3.7 trillion tenge, with annual increases exceeding 120% in some segments - far outpacing rates in comparable markets.

**Table 1. Non-cash payments in Kazakhstan, January-may (billion tenge)**

|                  | Total   |         | The growth of total |        | The share of RK |         |
|------------------|---------|---------|---------------------|--------|-----------------|---------|
|                  | 2019/05 | 2018/05 | 2018/05             |        | 2019/05         | 2018/05 |
| Kazakhstan       | 3746,8  | 1746,8  | 214,5%              | 2000,0 | 100,0%          | 100,0%  |
| Almaty           | 2570,1  | 1105,3  | 232,5               | 1464,8 | 68,6            | 63,3    |
| Nur-Sultan       | 321,6   | 160,7   | 200,1               | 160,9  | 8,6             | 9,2     |
| Almaty           | 186,9   | 40,5    | 461,9               | 146,4  | 5,0             | 2,3     |
| Karaganda        | 109,5   | 77,8    | 140,8               | 31,7   | 2,9             | 4,5     |
| Atyrau           | 77,1    | 40,5    | 190,3               | 36,6   | 2,1             | 2,3     |
| Shymkent         | 65,3    | 49,4    | 132,1               | 15,9   | 1,7             | 2,8     |
| Aktobe           | 59,1    | 36,0    | 164,1               | 23,1   | 1,6             | 2,1     |
| East Kazakhstan  | 57,3    | 33,4    | 171,4               | 23,9   | 1,5             | 1,9     |
| Kostanay         | 54,9    | 33,3    | 165,0               | 21,6   | 1,5             | 1,9     |
| West Kazakhstan  | 52,3    | 30,6    | 171,0               | 21,7   | 1,4             | 1,8     |
| Mangistau        | 51,7    | 36,0    | 143,6               | 15,7   | 1,4             | 2,1     |
| Pavlodar         | 44,3    | 28,9    | 153,2               | 15,4   | 1,2             | 1,7     |
| Akmolinsk        | 32,0    | 34,9    | 91,6                | -3,0   | 0,9             | 2,0     |
| Zhambyl          | 23,8    | 14,5    | 164,6               | 9,3    | 0,6             | 0,8     |
| North Kazakhstan | 20,8    | 14,4    | 144,4               | 6,4    | 0,6             | 0,8     |
| Kyzylorda        | 20,1    | 10,5    | 190,5               | 9,5    | 0,5             | 0,6     |

Source: Litvishko et al., 2020, based on National Bank of Kazakhstan statistics

The table reveals explosive growth in Kazakhstan's non-cash payments, doubling from 1,746.8 billion tenge in 2018 to 3,746.8 billion tenge in 2019 - a 214.5% increase. This surge aligns with the "Digital Kazakhstan" program's push for remote banking and fintech adoption (Litvishko et al., 2020).

Urban dominance is stark: Almaty captured 68.6% of transactions in 2019 (up from 63.3%), with volumes rising 232.5%. Nur-Sultan held 8.6%, while peripheral regions like Kyzylorda contributed just 0.5%. This concentration reflects first-order digital divides - better infrastructure and connectivity in cities enable higher ICT usage.

Skilled urban users benefit most, accessing seamless services and inclusion gains. However, remote or low-income groups face barriers in access and skills, risking exclusion and widened disparities (Bùi & Lê, 2025; Zhang et al., 2025).

For emerging economies like those in Southeast Asia, these patterns highlight the need for fiscal investments in rural infrastructure and digital literacy to narrow divides and ensure equitable digital dividends.

Table 1's regional disparities and 214.5% national growth in non-cash payments set the stage for Table 2's channel breakdown in 2019. Internet and mobile platforms led non-cash transactions (615.8 million operations, 9.7 trillion tenge), far exceeding POS and ATMs - confirming remote banking's dominance in urban hubs like Almaty (Litvishko et al., 2020).

Yet, cash withdrawals persisted at 15.9 trillion tenge, mostly via ATMs, revealing incomplete shift from cash. Urban-skilled users drive digital payments, while rural or low-skilled groups rely on physical channels, deepening first- and second-order divides (Bùi & Lê, 2025).

This underscores the need for inclusive fiscal policies to bridge infrastructure and skill gaps in emerging digital economies.

Complementing the regional growth patterns observed in Table 1, Table 2 shifts focus to channel-specific usage, revealing how non-cash transactions in Kazakhstan during 2019 were overwhelmingly driven by internet and mobile platforms (Litvishko et al., 2020). This channel dominance reinforces the urban concentration highlighted earlier, as better-connected areas

facilitate higher remote adoption. However, persistent cash withdrawal volumes also point to lingering divides in full digital transition. These insights together illustrate the uneven pace of banking digitalization, where infrastructure and skill levels determine the extent of benefits realized.

**Table 2. Use of payment cards on the territory of the Republic of Kazakhstan**

| Indicators                | January-December         |                        |                            |                        |
|---------------------------|--------------------------|------------------------|----------------------------|------------------------|
|                           | Non-cash transactions    |                        | Cash withdrawal operations |                        |
|                           | Number (thousand TRANS.) | Amount (million tenge) | Number (thousand TRANS.)   | Amount (million tenge) |
| Total, incl.              | 1 146 726,0              | 13 304 974,4           | 348 414,9                  | 15 916 249,4           |
| POS-terminal              | 524 199,0                | 3 454 469,5            | 22 633,3                   | 2 144 828,1            |
| ATM                       | 6 646,9                  | 194 826,1              | 325 781,6                  | 13 771 421,3           |
| Internet and mobile phone | 615 873,4                | 9 655 303,4            | 0,0                        | 0,0                    |
| Bank kiosk                | 6,7                      | 375,3                  | 0,0                        | 0,0                    |

Source: Litvishko et al., 2020, based on National Bank of Kazakhstan statistics

The table highlights the dominance of digital channels in non-cash transactions, with internet and mobile platforms processing 615.8 million operations worth 9.7 trillion tenge - far surpassing POS terminals (3.5 trillion tenge) and ATMs (Litvishko et al., 2020).

Total non-cash activity reached 1.1 billion transactions and 13.3 trillion tenge, yet cash withdrawals remained high at 15.9 trillion tenge, primarily via ATMs. This persistence indicates incomplete transition, where users leverage digital tools for payments but retain cash habits.

Skill and infrastructure divides likely contribute: urban, high-skilled groups drive remote adoption, while others face barriers in usage proficiency (Bùi & Lê, 2025). Targeted policies are needed to promote full digital shift and reduce exclusion in emerging economies.

However, digitalization also introduces notable challenges. Proficient usage demands digital skills; groups with lower education or limited ICT exposure often struggle to adopt new platforms, risking exclusion (Bùi & Lê, 2025; Zhang et al., 2025). Cybersecurity threats - phishing, data breaches - rise with online dependency, requiring substantial investments in protection. Automation displaces routine jobs, necessitating workforce reskilling in IT and data competencies (Litvishko et al., 2020).

A SWOT framework captures these dualities.

**Table 3. SWOT analysis of Internet banking**

| Strength                                                                                                                                                                                                                                                                                                                                                                                            | Weakness                                                                                                                                                                                                                                                             |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• Access at any time;</li> <li>• Saves a lot of time;</li> <li>• Faster transaction with lower costs;</li> <li>• Convenience for customers;</li> <li>• Competitive advantage for economies of scale;</li> <li>• Provides better convenience and greater efficiency</li> </ul>                                                                                | <ul style="list-style-type: none"> <li>• Security issues in digital mode;</li> <li>• Sensitivity to the global economy;</li> <li>• The use of Internet banking depends on the availability of the Internet;</li> <li>• Can only target specific customers</li> </ul> |
| Opportunities                                                                                                                                                                                                                                                                                                                                                                                       | Threats                                                                                                                                                                                                                                                              |
| <ul style="list-style-type: none"> <li>• Raising awareness of the benefits of digital banking among people;</li> <li>• Integration of domestic banks with foreign markets;</li> <li>• Better development in areas such as risk management and CRM;</li> <li>• Developing a modern it base to avoid system failures and provide an efficient and secure platform for online transactions.</li> </ul> | <ul style="list-style-type: none"> <li>• Any security-related issues or news may pose a threat;</li> <li>• Tough competition;</li> <li>• Global economic instability;</li> <li>• Lack of effective rules;</li> <li>• Lack of customer loyalty</li> </ul>             |

Source: Litvishko et al., 2020

Strengths stem from scalability and efficiency gains. Weaknesses arise from infrastructural vulnerabilities and skill gaps. Opportunities include expanded offerings through ecosystems. Threats involve intense competition and external risks like cyber attacks or outdated laws (Litvishko et al., 2020).

Human capital emerges as critical. Higher education levels enable better adaptation to digital demands, while gaps hinder participation in emerging opportunities like gig platforms or e-commerce (Bùi & Lê, 2025). In tax-related digital services, for example, user proficiency influences adoption rates and compliance (Đào & Nguyễn, 2025).

Customer satisfaction in digital banking similarly hinges on usability and trust. Factors such as seamless interfaces, security, and responsive support drive retention, though disparities in digital literacy can undermine these for certain segments (Ngô, 2025).

Broader implications extend to sustainability. While digital banking reduces paper-based processes, indirect effects - like increased energy demands from data centers - must be managed, aligning with green development goals (Trần & Trần, 2025).

In emerging economies advancing digital strategies, these experiences highlight the importance of balanced approaches. Investments in education and skills can narrow second-order divides, ensuring wider access to digital dividends. Regulatory support for secure innovation, coupled with inclusive policies, helps mitigate exclusion risks.

Ultimately, banking digitalization offers substantial efficiency and inclusion potential, yet its success depends on addressing skill

disparities and infrastructural gaps. Failure to do so may widen inequalities, even as transaction volumes grow. These insights inform subsequent discussions on regulatory and fiscal dimensions, where similar divides influence outcomes.

### 3. Regulatory Challenges for Digital Financial Assets and Currency

The emergence of digital financial assets (DFAs) and digital currencies has introduced profound complexities into financial governance, particularly in transition and emerging economies where regulatory frameworks often lag behind technological innovation. Access to these instruments promises efficiency gains and reduced intermediation costs, yet their decentralized nature challenges traditional oversight mechanisms and exacerbates risks tied to skill disparities and infrastructural divides (Bashilov et al., 2021; Mu et al., 2025).

In Russia, DFAs are legally defined as monetary claims or rights to emission-class securities recorded through distributed ledger technologies, excluding conventional electronic funds and dematerialized securities. Digital currency, meanwhile, is conceptualized as an aggregate of electronic data capable of serving as a payment instrument outside designated systems - neither legal tender nor fiat money within the Russian Federation (Bashilov et al., 2021). This narrow classification aims to integrate DFAs into existing civil law while imposing strict prohibitions on digital currency for domestic goods and services transactions.

Such regulation reflects a cautious approach. First, it subjects DFA issuance and turnover to centralized platforms operated by entities registered with the Bank of Russia, ensuring traceability and investor protection. Second, it mandates information disclosure and prospectus requirements for public offerings, aligning DFAs closer to securities than unrestricted cryptocurrencies. Third, it outright bans the use of digital currency as payment for Russian goods or services, mitigating risks of capital flight and monetary policy erosion (Bashilov et al., 2021).

However, implementation reveals significant hurdles. Legal predictability remains low due to the absence of uniform enforcement mechanisms and judicial precedents. Operators face endogeneity challenges: platforms must comply with stringent inclusion criteria, yet the regulatory perimeter itself evolves, creating uncertainty for

market participants. Taxation ambiguities further complicate matters - gains from DFA turnover are treated as property income, but digital currency holdings fall into gray zones, encouraging evasion (Bashilov et al., 2021).

These gaps amplify vulnerabilities linked to digital divides. High-skilled individuals with strong ICT proficiency can navigate complex platforms and disclosure requirements, accessing investment opportunities and hedging tools. In contrast, lower-skilled or less-educated groups encounter barriers in understanding risks, verifying legitimacy, or even participating - widening income disparities as capital flows toward digitally literate segments (Zhang et al., 2025; Bui & Lê, 2025).

Cybersecurity threats compound these issues. Distributed ledgers reduce certain intermediary risks but introduce new vectors - smart contract vulnerabilities, wallet breaches, and exchange hacks - that demand robust technical oversight. In jurisdictions with uneven digital infrastructure, rural or low-income users are disproportionately exposed, lacking resources for secure storage or recovery (Mu et al., 2025).

Comparative experiences highlight alternative paths. Permissive regimes, such as those in some offshore jurisdictions, prioritize innovation but risk money laundering and investor losses. Restrictive models, like Russia's, preserve control yet stifle domestic fintech development and push activity underground (Bashilov et al., 2021). Hybrid approaches - evident in evolving EU frameworks - balance innovation with safeguards through sandbox testing and proportional regulation, though adoption in emerging markets remains slow due to capacity constraints (Horobet et al., 2025).

Human capital constraints are particularly acute. Effective regulation requires regulators themselves to possess advanced digital competencies, yet talent shortages persist in many transition economies. Preferential policies attracting high-skilled professionals to urban centers can inadvertently deepen regional imbalances, as agglomeration effects raise incomes in digitally advanced areas while peripheral regions lag (Zhang et al., 2025).

Fiscal implications are intertwined. Unclear taxation of DFA gains and digital currency transactions erodes revenue bases, especially as cross-border flows evade traditional withholding mechanisms. Governments must therefore

redesign tax codes to capture value without stifling growth - potentially through simplified reporting for small investors and enhanced international cooperation (Mai & Nguyễn, 2025).

Customer protection represents another critical dimension. Without clear recourse mechanisms, retail investors - often lured by high returns - face significant losses in volatile markets. Proficiency in risk assessment varies widely; digitally literate users can employ wallets and diversification strategies, while novices fall prey to scams or market manipulation (Ngô, 2025).

In fast-growing Southeast Asian emerging markets pursuing comprehensive digital strategies, these Russian experiences carry direct relevance. Overly restrictive bans risk driving innovation offshore, whereas insufficient safeguards expose economies to systemic shocks. Balanced regulation - coupled with investments in digital education and infrastructure - offers a pathway to harness DFAs for inclusive growth rather than elite capture.

To sum up, regulatory frameworks for digital financial assets and currencies remain fragmented and reactive in many transition contexts. While Russia's approach prioritizes control and integration into existing law, persistent ambiguities in enforcement, taxation, and protection highlight the challenges of governing decentralized technologies. Bridging first- and second-order digital divides through skill-focused policies is essential to prevent these instruments from exacerbating inequality. These insights underscore the need for adaptive, evidence-based regulation that aligns innovation with equitable access - a theme further explored in the subsequent examination of fiscal policy responses.

#### **4. Fiscal Policy Frameworks for the Digital Economy: International Experiences and Recommendations**

Fiscal policy plays a central role in steering the digital economy toward sustainable and inclusive outcomes, particularly in emerging markets where rapid technological uptake intersects with structural inequalities. Access to digital tools and platforms generates new revenue streams and efficiency gains, yet the distribution of these benefits hinges on individuals' skills, infrastructure availability, and policy design (Mai & Nguyễn, 2025; Horobet et al., 2025).



International experiences reveal that effective fiscal measures can amplify positive effects while mitigating divides. First, targeted budget allocations for digital infrastructure - such as broadband expansion and 5G networks - enhance first-order access, enabling broader participation in e-commerce and remote services. Second, incentives like tax credits for R&D in digital technologies foster innovation in knowledge-intensive sectors. Third, progressive taxation on digital transactions helps capture value from platform economies without discouraging growth (Mai & Nguyễn, 2025).

In Kazakhstan's context, the economic impact of the "Digital Kazakhstan" program exceeded 600 billion tenge in 2018–2019, with fiscal support improving global digital rankings through investments in public services, education, and finance (Litvishko et al., 2020). Similar patterns emerge elsewhere: governments prioritizing human capital development see stronger workforce adaptation to digital shifts.

However, misalignment in fiscal spending can exacerbate disparities. Preferential policies attracting high-skilled talent - through subsidies or tax breaks - often concentrate benefits in urban agglomerations, raising regional incomes while low-skilled workers face limited mobility and fewer opportunities (Zhang et al., 2025). Capital-intensive digital sectors reward educated labor more generously than traditional ones, widening income gaps between skill tiers (Bùi & Lê, 2025).

Digital trade and fintech further illustrate these dynamics. Platforms lower transaction costs and expand markets, promoting growth for proficient users. Yet, without supportive fiscal tools, lower-income groups struggle with adoption barriers, missing out on gig economy channels or cross-border opportunities (Trần & Trần, 2025).

Empirical analyses from international datasets show strong positive correlations between digital trade and overall productivity, particularly when reinforced by technological innovation. Foreign direct investment yields mixed results, sometimes negative in certain contexts due to resource misallocation. In both long- and short-run estimations, digital trade and innovation exhibit significant positive coefficients on productivity measures, with innovation showing the strongest sustained impact (Mai & Nguyễn, 2025).

Tax administration in digital contexts demands

modernization. Experiences with electronic invoicing and risk management highlight how digital tools improve compliance for skilled taxpayers but require capacity building for others (Đào & Nguyễn, 2025; Đặng & Phan, 2025). International lessons suggest redesigning regimes for platform revenues - value-added taxes on digital services, withholding on cross-border flows - to ensure fairness.

Recommendations emphasize balance. Governments should increase spending on education and vocational training to elevate workforce skills, enabling better adaptation to digital demands (Bùi & Lê, 2025). Subsidies for rural connectivity narrow infrastructure divides, while progressive digital taxes fund inclusive programs.

In energy-dependent transitions, fiscal incentives for green digital technologies - such as renewable-powered data centers - align growth with sustainability (Horobet et al., 2025). Manufacturing digitalization similarly benefits from targeted credits, though outcomes depend on organizational readiness (Xu, 2025).

Customer-facing digital services, like banking apps, show satisfaction tied to usability; fiscal support for user education enhances adoption across demographics (Ngô, 2025).

To sum up, fiscal policy frameworks must address both opportunities and risks in the digital economy. International experiences demonstrate that strategic investments in infrastructure and skills can narrow divides, promoting equitable growth. Misaligned priorities, however, reinforce inequalities through skill-biased agglomeration and uneven access. For emerging Southeast Asian economies advancing national digital strategies, these lessons underscore the value of inclusive fiscal design - prioritizing human capital, fair taxation, and sustainable innovation - to ensure digital dividends reach all segments of society.

## 5. Synthesis of Challenges and Policy Implications

The analysis throughout this paper highlights deeply interconnected challenges in digital economy governance. Banking digitalization drives efficiency and inclusion where infrastructure and skills align, yet Kazakhstan's experience shows how urban bias and lingering cash dependency perpetuate exclusion for rural or low-skilled groups (Litvishko et al., 2020; Bùi

& Lê, 2025). Regulatory efforts, such as Russia's controlled integration of digital financial assets, prioritize stability but create enforcement gaps that leave less proficient users vulnerable (Bashilov et al., 2021). Fiscal measures, while capable of funding innovation and infrastructure, often favor high-skilled segments, reinforcing agglomeration and skill-based income divides (Mai & Nguyễn, 2025; Zhang et al., 2025).

These elements converge around digital divides: first-order barriers in access limit basic participation, while second-order differences in usage proficiency determine who captures meaningful gains. Without intervention, early digitalization phases widen disparities through premium rewards for educated labor and urban clustering; later stages offer narrowing potential only if policies promote diffusion (Trần & Trần, 2025).

Policy implications for fast-growing Southeast Asian emerging economies are clear and actionable. First, fiscal priorities should shift toward rural broadband and subsidized devices to close infrastructure gaps. Second, expanded vocational programs and lifelong learning initiatives can build workforce skills, opening gig economy and e-commerce channels for low- and middle-income households (Bùi & Lê, 2025). Third, regulatory reforms - defining clear DFA classifications, enabling sandboxes for innovation, and cooperating internationally on taxation - would reduce uncertainty while preventing evasion (Bashilov et al., 2021). Progressive digital taxes, paired with green incentives, can fund these efforts sustainably (Horobet et al., 2025).

Integrated approaches combining fiscal redistribution, regulatory clarity, and human capital investment are essential. Only through such coordination can digital transformation deliver equitable outcomes rather than elite capture.

## 6. Conclusion

The digital economy presents emerging markets with transformative potential alongside persistent governance risks. Kazakhstan's banking shifts demonstrate how digital tools enhance efficiency for connected users, while Russia's regulatory caution reveals the difficulties of controlling decentralized assets without stifling progress (Litvishko et al., 2020; Bashilov et al., 2021). International fiscal experiences further show that targeted spending can drive productivity, though poorly designed policies often exacerbate skill

and regional divides (Mai & Nguyễn, 2025).

At the core lies the enduring impact of digital divides - unequal access and varying usage capabilities - that shape inclusive growth trajectories. Proactive policies hold the key to mitigating these risks and unlocking broader benefits.

Looking ahead, fast-growing economies in Southeast Asia stand at a pivotal juncture. By embracing integrated strategies - robust infrastructure investment, comprehensive skill development, clear asset regulation, and fair taxation - policymakers can steer digital advancement toward equitable ends. Capacity building in tax systems and cybersecurity will complement these efforts, ensuring resilience against emerging threats (Đào & Nguyễn, 2025; Đặng & Phan, 2025).

Resilient governance demands aligning technological momentum with social priorities. When digital dividends reach beyond urban or high-skilled groups - through deliberate, inclusive design - emerging markets can achieve balanced, sustainable development that benefits society as a whole.

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# FACTORS INFLUENCING MANAGERIAL DECISION-MAKING EFFECTIVENESS IN THE DIGITAL TRANSFORMATION CONTEXT: THE MEDIATING ROLE OF KNOWLEDGE SHARING

PhD. Nguyen Thi Thu Huong\*

**Abstract:** *This study examines the paradoxical role of knowledge sharing in enhancing the effectiveness of managerial decision-making during digital transformation in Vietnam. Using the PLS-SEM method with 299 employees and managers from enterprises undergoing digital transformation, the study finds that, paradoxically, increased knowledge sharing has a negative impact on decision-making effectiveness, contrary to conventional expectations that more knowledge sharing improves decision-making.*

• **Keywords:** *knowledge sharing; decision-making effectiveness; digital transformation; PLS-SEM.*

*Date of receipt: 20<sup>th</sup> Feb., 2026*

*Date of delivery revision: 26<sup>th</sup> Feb., 2026*

*DOI:*

*Date of receipt revision: 05<sup>th</sup> Mar., 2026*

*Date of approval: 28<sup>th</sup> Mar., 2026*

## 1. Introduction

Digital transformation is fundamentally altering organizational operations and decision-making on a global scale. The unprecedented surge of digital information in recent years has fundamentally transformed the process of knowledge sharing. Previous research has typically emphasized the positive role of knowledge sharing in enhancing decision quality by enabling the synthesis of multidimensional information and leveraging collective intelligence. However, the digital age's data explosion raises important questions about whether more knowledge sharing always leads to better decisions. Recent systematic reviews indicate that exponential digital information growth commonly triggers information overload, affecting decision-making, productivity, and overall well-being. Does increased knowledge sharing always lead to more effective decisions in digital environments, or might it also introduce negative effects that remain underexplored?

Section 2 presents the theoretical framework and hypothesis development; Section 3 covers methodology; Section 4 presents results and discussion; Section 5 discusses theoretical and practical implications; Section 6 provides conclusions.

## 2. Theoretical framework and hypothesis development

### 2.1. Theoretical framework

*Resource-based view:* The resource-based view (RBV) posits that sustainable competitive advantage

arises from resources that are valuable, rare, inimitable, and non-substitutable (Barney, 1991). Within digital transformation contexts, organizational knowledge, particularly the tacit expertise of highly skilled professionals, constitutes a critical strategic asset. Recent research demonstrates that digital transformation significantly influences knowledge management system development and effectiveness, enabling organizations to enhance innovation performance and competitive advantage. However, research extends RBV by investigating circumstances in which knowledge resources remain unshared due to individual motivations or organizational barriers, resulting in paradoxical outcomes where valuable resources fail to generate anticipated value.

*Social exchange theory:* Social exchange theory posits that organizational relationships are governed by cost-benefit trade-off principles (Blau, 2017). Individuals engage in knowledge sharing when they anticipate receiving commensurate benefits, such as recognition, trust, and support. Recent empirical evidence demonstrates that organizational trust and perceived organizational support enhance knowledge-sharing motivation by strengthening reciprocity expectations (Chen et al., 2025). Both relational and structural social capital positively influence knowledge management processes, thereby facilitating knowledge-sharing behaviors. Nevertheless, within digital transformation contexts characterized by heightened competition, rapid technological change, and evolving work arrangements, the calculus surrounding the

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costs and benefits of knowledge sharing undergoes substantial modification, generating novel dynamics warranting investigation.

*Information processing theory:* Information processing theory posits that organizations possess finite information processing capacity, whereby decision-making effectiveness depends on the balance between information requirements and processing capabilities (Galbraith, 1973). In the digital era, information collection and dissemination capacity have expanded exponentially, precipitating widespread information overload that adversely affects decision-making quality, productivity, and employee well-being. Contemporary research demonstrates that excessive information delays decisions and compromises decision-making efficacy through cognitive overload mechanisms. This theoretical framework provides a foundation for understanding the potential adverse effects of knowledge sharing on decision-making effectiveness in digital organizational contexts, particularly when information volume exceeds cognitive processing capacity.

## 2.2. Concepts

### *Professional competence*

Professional competence (PC) encompasses specialized knowledge, technical skills, and problem-solving abilities acquired through education, training, and practical experience (Ericsson, 2006). In digital contexts, this extends to the capacity to utilize digital technologies for analyzing, selecting, and evaluating data to investigate work-related problems and build collaborative knowledge bases. Within digital transformation environments, professional competence encompasses both technical expertise and the ability to leverage information technology for organizational value creation. However, expert knowledge transfer remains critical for knowledge management, particularly as organizations recognize the risks associated with concentrating critical knowledge among limited personnel.

### *Process formalization*

Process formalization (PF) refers to the degree to which organizational policies, procedures, and work processes are documented, standardized, and explicitly articulated to guide employee behavior and ensure operational consistency (Pertusa-Ortega et al., 2010a). Research demonstrates that bureaucratic structures and procedures impede network flexibility and knowledge flow. Recent evidence indicates that excessive formalization inhibits the relationship between

knowledge-sharing behavior and organizational performance by imposing undue constraints (Mustafa et al., 2022). In rapidly evolving digital environments, traditional process rigidity constitutes a significant barrier to the flexible information flow required for digital transformation.

### *Organizational trust*

Organizational trust (OT) represents a psychological state whereby individuals willingly rely on organizational actions and colleague behaviors with positive expectations regarding their intentions and competence (Mayer et al., 1995). Trust plays a foundational role in social exchange relationships, as exchanges presume confidence between participating parties. Trust facilitates the open exchange of ideas and expertise, reducing perceived risks associated with knowledge disclosure. Recent research demonstrates that interpersonal trust significantly influences organizational commitment, knowledge-sharing behaviors, and creative performance. Within digital transformation contexts, trust assumes heightened importance as organizational trust and digital trust, confidence in digital platforms, processes, and protection mechanisms, jointly influence knowledge sharing through technology-mediated channels (Chen et al., 2025)

### *Knowledge sharing*

Knowledge sharing (KS) constitutes the process whereby individuals exchange explicit and tacit knowledge with organizational members to create new organizational knowledge and capabilities (Nonaka, 2009). Knowledge management processes enhance employee engagement, operational effectiveness, and organizational learning while serving as critical enablers for data-driven decision-making and digital transformation initiatives. Contemporary research emphasizes that knowledge sharing occurs through multiple technological channels in digital contexts, requiring organizations to balance knowledge accessibility with information quality and relevance. However, digital transformation can complicate knowledge management by exponentially increasing data volumes, necessitating sophisticated filtering, organizing, and comprehension mechanisms to prevent information overload.

### *Decision-making effectiveness*

Decision-making effectiveness (DME) represents the degree to which management decisions achieve desired objectives promptly, utilizing accurate and appropriate information while optimizing



organizational resources (Dean & Sharfman, 1996a). Information overload impairs decision quality, reduces productivity, and increases cognitive pressure. Excessive information can induce decision fatigue, anxiety, and choice paradox, hindering optimal decision-making. With global data projected to expand from 149 zettabytes in 2024 to 394 zettabytes by 2028, information processing challenges will continue to intensify.

### 2.3. Hypothesis development

#### 2.3.1. Relationship between professional competence and knowledge sharing

Although intuition suggests that employees with high professional competence share more knowledge due to possessing valuable expertise, empirical evidence reveals a paradoxical relationship. Highly competent individuals often develop psychological ownership over their specialized knowledge, perceiving it as a personal competitive advantage requiring protection. This psychological ownership manifests through territorial feelings wherein experts view certain domains of knowledge as their proprietary territory, leading to knowledge-hiding behaviors aimed at preserving power, status, and competitive positioning (Connelly et al., 2012). Research demonstrates that knowledge territoriality, characterized by possessive attitudes toward knowledge domains, significantly inhibits knowledge-sharing behaviors while simultaneously reducing the knowledge holder's creative performance and collaborative effectiveness.

This paradox becomes particularly pronounced in competitive organizational environments where highly skilled employees face conflicting pressures: they are expected to share knowledge for organizational development while simultaneously needing to protect their expertise to maintain personal status and job security. Empirical evidence suggests that stronger feelings of psychological ownership may lead employees to conceal knowledge from colleagues, particularly under conditions of avoidance motivation or perceived threat. Furthermore, in knowledge-intensive contexts, experts who have invested substantial time, effort, and resources in acquiring complex specialized knowledge exhibit higher reluctance to share this knowledge, viewing such hoarding as necessary for preserving their unique value proposition within the organization. Consequently, this research proposes that professional competence negatively affects knowledge-sharing behaviors in competitive digital transformation environments. Based on this theoretical and empirical evidence, this study proposes:

*H1: Professional competence negatively impacts knowledge sharing.*

#### 2.3.2. Relationship between process formalization and knowledge sharing

Process formalization, traditionally expected to facilitate knowledge sharing through clear mechanisms and standardized procedures, may paradoxically produce counterproductive effects in contemporary organizational contexts. Empirical evidence from European enterprises reveals a significant negative correlation between formalization levels and employee innovation capacity, demonstrating that as formalization increases through detailed rules and written guidelines, employees' willingness to proactively share novel ideas systematically decreases. This negative relationship stems from formalization's tendency to create bureaucratic constraints that restrict flexibility in knowledge flows and reduce employees' perceived autonomy.

The structural inertia induced by formalization manifests through rigid procedural adherence that prioritizes rule compliance over proactive knowledge contribution, thereby transforming knowledge-sharing from an intrinsically motivated collaborative behavior into a mechanistic obligation distinguish between enabling and coercive formalization, suggesting that well-designed formal systems can facilitate knowledge orchestration, research in digital transformation contexts indicates that bureaucratic dimensions frequently dominate, creating restrictions on spontaneous knowledge-exchange behaviors essential for innovation and adaptation. Consequently, this research proposes that process formalization negatively affects knowledge-sharing behaviors in organizations undergoing digital transformation, where flexibility and informal collaboration are paramount. Based on this theoretical and empirical evidence, this study proposes:

*H2: Process formalization negatively impacts knowledge sharing.*

#### 2.3.3. Relationship between organizational trust and knowledge sharing

Organizational trust is considered critical for promoting knowledge-sharing behavior. A comprehensive evidence synthesis by the Chartered Institute of Personnel and Development examining 56 empirical studies demonstrates that inter-organizational trust positively impacts cooperation, partnership, joint problem-solving, knowledge acquisition, and information-sharing outcomes. The research found

evidence that trust at different organizational levels is positively correlated, suggesting that organizational-level trust cascades to individual interactions and creates enabling conditions for knowledge exchange across hierarchical boundaries.

Recent research on virtual teams reveals that colleague trust positively impacts knowledge-sharing behavior through psychological safety mediation. The study demonstrated that high-trust environments enable safer knowledge sharing even in remote contexts characterized by information security risks and limited supervision. The psychological safety mechanism proves particularly critical in digital transformation contexts where traditional face-to-face trust-building opportunities are diminished. Employees who trust their coworkers perceive reduced interpersonal risks associated with knowledge contribution, thereby increasing willingness to share both explicit and tacit knowledge through digital platforms.

The concept of digital trust has emerged as increasingly important in transformation contexts. ISACA's state of digital trust 2024 report (ISACA, 2024), survey of over 5,800 digital trust professionals globally emphasizes that organizations with high digital trust more successfully implement digital transformation initiatives, including effective knowledge-sharing cultures. The report found that 78% of respondents agree that digital trust is crucial to digital transformation success, with 81% indicating that organizations demonstrating commitment to digital trust will be more successful. However, concerning gaps persist, as only 53% express confidence in their organization's digital trustworthiness, highlighting the critical need for organizations to prioritize trust-building mechanisms to facilitate knowledge-sharing behaviors in digital environments. Consequently, this research proposes that organizational trust positively affects knowledge-sharing behaviors in digital transformation contexts. Based on social exchange theory and this empirical evidence, this study proposes:

*H3: Organizational trust positively impacts knowledge sharing.*

#### 2.3.4. Relationship between knowledge sharing and decision-making effectiveness

Traditional perspectives posit that knowledge sharing positively impacts decision-making effectiveness by providing comprehensive information and diverse perspectives. However, in the digital age characterized by exponential information growth, this relationship requires reconsideration. Information processing theory suggests that organizations

possess finite information processing capacity; when information volume exceeds this capacity, decision-making effectiveness may decline rather than improve.

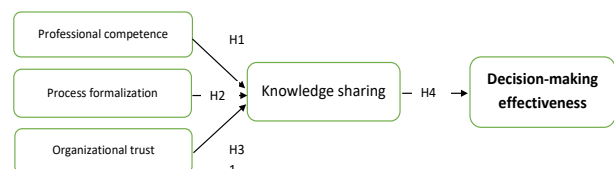
In high-pressure management contexts, decision-makers overwhelmed with excessive information may revert to habitual responses, delay critical actions, or commit errors due to cognitive fatigue. With global data projected to expand dramatically in the coming years, information processing challenges will intensify. The relationship between knowledge sharing and decision-making effectiveness may thus be non-linear or inverted U-shaped, where beyond a certain threshold, additional information degrades rather than improves decision quality. Consequently, this research proposes that knowledge sharing negatively affects decision-making effectiveness when information volume exceeds organizational processing capacity in digital transformation contexts. Based on theory and empirical evidence on digital-age information overload, this study proposes:

*H4: Knowledge sharing negatively impacts decision-making effectiveness.*

#### 2.4. Proposed research model

Based on the theoretical reasoning and hypothesis development presented above, this study proposes an integrated research model (Figure 1) reflecting relationships in organizational knowledge management.

Figure 1: Research model



#### 3. Research methodology

This study employs a quantitative cross-sectional design to test paradoxical relationships in organizational knowledge management. Research subjects are employees and managers who regularly participate in knowledge sharing and decision-making activities, ensuring sufficient understanding of organizational culture and knowledge management processes for accurate feedback.

All constructs were operationalized using a five-point Likert scale ranging from 1 ("Strongly disagree") to 5 ("Strongly agree"). Professional Competence (PC), Process Formalization (PF), Organizational Trust (OT), Knowledge Sharing (KS), and Decision-Making Effectiveness (DME) were each measured using three

adapted items. The study controlled for demographic variables, including gender, age, education, work experience, job position, enterprise type, company size, and industry.

Data were analyzed using PLS-SEM software. Observed variable quality was assessed through outer loadings  $\geq 0.7$ , and scale reliability through Cronbach's alpha ( $\alpha \geq 0.70$ ). Convergent validity was evaluated via: (1) standardized loadings  $\geq 0.50$  ( $p < 0.001$ ); (2) average variance extracted (AVE)  $\geq 0.50$ ; and (3) composite reliability (CR)  $\geq 0.70$ . Discriminant validity was assessed using the Fornell-Larcker criterion (square root of AVE exceeds inter-construct correlations). Multicollinearity was examined via the Variance Inflation Factor ( $VIF < 5$ ).

Following measurement model validation, the structural model was evaluated using PLS-SEM with bootstrapping to estimate path coefficients, t-statistics, and significance levels, thereby testing research hypotheses.

#### 4. Research results and discussion

##### 4.1. Sample characteristics

The final sample comprises 299 valid responses from employees and managers across Vietnamese industries, demonstrating diversity in age, education, work experience, and organizational position. Gender distribution is relatively balanced (52.8% male, 47.2% female). The majority of respondents (68.2%) are aged 25-40, consistent with professionals actively engaged in digital transformation. Educational attainment is high: 74.9% hold bachelor's degrees, 24.1% master's degrees, reflecting typical knowledge worker credentials in digital transformation contexts.

Organizational positions include staff-level employees (38.5%), managers (61.5%), ensuring adequate representation of decision-makers and participants in organizational decision-making. Work experience ranges from 1-3 years (32.4%), 3-5 years (28.1%), 5-10 years (26.8%), to over 10 years (12.7%), capturing perspectives from both recent hires experiencing current digital transformation.

Industry representation includes information technology (28.4%), financial services (19.4%), manufacturing (15.7%), education (12.0%), healthcare (8.7%), retail and e-commerce (7.4%), and other sectors (8.4%), enhancing generalizability across organizational contexts undergoing digital transformation. Organizational size distribution spans small enterprises under 50 employees (31.1%), medium enterprises 50-250 employees (38.8%),

and large enterprises over 250 employees (30.1%), providing insights across different transformation implementation stages and scales.

##### 4.2. Assessment of the measurement model

**Assessment of indicator quality:** Table 1 shows that all outer loadings exceed the 0.70 threshold, ranging from 0.720 to 0.965, indicating observed variables adequately explain their corresponding latent constructs.

**Table 1. Results of outer loadings**

|      | DME   | KS    | OT    | PC    | PF    |
|------|-------|-------|-------|-------|-------|
| DME1 | 0.740 |       |       |       |       |
| DME2 | 0.872 |       |       |       |       |
| DME3 | 0.890 |       |       |       |       |
| KS1  |       | 0.816 |       |       |       |
| KS2  |       | 0.810 |       |       |       |
| KS3  |       | 0.777 |       |       |       |
| OT1  |       |       | 0.903 |       |       |
| OT2  |       |       | 0.858 |       |       |
| OT3  |       |       | 0.904 |       |       |
| PC1  |       |       |       | 0.907 |       |
| PC2  |       |       |       | 0.720 |       |
| PC3  |       |       |       | 0.965 |       |
| PF1  |       |       |       |       | 0.824 |
| PF2  |       |       |       |       | 0.890 |
| PF3  |       |       |       |       | 0.762 |

Source: Analysis results from SmartPLS

**Reliability and convergent validity:** Cronbach's alpha coefficients range from 0.730 to 0.867, exceeding the 0.70 threshold and confirming good internal reliability. Average variance extracted (AVE) for all constructs exceeds 0.50 (range: 0.642-0.789), indicating observed variables converge well and explain over 50% of latent construct variance. Composite reliability (CR) ranges from 0.843 to 0.918, substantially exceeding the 0.70 benchmark and demonstrating high internal consistency. All reliability and convergent validity criteria are satisfied, confirming measurement model quality (Analysis results from SmartPLS)

**Discriminant validity:** Discriminant validity was assessed using the Fornell-Larcker criterion. The square root of AVE exceeds all inter-construct correlations (below-diagonal values), ranging from 0.801 to 0.888, confirming that each construct is distinct from others in the model (Analysis results from SmartPLS).

**Multicollinearity Assessment:** Multicollinearity was assessed using the Variance Inflation Factor (VIF). All VIF values range from 1.365 to 4.391, below the threshold of 5, indicating no serious multicollinearity among model variables and ensuring estimate accuracy in PLS-SEM analysis (Analysis results from SmartPLS).



**Assessment of the Model's Explanatory Power ( $R^2$ ):** The  $R^2$  values (Table 2) indicate that the model explains 46.4% of the variance in KS, reflecting a moderate explanatory power, while only 16% of the variance in DME is explained, indicating a weak but acceptable level of explanation. Given the behavioral characteristics of DME and the complexity of digital transformation processes, such  $R^2$  values are consistent with prior research in social science-oriented PLS-SEM studies.

**Table 2: Results of the assessment of the model's explanatory power**  
(Coefficient of Determination -  $R^2$ )

|     | R Square | R Square Adjusted |
|-----|----------|-------------------|
| DME | 0.160    | 0.157             |
| KS  | 0.464    | 0.459             |

Source: Analysis results from SmartPLS

### 4.3. Testing the research hypotheses

Following measurement model validation, the structural model was evaluated to test hypotheses using bootstrapping with 1,000 resamples to estimate path coefficients and assess statistical significance. Table 3 presents hypothesis test results.

**Table 3. Results of hypothesis testing**

|                      | Original Sample (O) - $\beta$ | Sample Mean (M) | Standard Deviation (STDEV) | T Statistics ( O/STDEV ) | P Values | Results   |
|----------------------|-------------------------------|-----------------|----------------------------|--------------------------|----------|-----------|
| KS $\rightarrow$ DME | -0.400                        | -0.406          | 0.053                      | 7.525                    | 0.000    | Supported |
| OT $\rightarrow$ KS  | 0.773                         | 0.767           | 0.081                      | 9.543                    | 0.000    | Supported |
| PC $\rightarrow$ KS  | -0.148                        | -0.148          | 0.070                      | 2.116                    | 0.035    | Supported |
| PF $\rightarrow$ KS  | -0.235                        | -0.224          | 0.094                      | 2.506                    | 0.012    | Supported |

Source: Analysis results from SmartPLS

#### *Impact of knowledge sharing on decision-making effectiveness*

Results reveal a significant paradox: knowledge sharing negatively impacts decision-making effectiveness ( $\beta = -0.400$ ,  $p < 0.001$ ), contrary to traditional expectations that knowledge sharing universally benefits organizations, particularly in digital transformation contexts. This finding is theoretically significant and reflects contemporary organizational realities in the digital age. Information processing theory explains this finding through information overload in digital environments. Exponential digital information growth creates widespread overload, negatively affecting decision-making, productivity, and worker wellbeing. Overwhelmed decision-makers revert to habitual responses, delay critical actions, or commit errors due to cognitive fatigue. In high-pressure environments requiring rapid responses, cognitive overload impairs judgment, causing missed warning signs, poor risk assessment, and costly consequences (Bawden & Robinson, 2020).

#### *Impact of organizational trust on knowledge sharing*

The study confirms the strong positive role of organizational trust in knowledge sharing ( $\beta = 0.773$ ,  $p < 0.001$ ). This result aligns with social exchange theory and is reinforced by numerous recent studies in the digital transformation context. In the digital transformation context, digital trust is becoming an important concept. Digital trust, characterized by confidence in digital platforms and processes, protection of best interests, availability of adequate expertise, and protection from threats, directly enhances knowledge sharing and open innovation. Although trust is a critical factor promoting knowledge sharing, many organizations have not invested sufficiently in building and maintaining trust in digital environments (Chen et al., 2025).

#### *Impact of professional competence on knowledge sharing*

The research identifies a significant negative relationship between professional competence and knowledge sharing ( $\beta = -0.148$ ,  $p < 0.05$ ). This counterintuitive finding reveals that higher levels of professional competence paradoxically inhibit knowledge sharing behaviors. Within digital transformation environments characterized by intense competition and rapid technological change, highly competent experts may perceive their specialized professional knowledge as a critical personal competitive advantage requiring protection. This protective behavior stems from what knowledge management scholars term 'knowledge hiding', the intentional concealment or withholding of requested knowledge from colleagues (Connelly et al., 2012). When employees perceive their expertise as their primary source of organizational value and job security, they become reluctant to share this knowledge, particularly in contexts marked by employment uncertainty or internal competition. Empirical evidence demonstrates that job insecurity significantly increases knowledge hiding behavior, as employees seek to maintain their competitive advantage and perceived indispensability within the organization (Nguyen et al., 2022). In highly competitive digital transformation contexts where automation and artificial intelligence threaten traditional job roles, these concerns become particularly salient.

#### *Impact of process formalization on knowledge sharing*

Another critical finding reveals the negative impact of process formalization on knowledge sharing ( $\beta$



= -0.235,  $p < 0.05$ ). This result assumes particular significance within digital transformation contexts, where organizations must navigate the fundamental tension between standardization imperatives and flexibility requirements. The finding aligns with contemporary research examining the complex relationship between bureaucratic structures and collaborative governance in 21st-century organizations. Formalization, in conjunction with complexity and centralization, can negatively affect knowledge management performance. In digital transformation environments characterized by rapid change and continuous innovation demands, the rigidity inherent in traditional formalized processes can constitute a serious impediment to flexible, spontaneous knowledge exchange (Mustafa et al., 2022).

### 5. Theoretical and practical implications

This study makes three important theoretical contributions. First, it extends information processing theory by demonstrating an inverted U-shaped relationship between information and decision-making effectiveness in the digital age. After a critical threshold, additional information reduces rather than enhances decision quality through cognitive overload mechanisms. Second, the study extends social exchange theory by showing that cost-benefit calculations of knowledge sharing become more complex in digital transformation contexts, requiring new forms of digital trust that encompass technological, procedural, and systemic dimensions beyond traditional interpersonal trust. Third, it enriches resource-based view theory by identifying conditions where valuable resources high professional competence and process formalization may paradoxically impede knowledge sharing, particularly in rapidly changing digital environments. This challenges the assumption that superior resources automatically translate to effective resource utilization.

The research provides four critical implications for managers. First, organizations should strategically manage information quality and flow rather than merely encouraging more knowledge sharing. Incorporating AI and intelligent technologies is now the top priority for knowledge management teams, with the goal of effectively curating and filtering information rather than creating additional volume. Second, organizations must invest in building digital trust as a foundation for effective knowledge sharing. When executive leadership actively advocates for digital trust, it cascades into enhanced prioritization, budget allocation, training programs, and technical resources that overcome key implementation challenges. Third,

organizations need to balance maintaining high professional competence with encouraging knowledge sharing through appropriate incentive mechanisms, supportive cultures, and comprehensive development programs. Change management continues as the paramount skill for knowledge management teams when implementing new approaches. Finally, organizations must reconsider process formalization levels to ensure necessary flexibility in digital environments. While some standardization remains essential, excessive formalization hinders natural knowledge flows and rapid adaptation, critical success factors for digital transformation.

### 6. Conclusion

This article sheds light on an important paradox in knowledge management in the digital age: knowledge sharing, often regarded as the key to organizational efficiency, can lead to information overload and reduce decision-making effectiveness if not managed properly. This finding points to a more balanced and strategic approach to knowledge management in the context of digital transformation, where the quality of information and the ability to process it are just as crucial as the quantity of knowledge shared. This research not only contributes to the theoretical foundation of knowledge management and digital transformation but also provides valuable practical guidance for managers navigating their organizations through the profound changes of the digital era. In an increasingly complex and uncertain world, the ability to manage knowledge effectively will be the distinguishing factor between thriving organizations and those that fall behind.

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# STRATEGIES FOR STRENGTHENING DIGITAL MARKETING ADOPTION IN VIETNAMESE TOURISM ENTERPRISES

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**Abstract:** *The global marketplace, driven by the pervasive influence of the internet and information technology, has witnessed the rise of digital marketing as a dominant paradigm, further boosted by the advancements brought by the Fourth Industrial Revolution. The tourism sector, characterized by its unique service-oriented nature, has experienced a profound impact from this technological shift, offering considerable potential for businesses adopting digital marketing practices. Although a growing number of Vietnamese tourism firms have integrated digital technologies into their business operations, especially in marketing activities, the implementation remains inconsistent, and many business leaders lack a comprehensive understanding of the vital role digital marketing plays in enhancing operational and marketing effectiveness. This paper addresses this gap by clarifying the role of digital marketing, analyzing key determinants of its adoption, and offering solutions to enhance its effective implementation by Vietnamese tourism enterprises.*

Date of receipt: 05<sup>th</sup> Feb., 2026

Date of delivery revision: 20<sup>th</sup> Feb., 2026

DOI:

Date of receipt revision: 28<sup>th</sup> Mar., 2026

Date of approval: 02<sup>nd</sup> Apr., 2026

## Introduction

Driven by ongoing scientific and technological advancements, digital marketing has become an essential instrument for enterprises across various sectors, including tourism. Effective utilization of digital marketing, however, requires a thorough understanding of its role and a detailed analysis of the factors impacting its application within tourism businesses. This necessitates the development of tailored solutions to optimize its implementation.

### 1. The role of digital marketing for tourism businesses

Pride and Ferrell (2018) define digital marketing as “Digital Marketing uses all digital media, including the Internet, mobile and other interactive channels, to develop communication and exchanges with customers”. This definition underscores the capacity of corporations to leverage a wide array of electronic devices and digital technologies in the execution of marketing activities, with a particular emphasis on customer communication and interaction.

Morrison (2022) offers a perspective on tourism marketing, characterizing it as “a continuous, sequential process through which tourism organizations plan, research, implement, control, and evaluate programs aimed at satisfying travelers’ needs and wants as well as their visions, goals, and objectives. To be most effective, these marketing programs depend upon the efforts of many other

organizations and individuals within and outside the destination.”

Synthesizing the aforementioned definitions of digital marketing and tourism marketing, the concept of Tourism Digital Marketing can be articulated as follows:

*Tourism Digital Marketing encompasses the marketing activities undertaken by tourism businesses utilizing the internet and digital technology platforms to achieve predetermined marketing objectives.*

Considering the unique characteristics of the tourism sector, the role of digital marketing is further amplified within the context of globalization and the ongoing advancements in information and digital technologies. Specifically:

*(1) Digital marketing enhances the effectiveness of advertising and marketing communications for tourism businesses*

While traditional marketing communication tools such as events, print media, television, and mail often require substantial budgets, digital marketing campaigns are significantly lower in price. In the context of digital transformation, the rise of social media and search engines, promoting tourism through digital marketing (DM) facilitates rapid and highly effective customer outreach. DM offers numerous advantages, such as precision targeting, speed, cost-efficiency, ease of implementation, etc .... Tourism promotion via DM generates long-term benefits

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compared to traditional marketing approaches: The costs of DM campaigns are lower due to their ability to provide 24/7 access to customers; Information can be tailored to different stages of a campaign and easily measured using analytical tools. Moreover, DM eliminates the need for printed materials like posters and banners. Therefore, enterprises can allocate their budgets toward creating high-quality digital content, such as company details, destination highlights, and essential information for tourists, to display on their websites. This shift not only enhances content quality but is also cost-effective, as customers often discover tourism businesses through automated online search systems, significantly reducing marketing expenses.

Digital marketing enables tourism companies to direct information precisely to target audiences by leveraging existing customer data, user information systems, and other resources. This capability enables the delivery of tailored and optimized information to distinct customer groups, enhancing the precision and relevance of marketing efforts. Some of these data systems are developed internally by businesses, while a significant portion is provided by third-party platforms, including prominent social media networks such as Facebook and Google.

Furthermore, digital marketing facilitates the efficient dissemination of information across channels such as websites, emails, and social media platforms, ensuring rapid and effective communication with potential and existing customers.

*(2) Digital marketing enables businesses to personalize customer relationships, thereby improving their customer responsiveness.*

Through digital marketing channels, tourism companies establish direct lines of communication with customers. This direct engagement enables the provision of personalized customer experiences, fostering a perception among customers that their individual preferences are understood and catered to through tailored product or service offerings. Consequently, customer satisfaction, trust, and loyalty are cultivated, leading to the establishment of more robust and enduring customer relationships. Direct interaction also enables tourism businesses to gain deeper insights into customer desires. Based on this understanding, corporates can adjust their products, services, and other operations to better meet customer expectations. Digital marketing allows tourism businesses to effectively target pre-defined customer segments, focusing on specific activities, countries, or geographic regions they wish to target. Kumar (2014) also suggests that tourists often expect personalized

recommendations when purchasing travel products online. Many are willing to share personal preferences to receive tailored product suggestions. He also argues that digital marketing enhances the tourist experience.

Mousavi (2012) provides a detailed analysis of customer personalization in digital marketing. The result shows that modern information technology, coupled with the application of social media, has significantly transformed tourism business marketing activities, particularly concerning interactions with international tourists. Digital marketing directs marketing efforts toward specific tourist segments and distributes diverse services to prospective visitors to a given destination.

*(3) Digital Marketing Ensures Enhanced Sales Effectiveness for Tourism Businesses*

The adoption of digital marketing strategies within tourism businesses streamlines online search and booking procedures for customers. Data from the Vietnam National Administration of Tourism (2020) indicates that in 2019, a substantial 70% of tourists utilized mobile devices to search for tour information, underscoring the importance of mobile-optimized digital platforms. Tourism business websites offer significant advantages in terms of time and cost savings for customers, as online information retrieval proves considerably more efficient than traditional visits to physical travel agencies.

The integration of advanced visualization technologies, such as 4D and 5D, into online tour design and presentation, ensures that tourists can easily identify and select tours that align with their specific needs and preferences. Furthermore, the ability to conduct online price comparisons across various businesses enables customers to optimize their travel expenditures, while access to reviews and feedback from previous travelers helps reduce potential costs by providing valuable insights and mitigating potential unforeseen expenses (Mousavi, 2012).

Beyond streamlining transactions, digital marketing also plays a crucial role in stimulating travel demand.

Through digital analytics and reporting tools, tourism enterprises gain the capacity to proactively monitor, measure, and evaluate the efficacy of their marketing campaigns. These tools also enable businesses to estimate, with reasonable accuracy, the level of interest within potential customer segments regarding specific advertisements or to determine the volume of website traffic and searches associated



with specific keywords. This data allows companies to flexibly adjust their digital marketing campaigns, ensuring alignment with budgetary constraints and defined strategic objectives.

The deployment of digital marketing campaigns expands the reach of tourism businesses, enabling them to connect with and engage tourists on a global scale, transcending geographical limitations and facilitating sales anywhere, even without a physical presence. With the application of Big Data, tourism enterprises readily access vast amounts of user data, including audio, text, images, and customer profiles collected by online advertising platforms (Facebook, Google). Through all online activities, user “digital footprints,” such as cookies, browsing history, IP addresses, online behavior, devices used, and provided information, are captured.

Leveraging Big Data analytics grants tourism companies access to extensive repositories of user-generated data, encompassing audio, text, images, and comprehensive customer profiles collected by prominent online advertising platforms such as Facebook and Google. Through online activities, user digital traces, including cookies, browsing history, IP addresses, online behavior patterns, device usage data, and provided personal information, are captured and analyzed, providing valuable insights for corporates’ targeted marketing efforts.

## 2. Factors influencing the adoption of digital marketing in vietnamese tourism businesses

To enhance the effectiveness of digital marketing implementation, Vietnamese tourism businesses must identify the influencing factors and accurately analyze the extent of each factor’s impact on digital marketing performance. Both internal and external factors require careful consideration.

### 2.1. Internal factors

- *Infrastructure requirements and technological resources:* Digital marketing implementation requires tourism businesses to meet specific infrastructure and technological requirements, including computers, internet connectivity, and business applications such as tour sales software or online booking systems, ...

- *Leaders’ perception of digital marketing’s role in tourism business:* The perception of digital marketing as a strategic marketing technology within a business largely depends on the mindset of its leaders. Recognizing the importance of applying digital technology in business operations, especially in digital marketing activities, is critical for the survival of tourism enterprises in the era of a digital economy

and global internet connectivity. CEOs’ ability to assess the benefits of investing in DM, accurately forecast opportunities, and identify potential risks and challenges from not adopting DM is essential to improving its effectiveness. Additionally, executive boards must also demonstrate strong commitment and persistence in implementing DM initiatives within their business operations.

- *Human Resources and Financial Resources:* Digital marketing personnel within tourism companies must possess expertise in both tourism marketing and information technology. This dual expertise is particularly important given the rapid pace of technological advancement and change. Therefore, employees within tourism businesses must engage in continuous learning and research to stay abreast of emerging marketing trends. Furthermore, the allocated budget for digital marketing activities influences the approach and execution of these activities. A stable financial resource sufficient to support digital marketing operations facilitates investment in physical infrastructure, equipment, and training for the digital marketing team.

### 2.2. External Factors

In addition to internal factors, the effective application of DM in tourism business operations requires a thorough analysis of external influences, including:

- *Tourists’ Awareness of E-Commerce and Internet Usage Rates:* Tourists must have access to high-speed internet, a willingness to pay for internet services, and established habits of online shopping. These are essential conditions for tourism businesses to implement DM in online operations. Furthermore, the market size for such services must be sufficiently large and demonstrate a growing trend to ensure the feasibility of investing in DM. As aforementioned, the initial costs of adopting DM in tourism businesses are substantial, making market scalability critical for investment viability.

- *Advancements in Information Technology and the Internet:* Digital marketing applications and e-commerce business models are products of information technology advancements. Digital marketing applications can be employed in activities such as market research, new product research and development, digital technology application in communication program design, market segmentation, product promotion, sales, customer relationship management, and customer service, ....

- *Local and National Information Digital*



*Infrastructure:* The development of local and national information digital infrastructure provides a foundation, facilitates implementation, and creates impetus for the adoption of information technology in general and digital marketing in particular within tourism businesses. This development enhances tourists' access to information and visuals of destinations, attracting visitors, meeting their communication and other travel-related needs, and ultimately contributing to enhanced tourist satisfaction.

*- Government Policies on Information Technology Development:* The enactment of regulatory frameworks, policies, and strategies contributes to establishing a legal framework that attracts business investment in information technology and digital technology development. This creates a robust infrastructure for tourism businesses to implement digital marketing. Simultaneously, government policies provide a legal basis for tourism businesses to develop plans and implement solutions aligned with established strategic objectives. Furthermore, these policies provide a foundation for tourism businesses to mobilize resources for investment in information and communication technology infrastructure within their organizations.

### **3. Solutions for enhancing digital marketing implementation within vietnamese tourism businesses**

#### **3.1. Enhancing awareness of digital marketing applications among leadership and personnel**

Empirical evidence from Vietnam indicates a gap in the comprehensive understanding among tourism enterprise leaders regarding the role of Digital Marketing (DM) and the efficacy of integrating Information Technology (IT) and digital technologies into marketing strategies. Consequently, investment in DM initiatives within these enterprises often lacks strategic focus and prioritization, resulting in suboptimal returns relative to its developmental potential. To maximize the effectiveness of DM activities within the Vietnamese tourism sector, it is imperative that CEOs and senior management of tourism enterprises proactively engage in research to develop a robust understanding of the fundamental nature and strategic role of DM in enhancing business performance within the evolving market landscape. When management teams possess a firm grasp of current technological trends and appreciate the significance of applying scientific and technological advancements to business development, a foundation for the successful implementation and expansion of

DM is established. Such informed awareness will subsequently translate into increased allocation of both human and financial resources toward DM initiatives.

#### **3.2. Enhancing investment in information technology infrastructure**

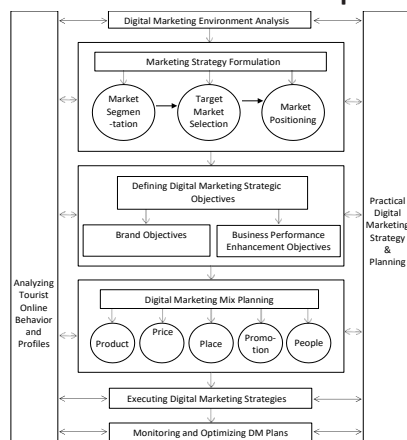
Effective DM strategies implementation within tourism enterprises are intrinsically linked to robust IT infrastructure. IT plays a crucial role not only in enhancing service quality and improving tourist satisfaction but also in enabling Vietnamese tourism enterprises to rapidly adapt to market dynamics. Customer satisfaction is significantly influenced by the accuracy and comprehensiveness of information regarding destination accessibility, facilities, attractions, and activities. Consequently, IT facilitates key drivers of consumer satisfaction. Proactive investment in and application of IT advancements within business operations will yield substantial benefits for Vietnamese tourism enterprises. To enhance competitiveness, these enterprises must embrace innovation in line with contemporary trends and societal advancements, thereby justifying substantial investment in IT. Of particular importance is the development of mobile-responsive websites that facilitate convenient access across various devices.

Vietnamese tourism enterprises must prioritize and augment budgetary allocations for DM activities. The Fourth Industrial Revolution necessitates the personalization of consumer products, including tourism offerings. Achieving this requires a deeper understanding of tourist needs, facilitated by technologies such as the Internet of Things (IoT) and Big Data. Digital transformation is imperative; however, some enterprises may encounter challenges due to varying levels of digital literacy. Digitalization often necessitates business restructuring and operational adjustments. Therefore, Vietnamese tourism enterprises must allocate additional budget for digitalization initiatives to accelerate this process.

#### **3.3. Developing a digital marketing framework for Vietnamese tourism enterprises**

To enhance the effectiveness of DM strategies implementation within Vietnamese tourism businesses, marketing practitioners must first establish a DM application framework tailored to the specific characteristics of both the industry and individual enterprises. Therefore, the research team proposes the following DM application process for Vietnamese tourism companies:

### Digital Marketing Application Process for Vietnamese Tourism Enterprises



#### 3.4. Solutions for digital marketing environment analysis

For effective DM strategies implementation in business operations, Vietnamese tourism enterprises (VTEs) must analyze the impact of environmental factors, with a primary focus on researching and analyzing internet environment factors. As tourist online behavior differs from traditional behavior, VTEs need to analyze emerging internet trends and examine environmental factors to identify opportunities and potential risks.

Examining internet environment factors provides VTEs with a holistic view and enables them to forecast future trends. The tourism industry is characterized by “on-the-spot export,” with international tourists constituting a significant proportion of total arrivals in Vietnam. DM application combined with global internet connectivity facilitates VTEs in researching both international and domestic tourism markets. Analyzing foreign competitors enables VTEs to develop effective competitive strategies.

Key research areas for DM planning include:

(1) *Researching Tourist Online Behavior*: This is a crucial area for VTEs. Research should address the following questions: Who are the enterprise’s customers? What are their online behaviors? What social, personal, or psychological factors influence their search and purchase of tourism products and accommodation online? What is their online purchase decision-making process? How does their behavior change with internet usage? Essentially, researching customer behavior involves analyzing big data related to online tourists. This analysis can leverage techniques such as web analytics, social listening, and customer journey mapping.

(2) *Researching Digital Product Suppliers in the Market*: VTEs need to understand the opportunities

and challenges presented by major suppliers like Google and Facebook. Data from these digital product suppliers or their partners can be analyzed to support VTEs if needed. This involves understanding platform algorithms, advertising options, and data analytics capabilities offered by these suppliers.

(3) *Researching Domestic and International Competitors* and factors influencing DM application in different countries’ online environments. Enterprises should utilize IT to gather information from various sources, design customer surveys, and employ software for customer behavior statistics. Competitive intelligence gathering, benchmarking, and cross-cultural analysis are relevant here.

(4) *Customer Research*: VTEs should use electronic research tools to monitor and regularly update customer feedback and reviews, organize online seminars, and conduct online surveys and interviews (using online survey tools like Google Forms and SurveyMonkey). Leveraging technologies like Artificial Intelligence (AI) can provide deeper insights into customer online behavior. VTEs should maximize the use of data analytics tools to closely align with customer experiences and expectations. Sentiment analysis and predictive analytics can further enhance understanding of customer preferences.

By applying DM and IT in market opportunity research and analysis, VTEs can exploit vast, low-cost data resources from the internet through official websites of agencies, organizations, associations, research institutes, universities, companies, enterprises, ministries, and departments. This data can include market reports, industry statistics, and consumer trend analyses.

**Conclusion:** Digital Marketing is a crucial tool for Vietnamese tourism enterprises to enhance business efficiency and create new competitive advantages in the global market within the context of the Fourth Industrial Revolution. Technology application in tourism is an inevitable trend. To maintain competitiveness and position, even domestically, VTEs need to shift their thinking and approach to DM activities to fully leverage the benefits it offers.

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# THE IMPACT OF DIGITAL TRANSFORMATION ON TAX ACCOUNTING SYSTEMS IN SMALL AND MEDIUM-SIZED ENTERPRISES

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**Abstract:** *This study focuses on analyzing and assessing the level of digital transformation adoption in tax accounting practices within small and medium-sized enterprises (SMEs). In addition, the paper examines the factors through which digital transformation influences the operational efficiency of tax accounting systems. Based on the research findings, the study proposes several recommendations and solutions aimed at enhancing the effectiveness of digital transformation in the field of tax accounting for SMEs.*

• **Keywords:** *digital transformation; tax accounting system; small and medium-sized enterprises.*

Date of receipt: 20<sup>th</sup> Jan, 2026

Date of delivery revision: 26<sup>th</sup> Feb., 2026

DOI:

Date of receipt revision: 05<sup>th</sup> Mar., 2026

Date of approval: 26<sup>th</sup> Mar., 2026

## 1. Introduction

In recent years, digital transformation has become an inevitable trend and a key driver of economic growth in Vietnam, exerting profound impacts on corporate governance practices, particularly in the fields of accounting and taxation. The rapid development of technologies such as cloud computing, artificial intelligence, and big data is fundamentally reshaping the ways in which tax accounting information is collected, processed, and reported within enterprises.

For SMEs, digital transformation offers opportunities to enhance operational efficiency, transparency, and tax compliance, while simultaneously posing significant challenges related to investment costs, human resource capabilities, and information security. In the context of Vietnam's accelerated implementation of electronic invoicing and e-taxation, examining the impact of digital transformation on SMEs' tax accounting systems is both necessary and of substantial practical significance.

## 2. Theoretical Framework and Research Methodology

### 2.1. Theoretical Framework

This study is grounded in three main theoretical frameworks, including the Technology-Organization-Environment (TOE) framework, Institutional Theory, and the Resource-Based View (RBV), to explain the determinants and mechanisms through which digital transformation affects tax accounting systems in SMEs.

According to the TOE framework (Tornatzky & Fleischer, 1990), technology implementation depends on technological readiness, organizational capability, and the regulatory environment. Meanwhile, Institutional Theory (DiMaggio & Powell, 1983) emphasizes the role of coercive and normative pressures particularly mandatory regulations on electronic invoicing and e-taxation in driving SMEs to digitalize their tax accounting systems. Complementing these perspectives, the RBV (Barney, 1991) posits that technological capability and digital accounting competence constitute strategic resources that enable enterprises to enhance tax accounting effectiveness and reduce compliance costs.

The integration of these theoretical perspectives suggests that digital transformation in SMEs' tax accounting systems results from the interaction between technological conditions, organizational capabilities, and the institutional environment, and directly influences information quality, tax compliance efficiency, and corporate tax governance capacity.

### 2.2. Research Methodology

This study adopts a mixed-methods approach, integrating both qualitative and quantitative methods to ensure the comprehensiveness and reliability of the research findings. Qualitative methods are employed to explore and systematize the factors through which digital transformation affects tax accounting systems in small and medium-sized enterprises, as well as to examine the suitability of the proposed research model within the Vietnamese context. Quantitative

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methods are applied to measure the extent to which digital transformation influences the operational effectiveness of tax accounting systems, based on the analysis of survey data collected from SMEs.

### **3. Research Content and Findings**

#### **3.1. Concept of Digital Transformation in Enterprises**

Digital transformation refers to the process of integrating digital technologies into all organizational activities in order to enhance operational efficiency, create new value, and optimize management practices (Westerman et al., 2014). According to the Ministry of Information and Communications of Vietnam (2021), digital transformation in enterprises is built upon three core pillars: the digitalization of operational processes, the transformation of business models, and the transformation of corporate culture. In the field of tax accounting, digital transformation is manifested through the adoption of electronic accounting software, electronic invoicing, online tax filing portals, cloud-based data storage systems, and artificial intelligence (AI) technologies to automate the recording, processing, and reporting of information.

Digital transformation is not merely the deployment of technological tools but rather a comprehensive restructuring of tax accounting systems to adapt to a modern regulatory and management environment. The application of digital technologies enables enterprises to improve the transparency, accuracy, and timeliness of tax-related financial information, minimize errors in tax declaration and payment, and enhance the effectiveness of regulatory oversight by tax authorities. However, digital transformation also poses significant challenges related to investment costs, data security, and the capacity of accounting personnel to effectively operate digital tools.

#### **3.2. Tax Accounting Systems in SMEs**

A tax accounting system comprises a set of processes, tools, and policies designed to collect, process, and report financial information for the purposes of determining tax obligations and supporting managerial decision-making (Horn gren et al., 2019). In SMEs, such systems are typically characterized by limited scale, constrained accounting staff, and a low level of automation. Consequently, tax recording, aggregation, and filing activities often rely on stand-alone software or manual procedures, which increases the risk of errors and delays in providing information to tax authorities.

According to the General Statistics Office of Vietnam (2024), SMEs account for over 97% of the

total number of enterprises in Vietnam, contributing more than 45% of GDP and approximately 31% of total state budget revenues. Despite their significant economic contribution, most SMEs face difficulties in accessing advanced technologies and lack the financial capacity to invest in digitalized tax accounting systems. Therefore, the implementation of digital transformation solutions in tax accounting is of substantial practical importance, as it enables enterprises to enhance labor productivity, reduce compliance costs, and improve financial transparency.

#### **3.3. Factors affecting the effectiveness of Tax Accounting Systems in SMEs**

The operational effectiveness of tax accounting systems in SMEs in the context of digital transformation is influenced by five key factors. First, the enterprise's digital technological capability, including IT infrastructure, accounting software, and data connectivity, serves as a fundamental determinant of system effectiveness. Second, digital accounting capability and human resource skills directly affect the ability to operate, utilize, and apply digital tools in tax accounting. Third, the legal environment and government support policies may facilitate or constrain the digitalization process through regulations on electronic taxation and digital transformation incentives. Fourth, the degree of automation in accounting-tax processes enhances accuracy and timeliness while reducing errors in tax declaration and payment. Finally, technology investment costs may negatively affect system effectiveness, particularly for SMEs with limited financial resources.

#### **3.4. Current Status and Level of Digital Transformation Adoption in Tax Accounting among SMEs**

The survey results from 118 small and medium-sized enterprises across three major economic centers Hanoi, Da Nang, and Ho Chi Minh City indicate that the adoption of digital transformation in tax accounting has achieved certain progress, albeit with substantial disparities across implementation dimensions. Specifically, approximately 78% of surveyed enterprises reported using electronic invoicing, and 64% had adopted accounting software integrated with tax declaration functions, reflecting a relatively high level of compliance with existing regulations. However, only about 38% of enterprises reported having online data connectivity between their accounting systems and tax authorities or internal management systems, suggesting that digitalization



remains largely fragmented rather than integrated and synchronized.

In addition, the proportion of enterprises applying data analytics tools or artificial intelligence to forecast tax liabilities or support tax cost optimization remains relatively low, accounting for only around 25% of the total sample. These findings reflect a common pattern among the surveyed SMEs, whereby digital transformation in tax accounting is primarily driven by compliance objectives rather than by managerial support or decision-making enhancement. Overall, the level of digital transformation in tax accounting among Vietnamese SMEs can be classified as moderate, with a predominant focus on meeting mandatory requirements such as electronic invoicing and online tax filing rather than on the automation of tax management processes.

The underlying causes of this situation stem mainly from constraints related to financial resources, the professional capacity of accounting personnel, and the absence of a clear strategic orientation toward digital transformation. Further analysis by firm size reveals that small enterprises (with fewer than 50 employees) exhibit significantly lower levels of digital technology adoption compared to medium-sized enterprises. Meanwhile, firms operating in the service and trade sectors tend to demonstrate higher levels of digital adoption, attributable to their frequent engagement in electronic transactions and the availability of extensive customer data systems.

### 3.5. Research Results

#### 3.5.1. Research Model and Hypotheses

Based on the theoretical foundations of digital accounting, the Resource-Based View (RBV), and prior empirical studies (Nguyen et al., 2022; Sadri, 2025; Vial, 2019), this study proposes a research model to identify and measure the factors influencing the operational effectiveness of tax accounting systems in small and medium-sized enterprises (SMEs) in the context of digital transformation. According to the RBV, the effectiveness of tax accounting system operations depends on the firm's ability to mobilize and integrate internal resources—such as technological, human, and financial capabilities—with external environmental conditions, including regulatory and policy frameworks. Accordingly, the proposed research model comprises five independent variables and one dependent variable, proposed research model:

- Digital technological capability of the enterprise (X1)

- Digital accounting capability and human resource skills (X2)

- Legal environment and government support policies (X3)

- Degree of automation in accounting-tax processes (X4)

- Technology investment costs (X5)

→ **Operational effectiveness of the accounting-tax system (Y)**

Each construct is measured using multiple observed variables based on a five-point Likert scale, ranging from 1 (“Strongly disagree”) to 5 (“Strongly agree”). The operational effectiveness of the accounting-tax system (Y) is assessed using criteria such as accuracy, timeliness, data connectivity, compliance, and system operating costs.

Based on the proposed model, the following research hypotheses are formulated:

- **H1:** Digital technological capability of the enterprise has a positive effect on the operational effectiveness of the tax accounting system.

- **H2:** Digital accounting capability and human resource skills have a positive effect on the operational effectiveness of the tax accounting system.

- **H3:** The legal environment and government support policies have a positive effect on the operational effectiveness of the tax accounting system.

- **H4:** The degree of automation in accounting-tax processes has a positive effect on the operational effectiveness of the tax accounting system.

- **H5:** Technology investment costs have a negative effect on the operational effectiveness of the tax accounting system.

Hypotheses H1-H5 are tested using Ordinary Least Squares (OLS) regression and Partial Least Squares Structural Equation Modeling (PLS-SEM). The empirical results will determine the magnitude and statistical significance of each factor's impact, thereby providing practical evidence to support policy recommendations and managerial solutions aimed at enhancing the effectiveness of digital transformation in tax accounting among Vietnamese SMEs.

#### 4.2. Results of Research Model Testing

The survey data were collected from 118 small and medium-sized enterprises (SMEs) operating in the manufacturing, trade, and service sectors across three key economic regions: Hanoi, Da Nang, and Ho Chi Minh City.

The reliability analysis of the measurement scales indicates that all observed variables achieved Cronbach's Alpha values greater than 0.7, and factor loadings exceeding 0.6, thereby confirming the internal consistency of the scales. The results of the Exploratory Factor Analysis (EFA) reveal that five distinct independent factor groups were clearly identified, jointly explaining 68.5% of the total variance in the model.

The Ordinary Least Squares (OLS) regression results demonstrate that the model is statistically significant, with an  $R^2$  value of 0.63 and an F-statistic of 47.82 (Sig. = 0.000). Specifically, the standardized regression coefficients (Beta) are presented in Table 1:

| Influencing factors                                     | Standardized Beta coefficient | Significance (Sig.) | Level of impact |
|---------------------------------------------------------|-------------------------------|---------------------|-----------------|
| Digital technological capability of the enterprise      | 0.41                          | 0.000               | Strong          |
| Digital accounting capability and human resource skills | 0.33                          | 0.001               | Moderate-strong |
| Legal environment and support policies                  | 0.28                          | 0.005               | Moderate        |
| Degree of automation in tax accounting processes        | 0.21                          | 0.009               | Moderate        |
| Technology investment costs                             | -0.19                         | 0.014               | Negative impact |

The results of the PLS-SEM analysis further confirm that the model satisfies both convergent and discriminant validity criteria, with Average Variance Extracted (AVE) values exceeding 0.5 and Composite Reliability (CR) values greater than 0.7. The model explains 61.2% of the variance in the operational effectiveness of tax accounting systems ( $R^2 = 0.612$ ), indicating a relatively high explanatory power. Hypotheses H1, H2, H3, and H4 are supported at the 1% significance level, while H5 is supported at the 5% level, consistent with the initial expectations.

The empirical findings reveal that digital technological capability of the enterprise (H1) exerts the strongest influence on the effectiveness of tax accounting systems ( $\beta = 0.41$ ). This result underscores that digital infrastructure readiness, electronic accounting software, and data integration between enterprises and tax authorities constitute the foundational determinants of successful digital transformation. This finding is consistent with prior studies by Nguyen et al. (2022) and Sadri (2025), which emphasize that technological investment is a prerequisite for realizing the benefits of digitalization.

Digital accounting capability and human resource skills (H2) also demonstrate a significant positive effect ( $\beta = 0.33$ ), highlighting the central role of human capital in the digital transformation process. Enterprises with accounting staff who are proficient in digital tools, capable of data utilization, and skilled in using accounting software tend to achieve

higher levels of efficiency in tax management and compliance.

The legal environment and government support policies (H3) show a moderate yet positively moderating effect. Enterprises benefiting from tax authority support or participating in government-led digital transformation programs exhibit operational effectiveness levels approximately 1.3 times higher than those without such support.

The degree of automation in tax accounting processes (H4) contributes to reducing errors and shortening document processing time; however, its impact has not yet reached an optimal level due to limitations in system integration and data security.

In contrast, technology investment costs (H5) have a statistically significant negative effect ( $\beta = -0.19$ ), indicating that financial constraints remain a substantial barrier, particularly for smaller SMEs. This finding aligns with the Vietnamese context, where the costs of implementing accounting software and cloud infrastructure remain relatively high compared to enterprises' financial capacity.

Overall, the results suggest that digital transformation exerts a positive but uneven impact on tax accounting systems in SMEs. To achieve higher effectiveness, enterprises need to simultaneously enhance technological capabilities, develop human resource skills, and fully leverage government support policies, thereby moving toward a more efficient, transparent, and sustainable digital tax accounting system.

#### ***4.4. Recommendations and Policy Implications for Enhancing the Effectiveness of Digital Transformation in Tax Accounting Systems of SMEs***

The research findings indicate that digital transformation has a clear positive impact on the operational effectiveness of tax accounting systems in small and medium-sized enterprises (SMEs); however, the magnitude of this impact depends largely on technological capabilities, human resource skills, and the legal and regulatory environment. To promote a sustainable and effective digital transformation process, a set of coordinated solutions should be implemented, as outlined below.

##### ***(1) Enterprise-level solutions***

First, SMEs should develop a comprehensive digital transformation strategy for tax accounting. Enterprises need to clearly define their objectives, implementation roadmap, and allocated resources for

digital transformation, thereby avoiding fragmented or trend-driven investments. This strategy should be embedded within the overall business plan and aligned with financial management, sales operations, and supply chain management.

Second, enterprises should make selective and strategic investments in digital tax accounting infrastructure and software. Priority should be given to cloud-based platforms and accounting systems that enable data connectivity with tax authorities through application programming interfaces (APIs), electronic invoicing, and online tax filing. Software selection should emphasize key criteria such as data security, scalability, integration with management systems (e.g., ERP, CRM), and cost-effectiveness.

Third, enhancing digital accounting capabilities and data-related skills of human resources is essential. SMEs should regularly organize in-house training programs or collaborate with accounting and auditing training institutions to update employees' skills in software utilization, data analytics, and information security. Human capital remains the critical determinant of success in digital transformation initiatives.

Fourth, enterprises should strengthen internal control mechanisms and ensure the security of tax accounting information. SMEs need to establish access control procedures, perform regular data backups, and clearly define user authorization levels to mitigate the risks of fraud and data leakage in digital environments.

#### (2) Government and tax authority-level solutions

First, it is essential to further improve the legal framework governing electronic tax accounting and digital transactions. The Ministry of Finance and the General Department of Taxation should harmonize regulations related to data standards, system connectivity, security, and electronic document storage, while eliminating overlapping or inconsistent provisions that create barriers for enterprises adopting digital accounting software.

Second, government agencies should expand support programs for SMEs' digital transformation. These initiatives may include financial support packages (such as concessional loans, tax incentives, and software subsidies), technical consulting services, and digital skills training programs for enterprise accountants. Scaling up pilot models of "standard electronic accounting systems" at the local level would also facilitate knowledge transfer and faster adoption among SMEs.

In addition, strengthening data connectivity and information sharing between tax authorities and enterprises is crucial. Electronic tax management systems should be further synchronized to enable real-time data exchange, thereby reducing the time required for tax declaration and payment while minimizing errors. This represents a critical foundation for advancing toward a "Digital Government-Digital Enterprise" ecosystem in the accounting and taxation domain.

In summary, enhancing the effectiveness of digital transformation in tax accounting systems of SMEs requires not only internal efforts from enterprises but also coordinated support from the government, tax authorities, and the broader technology ecosystem. A balanced integration of technological resources, human capital, and institutional frameworks will be the key to enabling Vietnamese enterprises to successfully undergo digital transformation and achieve transparency, efficiency, and sustainable development in the digital era.

#### Conclusion

This study examines the impact of digital transformation on tax accounting systems in Vietnamese small and medium-sized enterprises (SMEs). The results indicate that technological capability, digital accounting competence, human resource skills, legal environment, and investment costs significantly affect system effectiveness. Among these factors, digital technological capability and human capital play the most critical roles in driving successful digital transformation. Supportive legal frameworks and government policies facilitate the adoption of digital tax accounting practices. However, high technology investment costs remain a major barrier for smaller SMEs. Based on these findings, the study proposes multi-level solutions to enhance the effectiveness of digital tax accounting systems. These recommendations support the development of a transparent and efficient tax accounting ecosystem aligned with Vietnam's National Digital Transformation Program toward 2030.

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# FACTORS INFLUENCING THE ADOPTION OF DIGITAL BANKING SERVICES OFFERED BY VIETNAMESE COMMERCIAL BANKS AMONG INDIVIDUAL CUSTOMERS IN THE MEKONG DELTA REGION: THE MODERATING ROLE OF GOVERNMENT SUPPORT AND DEMOGRAPHICS

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**Abstract:** *This study examines factors affecting the adoption of digital banking services among customers in the Mekong Delta region, using data from 589 surveys and a PLS-SEM model. Integrating TAM, UTAUT, and DOI, the results show that Perceived Benefits (PB), Green Concern (GC), and Social Influence (SI) positively influence adoption, while Risk Dimension (RD) has a negative effect. Government Support (GS) plays a moderating role by strengthening positive factors and reducing barriers, and demographic characteristics also influence adoption behavior.*

• Keywords: digital banking services adoption, government support, green concern, Mekong Delta region, perceived benefits.

Date of receipt: 30<sup>th</sup> Jan., 2026

Date of delivery revision: 12<sup>th</sup> Mar., 2026

DOI:

Date of receipt revision: 25<sup>th</sup> Mar., 2026

Date of approval: 31<sup>th</sup> Mar., 2026

## 1. Introduction

Amidst the rapid digital transformation, digital banking has become a key driver of change in the financial operations at Vietnamese commercial banks. However, in the Mekong Delta Region (MDR), individual customers' adoption of digital banking services remains limited. Although these customers are well aware of the benefits related to convenience and positive environmental impacts, users in this region still face significant barriers arising from traditional transaction habits and concerns regarding security and privacy.

Therefore, this study focuses on analyzing the factors influencing personal and social benefits, as well as the barriers directly affecting the adoption of digital banking services by users in this region. In particular, the study emphasizes the moderating role of Government Support (GS) in amplifying positive impacts and mitigating negative effects, thereby enhancing user confidence in adopting digital banking services from Vietnamese commercial banks. Consequently, the study proposes several solutions to help these banks retain existing customers and attract potential ones; simultaneously, it recommends policies aimed at building a safe and sustainable digital financial ecosystem in the digital era.

## 2. Literature review

### 2.1. Perceived Benefits (PB)

Perceived Benefits are determined by the convergence of functional value and service innovation characteristics. Based on the TAM model, an empirical study (Safeena et al., 2014) identified two core components: Perceived Usefulness and Perceived Ease of Use, which reflect the advantages of online banking. Additionally, this study integrates relative advantage and compatibility within the DOI framework (Rogers, 2003), drawing on empirical research (Tan & Teo, 2000) regarding the adoption of online banking.

### 2.2. Risk Dimension (RD)

The Risk Dimension creates resistance based on the theory of perceived risk (Bauer, 1960). Empirical research (Safeena et al., 2014) has shown that perceived risk and complexity are major obstacles, particularly concerns about security and cumbersome authentication processes. Furthermore, (Laukkanen, 2016) highlighted traditional barriers, specifically the preference for physical interaction with bank staff. The lack of human presence in significant transactions, such as loans and savings, creates a psychological barrier, making it difficult for customers to abandon traditional methods and transition fully to digital banking.

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### 2.3. Social Influences (SI)

The acceptance of digital banking also possesses a community-based nature. (Safeena et al., 2014) confirmed that subjective norms (pressure from family and colleagues) strongly influence usage decisions. Additionally, image-related factors serve as intrinsic motivators. According to (Venkatesh et al., 2003), using advanced financial services helps individuals assert their status and technological savvy, thereby promoting adoption as a means of integrating into the digitalization trend.

### 2.4. Green Concern (GC)

The VBN (Stern, 2000), theoretical framework on environmental behavior is applied to sustainable consumption trends in the digital era. Although concepts of green perceived value and green trust are typically associated with tangible goods (Chen, 2010; Chen & Chang, 2012). Consequently, these studies show that users are willing to commit to the service as part of a responsible consumption lifestyle.

## 3. Theoretical foundations, models, and research hypotheses

### 3.1. Foundational Theory

Technology Acceptance Model (TAM) (Davis, 1989): This framework identifies perceived usefulness and ease of use as the primary intrinsic motivators driving the adoption of digital banking services.

Diffusion of Innovations (DOI) Theory (Rogers, 2003): This theory explains innovation adoption through several key characteristics, including relative advantage and compatibility as facilitators, and complexity as a significant barrier.

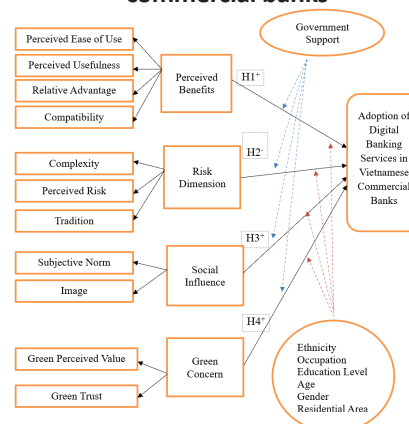
Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003): This framework demonstrates the impact of social influence as an independent variable and highlights the moderating role of facilitating conditions (such as Government Support) on user behavior.

Perceived Risk Theory (Bauer, 1960): This theory provides a framework for explaining customer hesitation caused by various risk dimensions, including security and financial risks in online transactions.

Value-Belief-Norm (VBN) Theory (Stern, 2000): As a foundational theory of environmental behavior, VBN links ecological consciousness with perceived green values and beliefs within the context of sustainable consumption.

### 3.2. Research Model

**Figure 1. Model of individual customers' adoption of digital banking services offered by Vietnamese commercial banks**



### 3.3. Research hypotheses

The research hypotheses were formulated based on the TAM, UTAUT, and DOI theories, as well as the empirical studies (Safeena et al., 2014) and (Chen & Chang, 2012), specifically:

H1–H4: Perceived Benefits (PB), Social Influence (SI), and Green Perceived Value (GC) are hypothesized to have significant positive impacts on the adoption of digital banking services offered by Vietnamese commercial banks among individual customers in the MDR, while Risk Dimension (RD) is expected to exert a negative effect on this adoption

H5–H8: Government Support (GS) is hypothesized to positively moderate the relationships between the independent variables (PB, RD, SI, GC) and the adoption of digital banking services offered by Vietnamese commercial banks among individual customers in the MDR. Specifically, GS strengthens the positive effects of PB, SI, and GC, while mitigating the negative impact of RD on this adoption.

H9–H14: Demographic factors, including ethnicity (H9), occupation (H10), education level (H11), age (H12), gender (H13), and residential area (H14), are hypothesized to significantly moderate the relationships between the independent variables (PB, RD, SI, GC) and the dependent variable, which is the adoption of digital banking services (UA) offered by Vietnamese commercial banks among individual customers in the MDR.

## 4. Research methodology

### 4.1. Sample Size, Sampling Method, and Sample Characteristics

#### Sample Size

Following the principle proposed (Hair Jnr et al., 2010), the minimum sample size should be ten times the number of observed variables to ensure the reliability of

the statistical tests. Since the research model includes 55 observed variables, the study required at least 550 observations. In practice, the sample size reached 589 valid responses out of a total of 650 surveys collected.

#### *Sampling Method*

Convenience sampling was employed for the following reasons (Saunders et al., 2011): (1) Ensuring the confidentiality of bank customers' information (Bornstein et al., 2013); (2) Enhancing objectivity by collecting data at multiple locations; and (3) Ensuring the target population was reached through a rigorous screening process within the survey questionnaire (Creswell & Creswell, 2017).

#### *Sample Characteristics*

The survey participants met the following criteria: (i) Individual customers of Vietnamese commercial banks residing in the MDR; (ii) Using a smartphone and having an internet connection; (iii) Being willing to use or currently using digital banking services from Vietnamese commercial banks; and (iv) Being 18 years of age or older.

#### **4.2. Data Analysis**

The study employed the PLS-SEM technique using SmartPLS software. The analysis followed the standard two-stage procedure (Hair et al., 2022) such as:

##### **Stage 1: Measurement Model Evaluation**

The reliability and scale validity were assessed. Internal consistency was measured using Cronbach's Alpha and Composite Reliability (CR), both required to be  $\geq 0.7$ . Convergent validity was evaluated based on factor loadings ( $> 0.7$ ), Average Variance Extracted (AVE  $> 0.5$ ). Discriminant validity was verified using the Fornell-Larcker criterion and the Heterotrait-Monotrait (HTMT) ratio with a threshold of  $< 0.85$  (Fornell & Larcker, 1981).

##### **Stage 2: Structural Model Evaluation**

Research hypotheses were tested using the bootstrapping technique (5,000 resamples). Evaluation was based on path coefficients ( $\beta$ ) and significance levels ( $p < 0.05$ ). Additionally, the model was assessed for multicollinearity ( $VIF < 5$ ), explanatory power  $R^2 \geq 0.25$ , and predictive power ( $Q^2 > 0$ ).

Multigroup Analysis (MGA). To compare differences across various demographic groups, the study first employed the MICOM procedure to ensure measurement invariance. Subsequently, the PLS-MGA technique was applied to identify statistically significant differences in path coefficients across groups ( $p < 0.05$ ).

### **5. Research results**

#### **5.1. Results of Preliminary Assessment of Cronbach's Alpha Reliability and Exploratory Factor Analysis (EFA) in Stage 1**

Cronbach's Alpha was used to assess the internal consistency of the scales. According to the standard (Hair et al., 2022), a scale meets the criteria when the Cronbach's Alpha coefficient is  $> 0.7$  and corrected item-total correlation is  $> 0.3$ .

EFA was conducted to identify the latent structure and convergent validity of the observed variables (Hair et al., 2022). The specific results for the variables were as follows:

- Independent variables: KMO value =  $0.915 > 0.5$  and Bartlett's test was statistically significant (Sig. =  $0.000$ ), confirming that the data was fully suitable for factor analysis. Twelve factors were extracted at the Eigenvalue level of  $1.016 > 1$ , explaining  $71.387\% > 50\%$  of the cumulative variance across the 50 observed variables.

- Moderator variable (GS): Achieved KMO =  $0.882$ ; Sig. =  $0.000$ ; Eigenvalue =  $2.743$ ; and total extracted variance reached  $68.575\%$ . This factor effectively explains the variance of its 4 observed items.

- Dependent variable (UA): Achieved KMO =  $0.708$ ; Sig. =  $0.000$ ; Eigenvalue =  $2.125$ , and the total variance explained reached  $70.839\%$  for the 3 observed variables involved.

#### **5.2. Results of the First-order Measurement Model Evaluation (Stage 1)**

Indicator Reliability: The analysis results showed that all first-order observed variables and the GS moderator variable achieved outer loadings exceeding  $0.70$ . This demonstrates that the indicators effectively reflect the research concepts and satisfy the requirements for explained variance (Hair et al., 2022).

Internal Consistency Reliability: All scales yielded Cronbach's Alpha coefficients and Composite Reliability (CR) values ranging from  $0.70$  to  $0.95$ . These results confirm the high stability of the measurement structure, with no evidence of redundancy or content overlap among the indicators.

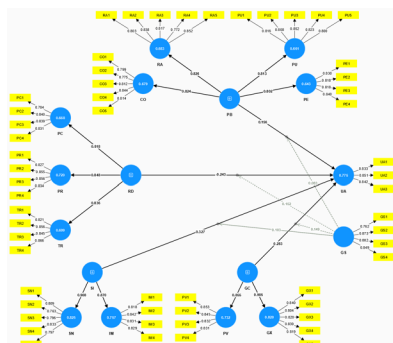
Convergent Validity: The Average Variance Extracted (AVE) for all latent variables was above  $0.50$ . This implies that the theoretical concepts explain more than  $50\%$  of the variance in the component observed variables, ensuring the model's convergent validity.

Discriminant Validity: According to Fornell and Larcker (1981), the square roots of the AVE values along the main diagonal [ranging from  $0.800$  to  $0.847$ ] were all greater than the correlation coefficients between the constructs, confirming clear boundaries between the concepts.

Furthermore, the HTMT ratios between variable pairs were all below  $0.85$ . According to Hair et al. (2022), this result demonstrates that the research structures are

completely distinct and show no statistical overlap in content. Therefore, the Stage 1 PLS-SEM measurement model is validated, specifically:

**Figure 2. The research model for Stage 1 of PLS-SEM**



Source: Authored by PLS-SEM

### 5.3. Results of Evaluation of the Second-Order Measurement Model (Stage 2)

The evaluation results for the second-order constructs (GC, GS, PB, RD, SI, and UA) indicated that all scales satisfied the requirements for reliability, convergent validity, and discriminant validity through the following five steps:

**Reliability of Indicators (Outer Loadings):** All first-order variables had Outer Loading coefficients linked to their corresponding second-order variables exceeding the 0.7 threshold (ranging from 0.808 to 0.893).

**Internal Consistency Reliability:** All reliability indices fell within acceptable ranges. Cronbach's Alpha coefficients for the second-order variables were all > 0.7 (lowest for GC: 0.713; highest for GS: 0.847). Composite reliability ( $\rho_a$ ,  $\rho_c$ ) ranged stably from 0.713 to 0.901, confirming high internal consistency among the components of the second-order variables.

**Average Variance Extracted (AVE):** The AVE values for all second-order constructs were above 0.5 (ranging from 0.667 to 0.792). This demonstrates that a significant portion of the variance is explained by the latent variables, ensuring convergent validity.

**Discriminant Validity (Fornell-Larcker Criterion):** The square roots of the AVE values for the second-order constructs on the main diagonal (ranging from 0.817 to 0.890) were all greater than the correlation coefficients between them and other constructs. This confirms that the model's constructs are distinct and do not overlap conceptually.

**Discriminant Validity (HTMT criterion):** The HTMT ratios between all pairs of latent variables were below the strict threshold of 0.85 (with the highest value being 0.845). This result reinforces the clear discriminant validity between the measurement structures in the research model.

### 5.4. Structural Model Evaluation

The VIF values for independent variables (GC, GS, PB, RD, SI) ranged from 1.049 to 1.466, well below the threshold of 5 (Hair et al., 2022). This confirms the absence of multicollinearity, ensuring the reliability of subsequent hypothesis testing

The structural model was evaluated using the bootstrapping technique (5,000 resamples). The results supported all four direct hypotheses ( $p < 0.05$ ). Specifically, PB ( $\beta = 0.156$ ;  $p = 0.000$ ) had a significant positive effect on UA, consistent with (Safeena et al., 2014) regarding the role of perceived benefits. Conversely, RD ( $\beta = -0.243$ ;  $p = 0.000$ ) exerted a significant negative effect, highlighting the impact of cognitive barriers as found in previous studies (Nguyen-Viet & Ngoc Huynh, 2021; Safeena et al., 2014). SI ( $\beta = 0.326$ ;  $p = 0.000$ ) emerged as the strongest positive predictor, aligning with (Venkatesh et al., 2003) and (Safeena et al., 2014). Additionally, GC ( $\beta = 0.281$ ;  $p = 0.000$ ) showed a significant positive impact, supporting the findings of (Chen & Chang, 2012) on the role of green perceived values. Overall, SI was the most influential factor, followed by GC, RD, and PB.

### 5.5. Results of the Moderation Test

The structural model analysis, using bootstrapping (5,000 samples), confirmed that all moderating effects on UA were statistically significant ( $p < 0.05$ ). With positive  $\beta$  coefficients for all interaction terms, GS effectively amplified the positive impacts of SI, GC, and PB on UA while mitigating the negative effect of RD.

Furthermore, an adjusted  $R^2$  of 0.771 indicates that the model explains 77.1% of the variance in adoption behavior. According to (Hair et al., 2022), this reflects substantial explanatory power, validating the significant role of both independent and moderating variables in predicting customer behavior.

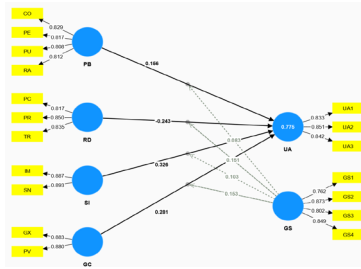
Regarding the contribution of  $f^2$ , the variables SI, GC, and RD exhibited moderate effects (ranging from 0.231 to 0.321), while PB had a small effect (0.081). The moderating effects of GS were all small (ranging from 0.029 to 0.117) but remained statistically significant and consistent with the characteristics of interaction terms in the PLS-SEM model.

The model showed strong predictive power with:  $Q^2 = 0.765 > 0$ . Both RMSE (0.487) and MAE (0.373) fell within acceptable ranges, indicating high accuracy and minimal sensitivity to outliers. Furthermore, the model achieved a good fit with an SRMR of 0.050 < 0.08 which was lower than the saturated model (0.052), confirming that structural relationships did not increase the model's error

So, all test statistics met the required criteria, so the Stage 2 PLS-SEM research model was presented as follows:



Figure 3. The research model for Stage 2 of PLS-SEM



Source: Authored by PLS\_SEM

### 5.6. Results of Multigroup Analysis by Demographic Groups

#### 5.6.1. Measurement Invariance Test (MICOM)

##### Step 1: Configural Invariance

The models across all demographic groups (ethnicity, occupation, education level, age, gender, and residential area) were established using an identical model structure, the same set of indicators, and the same PLS algorithm. This ensured configural invariance, providing a consistent basis for subsequent testing (Hair et al., 2022).

##### Step 2: Compositional Invariance

The results of the permutation test (with 5,000 permutations) for the six demographic variables indicated that the original correlations were high and the p-values exceeded 0.05 for all comparison pairs. Specifically, no statistically significant differences were found across ethnicities, occupations, educational levels, ages, genders, and residential areas. Thus, compositional invariance was confirmed for all demographic variables, satisfying the requirements for conducting Multi-Group Analysis (MGA) in PLS-SEM.

#### 5.6.2. Multigroup Analysis (MGA)

Based on the p-value difference criterion, the majority of group comparisons showed no statistically significant differences ( $p > 0.05$ ). However, the study highlights notable exceptions where significant differences were found, specifically in the SI  $\rightarrow$  UA path between the Khmer and Kinh ethnic groups, and the PB  $\rightarrow$  UA path between the 29–43 age group and those over 43 ( $p < 0.05$ ).

Bootstrapping results confirmed that most relationships were significant at the 5% level, except for the PB  $\rightarrow$  UA path in the postgraduate group. SI  $\rightarrow$  UA emerged as the dominant predictor across nearly all segments, including Chinese–Khmer, Civil Servants–Students, Male–Female, Rural–Urban, and Young–Middle-Aged adults. Conversely, GC  $\rightarrow$  UA was most prominent among the Kinh ethnic group, the self-employed, and university-educated individuals. These findings indicate that the model remains stable, demographic differences primarily manifest in effect intensity rather than direction.

### 6. Solutions and policy recommendations

Based on PLS-SEM results, Vietnamese commercial banks should prioritize interventions following the hierarchy of factors. Specifically, banks should leverage Social Influence (SI) through referral programs, social media, and employee support, while promoting Green Concern (GC) via transaction digitization, resource-saving features, and environmental reporting to bolster trust. To address barriers, Risk Dimension (RD) must be neutralized by strengthening security, simplifying UI/UX, and providing 24/7 support, while Perceived Benefits (PB) are maximized through optimized transaction speeds and advanced financial tools. Finally, implementing specialized segmentation for ethnic and age groups will enable tailor-made communications and instructional content, optimizing adoption across the Mekong Delta region.

Furthermore, the State Bank of Vietnam (SBV) should align support policies to: (i) amplify Social Influence (GS  $\times$  SI) through robust legal frameworks and national campaigns; (ii) promote Green Concern (GS  $\times$  GC) by providing capital support for banks to invest in environmental technologies, enabling them to establish incentive programs targeting users with green awareness in online transactions; (iii) maximize Perceived Benefits (GS  $\times$  PB) via infrastructure development and e-KYC refinement; and (iv) minimize Risk Dimension (GS  $\times$  RD) through stringent security standards and 24/7 fraud monitoring. Finally, both banks and the SBV must implement inclusive strategies tailored to ethnic and age-specific characteristics through localized communication and digital literacy programs, thereby narrowing the digital divide and promoting financial inclusion in the Mekong Delta region.

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# RESEARCH ON THE COST OF FINANCE LEASED ASSETS ACCORDING TO VIETNAMESE ACCOUNTING STANDARD NO. 06 (VAS 06) AND THE POLICY IMPACTS ON INTERNATIONAL FINANCIAL REPORTING STANDARDS (IFRS 16) - A CASE STUDY OF THE MINING INDUSTRY

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**Abstract:** *This research provides a comprehensive and multifaceted analysis of the initial measurement of finance lease assets under Vietnamese Accounting Standard 06 (VAS 06). The primary mechanism involves selecting the lower value between the Present Value of Minimum Lease Payments (PVMMMP) and the Fair Value (FV). This paper argues that such a mechanism serves as a critical bridge between historical cost and the prudence principle. By focusing on the mining sector, characterized by high-value, specialized equipment, extreme operating conditions, and significant environmental risks, the study highlights the practical challenges of asset valuation. Furthermore, the article explores the fundamental shift toward IFRS 16, which removes the FV ceiling, and offers strategic recommendations for Vietnamese mining firms to manage financial volatility during the IFRS adoption roadmap.*

• Keywords: *lease accounting; VAS 06; IFRS 16 adoption; financial reporting impact.*

Date of receipt: 21<sup>th</sup> Jan., 2026

Date of delivery revision: 26<sup>th</sup> Feb., 2026

DOI:

Date of receipt revision: 15<sup>th</sup> Mar., 2026

Date of approval: 30<sup>th</sup> Mar., 2026

## 1. Introduction and problem statement

In the current era of global financial integration and the rapid digital transformation of accounting practices, the transparency and comparability of financial reports have become non-negotiable requirements for sustainable corporate growth and investor confidence. For Vietnamese enterprises, especially those operating in capital-intensive industries such as coal, stone, and mineral extraction, finance leasing has emerged as a strategic financing channel. This mechanism allows companies to acquire high-capacity, modern machinery, ranging from hydraulic excavators to complex mineral processing lines, without the immediate burden of massive cash outflows, which is essential for maintaining liquidity and operational agility in a volatile market.

However, the accounting treatment of these leases is governed by the complex Substance Over Form (SOF) principle. While a lease may legally

appear as a simple rental agreement, its economic reality in a finance lease is a credit-based purchase of a long-term productive asset. This necessitates the recognition of both an asset and a liability on the balance sheet. The core challenge lies in the initial measurement: Vietnamese Accounting Standard 06 (VAS 06) requires the asset to be recorded at the “lower of two values”-the Present Value of Minimum Lease Payments (PVMMMP) or the Fair Value (FV). This “Min rule” is not just a technical formula; it represents a deep-seated accounting philosophy that seeks to balance cost-based recognition with market-based risk control.

For the mining industry, where assets are often multi-billion VND investments, understanding this mechanism is crucial. Any error in valuation could lead to significant distortions in financial ratios, potentially impacting credit ratings and the ability to raise capital. This paper delves into why this mechanism exists and how its removal under

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IFRS 16 will revolutionize the financial landscape for Vietnamese miners.

## **2. Literature review and research methodology**

### **2.1. Literature Review**

The shift in lease accounting from a dual model (VAS 06/IAS 17) to a single model (IFRS 16) has been a global focal point for academic research. Scholars like Barone et al. (2014) argued that the capitalization of all leases significantly improves the predictive power of financial statements regarding future cash flows. In the context of extractive industries, Morales-Díaz and Zamora-Ramírez (2018) observed that firms with high-value specialized equipment experience the most profound impact on their leverage ratios, as previously hidden “off-balance sheet” obligations are brought into the light.

In Vietnam, contemporary research has primarily focused on the overall readiness for IFRS adoption. However, a specific gap exists regarding the mining sector, where environmental degradation and technical obsolescence happen at a much faster rate than in manufacturing. This paper fills that gap by linking the removal of the FV ceiling under IFRS 16 to the increased necessity for robust impairment testing (IAS 36).

### **2.2. Research Methodology**

This study employs a Qualitative-Comparative research design combined with Simulated Case Study Analysis. First, we utilize the comparative method to analyze the philosophical divergence between the “Prudence-based” approach of VAS 06 and the “Commitment-based” approach of IFRS 16. Second, a deductive reasoning approach is applied to the mining sector’s specific environmental risks to evaluate how these risks manifest in accounting entries. Finally, we built a multi-year financial simulation for a stone crushing system to provide concrete evidence of the impact on key financial indicators (EBITDA, ROA, and Debt-to-Equity).

## **3. Theoretical framework and VAS 06 provisions**

### **3.1. The Principle of Substance Over Form and Lease Capitalization**

SOF is the fundamental bedrock of modern

lease accounting. It mandates that the economic substance of a transaction takes precedence over its legal shell. In a finance lease, the lessee effectively gains control over the asset’s economic benefits and assumes almost all ownership risks, such as maintenance costs, technical obsolescence, and insurance. Therefore, capitalizing the lease, recognizing it as an asset, is essential to provide a “true and fair view” of the firm’s resources. Without capitalization, firms could engage in “off-balance sheet” financing, which hides the true level of debt and artificially inflates financial performance metrics.

### **3.2. Cost Determination: The Interplay between PVMMP and Fair Value**

Paragraph 07 of VAS 06 stipulates that the initial cost of a finance lease asset is the lower of:

- PVMMP (Present Value of Minimum Lease Payments): This represents the discounted value of all future lease obligations, effectively the “historical cost” of the financial commitment.
- Fair Value (FV): This is the amount for which an asset could be exchanged between knowledgeable, willing parties in an arm’s length transaction. It acts as a market benchmark at the start of the lease.

### **3.3. Technical Nuances of Discount Rates**

The calculation of PVMMP is highly sensitive to the discount rate used. Under VAS 06, the lessee should use the implicit interest rate of the lease if it is practicable to determine. However, this is often a “black box” for lessees because it requires knowing the lessor’s residual value expectations. In the absence of an implicit rate, the lessee must apply the incremental borrowing rate. In the mining sector, where firms often have high risk profiles, this rate can be significantly higher than market averages, leading to lower PVMMP values and potential mismatches with asset Fair Values.

### **3.4. The Prudence Concept and Loss Recognition**

The “Min” rule ensures that an asset is never recorded above its market utility. If the PVMMP (the discounted total cost of financing) is higher than the FV (the market price), the enterprise is essentially paying more for the financing than

the asset is worth as a physical object. Under the Prudence Principle, this “overpayment” cannot be capitalized. Instead, the enterprise must record the asset at FV and recognize the difference (PVMMP - FV) as an immediate financial expense. This prevents the “inflation” of assets on the balance sheet and provides a conservative view of the entity’s net worth.

#### 4. Sector-specific analysis: the mining industry

##### 4.1. High-Value Assets and Sensitivity to Interest Rates

Mining machinery, such as large-scale conveyor systems or tunnel boring machines, involves massive capital expenditures. Due to these high nominal values, even a minor 0.25% shift in the discount rate used to calculate PVMMP can result in a valuation difference of hundreds of millions of VND. This makes the selection of the discount rate a high-stakes decision for mining accountants, as it directly affects the reported value of fixed assets and long-term liabilities.

##### 4.2. Volatility of Fair Value and the “Landed Cost” Challenge

Mining equipment values are inextricably tied to global commodity prices. Furthermore, mines are often located in remote, inaccessible areas. This leads to extremely high “landed costs”—the cost of transportation, specialized assembly, and heavy-duty installation in difficult terrain. While these costs increase the PVMMP, they often do not increase the “Fair Value” of the machine in a standard market transaction. Consequently, mining firms frequently encounter the “PVMMP > FV” scenario, forcing a significant “day-one hit” to their income statement.

##### 4.3. Detailed Numerical Case Study: Stone Crushing System

Let us consider a realistic scenario for a Vietnamese mining enterprise leasing a German-engineered crushing system:

- Fair Value (FV) at inception: 50,000,000,000 VND.
- Lease Term: 5 years with annual payments of 14,000,000,000 VND.
- Incremental Borrowing Rate: 12% per annum.

#### Calculation under VAS 06:

- PVMMP: approx 50.47\$ billion VND.
- Comparison: PVMMP (50.47 billion) > FV (50 billion).
- Accounting Treatment: Cost of Asset is recorded at 50 billion VND. A loss of 470 million VND is recognized immediately in Year 1.
- Strategic Implication: The firm must manage its profit expectations in Year 1 to accommodate this write-down, ensuring that its ROA (Return on Assets) is based on a realistic market-based denominator.

#### 4.4. Qualitative and Quantitative Impact on Financial Indicators

The choice between VAS 06 and IFRS 16 dictates the health of financial ratios. Under VAS 06, the capping of assets at FV keeps the Debt-to-Equity ratio lower than it would be under IFRS 16. However, it also leads to higher reported profitability in subsequent years due to lower depreciation charges. Conversely, IFRS 16 will see an increase in EBITDA because lease payments are moved from “Operating Expenses” to “Depreciation and Interest.” For a mining firm, this change can make the company look more “operationally efficient” to investors, even if its total debt has increased.

**Table 1: Comparative Impact Analysis on Mining Ratios**

| Ratio     | VAS 06 Impact               | IFRS 16 Impact                      | Strategic Consequence                  |
|-----------|-----------------------------|-------------------------------------|----------------------------------------|
| D/E Ratio | Lower (due to FV cap)       | Higher (Full commitment recognized) | Risk of breaching loan covenants.      |
| EBITDA    | Lower (Lease as OpEx)       | Higher (Lease as Depr/Int)          | Better “Interest Coverage” perception. |
| ROA       | Higher (Smaller Asset base) | Lower (Larger Asset base)           | Need for better asset utilization.     |

#### 5. The transition to ifrs 16: philosophical shifts

##### 5.1. From Front-End Control to Back-End Impairment

The adoption of IFRS 16 represents a paradigm shift. It removes the “Min rule” and the FV ceiling. Instead, the Right-of-Use (ROU) Asset is measured based on the lease liability. This moves the focus from “Initial Prudence” to “Subsequent Monitoring.” Firms are allowed to capitalize the full cost of financing, but they must perform

rigorous IAS 36 (Impairment of Assets) tests annually.

### 5.2. The Complexity of “Right-of-Use” in Mining Licenses

A further complication in mining is the synergy between leased equipment and mining licenses. Under IFRS 16, the ROU asset must be evaluated as part of a Cash Generating Unit. If the mine’s mineral reserves are depleted faster than expected, the leased

Equipment- even if physically functional, may need to be impaired. This requires a level of integration between technical geological data and accounting valuation that most Vietnamese firms have yet to develop.

## 6. Policy implications and strategic recommendations

### 6.1. Managing the “Expense Shock” and Renegotiating Covenants

The transition to IFRS 16 after 2025 will be a significant financial event for many mining corporations. The sudden capitalization of all leases will increase reported debt. Mining firms must proactively engage with their creditors to redefine “Debt” in their loan covenants to account for these accounting changes.

### 6.2. Recommendations for Regulatory Agencies (Ministry of Finance)

The Ministry should provide a specific framework for assessing the “recoverable amount” of specialized mining equipment. Since there is often no active secondary market for used specialized mucking machines, specific “value-in-use” models must be standardized to prevent inconsistent reporting across the industry. Furthermore, tax laws must be harmonized to clarify the deductibility of impairment losses.

### 6.3. Recommendations for Mining Enterprises

Firms must establish internal processes to determine their Incremental Borrowing Rate based on their specific risk profile. Additionally, the accounting department must receive real-time data from mine site engineers regarding machine hours and degradation. This technical data is the only way to perform the impairment assessments required by international standards accurately. Investing in automated lease management

software is no longer optional; it is a prerequisite for a successful transition.

## Conclusion

The “Min (PVMMP, FV)” mechanism of VAS 06 has provided a conservative and prudent foundation for the Vietnamese accounting system for over two decades. It has effectively prevented asset inflation and protected stakeholders from over-leveraged balance sheets. However, as the Vietnamese mining sector seeks to integrate with global capital markets and attract foreign direct investment, the transition to IFRS 16 is an inevitable and necessary step. This shift requires a move from rigid, “ceiling-based” rules to a more dynamic, “judgment-based” approach centered on impairment. Success in this transition will depend on the ability of mining firms to bridge the gap between financial reporting and technical mining reality. By accurately valuing their assets and managing the resulting financial transparency, Vietnamese mining enterprises can position themselves as robust, reliable participants in the global economy.

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# THE INTEGRATION OF CLIMATE-RELATED RISKS INTO FINANCIAL RISK MANAGEMENT WITHIN THE VIETNAMESE STEEL ENTERPRISES: CHALLENGES AND IMPLEMENTATION STRATEGIES

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**Abstract:** As climate change has become a material risk with significant implications for corporate financial performance, the integration of climate-related risks into financial risk management frameworks has emerged as an essential and increasingly indispensable practice for enterprises. This research identifies the key challenges associated with this integration process within the Vietnamese steel companies. Utilizing a qualitative research methodology based on survey data collected from the enterprises affiliated with the Vietnam Steel Association, the paper identifies three main categories of challenges: (1) institutional barriers and limitations in implementation guidance; (2) data constraints and the complexity of translating climate-related risks into quantifiable financial metrics; and (3) limitations in organizational resources and managerial mindsets. Based on these findings, the study proposes a set of macro- and micro-level solutions to promote the integration of climate risks into financial management practices within steel enterprises to enhance resilience and create sustainable competitive advantages in the green economy era.

• Keywords: financial risk management, climate-related risks, sustainable finance.

Date of receipt: 30<sup>th</sup> Jan., 2026

Date of delivery revision: 06<sup>th</sup> Feb., 2026

Date of receipt revision: 20<sup>th</sup> Mar., 2026

Date of approval: 27<sup>th</sup> Mar., 2026

DOI:

## 1. Introduction

Climate change is increasingly recognized as a material risk that directly affects corporate value through rising operational costs, supply chain disruptions, changes in asset valuation, and constraints on access to capital (Dow & Shi, 2025). Therefore, incorporating climate-related risks into financial risk management frameworks is a prerequisite for enhancing organizational resilience and long term sustainability. To support enterprises in identifying an

d managing climate-related risks, various management frameworks and reporting standards have been established, notably the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD) serve as a prominent example (Jona & Soderstrom, 2022). However, the practical integration of climate-related risks into financial risk management frameworks remains difficult due to data limitations, insufficient analytical capabilities, and the complexity of climate projection models

(Singh & Goyal, 2023; Zhao et al., 2025). As a result, the integration is still at an early stage of development, with many enterprises focusing primarily on reactive adaptation measures after risks materialize, rather than proactively incorporating climate risk scenarios into their business strategies and risk management systems (Leitold et al., 2021).

In Vietnam, the steel industry is characterized by high energy consumption and significant greenhouse gas emissions. Steel enterprises are currently facing dual pressures from domestic and international fronts. Domestically, Vietnam has committed to achieving Net Zero emissions by 2050. Internationally, the industry must navigate barriers such as the Carbon Border Adjustment Mechanism (CBAM) of the European Union. These pressures are likely to increase compliance costs, as well as capital expenditures on green technologies and the adoption of internal carbon pricing mechanisms. Furthermore, the Vietnamese steel enterprises are highly dependent on imported raw materials, while

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the coastal location of many production facilities exposes them to heightened risks of supply chain disruptions and infrastructure damage caused by extreme weather events. Such climate-related risks can readily translate into financial risks, leading to increased costs, weakened liquidity, and deteriorating business performance. Given the high level of exposure to climate-related risks, integrating these risks into financial risk management frameworks is essential for steel enterprises. This research clarifies the challenges, thereby enabling firms to develop appropriate solutions to promote the integration of climate-related risks into their financial strategies, ensuring sustainable and efficient operations.

## 2. Theoretical Framework

Modern theoretical frameworks categorize climate-related risks into two primary components: physical risks and transition risks. Physical risks arise from the direct impacts of climate change, such as natural disasters, extreme weather events, global warming, and rising sea levels. These factors can disrupt production, supply chains, and broader economic activities. Conversely, transition risks stem from structural changes associated with the move toward a low carbon economy. These include regulatory shifts, green technological breakthroughs, and evolving preferences among consumers and investors. While both risk types are significant, they differ fundamentally in their transmission mechanisms (Zhou et al., 2023). Physical risks often lead to sudden shocks and immediate financial losses. In contrast, transition risks tend to unfold gradually, shaping long term investment strategies and asset revaluations.

Climate-related risks exert a transformative influence on financial risks. Specifically, physical risks directly affect cash flow expectations and corporate value by increasing operating costs, damaging fixed assets, and disrupting global supply chains (Dow & Shi, 2025; Leitold et al., 2021). Transition risks increase compliance costs and investments in green transformations (Dow & Shi, 2025; Massey, 2022). Simultaneously, they influence capital raising costs and corporate investment behavior (Di Febo, 2025). Stringent carbon emission regulations may reduce asset values in energy intensive industries. Furthermore, such regulations create credit and liquidity risks for enterprises within these sectors (Thai et al., 2024; Vu Hiep et al., 2024).

Regarding modeling and measurement, the transition from traditional financial risk management to adaptive risk management is an essential requirement in the face of climate uncertainty. Traditional methods often rely on historical data to forecast the future. However, this approach reveals significant limitations due to the non-linear and unpredictable nature of climate phenomena (Maksymova et al., 2024; Wagner, 2026). Consequently, modern frameworks, such as the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD), help enterprises integrate climate-related risk factors into core financial decisions. The TCFD framework is based on the philosophy that climate-related risks should be identified and reported with the same rigor as traditional financial risks to ensure transparency for investors and stakeholders.

The TCFD framework is structured around four core pillars: governance, strategy, risk management, and metric & targets. The governance pillar emphasizes on establishing the oversight responsibilities of the board of directors and the executive role of management in addressing climate-related issues. Organizations are therefore required to clearly describe the mechanisms used by the board to review climate-related risks and opportunities when approving strategies, action plans, and annual budgets. The strategy pillar requires enterprises to assess and disclose the actual and potential impacts of climate-related risks and opportunities on their business models, strategic orientation, and financial planning. A key innovation within this pillar is the requirement for scenario analysis regarding climate variables. The third pillar, risk management, focuses on the processes used to identify, assess, and manage climate-related risks. The TCFD underscores that such risks should not be addressed in isolation; rather, they must be fully integrated into the organization's existing enterprise risk management (ERM) framework. This includes determining the materiality of climate risks and establishing how they are prioritized relative to other categories of risk. Finally, The establishment of specific, measurable, and time-bound targets enables stakeholders to monitor progress and assess the organization's capacity to generate sustainable value within a low-carbon economy.

## 3. Research Methodology

To clarify the existing challenges and propose solutions for integrating climate-related risks, this

study utilizes a qualitative approach supported by an empirical survey.

The literature review and theoretical framework analysis are conducted using data gathered from reputable academic databases, specifically Scopus and Web of Science. International benchmarks, including the TCFD framework and IFRS S2 standards, serve as the primary reference points alongside empirical studies on climate finance.

The empirical portion of the research involves a survey targeting middle and senior management within the financial and executive divisions of steel enterprises belonging to the Vietnam Steel Association. Data collection and processing took place from September 2025 to November 2025. A total of 126 valid responses were obtained, providing a representative sample of the diverse sectors within the steel industry. This sample includes construction steel production (46%), steel pipe production (5.5%), galvanized and color-coated steel (9.5%), and trading or other related sectors (38.9%). The survey instrument was developed by adapting established international studies and was further refined through expert consultations to ensure alignment with the specific management landscape in Vietnam.

Finally, through synthesis and logical reasoning, the study proposes implementation strategies at both the macro level regarding policy planning and the micro level concerning corporate operations. These strategies aim to facilitate the integration of climate risks into enterprise risk management frameworks.

#### 4. Research Results

Based on the empirical survey findings from Vietnamese steel enterprises, the challenges associated with integrating climate-related risks into financial risk management can be categorized into three areas: (1) institutional barriers and limitations in implementation guidance; (2) data constraints and the complexity of translating climate-related risks into quantifiable financial metrics; and (3) limitations in organizational resources and managerial mindsets.

##### *Institutional barriers and limitations in implementation guidance*

The lack of a synchronized institutional framework and detailed implementation guidelines creates significant obstacles for steel enterprises. Survey results indicate that firms perceive institutional misalignment as a major barrier, yielding a mean score of 4.2 out of 5. This finding aligns with

research by Do and Nguyen (2025), which observes that while Vietnam has made progress in developing sustainable policies, a substantial gap remains between macro-level directives and micro-level implementation standards for businesses. Currently, Vietnam has not issued a formal and comprehensive green taxonomy. This deficiency prevents enterprises from objectively identifying and classifying green assets versus high risk brown assets. Consequently, inconsistency arises when determining materiality thresholds for assessing climate impacts on balance sheets (Dow & Shi, 2025; Vu Hiep et al., 2024). This specific issue was rated as a significant hurdle with a mean score of 4.3/5.

Regarding measurement standards, domestic regulations do not yet meet the rigorous requirements of international frameworks such as TCFD or IFRS S2. While many nations have mandated disclosures based on TCFD recommendations to standardize climate risk reporting, adoption in Vietnam remains largely voluntary. This results in inconsistent implementation across the industry (Jona & Soderstrom, 2022). Steel enterprises reported notable difficulty in applying these international standards to their risk management processes, with an assessment score of 4.1/5.

In terms of disclosure, although Circular 96/2020/TT-BTC provides guidance for listed companies to report environmental and social impacts, these requirements are primarily qualitative. They lack mandates for climate scenario analysis or the quantification of Scope 3 emissions (Thai et al., 2024). This limitation received a score of 4.0/5 from the surveyed enterprises. The absence of standardized methodologies and technical parameters for the Vietnamese market leaves companies without a basis to measure potential losses from transition risks, such as carbon taxes or technology compliance costs (Maksymova et al., 2024; Wagner, 2026). This creates a cycle of information asymmetry where enterprises are uncertain about correct measurement techniques and financial institutions lack reliable data to assess environmental risks for green financing (Vu Hiep et al., 2024).

Furthermore, the monitoring mechanism for climate risk disclosure in Vietnam is voluntary and lacks strong sanctions to promote financial transparency. Empirical studies by Dinh and colleagues (2024) indicate that although climate risks negatively impact financial performance, voluntary

disclosure levels remain low and lack comparability across sectors. Steel enterprises rated the lack of strong monitoring and sanctions at 4.1 out of 5. Legal framework limitations increase compliance costs for firms pursuing green transitions and also introduce the risk of greenwashing. Disclosures often focus on corporate social responsibility efforts rather than reflecting substantive financial risks (Do & Nguyen, 2025; Massey, 2022). Concerns regarding the risk of greenwashing were identified as a significant challenge with an average score of 3.9/5.

**Table 1. Survey results on institutional and implementation barriers**

| No. | Survey Question                                                                                                                               | Mean Likert Score |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| 1.1 | The institutional framework for integrating climate risks into risk management in Vietnam is unsynchronized, making implementation difficult. | 4.2               |
| 1.2 | The absence of a formal green taxonomy complicates the identification of green assets and high risk assets.                                   | 4.3               |
| 1.3 | Current regulations only require qualitative environmental reporting and omit climate scenario analysis or Scope 3 quantification.            | 4.0               |
| 1.4 | Enterprises struggle to apply international standards such as TCFD and IFRS S2 in risk management.                                            | 4.1               |
| 1.5 | Weak monitoring mechanisms and a lack of sanctions result in low transparency and a lack of comparability in climate risk disclosures.        | 4.1               |
| 1.6 | Enterprises fear the risk of greenwashing when disclosure requirements are unclear and fail to focus on substantive financial risks.          | 3.9               |

Source: Survey of enterprises under the Vietnam Steel Association

### ***Second, data constraints and the complexity of translating climate-related risks into quantifiable financial metrics***

The scarcity of climate data constitutes a major impediment to the integration of climate-related risks into financial risk management. Climate-related risks exhibit non-linear characteristics that are difficult to forecast using conventional statistical methods (Maksymova et al., 2024). Steel enterprises expressed a high level of agreement, rated at 4.5/5, regarding the difficulty of determining the probability of such extreme events. Furthermore, the reliance on historical data to predict anomalous climate shocks presents significant obstacles, receiving a score of 4.3/5. These constraints hinder the prediction of Black Swan climate events. Consequently, enterprises suffer from strategic blindness when allocating capital for adaptation measures (Dow & Shi, 2025).

Moreover, climate risks are highly localized, making them difficult to project based solely on global climate models. Enterprises often struggle to access relevant information at the corporate level. For instance, flooding at an industrial park in Ho Chi Minh City depends on a combination of

tidal patterns, land subsidence, and local drainage systems. Global forecasting models frequently overlook these specific factors (Leitold et al., 2021). The lack of high-resolution localized data prevents enterprises from conducting accurate scenario analyses, which leads to biased assessments of asset loss. This challenge was rated at 4.1/5 by steel industry participants.

Managing climate-related risks requires long-term forecasting capabilities, the use of complex climate models, and the integration of environmental data with corporate financial records. In practice, many enterprises lack suitable analytical tools to convert climate information into financial risk indicators for decision-making (Singh & Goyal, 2023). The shortage of empirical datasets linking historical climate events to direct financial damages, such as revenue decline, increased insurance premiums, or asset degradation, complicates the conversion of climate info into financial data (Dinh et al., 2024; Thai et al., 2024). This difficulty is particularly evident in the steel sector, with a score of 4.4 out of 5. This deficiency prevents Chief Financial Officers from developing risk response functions to implement internal carbon pricing or calculate the risk-adjusted cost of capital (Wagner, 2026). Climate databases for financial risk analysis remain underdeveloped. As a result, enterprises find it difficult to apply advanced tools such as scenario analysis or climate stress testing. Consequently, climate risks are often restricted to qualitative descriptions in sustainability reports rather than being quantitatively integrated into financial risk management systems.

**Table 2. Survey results regarding data limitations and the quantification of climate risks into financial metrics**

| No. | Survey Question                                                                                                                                     | Mean Likert Score |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| 2.1 | Climate risks are non-linear and difficult to forecast using traditional statistics, making it hard to determine the probability of extreme events. | 4.5               |
| 2.2 | It is difficult to use historical data to predict anomalous climate phenomena.                                                                      | 4.3               |
| 2.3 | There is a lack of high-resolution localized climate data required for accurate scenario analysis.                                                  | 4.1               |
| 2.4 | Enterprises lack the tools and methodologies to convert climate information into quantitative financial risk indicators.                            | 4.4               |
| 2.5 | There are no empirical datasets linking past climate events to specific financial losses such as revenue, insurance costs, or assets.               | 4.3               |
| 2.6 | Enterprises struggle to develop risk response functions like internal carbon pricing or risk-adjusted cost of capital.                              | 4.5               |

Source: Survey of enterprises under the Vietnam Steel Association

### ***Third, limitations in organizational resources and managerial mindsets***

Financial and human resource constraints



represent significant barriers to integrate climate-related risks into financial risk management. Establishing an effective climate risk management system requires substantial investment in personnel possessing interdisciplinary expertise across finance, risk management, and environmental science. Furthermore, the implementation of international risk measurement standards involves prohibitive costs. The combination of a specialized talent shortage and high expenses makes climate integration unattainable for many firms (Maksymova et al., 2024). Consequently, many enterprises adopt reactive risk strategies instead of proactive adaptation (Leitold et al., 2021). Survey results from the steel industry confirm these challenges, with human resource limitations and implementation costs receiving mean scores of 4.2 and 4.5 out of 5, respectively.

Parallel to resource burdens, a management mindset characterized by short-termism acts as a critical bottleneck for innovation. Boards of directors frequently prioritize immediate financial metrics and short-term profitability over climate risks which are often characterized by significant time lags and high uncertainty (Dow & Shi, 2025). As a result, measures to prevent or mitigate climate-related risks receive insufficient attention. A lack of structural integration where climate specialists are excluded from decision-making processes often results in climate risk being omitted from strategic risk portfolios. This omission leaves enterprises vulnerable to both physical and transition risks. These management mindset limitations were identified as major obstacles with high levels of agreement in the steel industry survey.

**Table 3. Survey results regarding resource limitations and management mindset**

| No. | Survey Question                                                                                                                                           | Mean Likert Score |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| 3.1 | Enterprises lack human resources with interdisciplinary knowledge in finance, risk management, and environmental science to operate climate risk systems. | 4.2               |
| 3.2 | The cost of implementing international-standard climate risk measurement systems exceeds corporate financial capacity.                                    | 4.5               |
| 3.3 | Enterprises prioritize short-term profit targets over investing in long-term climate risk management.                                                     | 4.4               |
| 3.4 | Current climate change response strategies are primarily reactive and temporary rather than proactive and long-term.                                      | 4.0               |

In summary, the integration of climate-related risks into enterprise risk management in Vietnam faces multiple hurdles. These include an incomplete institutional framework, insufficient implementation guidelines, data and analytical limitations, and

internal constraints regarding resources and management philosophy. These challenges not only delay the integration of climate factors into financial risk systems but also heighten corporate vulnerability to future climate shocks. This situation necessitates urgent solutions to facilitate climate risk integration. Such measures will enhance the resilience of the steel industry and the broader Vietnamese business sector as climate change impacts escalate.

### **5. Solutions for enhancing the integration of climate-related risks into the financial risk management of Vietnamese steel enterprises**

To address systemic barriers in integrating climate-related risks into corporate financial risk management, a synchronized approach spanning macro and micro levels is required.

At the macro level, the primary task involves bridging the institutional gap by promptly issuing a National green taxonomy. This framework provides a fundamental tool for steel enterprises to distinguish between green assets and high risk brown assets. Consequently, firms can quantify the materiality of climate risks on their balance sheets. This taxonomy should be developed based on international standards such as TCFD and IFRS S2 while incorporating adjustments for the specific context of Vietnam. It must also reflect industry specific characteristics, including metallurgical technologies, energy efficiency, and emission thresholds.

Secondly, a mandatory roadmap for climate related financial disclosures should be established for listed companies and high emission industries like steel. Disclosures must be standardized across the four pillars of governance, strategy, risk management, and metrics and targets. Furthermore, reports should require climate scenario analysis and the quantification of Scope 3 emissions, which represent the primary emission source in the steel supply chain. Monitoring mechanisms and sanctions are necessary to ensure transparency and comparability while mitigating the risk of greenwashing.

Thirdly, to encourage proactive compliance, the government should implement supportive policies such as tax incentives and low interest green credit. Technical assistance for investments in cleaner production technologies and climate risk measurement systems is also essential. These policies should be designed with flexibility to

account for enterprise size, with particular emphasis on supporting small and medium enterprises that face the greatest pressure from compliance costs.

At the micro level, enterprises must transition from reactive response to proactive adaptation. Rather than viewing climate change as a component of corporate social responsibility triggered only by losses, management should perceive climate challenges as opportunities to restructure business models and gain competitive advantages. Given the capital intensive nature of the steel industry and its reliance on long lived fixed assets, embedding climate risk into financial management and long term strategy is a fundamental requirement. Enterprises should move beyond short term perspectives by establishing KPIs for climate resilience and treating climate risk as a formal component of the risk portfolio. Identifying and quantifying risks through carbon price fluctuation scenarios and energy costs will enable firms to adjust asset structures and cash flow plans effectively. This restructuring should involve the establishment of ESG committees to ensure oversight and the integration of climate factors into the corporate risk matrix with clearly defined materiality thresholds.

In addition, to overcome data and measurement limitations, enterprises should invest in internal data systems and utilize localized climate information. Priority should be given to developing the capacity to transform climate information into quantitative financial indicators. Relevant metrics include production disruption losses, risk adjusted insurance costs, internal carbon pricing, and the cost of capital reflecting transition risks. Adopting advanced tools such as artificial intelligence and machine learning for scenario analysis and climate stress testing will improve forecast accuracy, particularly for non linear extreme events.

Finally, enterprises should strengthen resources through cooperation and interdisciplinary capacity building. To manage the costs of implementing international standard systems, steel companies can form collaborative mechanisms to share data costs and consulting services. Participation in technical support programs from international financial institutions is also recommended. Concurrently, firms must focus on training personnel with expertise spanning finance, risk management, and climate science. Encouraging short term training programs and international certifications through industry associations and domestic educational institutions

will provide a sustainable foundation for the new risk management system.

## 6. Conclusion

Climate change adaptation is no longer a matter of corporate social responsibility, it has become a critical requirement for organizational survival and a key indicator of core competitiveness in the new era. Although challenges such as the lack of reliable data, policy uncertainty, and resource constraints persist, the integration of climate-related risks into financial risk management represents an inevitable trajectory. This transition requires enterprises to move from reactive strategies to proactive management models.

Addressing the integration of climate-related risks into enterprise risk management requires a comprehensive and coordinated approach. For a regulatory perspective, the development of a comprehensive legal framework for climate-related disclosure, as well as the standardization of green criteria constitutes a necessary foundation. At the firm level, transforming managerial mindsets, governance structures, and risk management tools serves as a prerequisite for advancing climate risk governance. In the long term, the successful incorporation of climate factors into financial strategies will be the deciding factor in mitigating systemic losses. Furthermore, this process will enhance corporate resilience and secure sustainable development goals.

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# USING CORPORATE GOVERNANCE TO PREDICT THE POSSIBILITY OF FINANCIAL DISTRESS OF LISTED COMPANIES IN VIETNAM'S MINING INDUSTRY

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**Abstract:** *Corporations with weak management systems significantly increase risks, leading to inefficient operations and financial distress. The authors' research selects corporate governance characteristics such as corporate ownership, ownership concentration, gender issues, board size, board independence, and CEO duality as factors to forecast financial distress for Vietnamese listed enterprises in the mining industry. The research combines the corporate governance predictors with other variables such as financial ratios and macroeconomic factors in a panel data sample over a 10 - year period for predicting financial distress. The results show that corporate governance alone is not sufficient to forecast effectively financial difficulties for Vietnamese mining companies. The predictive power of the model appears to be performing much better in combination with financial ratios and macroeconomic factors.*

• Keywords: *corporate governance, financial distress, Vietnam mining industry.*

Date of receipt: 05<sup>th</sup> Feb., 2026

Date of delivery revision: 10<sup>th</sup> Mar., 2026

Date of receipt revision: 20<sup>th</sup> Mar., 2026

Date of approval: 31<sup>th</sup> Mar., 2026

DOI:

## 1. Introduction

Financial distress (FD), also known as financial crisis, is commonly used to describe the financial condition of an individual or a company that is experiencing difficulty in meeting its obligations, particularly in making timely payments to its creditors. Prolonged and severe FD can ultimately lead to bankruptcy. Studies on predicting corporate FD were conducted very early, with the first study in 1930 by Fitzpatrick. The field gained significant momentum in subsequent years, with notable contributions from researchers such as Altman (1968). While there are varying perspectives on the selection of variables for predictive models, studies during this period generally focused on two groups of factors: financial ratios and external factors. Researchers generally agree on using financial ratios reflecting profitability, solvency, leverage, cash flow, and operational efficiency as crucial indicators of FD, as demonstrated in the works of Ohlson (1980). Additionally, external factors such as tight monetary policy, high-interest rates and high inflation (Liou and Smith, 2007) can contribute to FD situation and are often included as predictive variables.

However, in the 2000s and beyond, researchers began to focus on the impact of corporate governance on bankruptcy and financial distress. Corporate

governance refers to a system of relationships between the management, board of directors, shareholders, and other stakeholders that provides the structure through which the company is directed and controlled. Effective corporate governance promotes increased company value, fosters investment growth, and contributes to long-term sustainability. In reality, companies with weak governance systems are more susceptible to loss, are at a higher risk of financial distress, and face increased overall risk. Numerous corporate governance characteristics are linked to these risks, including ownership structure, power dynamics, and gender diversity. Smaller board sizes, greater board independence, greater gender diversity on boards, and lower levels of management power concentration have been shown to reduce the risk of bankruptcy. Rajan and Zingales (1998) have pointed out that excessive ownership concentration is a common characteristic of many bankrupt Asian companies. Additionally, managerial abuse of power for private gain and short-term decision-making can lead to financial distress. Studies by Zhiyong Li et al. (2020) have demonstrated the predictive power of corporate governance characteristics in forecasting financial distress. Consequently, predictive models that combine corporate governance characteristics with other

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financial indicators have become increasingly popular among researchers.

## 2. Literature review

There is no consensus on the specific characteristics of corporate governance, such as ownership structure, power dynamics, gender diversity, board size, and board independence, and their impact on the probability of financial distress.

### 2.1. Board composition

The roles of the chairman of the board and the CEO differ significantly, as the former is responsible for major strategic decisions while the latter oversees day-to-day operations. In some companies, the same person holds both positions, and several studies have shown that dual leadership is positively correlated with the likelihood of financial distress, as demonstrated by Daily and Dalton (1994b). These authors argue that dual leadership can lead to more autocratic behavior and increased opportunities for CEOs/chairmen to pursue their own interests, while reducing the level of control. Conversely, De Maere et al. (2014) suggest that separating the roles of chairman and CEO can mitigate the risk of bankruptcy.

### 2.2. Proportion of independent directors

Based on agency theory, Jensen & Meckling (1976) argue that the presence of outside directors on a board is crucial for a company's survival. Daily & Dalton (1994a, 1994b) also support the view that the effectiveness of a board is highly dependent on the proportion of outsiders, especially during crises, as these members provide the company with access to valuable resources and information. However, there are some dissenting views, such as those of Chaganti et al. (1985), who argue that independent directors have a more superficial understanding of the company's specific characteristics and may therefore lead to less effective board functioning. Thus, previous studies have not reached a consensus on whether a higher proportion of independent directors has a positive or negative impact on the probability of financial distress.

### 2.3. Board size

The impact of board size on financial distress is a subject of debate, with research findings presenting conflicting conclusions. On the one hand, larger boards are less likely to experience financial distress. Researchers argue that larger boards offer a more diverse skill set, fostering a wider range of external relationships and generating a greater variety of viable solutions, thereby positively impacting organizational performance (Goodstein et al., 1994). An empirical

study by Chaganti et al. (1985) also shows that companies experiencing financial distress tend to have smaller boards. On the other hand, proponents of agency theory argue that larger boards are more difficult to manage and coordinate, while smaller boards can make decisions more efficiently and effectively, thus better supporting the company's operations. Findings from research conducted by Yuli, A., & Choisi, E.A. (2021) using samples from Indonesian Coal Mining Companies support the agency theory.

### 2.4. Ownership concentration

Shleifer & Vishny (1997) argued that excessive ownership concentration often leads large shareholders to exploit their control to pursue private interests. In contrast, proponents of agency theory highlight the positive impact of ownership concentration on firm performance (Jensen & Meckling, 1976). This is because large shareholders are incentivized and have the expertise to effectively monitor the company's operations. Empirical studies also present conflicting findings on the relationship between ownership concentration and financial distress. While Deng and Wang (2006), in a study of 96 financially distressed and 96 non-distressed firms, found a negative correlation between ownership concentration and financial distress, Lee and Yeh (2004), in a study of Taiwanese listed companies, found that financial distress is more likely to occur in firms with high ownership concentration.

## 3. Research Methods

### 3.1. Research data

Data on corporate governance factors such as ownership concentration, dual leadership (chairman and CEO), proportion of independent directors, board size, and average board age were collected from the annual reports of publicly listed mining companies on the Vietnamese stock market from 2012 to 2021. The sample includes 26 listed companies on both the HoSE and HNX exchanges. Additionally, secondary data on the financial ratios of these 26 companies were calculated by the authors based on financial statement data. To minimize errors due to the use of low-quality data, the authors collected annual reports and audited financial statements from reliable sources such as <http://Vietstock.vn>, <http://s.caphe.vn>. The listed mining companies included in the sample must have audited financial statements, ensuring reliability, and must have been listed for at least three years to meet the model's requirements. Macroeconomic data were collected from <http://Vietstock.vn>, <http://s.caphe.vn> and <http://gso.gov.vn>.



### 3.2. Research methods and model

#### 3.2.1. Research methods

The methods used to forecast financial distress include univariate discriminant analysis (DA), multivariate discriminant analysis (MDA), and logistic regression. Logistic regression is widely used in recent studies on financial distress forecasting. With logistic regression, the dependent variable is a binary variable that can take on one of two values: 0 (not distressed) and 1 (distressed). Therefore, the study requires a function that represents the probability of the estimated variable being equal to the actual values through the maximum log-likelihood function. The overall binary logistic regression function is constructed as follows:

$$Z = \ln[P_i/(1-P_i)] = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k \quad (1)$$

Where: P (i=1): Probability of financial distress occurrence

P(i=0): Probability of no financial distress

#### 3.2.2. Research model

##### Dependent variable:

Early identification of financial distress allows managers to take timely actions to mitigate risks, especially when a company is facing only minor difficulties. Therefore, this study adopts the criteria for identifying financial distress at the failure stage as proposed by Asquith, Gertner, and Scharfstein (1994). A company is considered to be financially distressed if it meets at least one of the following criteria: (1) The company has negative earnings before interest, taxes, depreciation, and amortization (EBITDA) for two consecutive years or (2) In any given year, the company's EBITDA is less than 80% of its interest expense.

##### Independent variables:

Based on previous theories and empirical studies, the authors selected the following corporate governance factors as predictors: board size, average board age, dual leadership (chairman and CEO), ownership concentration by large shareholders, and ownership of the board. Additionally, the authors selected five financial ratios and three macroeconomic factors, including inflation rate, economic growth rate, and interest rate, in combination with governance factors to examine their impact on the risk of financial distress among mining companies. The regression model is constructed as follows

##### Model 1: Utilizing corporate governance factors

$$Z = \ln \left[ \frac{P_i}{1-P_i} \right] = \beta_0 + \beta_1 \text{OWCN} + \beta_2 \text{BOARDSIZE} + \beta_3 \text{CEODL} + \beta_4 \text{BDINDE} + \beta_5 \text{BOARDAGE} + \beta_6 \text{BDOW} + \epsilon \quad (2)$$

##### Model 2: Combining corporate governance factors and financial ratios

$$Z = \ln \left[ \frac{P_i}{1-P_i} \right] = \beta_0 + \beta_1 \text{OWCN} + \beta_2 \text{BOARDSIZE} + \beta_3 \text{CEODL} + \beta_4 \text{BDINDE} + \beta_5 \text{BOARDAGE} + \beta_6 \text{BDOW} + \beta_7 \text{NSTA} + \beta_8 \text{MVETD} + \beta_9 \text{CFOTD} + \beta_{10} \text{EBITTA} + \beta_{11} \text{WCTA} + \epsilon \quad (3)$$

##### Model 3: Combining corporate governance factors, financial ratios, and macroeconomic factors

$$Z = \ln \left[ \frac{P_i}{1-P_i} \right] = \beta_0 + \beta_1 \text{OWCN} + \beta_2 \text{BOARDSIZE} + \beta_3 \text{CEODL} + \beta_4 \text{BDINDE} + \beta_5 \text{BOARDAGE} + \beta_6 \text{BDOW} + \beta_7 \text{NSTA} + \beta_8 \text{MVETD} + \beta_9 \text{CFOTD} + \beta_{10} \text{EBITTA} + \beta_{11} \text{WCTA} + \beta_7 \text{SIZE} + \beta_8 \text{GDP} + \beta_9 \text{CPI} + \beta_{10} \text{IR} + \epsilon \quad (4)$$

Table 1: Table of variable descriptions

| Symbol                   | Variable                                                                                     | Measurement                                                                                                |
|--------------------------|----------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
| 1. Dependent Variable    |                                                                                              |                                                                                                            |
| FD                       | Financial Distress                                                                           | - EBITDA < interest expense for 2 consecutive year<br>- EBITDA < 80% of interest expense in any given year |
| 2. Explanatory Variables |                                                                                              |                                                                                                            |
| OWCN                     | Ownership Concentration                                                                      | Percentage of shares held by entities or individuals holding 5% or more of the shares                      |
| BOARDSIZE                | Board Size                                                                                   | Number of board members                                                                                    |
| CEODL                    | Chairman of the Board and the Chief Executive Officer (CEO) is the same person (CEO Duality) | A dummy variable equals 1 if the chairman is also the CEO, 0 otherwise                                     |
| BDINDE                   | Board Independence                                                                           | Proportion of independent directors on the board.                                                          |
| BOARDAGE                 | Board Age                                                                                    | Average age of board members                                                                               |
| BDOW                     | Board Ownership                                                                              | Percentage of shares owned by the board                                                                    |
| EBITTA                   | Ratio of Profit before taxes and interest/Total assets                                       | (Total profit before tax + interest expense)/Total assets                                                  |
| CFOTD                    | Cash Flow to Total Debt Ratio                                                                | Net cash from operating activities (code 20 on cash flow statement) / Total liabilities                    |
| MVETD                    | Market Value of Equity to Total Debt Ratio                                                   | (Closing stock price at the end of the year x number of shares outstanding) / Total liabilities            |
| NSTA                     | Net Sales / Total Assets Ratio                                                               | Net Sales / Total Assets                                                                                   |
| WCTA                     | Working Capital/Total Assets Ratio                                                           | (Current Assets-Current Liabilities)/Total Assets                                                          |
| SIZE                     | Company size                                                                                 | Ln (total assets)                                                                                          |
| IR                       | Interest rate                                                                                | Interbank interest rate for 6-month term                                                                   |
| GDP                      | Economic growth rate                                                                         | Economic growth rate (%)                                                                                   |
| CPI                      | Inflation rate                                                                               | Consumer price index growth rate (%)                                                                       |

### 4. Regression results and discussion

#### 4.1. Summary of sample characteristics

Table 2 presents the descriptive statistics of the variables, including the number of observations, mean, maximum, minimum, and standard deviation. Variable BDINDE has the highest mean and standard deviation, with values of 60.928 and 15.718, respectively. Moreover, the independent variables OWCN, BDOW, and MVETD exhibit large standard deviations, suggesting that the dependent variable FD might be influenced by these three independent variables.

Table 2: Table of descriptive statistics

| Variable | Obs | Mean  | Std. Dev. | Min   | Max     |
|----------|-----|-------|-----------|-------|---------|
| FD       | 247 | .101  | .302      | 0     | 1       |
| WCTA     | 247 | .13   | .261      | -.325 | .887    |
| LNGLTS   | 247 | .039  | .118      | -.439 | .324    |
| EBITTA   | 247 | .085  | .111      | -.208 | .519    |
| MVETD    | 247 | 6.397 | 25.969    | 0     | 327.193 |
| NSTA     | 247 | 1.14  | 1.216     | 0     | 10.911  |
| IR       | 247 | 5.51  | 2.095     | 3.333 | 11.327  |

| Variable  | Obs | Mean   | Std. Dev. | Min     | Max     |
|-----------|-----|--------|-----------|---------|---------|
| CFOTD     | 247 | 1.249  | 13.945    | -45.058 | 196.822 |
| OWCN      | 247 | 45.158 | 26.875    | 0       | 98.21   |
| BOARDAGE  | 247 | 46.852 | 5.251     | 31.667  | 57.8    |
| CEODL     | 247 | .247   | .432      | 0       | 1       |
| BDINDE    | 247 | 60.928 | 15.718    | 20      | 100     |
| BOARDSIZE | 247 | 4.992  | .675      | 3       | 7       |
| BDOW      | 247 | 33.225 | 28.326    | 0       | 98.328  |
| GDP       | 247 | 5.567  | 2.926     | 1       | 10      |
| CPI       | 247 | 5.348  | 2.826     | 1       | 10      |

Source: Results from sample analysis

Table 3: Correlation Coefficient Matrix

| Variables      | (1)    | (2)    | (3)    | (4)    | (5)    | (6)    | (7)    | (8)    | (9)    | (10)   | (11)   | (12)   | (13)   | (14)   | (15)  |
|----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------|
| (1) FD         | 1.000  |        |        |        |        |        |        |        |        |        |        |        |        |        |       |
| (2) IR         | -0.015 | 1.000  |        |        |        |        |        |        |        |        |        |        |        |        |       |
| (3) GDP        | -0.033 | -0.071 | 1.000  |        |        |        |        |        |        |        |        |        |        |        |       |
| (4) CPI        | 0.063  | 0.647  | -0.022 | 1.000  |        |        |        |        |        |        |        |        |        |        |       |
| (5) WCTA       | -0.074 | 0.020  | -0.047 | 0.043  | 1.000  |        |        |        |        |        |        |        |        |        |       |
| (6) CFOTD      | -0.025 | 0.061  | -0.017 | 0.093  | 0.078  | 1.000  |        |        |        |        |        |        |        |        |       |
| (7) MVETD      | 0.071  | 0.071  | -0.070 | 0.148  | 0.185  | 0.732  | 1.000  |        |        |        |        |        |        |        |       |
| (8) EBITTA     | -0.467 | -0.160 | -0.036 | 0.099  | 0.367  | -0.057 | -0.084 | 1.000  |        |        |        |        |        |        |       |
| (9) NSTA       | -0.229 | 0.015  | -0.031 | 0.017  | -0.263 | -0.060 | -0.155 | 0.163  | 1.000  |        |        |        |        |        |       |
| (10) OWCN      | -0.239 | -0.081 | 0.010  | -0.050 | -0.417 | -0.130 | -0.237 | 0.247  | 0.347  | 1.000  |        |        |        |        |       |
| (11) BDINDE    | 0.199  | -0.132 | -0.001 | -0.135 | 0.280  | 0.084  | 0.131  | -0.127 | -0.318 | -0.275 | 1.000  |        |        |        |       |
| (12) CEODL     | 0.027  | 0.367  | 0.032  | 0.270  | 0.045  | -0.037 | -0.100 | 0.070  | -0.017 | -0.114 | -0.273 | 1.000  |        |        |       |
| (13) BDOW      | -0.206 | -0.028 | 0.000  | 0.023  | -0.270 | -0.067 | -0.049 | 0.167  | 0.350  | 0.588  | -0.344 | -0.140 | 1.000  |        |       |
| (14) BOARDSIZE | -0.116 | 0.010  | 0.046  | 0.025  | 0.101  | 0.025  | 0.002  | 0.223  | -0.057 | 0.109  | 0.068  | -0.035 | -0.035 | 1.000  |       |
| (15) BOARDAGE  | -0.119 | -0.115 | -0.009 | -0.089 | -0.239 | 0.014  | -0.158 | 0.166  | 0.244  | 0.492  | -0.202 | 0.028  | 0.303  | -0.045 | 1.000 |

Source: Results from sample analysis

The correlation coefficients presented in Table 3 indicate the relationship between each pair of variables. A higher correlation coefficient suggests a stronger relationship between two variables, while a lower coefficient indicates a weaker relationship. The correlation matrix shows that the variables in the model have relatively low correlations (all below 0.8), indicating that the potential impact of multicollinearity is negligible. Additionally, Table 3 reveals that corporate governance factors such as ownership concentration and board ownership are negatively correlated with the probability of financial distress. Conversely, the level of board independence is positively correlated with the likelihood of financial distress. Furthermore, financial ratios such as EBIT/Total Assets and Net Sales/Total Assets are negatively correlated with the dependent variable. However, to confirm whether these factors have a significant impact on the probability of financial distress, further regression analysis is needed.

#### 4.2. Regression results

Table 4 presents the results of the binary logistic regression model predicting the probability of financial distress based on corporate governance factors, as well as a combination of financial and macroeconomic variables.

Table 4: Summary of regression results

| VARIABLES | (1)      | (2)     | (3)     |
|-----------|----------|---------|---------|
| OWCN      | -0.0184* | -0.0446 | -0.128* |
| BOARDAGE  | 0.00478  | 0.0860  | 0.0710  |
| CEODL     | 0.632    | 2.589   | 11.73*  |

| VARIABLES | (1)      | (2)       | (3)      |
|-----------|----------|-----------|----------|
| BDINDE    | 0.0463** | 0.0777*   | 0.323*   |
| BOARDSIZE | -0.471   | 0.0367    | -1.109   |
| BDOW      | -0.0164  | -0.0108   | -0.0364  |
| WCTA      |          | -3.109    | -15.57*  |
| CFOTD     |          | -0.184*** | -0.516** |
| MVETD     |          | -0.0684** | -0.187** |
| NSTA      |          | -1.334    | -4.501   |
| EBITTA    |          | -86.36*** | -234.6** |
| IR        |          |           | -0.194   |
| GDP       |          |           | -0.936*  |
| CPI       |          |           | 0.471    |
| Size      |          |           | 12.76*   |
| Constant  | -2.258   | -8.860    | -158.6*  |

Source: Results from sample analysis

Model 1, which includes five corporate governance factors, reveals that ownership characteristics and the activity proportion of independent directors are statistically significant at the 10% and 5% levels, respectively, in relation to the dependent variable (Table 4). The greater the ownership concentration, the lower the probability of a mining company experiencing a financial crisis. Meanwhile, the proportion of independent directors on the board has a positive impact on the probability of financial distress in mining companies. When measuring the effects of variables related to corporate governance on dependent variable model 1 shows that the BDINDE variable has a larger impact. Model 2 includes five financial ratios, of which three - the Earnings before Interest and Taxes to Total Assets, the Cash Flow to Total Debt ratio, and the Capitalization to Total Debt ratio - are significant in predicting financial distress. In particular, the Earnings before Interest and Tax to Total Assets Ratios predictor (EBITTA), Cash Flow to Total Debt predictor (CFOTD) and Market Value of Equity to Total Liabilities Ratios predictor (MVETD) have an adverse effect on the probability of financial distress of Vietnamese listed companies at 1% significance level. Besides in Model 2, all significant corporate governance factors and financial ratios are combined, and the variable BDINDE exhibits the same significance as in Models 1. In Model 3, macroeconomic factors are added, and at the 10% significance level, the growth rate is found to have a negative impact on financial distress among mining companies. The effect of the predictors on distress among mining companies in model 3 is consistent with model 2. Four out of five financial ratios and three out of five explanation variables related to corporate governance have effects on the dependent variable (FD) with the corresponding significance levels of 5% and 10%.

Table 5: Summary of model fit tests

| Models | AIC   | Sig   | -2 Log likelihood | McFadden's R2 | Correctly classified |
|--------|-------|-------|-------------------|---------------|----------------------|
| MH1    | 0.608 | 0,000 | 68.051            | 0.159         | 89.07%               |
| MH2    | 0.249 | 0,000 | 18.666            | 0.769         | 96.75%               |
| MH3    | 0.232 | 0,000 | 12.490            | 0.846         | 97.15%               |

Source: Results from sample analysis

To assess the goodness-of-fit of the constructed models, the authors employed the Chi-square test. The Chi-square significance value for all three models is 0.000, which is less than 0.05, indicating that all four regression models are well-fitted. Furthermore, Model 3 exhibits the highest pseudo R-squared (McFadden's R<sup>2</sup>) and the lowest -2 Log likelihood, suggesting that it is the best-fitting model.

#### 4.3. Discussion on results of research

The output of the study revealed that Model 3 with the combination of different variables has predictive power. The WCTA Ratio, EBITTA ratio, CFOTD ratio and MVETD ratio are adverse determinants of financial distress. When WCTA Ratio, CFOTD Ratio, MVETD Ratio, EBITTA Ratio increases, the probability of financial distress tends to decrease and vice versa. This finding is consistent with the prior expectation and findings of Altman (1968).

On the other hand, the corporate governance coefficients in Model 3 have a relationship with the financial distress probability. The results indicate that when the chairman of the board also serves as the CEO, it increases the risk of financial distress for mining companies at the 10% significance level. When the chairman of the board also serves as the CEO, it leads to an excessive concentration of power in one individual, which can result in authoritarianism, abuse of power, bureaucratic decision-making, and decreased control and efficiency in business operations. This finding is consistent with the studies of Daily and Dalton (1994b) and De Maere et al. (2014)

There is a positive correlation between board independence and the probability of financial distress at the 10% significance level. Independent directors, characterized by a less in-depth understanding of the company's specific characteristics, can lead to decreased board effectiveness when their number increases, thus raising the risk of financial distress for mining companies. This finding is consistent with the studies of Chaganti et al. (1985).

Concentrated ownership by large shareholders is negatively correlated with financial distress in mining companies at the 10% significance level. Large shareholders with high ownership stakes are typically specialized investors who are better able to identify potential risks to the company, thereby reducing the likelihood of financial distress. This conclusion is consistent with the views of previous researchers such as Jensen & Meckling (1976) and Deng and Wang (2006).

#### Conclusion

This study empirically examines the impact of corporate governance factors on the likelihood of

financial distress among Vietnamese listed mining companies from 2012 to 2021. The governance factors considered include board size, average board age, duality of CEO and chairman, board independence, ownership concentration, and ownership by directors. Logistic regression analysis on a dataset of 26 companies revealed a significant relationship between corporate governance factors and the probability of financial distress in the mining industry during this period. The results show a positive correlation between duality (combining the roles of CEO and chairman) and board independence, and a negative correlation between ownership concentration and the dependent variable. Therefore, mining companies should clearly separate the roles and responsibilities of the chairman and CEO to enhance oversight, improve operational efficiency, and reduce the risk of financial distress. Additionally, mining companies should consider regulations regarding the number of independent directors in proportion to the company size, as an excessive increase in this factor may heighten the risk of financial difficulties. Furthermore, considering the complexity and capital-intensive nature of the mining industry in Vietnam, along with high ownership concentration primarily by the state large shareholders with concentrated ownership in mining companies play a crucial role. These shareholders, with their experience and management knowledge, can establish modern corporate governance mechanisms, thereby improving operational efficiency and reducing the risk of financial distress. Moreover, the study's findings indicate that combining corporate governance factors with financial ratios and macroeconomic variables provides a better predictive model compared to using single factors alone.

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# THE IMPACT OF ACTIVITY-BASED COSTING ON FIRM PERFORMANCE: A COMPREHENSIVE REVIEW

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**Abstract:** *This review article provides a critical synthesis of empirical literature from 2010 to 2024 regarding the impact of activity-based costing (ABC) and its evolutionary successor, time-driven activity-based cCosting (TDABC), on firm performance. Moving beyond the initial theoretical promise of ABC, this study evaluates its actual efficacy across financial, operational, and strategic dimensions. The analysis reveals that while ABC consistently enhances operational efficiency - improving cycle times, quality control, and resource utilization - its direct correlation with financial performance metrics like return on assets (ROA) is complex and often mediated by complementary practices such as lean manufacturing and robust IT integration. The review further examines the divergent adoption landscapes between developed and emerging markets, highlighting specific barriers faced by small and medium enterprises (SMEs). Finally, the paper discusses the rising prominence of TDABC in the healthcare and service sectors and outlines future research directions focusing on longitudinal impacts and digital integration.*

• Keywords: *activity-based costing, firm performance, comprehensive review.*

JEL code: M41

Date of receipt: 25<sup>th</sup> Jan., 2026

Date of delivery revision: 04<sup>th</sup> Feb., 2026

DOI:

Date of receipt revision: 28<sup>th</sup> Feb., 2026

Date of approval: 26<sup>th</sup> Mar., 2026

## 1. Introduction

In the contemporary business environment, characterized by intense global competition, rapid technological flux, and shrinking profit margins, the efficacy of management accounting systems has escalated from an administrative function to a paramount determinant of organizational survival. Historically, firms relied on traditional cost accounting (TCA) systems, which allocate indirect manufacturing overheads using broad, volume-based drivers such as direct labor hours or machine hours. While sufficient for standardized mass production, TCA has increasingly failed to provide the granular visibility required for strategic decision-making in modern, complex production environments. As overhead costs rise due to automation and support services, volume-based allocation leads to significant cost distortions, obscuring the true profitability of products and services (Gunasekaran et al., 1999; Pham et al., 2021).

To address these structural deficiencies, ABC emerged as a corrective methodology. By tracing overhead costs first to specific activities and then to products based on their actual consumption of those activities, ABC promises to rectify the cross-

subsidization inherent in traditional models. Since its inception, the academic discourse surrounding ABC has pivoted from technical implementation guides to a critical evaluation of its consequential impact on firm performance. The central question remains: does the adoption of ABC translate into tangible financial and operational gains? The empirical literature presents a nuanced and often contradictory picture. While proponents argue that ABC enhances decision-making accuracy, leading to improved return on investment (ROI) and profitability (Cagwin & Bouwman, 2002), critics point to prohibitive implementation costs and mixed empirical results, suggesting that the system's complexity may outweigh its benefits in certain contexts (Knápková et al., 2014). Consequently, this review synthesizes recent evidence to determine the specific conditions under which ABC creates value, exploring the critical mediating roles of organizational culture, top management support, and technological infrastructure.

## 2. The Multidimensional Impact on Firm Performance

The impact of ABC is not monolithic; it manifests distinctively across financial, operational, and strategic dimensions.

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### **2.1. Financial Performance: A Contingent Reality**

The relationship between ABC adoption and financial performance - measured by metrics such as ROI, ROA, and profit margin - remains a subject of intense academic debate. Early theoretical models posited a direct linear relationship, but recent empirical evidence suggests a more complex, contingent reality.

Studies indicate that ABC does not automatically generate higher profits. Instead, its financial benefits are often lagging, appearing only after the system has been fully institutionalized and integrated with other strategic initiatives (Jänkälä & Silvola, 2012). For instance, in a study of Czech companies, Pokorná (2016) found that while ABC improved cost visibility, the translation to financial performance was dependent on the firm's ability to act on that information. Furthermore, the success of ABC is frequently mediated by world-class manufacturing practices; ABC provides the data, but operational excellence strategies (like JIT or TQM) execute the savings (Banker et al., 2008). Without these complementary practices, ABC may result in information overload without tangible financial return (Yu-Lee et al., 2006).

### **2.2. Operational Performance: Consistent Gains**

In contrast to financial metrics, the impact of ABC on operational performance is robust and consistently positive across the literature. By mapping activities and identifying non-value-added tasks, ABC serves as a potent diagnostic tool for process improvement.

Empirical research demonstrates that ABC adoption is strongly correlated with reductions in manufacturing cycle time, defect rates, and inventory holding costs (Ittner et al., 2002). In manufacturing plants, the granular data provided by ABC allows managers to identify bottlenecks and resource wastage that traditional systems obscure (Maiga, 2017). The integration of ABC with internal information systems further amplifies these operational gains, creating a feedback loop where cost data drives continuous process optimization (French et al., 2013).

### **2.3. Strategic Decision-Making**

Beyond the shop floor, ABC fundamentally alters strategic decision-making. By revealing the true cost of service delivery and product

complexity, ABC enables sophisticated customer profitability analysis (CPA) and product mix optimization.

Firms utilizing ABC are better equipped to identify and divest from unprofitable product lines or customer segments that were previously subsidized by high-volume staples (Narayanan & Sarkar, 2002; Wei, 2011). In the context of startups and highly competitive markets, the perceived accuracy of ABC data empowers managers to make aggressive pricing and market entry decisions with greater confidence (Daowadueng, 2024; Goebel et al., 1998).

### **3. Contextual Moderators of Success**

The success of ABC is not intrinsic to the methodology but is heavily moderated by internal and external contextual factors.

#### **3.1. Top Management Support and Organizational Culture**

Among the myriad factors influencing the successful adoption and efficacy of ABC, top management support (TMS) consistently emerges in the literature as the single most critical determinant. The implementation of ABC is not merely a change in accounting technique; it is a systemic organizational restructuring that challenges existing power dynamics and resource allocation norms. Consequently, without active, visible championship from the C-suite, ABC initiatives often lack the political capital necessary to overcome internal resistance. Research indicates that when senior leadership views ABC solely as a finance department initiative rather than a strategic imperative, implementations frequently devolve into isolated accounting exercises that are ignored by operational managers (Jebreel et al., 2021).

Parallel to leadership support, organizational culture acts as the fertile soil in which ABC either thrives or withers. ABC demands a high degree of transparency and accountability, as it exposes the true cost of inefficiencies and non-value-added activities. Empirical studies suggest that cultures characterized by an outcome orientation - a focus on results rather than procedures - and a meticulous attention to detail are significantly more likely to derive tangible value from ABC. Furthermore, firms with flexible, innovative cultures that encourage employees to challenge established hierarchies are better positioned to act on the uncomfortable insights ABC often reveals

(Hamid, 2021; Zhang et al., 2015). Conversely, rigid, bureaucratic structures that prioritize stability over agility often reject the transparency ABC imposes, viewing the data as a threat rather than a tool for improvement.

### **3.2. Technological Infrastructure (IT and ERP)**

Historically, the Achilles' heel of ABC was the prohibitive labor intensity required for data collection. Early implementations often relied on manual time sheets and periodic employee surveys to estimate activity drivers, a process that was not only prone to significant human error but also costly to maintain. This burden frequently led to the abandonment of ABC systems as too complex or too expensive. However, modern research highlights that the integration of ABC with robust enterprise resource planning (ERP) systems and advanced information technology (IT) infrastructure has fundamentally altered this equation, becoming a prerequisite for sustainable performance (Maiga, 2017).

The synergy between ABC and IT is transformative. ERP systems centralize vast amounts of operational data - from machine run times and inventory movements to labor hours - creating a digital reservoir that ABC models can tap into automatically. This automated data capture eliminates the need for manual tracking, drastically reducing the cost of maintaining the system. Moreover, it ensures that cost drivers reflect real-time operational realities rather than outdated estimates or guesstimates. This immediacy allows managers to make decisions based on current market conditions. Furthermore, advanced IT infrastructure enables the modeling of complex what-if scenarios, allowing firms to simulate the financial impact of strategic changes before implementation. Consequently, the successful deployment of ABC is no longer just an accounting challenge but a technological one, dependent on the maturity of the firm's digital ecosystem.

## **4. Sectoral Analysis and the Challenge of SMEs**

### **4.1. Manufacturing vs. Services and Healthcare**

Historically, the genesis of ABC lay within the manufacturing sector, developed to address the distortions caused by rising overheads in

factory automation. While manufacturing remains a traditional stronghold, the application of ABC has matured significantly, expanding its footprint into the service and healthcare industries. This shift is driven by the realization that service delivery, much like manufacturing, involves complex, resource-consuming activities that traditional costing obscures. In the healthcare sector, specifically, the imperative to control spiraling costs while maintaining or improving patient outcomes has catalyzed the adoption of ABC. Hospitals and clinics are increasingly utilizing ABC to map patient care pathways, tracing the costs of specific medical interventions - from admission and diagnostics to surgery and post-operative care - rather than relying on broad departmental budgets.

Recent empirical work highlights that ABC allows healthcare administrators to identify the true cost of diverse treatments, revealing cross-subsidization between different patient groups (Nabelsi & Plouffe, 2024). For instance, ABC can expose how standard procedures may be subsidizing complex, resource-intensive cases. Similarly, in the broader service sector (e.g., banking, logistics, hospitality), where intangible overheads like customer support and IT infrastructure constitute the majority of costs, ABC is pivotal for CPA. It enables firms to differentiate between profitable clients and those who erode value through excessive service demands. This sectoral evolution underscores ABC's versatility, proving that the logic of activity-based management is applicable wherever resources are consumed to produce an output, whether tangible or intangible.

### **4.2. The SME Paradox**

SMEs present a unique paradox in the context of ABC. On one hand, SMEs operate in highly competitive environments with thin margins, meaning they stand to benefit disproportionately from the precise cost control and strategic insights ABC offers. On the other hand, they face a severe liability of smallness. Unlike large corporations, SMEs often lack the requisite financial capital to invest in sophisticated ERP systems and the specialized human capital to design and maintain complex accounting models. Consequently, the high upfront costs and technical demands of full-scale ABC implementation frequently act as prohibitive barriers (Needy et al., 2003; Rundora

& Selesho, 2014).

This creates a tension where the firms that need ABC the most are often the least equipped to adopt it. Research suggests that for many SMEs, the administrative burden of a comprehensive ABC system can indeed outweigh its benefits, leading to implementation failure or abandonment. However, the narrative is shifting. Recent studies indicate that when simplified or tailored methodologies are applied - such as TDABC or localized pilot programs - SMEs can overcome these resource constraints. By focusing on key activities and avoiding over-engineering, smaller firms can extract the strategic value of ABC - improved pricing accuracy, better product mix decisions, and enhanced competitiveness - without the crushing overhead of a corporate-style system (Jänkälä & Silvola, 2012; Roffia et al., 2024). Thus, the challenge for SMEs is not the validity of ABC, but the adaptation of its scale.

### 5. The Evolution: TDABC

While traditional ABC represented a significant leap forward in cost accuracy, its practical application was often hampered by the sheer complexity of maintaining the system. The requirement to constantly interview employees to update resource allocation percentages proved to be costly, time-consuming, and prone to subjective bias. To address these structural limitations, TDABC has emerged as a refined, evolutionary successor, gaining particular traction in service-oriented industries where labor is the primary cost driver.

TDABC fundamentally simplifies the allocation process by reversing the traditional logic. Instead of surveying staff on how they spend their time, TDABC estimates resource consumption using elegant time equations. Managers need only estimate two parameters: the unit cost of supplying capacity (e.g., the cost per minute of a nurse or a machine) and the time required to perform a specific transaction (Mortaji et al., 2013). For example, a time equation might calculate the time for a patient consultation as:  $\text{Time} = 10 \text{ minutes} + (5 \text{ minutes} \times \text{number of complications})$ . This dynamic modeling eliminates the need for exhaustive surveys and allows the system to update automatically as process variables change.

Recent empirical studies have validated the superiority of TDABC, particularly in the

complex domain of healthcare. Research focusing on orthopedic and spinal surgeries demonstrates that TDABC provides significantly greater accuracy in calculating total episode-of-care costs compared to both traditional costing and standard ABC (Fang et al., 2021; Keppetipola et al., 2025). Furthermore, a critical operational advantage of TDABC is its ability to make unused capacity visible. By calculating costs based on practical capacity rather than actual utilization, TDABC isolates the cost of idle time, allowing managers to distinguish between process efficiency and resource utilization. This transparency empowers organizations to streamline processes and optimize workforce planning more effectively than was possible with traditional ABC models (Halaška & Šperka, 2021).

### 6. Adoption in Emerging vs. Developed Markets

A critical analysis of the global landscape reveals a significant divergence in the adoption and maturity of ABC between developed and emerging economies. In developed markets (e.g., North America, Western Europe, Australia), ABC has largely transitioned from a novel innovation to a standard component of mature management control systems. Here, firms operate in high-cost environments with sophisticated IT infrastructure, making the precision of ABC both necessary and feasible. However, the scenario is markedly different in emerging markets such as Vietnam, South Africa, and Sudan.

These regions face a unique constellation of barriers that hinder widespread adoption. Firstly, there is often a chronic shortage of qualified management accountants who possess the technical expertise to design and maintain complex cost models. Secondly, cultural factors play a significant role; in many traditional business environments, there is a deep-seated resistance to the transparency ABC requires, as it can disrupt established hierarchies and expose inefficiencies that management may prefer to ignore (Nguyen & Pham, 2021). Furthermore, the historical economic model of these regions - predicated on low-cost labor - reduced the perceived urgency for precise overhead allocation. When direct labor is cheap, overheads appear less significant, leading firms to rely on simple, traditional costing methods (Rundora, 2013).



Despite these challenges, the tide is turning. As emerging market firms increasingly integrate into global supply chains, they are exposed to fierce international competition that erodes the labor arbitrage advantage. Global partners demand rigorous cost transparency and efficiency, creating external pressure that is driving a new wave of ABC adoption. Consequently, ABC is moving from a theoretical concept to a strategic necessity for emerging market firms aiming to compete on the global stage (Albalak et al., 2019).

## 7. Conclusion and Future Directions

The cumulative empirical evidence amassed over the last decade offers a definitive yet qualified verdict on the efficacy of ABC. While the methodology acts as a potent mechanism for enhancing firm performance by revealing cost structures that traditional systems obscure, it must not be misconstrued as a universal panacea. The transition from theoretical potential to tangible operational and financial gains is strictly contingent upon a constellation of critical organizational enablers. Foremost among these is unwavering top management support, which is essential for overcoming internal political resistance and securing necessary resources. Equally vital is the integration of robust IT infrastructure, which transforms static data into dynamic insights, and the cultivation of an organizational culture conducive to data-driven transparency. Without these foundational pillars, ABC implementations risk devolving into costly, administrative exercises. Thus, the ultimate value of ABC lies not merely in the accounting mechanics, but in the organizational readiness to integrate granular cost insights into strategic decision-making.

Looking forward, the academic trajectory of ABC must evolve to address significant gaps that remain in the current landscape. First, there is a pressing need for longitudinal research, particularly within the SME context, to move beyond cross-sectional snapshots and track the long-term survival and adaptation of cost systems over time (Sánchez Rebull et al., 2023). Second, future scholarship must rigorously investigate the intersection of ABC and TDABC with Industry 4.0 technologies. Specifically, the application of process mining and artificial intelligence offers a pathway to fully automate cost driver analysis, potentially resolving the historic challenge of data complexity (Halaška & Šperka, 2021). Finally,

as global corporate governance shifts toward environmental stewardship, a vital frontier for inquiry is the development of green ABC. Future studies must explore how ABC frameworks can be adapted to trace environmental costs - such as carbon emissions and waste management - aligning financial precision with sustainable development goals (van der Poll, 2022).

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# INTEGRATED REPORTING QUALITY AND COMMERCIAL BANK VALUATION UNDER INFORMATION OPACITY AND COMPLEXITY: A SIGNALING PERSPECTIVE

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**Abstract:** Commercial banks operate under high information opacity and complex risk structures, making valuation heavily dependent on reported information. In this context, reporting quality, rather than quantity, is critical. Integrated Reporting Quality (IRQ) enhances interpretability by linking financial and non-financial information within a coherent value-creation framework. However, existing studies on the IRQ-firm value relationship mainly focus on non-financial firms and developed markets, with limited attention to banks. This paper conducts a structured literature review, applying signaling theory to view IRQ as a signal of governance and risk management quality. It identifies gaps in theory, measurement, emerging-market contexts and proposes directions for future research and policy development.

• Keywords: integrated reporting quality; commercial bank valuation; information opacity; information complexity; connectivity; signaling theory.

Date of receipt: 25<sup>th</sup> Feb., 2026

Date of delivery revision: 04<sup>th</sup> Mar., 2026

DOI:

Date of receipt revision: 30<sup>th</sup> Mar., 2026

Date of approval: 02<sup>nd</sup> Apr., 2026

## 1. Introduction

### 1.1. Background and Research Motivation

Commercial banks play a key role in financial intermediation but differ from non-financial firms due to their complex and opaque asset structures, including long-term loans, derivatives, and Level 3 fair value assets. These features intensify information asymmetry, as asset quality and risk exposure rely heavily on internal models and managerial judgment, making external evaluation difficult.

Opacity in banking is structural, with key elements such as loan loss provisions and risk-weighted assets depending on discretionary assumptions. As a result, investors rely not only on financial figures but also on the quality of disclosures to assess performance and risk. At the same time, the interconnected nature of banking systems means that reduced transparency can undermine market confidence, increase funding costs, and amplify systemic risk.

From an information economics perspective, high asymmetry raises perceived risk and lowers firm value, while transparent and credible disclosure improves monitoring and capital allocation. Given banks' systemic importance and regulatory environment, disclosure quality is crucial, directly influencing investor perceptions of risk, governance,

and valuation..

### 1.2. Integrated Reporting under Opacity and Information Overload

Disclosure is typically seen as a tool to reduce information asymmetry, but in commercial banking, high reporting volume does not necessarily improve clarity. Despite extensive disclosures, key drivers of bank value such as credit risk, capital resilience, and risk governance remain difficult to interpret. This creates a paradox where investors face abundant but complex information, limiting their ability to assess true risk-return profiles. Integrated Reporting (IR) addresses this by structuring financial and non-financial data into a coherent value-creation narrative. Accordingly, a key question arises: whether higher Integrated Reporting Quality (IRQ) improves investors' ability to evaluate risk and long-term sustainability under conditions of opacity.

### 1.3. Research Gaps and Objectives

Existing studies generally find that transparency reduces cost of capital and increases firm value, but most evidence focuses on non-financial firms in developed markets, with limited attention to commercial banks. This gap is more evident in emerging economies like Vietnam, where bank-based systems, ownership concentration, and evolving disclosure practices shape the credibility

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and impact of reporting. A second gap concerns measurement. Many studies rely on simple proxies or checklists, failing to capture the structural connectivity of Integrated Reporting Quality (IRQ), which limits its role as a meaningful signal and reduces comparability. A third gap relates to methodology, as prior research often examines direct relationships without considering mediating mechanisms or addressing endogeneity, especially in banking contexts with high opacity. This study reviews the literature on IRQ and firm value in commercial banks, focusing on measurement, economic impacts, and empirical evidence, and proposes directions for future research, particularly for listed banks in Vietnam.

## 2. Theoretical foundations

### 2.1. Integrated Reporting

Integrated Reporting can be conceptualized as a reporting architecture that restructures corporate disclosure around a coherent value-creation logic rather than isolated reporting segments. Instead of treating financial performance, governance, sustainability, and risk disclosures as parallel streams, IR integrates them within a cause-and-effect framework linking strategy, business model, capital allocation, risk management, and performance outcomes. Connectivity and forward-looking orientation are therefore its defining structural attributes.

In commercial banking, this architectural shift is economically meaningful. Commercial bank valuation depends heavily on the articulation of credit risk, capital adequacy, liquidity management, and long-term strategic positioning. When financial outcomes are explicitly linked to risk appetite and regulatory capital strategy, disclosure moves beyond compliance and begins to operate as a potential signal of governance coherence and risk integration. The relevant question is not whether IR is adopted, but whether reporting reflects substantive integration capable of informing capital market assessments.

### 2.2. Integrated Reporting Quality

A distinction must be made between IR adoption and IRQ. Issuing an integrated report does not guarantee true integration; IRQ reflects the quality of disclosure rather than mere compliance.

IRQ encompasses materiality, reliability, and consistency, but its core feature is connectivity the alignment between strategy, business model, risk, capital, and financial outcomes within a coherent framework.

In commercial banking, where asset opacity is high, fragmented disclosures increase information risk. By linking key elements such as credit risk, provisioning, and performance, high IRQ enhances clarity and credibility, improving the usefulness of reporting under complex conditions.

### 2.3. Theoretical Perspectives on IRQ and Bank Value

The relationship between IRQ and commercial bank value is grounded in information economics and corporate finance. In commercial banking, information asymmetry is structural. Loan portfolios, expected credit loss estimates, and regulatory capital calculations rely heavily on internal models and managerial judgment. As a result, the economic relevance of disclosure depends less on quantity than on structural credibility.

This study positions signaling theory as the primary explanation for the direct IRQ valuation link, while agency theory and economic limits of disclosure define important transmission channels and boundary conditions.

#### 2.3.1. Signaling Theory

Under asymmetric information, high-quality firms distinguish themselves through signals that are costly to produce and difficult to imitate. Commercial banking provides an ideal setting for such signaling. Valuation depends on largely unobservable attributes credit risk quality, loan loss provisioning discipline, internal control robustness, and capital resilience.

When integrated reporting is voluntary, achieving high IRQ requires investment in data infrastructure, risk integration systems, and governance coordination across functional units. These organizational capabilities are embedded and not easily replicated. IRQ therefore operates as a costly-to-imitate signal of integrated risk governance.

Connectivity is central to signal credibility. Commercial banking disclosures are frequently siloed across credit, risk, capital, and performance segments. When reporting explicitly links strategic objectives to risk appetite, regulatory capital management, and realized financial outcomes, investors can form a coherent valuation model. Connectivity transforms dispersed technical disclosures into structured evidence.

If markets interpret high IRQ as indicative of disciplined risk governance, perceived information

risk declines. Discount rates may adjust through cost-of-capital and liquidity channels, leading to higher market valuation.

### 2.3.2. Agency Theory

While signaling theory explains market pricing, agency theory clarifies the internal channel. In commercial banking, managerial discretion is substantial, particularly in loan loss provisions (LLP), expected credit loss estimation, and capital management. Information opacity weakens monitoring and expands the scope for discretionary reporting.

High IRQ - especially strong connectivity - imposes alignment between strategic commitments, risk disclosures, and reported financial outcomes. Integrated articulation of credit policy, provisioning behavior, and capital adequacy increases the detectability of opportunistic earnings management. In this sense, IRQ functions as a monitoring mechanism.

Under this channel, IRQ affects firm value indirectly through earnings credibility. Reduced discretionary distortion strengthens investor confidence and lowers perceived agency risk.

### 2.3.3. Information Overload and Proprietary Costs

Transparency has economic limits. In commercial banking, the coexistence of opacity and technical complexity creates a risk of information overload. Excessively detailed reporting may exceed investors' processing capacity, weakening marginal transparency benefits.

Proprietary cost considerations further constrain disclosure. Detailed revelation of risk exposures or capital allocation strategies may impose competitive or compliance costs, particularly under evolving regulatory regimes.

Accordingly, the IRQ valuation relationship may be non-linear. Beyond an optimal threshold, incremental disclosure quality may generate diminishing returns.

## 3. Research methodology for literature review

This study uses a structured narrative review to synthesize research on IRQ and firm value, focusing on banking contexts. Data were collected from Scopus and Google Scholar using keywords related to integrated reporting, disclosure, bank transparency, firm value, and information opacity for the period 2016-2024.

Only peer-reviewed journal articles were included. Studies were selected based on

their relevance to theory, empirical evidence, measurement of IRQ (especially connectivity), and banking-specific contexts. The selected articles were systematically coded and reviewed to identify key themes, measurement issues, and research gaps in the IRQ-valuation literature.

## 4. Literature review

### 4.1. Disclosure and Firm Value

Research shows that better disclosure reduces information asymmetry, lowers information risk, and decreases the cost of capital. Firms with more credible transparency tend to have lower equity costs, higher liquidity, and improved market valuation. Disclosure also enhances price informativeness by helping investors better assess future cash flows. However, traditional studies assume that disclosed information is easily processed. In practice, increasing reporting volume reduces clarity, making structure more important than quantity. This shift highlights the importance of how information is organized, forming the basis for integrated reporting and the focus on IRQ.

### 4.2. IR/IRQ and Firm Value: Evidence and Transmission Channels

The development of IR has reoriented corporate disclosure toward a value-creation architecture linking financial and non-financial capitals. Early empirical evidence indicates that IR adoption is generally associated with higher market valuation, particularly in institutional environments characterized by stronger transparency norms and investor protection.

Subsequent research shifts attention from adoption to IRQ as a substantive signaling attribute. A growing body of evidence documents a positive IRQ-valuation nexus, especially in firms characterized by organizational complexity and substantial external financing needs (Lee & Yeo, 2016). These findings are consistent with the broader information-environment perspective articulated by Barth et al. (2017), who argue that structured and integrated disclosure yields greater marginal benefits when valuation uncertainty and information asymmetry are elevated. In such settings, the economic relevance of connectivity becomes more pronounced.

Two principal transmission channels are identified. First, an information environment channel suggests that high-quality integrated disclosure enhances risk pricing and cash flow predictability, thereby reducing the cost of equity

(Barth et al., 2017; Zhou et al., 2017). Second, a real effects channel positions IRQ as a manifestation of internal management discipline. By aligning strategy, risk governance, capital allocation, and performance within a cause-and-effect structure, IRQ signals integrated thinking rather than incremental disclosure expansion (Barth et al., 2017). More recent evidence identifies mediation mechanisms such as earnings quality and analyst forecast accuracy, reinforcing the monitoring and credibility dimensions of valuation effects (Radwan & Xiongyuan, 2024).

Notwithstanding broadly supportive findings, empirical inconsistencies persist. These variations often stem from measurement heterogeneity. Checklist-based proxies tend to capture formal compliance rather than the structural connectivity that capital markets appear to price, thereby obscuring economically meaningful associations.

Importantly, the consolidation of the IIRC into the International Sustainability Standards Board (ISSB) and the issuance of IFRS S1 and IFRS S2 represent more than institutional restructuring. These standards operationalize the financial-sustainability nexus by requiring entities to disclose sustainability-related risks and opportunities in a manner connected to strategy, risk management, and financial performance across reporting periods. In this sense, ISSB standards codify both cross-sectional connectivity and inter-period connectivity within the global financial reporting architecture. What began as a voluntary integrated reporting philosophy is progressively embedded in enforceable disclosure requirements. This transition strengthens the theoretical and empirical relevance of IRQ by institutionalizing connectivity as a core dimension of capital market reporting.

#### ***4.3. Disclosure in the Banking Sector and Information Opacity***

Opacity in banking is structural rather than incidental. It originates from the economic nature of bank assets. Unlike publicly traded securities, loan portfolios are relationship-specific, heterogeneous, and rarely priced in transparent secondary markets. Morgan (2002) documents that banks are systematically more difficult to evaluate than non-financial firms because the value of their core assets is privately assessed and idiosyncratic. Flannery (2004) further argues that such asset opacity constrains the effectiveness of market discipline, as external investors cannot independently verify credit quality or concentration risk.

This opacity is amplified by accounting discretion. Loan loss provisions, expected credit loss (ECL) estimations, and internal risk-weight calculations under regulatory capital frameworks rely heavily on managerial judgment and proprietary risk models. Even under extensive disclosure regimes, outside stakeholders face inherent limits in reconstructing a bank's true solvency position and loss-absorption capacity. Valuation uncertainty is therefore embedded in the accounting architecture of banking.

In this context, disclosure assumes both informational and monitoring roles. Increased transparency can strengthen risk sensitivity in capital markets and deposit funding. However, banking disclosures are predominantly prudential in orientation. Regulatory capital ratios, stress-testing outcomes, and asset-quality indicators are primarily designed for supervisory assessment rather than investor pricing. As a result, the translation of prudential data into market valuation inputs is not automatic.

IRQ may function as a complementary, market-oriented signal. By linking risk appetite, capital management, governance mechanisms, and financial performance within a structured narrative, high IRQ can transform fragmented prudential disclosures into analytically coherent information. IRQ does not eliminate structural opacity. Instead, it mitigates its valuation consequences by enhancing interpretability and internal consistency.

Empirical evidence illustrates this nuanced effect. Matemane and Wentzel (2019) find a positive association between IRQ and earnings per share among South African banks, while market-based indicators such as Tobin's Q exhibit weaker sensitivity. Ben Said (2025) shows that higher IRQ reduces debt costs in Islamic banks but is negatively associated with equity valuation, implying heterogeneous interpretation by creditors and shareholders.

Overall, in commercial banking, the economic relevance of IR/IRQ lies in its capacity to alleviate valuation uncertainty arising from structural asset opacity and accounting discretion. Yet its market impact remains contingent upon disclosure credibility, governance quality, and the institutional configuration of prudential supervision.

#### ***4.4. Divergent Empirical Findings***

Despite substantial supportive evidence, other studies report statistically insignificant or context-dependent results. Such divergences reflect systematic heterogeneity rather than theoretical contradiction.



*First*, institutional quality conditions valuation relevance. In jurisdictions with strong investor protection and effective enforcement, transparency is more likely to be capitalized into equity prices. By contrast, in markets where integrated reporting remains voluntary and informational efficiency is limited, integrated disclosures may not be fully impounded into valuation. Information-processing constraints and short-term trading horizons can attenuate pricing effects.

*Second*, ownership structure moderates disclosure sensitivity. State ownership, concentrated shareholding, or foreign strategic participation may influence managerial disclosure incentives and the perceived credibility of reporting signals, thereby shaping market reactions.

*Third*, measurement heterogeneity remains a central issue. Binary or checklist-based proxies capture disclosure presence but not structural integration. Metrics emphasizing connectivity, materiality, and strategic alignment are more likely to reflect economically meaningful reporting attributes. Measurement error can therefore obscure true associations.

*Finally*, sectoral information opacity shapes the marginal value of disclosure. In high-opacity industries such as banking, transparency may generate stronger valuation effects, but only when disclosures are credible and internally consistent. Evidence from Islamic banking suggests that debt markets and equity markets may respond differently to the same reporting signal.

Overall, the IR/IRQ-firm value nexus is conditional on institutional environment, measurement design, and sectoral characteristics. Future research should prioritize structurally grounded IRQ metrics and empirical strategies capable of addressing endogeneity within regulated, bank-dominated systems aligned with evolving ISSB standards.

## 5. Research gaps

### 5.1. Research Gap in the Object of Analysis: Banking in a Bank-Based Financial System

Most evidence on IRQ and firm value focuses on non-financial firms in market-based systems, where valuation is driven mainly by market discipline. In contrast, banks operate under high leverage, asset opacity, and strict prudential regulation. In bank-based systems like Vietnam, valuation reflects both investor perception and regulatory oversight. This dual governance creates a unique information

environment, yet the interaction between regulatory supervision and voluntary disclosure quality remains underexplored. Therefore, banks require separate analysis rather than being treated like non-financial firms.

### 5.2. Methodological Gap in Measuring Integrated Reporting Quality

A second gap concerns the operationalization of IRQ. Many prior studies rely on checklist-based proxies, binary scoring systems, disclosure counts, page length, or keyword frequency. While such measures capture disclosure breadth, they do not adequately reflect content depth or structural integration.

Integrated reporting is not defined by disclosure volume but by the articulation of strategy, business model, risk governance, capital allocation, and performance within a coherent value-creation logic. In banking where credit risk, capital adequacy, and liquidity management are central to valuation IRQ measurement must capture materiality, connectivity, and internal consistency. Mere disclosure presence does not necessarily imply integrative coherence.

Current proxies often approximate formal compliance rather than economic substance. Connectivity the alignment among strategic intent, risk exposure, regulatory capital management, and realized outcomes remains under-measured. This measurement limitation may contribute to inconsistent empirical findings. There is therefore a need for IRQ metrics capable of capturing substantive integration, particularly in sectors characterized by regulatory capital constraints and complex risk architectures.

### 5.3. Gap in Transmission Mechanism and Endogeneity under Information Opacity

Section 2.3.3 establishes that transparency is subject to economic limits. Information overload and proprietary costs imply that the IRQ-valuation relationship may exhibit non-linear or threshold effects. However, existing empirical studies have not identified how this optimal transparency boundary operates within structurally opaque banking environments.

Most prior research estimates a direct association between IRQ and firm value without explicitly modeling transmission mechanisms. In banking, where asset quality, loan loss provisioning, and regulatory capital are not fully observable, IRQ is likely to influence valuation indirectly through information risk reduction, earnings credibility,

or market discipline rather than through a simple linear channel. Empirical evidence rarely tests these mediation effects or examines potential non-linear responses. Moreover, the IRQ-valuation nexus remains vulnerable to endogeneity and reverse causality. Higher-valued banks may possess stronger governance systems and reporting capacity, leading to higher IRQ. Without addressing this econometric concern, observed associations may reflect underlying firm quality rather than causal disclosure effects.

Accordingly, future research should test mediation channels, explore potential threshold effects consistent with theoretical transparency limits, and employ identification strategies capable of mitigating endogeneity in opaque banking contexts.

#### 5.4. Institutional and Standard-Transition Gap: The Case of Vietnam

Vietnam represents a transitional economy characterized by a bank-dominated financial system and evolving capital markets. Integrated reporting remains voluntary, and disclosure practices vary across banks. Ownership structures frequently combine state participation and foreign strategic investors, influencing governance dynamics and disclosure incentives. Within this institutional environment, market-based pricing mechanisms may not fully incorporate non-financial or forward-looking information. Although prior domestic studies have examined financial transparency more broadly, systematic evidence on the relationship between IRQ and firm value in the Vietnamese banking sector remains limited.

An additional gap concerns international standard convergence. The consolidation of the IIRC into the International Sustainability Standards Board (ISSB) and the issuance of IFRS S1 and IFRS S2 signal a global transition toward harmonized sustainability-related financial disclosure standards. However, little empirical research evaluates the readiness of Vietnamese banks to align with these emerging standards or assesses how such standard transition may affect the valuation relevance of integrated disclosure.

Re-examining the IRQ-firm value relationship within Vietnam's institutional and regulatory context while accounting for prudential oversight, ownership structure, and evolving international standards may generate insights that differ materially from those observed in market-based systems. Without incorporating these contextual dynamics, conclusions regarding the economic consequences of IRQ risk remaining incomplete.

## Conclusion

This paper synthesizes the literature on corporate disclosure, integrated reporting, and Integrated Reporting Quality (IRQ) in relation to firm value. The review confirms that higher transparency and well-structured reporting can reduce the cost of capital, improve liquidity, and enhance firm valuation. However, most existing evidence is concentrated in non-financial firms and developed markets, limiting its applicability to banking contexts.

Four major research gaps are identified. First, the banking sector remains underexplored despite its high opacity, leverage, and systemic importance. Second, measurement issues persist, as many studies rely on simple proxies that fail to capture connectivity and value-creation logic in IRQ. Third, the mechanisms through which IRQ affects firm value such as earnings quality, risk perception, and cost of capital are insufficiently examined. Fourth, there is a lack of empirical evidence from emerging markets like Vietnam, where financial systems are bank-based and disclosure practices are still evolving.

To address these gaps, the study proposes developing a banking-specific IRQ framework that emphasizes connectivity among strategy, risk, capital, and performance. Future research should also focus on testing transmission mechanisms and applying more rigorous econometric approaches to address endogeneity and potential non-linear effects. From a policy perspective, improving the quality of integrated disclosure can strengthen investor confidence and enhance market efficiency, especially as Vietnam's banking sector advances toward Basel, IFRS, and ESG standards. Overall, the findings suggest that future research should move beyond disclosure quantity and focus on the quality, structure, and credibility of information in complex and opaque banking environments.

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# THE IMPACT OF PERCEIVED VALUE ON BRAND TRUST AND WORD-OF-MOUTH OF ORGANIC FOOD CONSUMERS

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**Abstract:** *The purpose of the study was to ascertain how consumers of organic food viewed perceived value in relation to brand trust and word-of-mouth. 319 customers who were aware of organic food and were at least 18 years old made up the study sample. The study tested the theoretical model and evaluated the scale's reliability using SPSS 26 software and Smart PLS. According to the study's findings, perceived value influences brand trust and word-of-mouth favorably; brand trust influences word-of-mouth favorably; and brand trust mediates the relationship between perceived value and word-of-mouth. This finding serves as a foundation for recommending management changes to improve consumer brand trust and intent to spread the news about organic food.*

• Keywords: *perceived value, brand trust, word-of-mouth, organic food.*

Date of receipt: 04<sup>th</sup> Feb., 2026

Date of delivery revision: 27<sup>th</sup> Feb., 2026

DOI:

Date of receipt revision: 10<sup>th</sup> Mar., 2026

Date of approval: 31<sup>th</sup> Mar., 2026

## 1. Introduction

In recent years, the Vietnamese organic food market has witnessed remarkable growth, reflecting a strong shift in consumer trends toward green and sustainable lifestyles due to concerns about food safety. In this context, understanding the psychological drivers of customer behavior becomes a strategic challenge for businesses. This study focuses on analyzing three core aspects: perceived value, brand trust, and word-of-mouth.

First of all, perceived value (PV) serves as the decisive premise in the exchange process. According to Wu & colleagues (2014), consumers evaluate the usefulness of a product based on the balance between the benefits received and the costs incurred. For organic food, PV lies not only in its physical properties but also in the trade-off between sustainable values and high prices and search time (Lam et al., 2016). This is an essential driver that shapes long-term customer relationships and directly influences actual consumer decisions (Yee et al., 2011).

Next, brand trust (BT) emerged as a shaping factor in the food industry - where quality and safety attributes are often difficult to observe directly. Lassoued & Hobbs (2015) assert that trust serves as a "signal" substitute, helping to convince customers of product reliability. In particular, after food safety crises eroded public trust, understanding the mechanisms of trust formation is an urgent requirement for restoring and maintaining the connection between brands and consumers.

Finally, word-of-mouth (WOM) is considered an important post-purchase outcome. For a product line with a high price point, such as organic food, when expectations regarding health, taste, and the environment are met (Basha & Lal, 2019), consumers tend to be willing to pay a higher price and spread positive reviews (Lee et al., 2010). Therefore, evaluating the mechanism of impact between perceived value and brand trust on word-of-mouth intention is key to promoting the sustainable growth of the organic food market in Vietnam today.

## 2. Theoretical framework and research hypotheses

### 2.1. Theoretical background of the study

This study builds upon and expands the Stimulus - Organism - Response (S-O-R) theoretical framework initiated by Mehrabian & Russell (1974), incorporating systematic adjustments by Jacoby (2002). According to SOR theory, environmental stimuli (S) will influence an individual's internal state (O), which in turn will lead to specific behavioral responses (R). In the proposed research model, perceived value is considered the main stimulus (S), directly impacting brand trust (O) - which serves as an intervening psychological state - and ultimately driving word-of-mouth behavior (R). This relationship is strengthened by empirical evidence showing that positive perceived value is not only a prerequisite for brand trust but also a driver of positive consumer responses.

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## 2.2. Theoretical basis and research hypotheses

### *Perceived value, brand trust, and word-of-mouth.*

Perceived value is understood as the consumer's assessment of the benefits of using a product based on their perceptions and consumption experiences, which meet their needs and desires compared to other alternatives (Sheth et al., 1991; Sweeney & Soutar, 2001). Brand trust is the willingness of customers to place their confidence in a brand even when there are risks, based on the expectation that the brand will do what it has promised (Yu et al., 2022). In behavioral psychology, brand trust serves as a signal guaranteeing product quality and safety (Aaker, 1996), while perceived value is a key antecedent in forming trust by meeting expectations regarding benefits and costs (Sirdeshmukh et al., 2002; Kim & Cho, 2017). Evidence from Konuk (2018) and Watanabe et al. (2020) confirms that perceived value has a strong positive impact on customer trust. Therefore, a positive level of perceived value not only helps reduce skepticism but is also the core driver of trust in organic food brands (Chen & Chang, 2012; Amin & Tarun, 2021).

Additionally, perceived value can influence an individual's ability to generate positive word-of-mouth based on the perceived value associated with a specific product or service. High perceived value will increase an individual's likelihood of recommending the product/service to their colleagues, friends, and family, leading to positive word-of-mouth. Similarly, if perceived value is low, individuals are less likely to recommend the product/service, leading to less positive word-of-mouth (Sukaris et al., 2020; Samadara & Fanggidae, 2020).

Based on the above arguments, the following hypotheses are proposed:

*H1: Perceived value has a positive impact on brand trust.*

*H2: Perceived value has a positive impact on word-of-mouth.*

### *Brand trust and word-of-mouth*

Word-of-mouth (WOM) is defined as an individual's evaluation of a brand, product, service, or organization without commercial intent, which is spread through direct communication or other forms of social media communication (Silverman, 1997). According to Morgan & Hunt (1994), trust is considered a key component of all long-term relationships and a primary driver of positive word-of-mouth. Khan & Fatman (2023) and Tessema et al. (2025) have demonstrated that WOM is a result of brand trust. Positive WOM,

in both offline and online environments, is one of the main goals of modern marketing activities. From this, the research team proposed the following hypothesis:

*H3: Brand trust has a positive impact on word-of-mouth.*

### *The mediating role of brand trust*

In many contexts, studies widely support the notion that trust is a crucial path from perceived value to WOM, although WOM often operates alongside other mediating variables rather than in isolation. In green marketing, green perceived value increases green trust, and green trust in turn significantly drives green WOM, partially moderating the impact of perceived value on WOM (Román-Augusto et al., 2022). Research on green products in general shows that trust is both a direct predictor of WOM and an outcome of perceived value. Based on these analyzes, the research team proposes the following research hypothesis:

*H4: Brand trust mediates the relationship between perceived value and WOM*

## 3. Research methods

The research method was conducted in three main steps: (1) Scale validation; (2) Present the data collection method; (3) Analyze and process the data.

The scale in this study is inherited and adapted from reputable published works, including: Perceived Value (PV) consisting of 5 observed variables, inherited from Chauke & Duh (2019) and Singh & Alok (2021); Brand Trust (BT) consisting of 3 observed variables, inherited from Tian et al. (2022); Word-of-Mouth (WOM) consisting of 4 observed variables, inherited from Chauke & Duh (2019).

Based on established scales, the study conducted expert consultations to adjust them to suit the actual context. The survey instrument was developed through a reverse translation process as recommended by Bulmer & Warwick (2005), using English-Vietnamese bilingualism to ensure semantic equivalence. The observed variables were measured using a 7-point Likert scale, designed as closed-ended questions.

The study applied a non-probability sampling method (convenience sampling) to consumers aged 18 and over who have knowledge of organic food. Data was collected through online surveys. Out of a total of 350 responses received, after data cleaning and the removal of 31 unsatisfactory questionnaires, the final research sample consisted of 319 qualified observations suitable for analysis.

Data analysis was performed on the SmartPLS 4 and SPSS 26 platforms using the PLS-SEM



method. The evaluation process follows the two-step approach of Henseler et al. (2015), which includes: (1) determining the validity and reliability of the scale (measurement model); and (2) testing the research hypotheses (structural model).

#### 4. Research results

##### 4.1. Demographic analysis results

Statistical results from 319 valid survey responses show a strong focus on female respondents (89.7%), consistent with gender-specific characteristics in household consumption. This customer group is characterized by social and economic stability: 56.1% are between 36 and 45 years old; 94.6% have a university degree or higher, and over half of the respondents (55.2%) have a high average income (18-32 million VND/month).

The occupational distribution is also primarily concentrated in the knowledge and office group (with 45.5% being civil servants/officials/military personnel; 31% being office workers). These parameters reaffirm the trend indicated in previous studies, according to which organic food consumers often belong to a highly educated and affluent segment, which are key factors driving the choice of sustainable and safe products.

##### 4.2. Data analysis results

##### Results of the model measurement evaluation

The model evaluation process includes assessing internal consistency reliability, convergent validity, and discriminant validity. For reflective latent variables, convergent validity is confirmed when the outer loading coefficient is 0.7 or higher and the AVE is above 0.5 (Hair et al., 2016). Simultaneously, the stability of the scale was confirmed thru Cronbach's Alpha coefficient and composite reliability (CR), with a minimum acceptable threshold of 0.7. Adhering to these technical standards ensures that the latent variables have sufficient reliability and validity to proceed with the next steps of structural analysis.

The results show that all indicators are suitable for the research model.

**Table 1. Reliability and convergent validity of variables**

| Items | Outer loading | Cronbach's Alpha | CR Rho_C | AVE   |
|-------|---------------|------------------|----------|-------|
| PV    |               | 0.934            | 0.950    | 0.790 |
| PV1   | 0.881         |                  |          |       |
| PV2   | 0.911         |                  |          |       |
| PV3   | 0.883         |                  |          |       |
| PV4   | 0.869         |                  |          |       |
| PV5   | 0.899         |                  |          |       |
| BT    |               | 0.933            | 0.957    | 0.881 |
| BT1   | 0.955         |                  |          |       |
| BT2   | 0.920         |                  |          |       |
| BT3   | 0.941         |                  |          |       |

| Items | Outer loading | Cronbach's Alpha | CR Rho_C | AVE   |
|-------|---------------|------------------|----------|-------|
| WOM   |               | 0.904            | 0.933    | 0.778 |
| WOM1  | 0.920         |                  |          |       |
| WOM2  | 0.852         |                  |          |       |
| WOM3  | 0.950         |                  |          |       |
| WOM4  | 0.797         |                  |          |       |

Source: Data analysis results

Discriminant validity continues to be examined thru the HTMT index to ensure that the concepts in the model do not overlap semantically. According to the recommendations of Henseler et al. (2015) and Kline (2018), the HTMT values obtained (presented in Table 2) are all below the thresholds of 0.85 and 0.90.

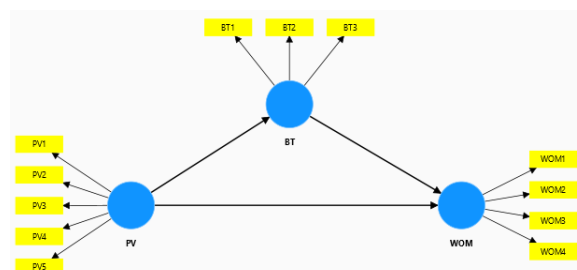
**Table 2. Distinctive value (HTMT)**

|     | BT    | PV    | WOM |
|-----|-------|-------|-----|
| BT  |       |       |     |
| PV  | 0.676 |       |     |
| WOM | 0.549 | 0.564 |     |

Source: Data analysis results

This result indicates that the measurement model achieved ideal discriminant validity, allowing for subsequent structural analyzes.

**Figure 1. Measurement model**



Source: Data analysis results

##### Structural model assessment results

The structural model evaluation process is carried out by examining multicollinearity, determining the significance level of the relationships, along with analyzing the coefficient of determination  $R^2$  and the effect size  $f^2$ .

First, multicollinearity between the structures is controlled thru the variance inflation factor (VIF). Based on Hair & colleagues' (2016) reference threshold of  $VIF < 3$ , the experimental results show that the VIF values range from 1.000 to 1.674. This confirms that the model does not violate multicollinearity, ensuring the reliability of subsequent hypothesis testing steps.

Testing the research hypothesis using bootstrapping yielded the following results:

**Table 3: Structural model assessment results**

| Path         | Original sample (O) | Standard deviation (STDEV) | T value | P value | $f^2$ | Hypothesis |
|--------------|---------------------|----------------------------|---------|---------|-------|------------|
| H1: PV → BT  | 0.635               | 0.040                      | 15.758  | 0.000   | 0.674 | Support    |
| H2: PV → WOM | 0.347               | 0.058                      | 6.009   | 0.000   | 0.108 | Support    |

| Path              | Original sample (O) | Standard deviation (STDEV) | T value | P value | f <sup>2</sup> | Hypothesis |
|-------------------|---------------------|----------------------------|---------|---------|----------------|------------|
| H3: BT → WOM      | 0.292               | 0.055                      | 5.260   | 0.000   | 0.076          | Support    |
| H4: PV → BT → WOM | 0.185               | 0.038                      | 4.851   | 0.000   |                | Support    |

Source: Data analysis results

Thus, all research hypotheses are accepted. Specifically, in the direct relationship, perceived value has the strongest impact on brand trust with a coefficient  $\beta = 0.635$ , P-value = 0.000, T-value = 15.758,  $f^2 = 0.674$ , and hypothesis H1 is accepted. Perceived value also has a positive impact on word-of-mouth with a coefficient  $\beta = 0.347$ , P-value = 0.000, T-value = 6.009,  $f^2 = 0.108$ , and hypothesis H2 is accepted. Hypothesis H3 was also accepted with a coefficient  $\beta = 0.292$ , P-value = 0.000, T-value = 5.260,  $f^2 = 0.076$ , indicating that brand trust influences word-of-mouth, but the degree of influence is relatively low.

In an indirect relationship, brand trust partially mediates the relationship between perceived value and word-of-mouth with a coefficient  $\beta = 0.185$ , P-value = 0.000, and T-value = 4.851.

The coefficient of determination  $R^2$  for brand trust is 0.403, and for WOM is 0.334, indicating that the independent variables explain 40.3% of the variation in brand trust and 33.4% of the variation in word-of-mouth.

## 5. Discussion of research results and some policy implications

### 5.1. Discussion of research results

The results of the structural model analysis show that perceived value plays a key role in driving brand trust and WOM in the context of organic food. Specifically, the impact of perceived value on brand trust was recorded as very strong ( $\beta = 0.635$ ,  $f^2 = 0.674$ ), surpassing the direct impact on WOM ( $\beta = 0.347$ ,  $f^2 = 0.108$ ). This correlation is perfectly consistent with the empirical evidence of Yu et al (2022) and Liu et al (2025) regarding the role of perceived value in brand trust formation, as well as the research of Bashara et al (2023) on WOM.

Similarly, brand trust was also confirmed to have a positive effect on WOM ( $\beta = 0.292$ ,  $f^2 = 0.076$ ). This result reaffirms the previous arguments of Khan & Fatma (2023) as well as Tessema et al (2025) regarding the power of brand trust in eliciting positive consumer responses.

Specifically, the study demonstrated the mediating role of brand trust in the relationship between perceived value and WOM. This finding aligns with the research results of Román-Augusto et al. (2022), which show that brand trust is not only a result of perceived value but also an important transmission

mechanism that encourages customers to spread information about the brand.

### 5.2. Management Implications

Based on the results of experimental research on the impact of perceived value on brand trust and word-of-mouth intention in the organic food sector, the authors propose several management implications to help businesses optimize their business strategies and sustainable brand development:

*First*, focus on enhancing perceived value for customers. The research results confirm that perceived value is the most important prerequisite for driving brand trust and word-of-mouth, therefore, businesses should not only focus on providing clean, safe, and healthy products, but also need to build a comprehensive value system such as: making product information transparent thru the application of traceability technology; publicly disclosing organic certifications (USDA, JSA, PGS,...) and actual production processes.

*Second*, it strengthens brand trust. As an important mediating variable in the SOR model, brand trust is the bridge that determines the conversion of positive perceived value into information dissemination intention. Therefore, businesses need to build trust by focusing on a consistent communication strategy and a commitment to social responsibility.

*Third* is to activate a word-of-mouth strategy based on community strength. Businesses should consider building and nurturing organic consumer communities (such as green lifestyle groups, organic consumption groups, etc.). Especially with “customer referral” programs offering practical incentives, this will motivate current consumers to become voluntary brand ambassadors.

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# EMPIRICAL RESEARCH ON THE RELATIONSHIP BETWEEN INNOVATIVE WORK BEHAVIORS, ORGANIZATIONAL KNOWLEDGE MANAGEMENT AND AUDIT FIRMS' PERFORMANCE IN VIETNAM

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**Abstract:** Nowadays, the ability to continuously innovate and improve products, services and work processes is crucial for organizations. This research aims at exploring the effects of innovative work behavior (IWB) on job performance (JP) and firm performance (FP). It also investigates the mediating role of job performance and the moderating role of organizational knowledge management (OKM) in the relationship between IWB and FP. This study employed a PLS-SEM model to assess the effects of IWB on FP, the mediating role of JP and the moderating role of OKM. Data were collected via a survey of 255 auditors from 40 Vietnamese auditing firms between April and June 2024. Data analysis was conducted using SmartPLS 4.0 software, involving measurement model evaluation, structural model assessment, and hypothesis testing. The findings indicate that JP has a statistically significant direct impact on FP, with IWB positively influencing JP. Furthermore, JP was found to have an effective mediating role in the relationship between IWB and FP, while OKM moderated the relationship between JP and FP.

• Keywords: job performance; innovative work behaviors; firm performance; knowledge management.

JEL codes: O31, D83, M42

Date of receipt: 04<sup>th</sup> Jan., 2026

Date of delivery revision: 27<sup>th</sup> Feb., 2026

DOI:

Date of receipt revision: 10<sup>th</sup> Mar., 2026

Date of approval: 27<sup>th</sup> Mar., 2026

## 1. Introduction

Since the concept of innovation was introduced, it has been widely adopted and implemented across various organizations (Hsu, 2016). Among the different dimensions of innovation, innovative work behavior (IWB), or employee innovative behavior, is essential for organizational innovation (Janssen et al., 2004). IWB plays a critical role in the success of businesses, particularly within service industries, and has been the subject of extensive research (Yuan and Woodman, 2010; Calantone et al., 2002). However, the literature reveals that, compared to group or firm-level innovation, IWB has received less attention, with most research focusing on the manufacturing sector (Axtell et al., 2000; Ramamoorthy et al., 2005).

In service firms, such as those in the auditing industry, innovation has emerged as a crucial factor for performance and growth in response to the rapidly changing environment (Campo et al., 2014; Rodgers, 2007). IWB is beneficial for both service firms and their employees and is influenced by both individual and organizational factors (Hsu, 2016), such as human resource management practices (Bos-Nehles et al., 2017). Given this context, the current study provides empirical evidence from Vietnamese auditing firms

to explore the relationship between IWB and firm performance (FP), with a particular focus on the mediating role of job performance (JP). The study also examines the role of organizational knowledge management (OKM) in this dynamic.

*This study aims to answer the following questions:*

RQ1: Does IWB directly affect JP and FP?

RQ2: Does JP mediate the relationship between IWB and FP?

RQ3: Does OKM moderate the relationship between JP and FP?

The research consists of 5 parts, starting with the introduction section. Past research is discussed in Section 2. Data and methods used in the current research are given in Section 3. Section 4 summarizes and discusses the statistical results, while Section 5 gives the conclusion and implications.

## 2. Literature review

### 2.1. Foundation theories

The theory of planned behaviour (TPB), proposed by Martin Fishbein and Icek Ajzen in 1975 (Fishbein and Ajzen, 1975), is based on the theory of reasoned action (TRA). In the TPB model, three main factors impact the intention and behaviour of a person,

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including attitude, subjective norm, and perceived behavioural control (newly added by TPB). The TPB model is well-known and used mostly in predicting people's intention and behaviour, especially innovative and knowledge-sharing behaviour. Therefore, in this research, TPB is used as a base for developing the research model.

This study is also based on Social Exchange Theory (SET). This theory, developed by Blau (1964), is based on the principle of exchanges in relationships. It is a common sociological theory of understanding the exchange of assets between people in a relationship (Ap, J., 1992). It proposed that interest exchange was formed during the beneficiary interaction between two parties (Yu et al., 2018). Parties wishing to maintain their relationship are willing to exchange something of economic or social value. Within the framework of SET, to take full advantage of the gained incomes, persons may form social relations with other persons by sharing their knowledge (Liang et al., 2008), and different exchange relations in the organization affect the innovative behavior of the employees (Wang et al., 2015).

## 2.2. IWB and Its Effects on JP and FP

Innovative Work Behavior (IWB) refers to intentional actions by individuals to create and implement new, useful ideas that benefit individuals, groups, or organizations (Bos-Nehles et al., 2017). While creativity is a key component of IWB, it also includes idea promotion and implementation, leading to innovative outputs such as new products, services, processes, and management systems (Crossan & Apaydin, 2010).

IWB has been conceptualized in different ways. Dorenbosch et al. (2005) divided it into two stages, including invention and implementation. Scott and Bruce (1994) proposed three stages, consisting of idea generation, sponsorship search, and implementation. De Jong and Den Hartog (2010) added a fourth stage, which is recognizing opportunities or problems. However, empirical studies suggest that IWB is best viewed as an interrelated set of behaviors rather than distinct phases (Scott & Bruce, 1994; Janssen, 2000).

Innovative employees actively gather and apply knowledge to generate ideas and improve processes (Aryee et al., 2012). They are willing to learn and develop new solutions, enhancing job performance (JP) (Amabile et al., 2005). Learning fosters information gathering, which improves job execution (Walumbwa et al., 2009), while challenge stressors enhance motivation and performance (LePine et al., 2005). Thus, hypothesis 1 was proposed:

**H1:** IWB positively impacts JP.

In service industries, JP significantly influences customer perceptions of service quality (Auh, 2005). High JP enhances customer satisfaction, service quality, and business retention, directly improving firm performance (FP) (Lee et al., 2011). Therefore:

**H2:** JP positively impacts FP.

To remain competitive, service organizations must harness employees' innovative potential (Jafri, 2010). Innovative employees contribute to competitive advantage and improved business outcomes (Jafri, 2010). Thus, the following hypotheses were proposed:

**H3:** IWB positively impacts FP.

**H4:** JP mediates the relationship between IWB and FP.

These hypotheses highlight the critical role of IWB in enhancing both individual and organizational performance.

## 2.3. OKM and Its Effect on the Relationship Between IWB and FP

Organizational Knowledge Management (OKM) involves creating, sharing, and applying knowledge to enhance business performance. Effective OKM requires improving capabilities, motivation, and opportunities for individuals and teams to learn and innovate (Dalkir, 2020). The KM cycle includes knowledge capturing, sharing, and applying, all of which support innovation.

Training and development play a crucial role in fostering IWB. Previous studies show a direct positive impact of T&D on IWB by enhancing employees' knowledge and skills (Knol & van Linge, 2009; Pratoom & Savatsomboon, 2012). Some scholars explain this relationship from a human capital perspective, where training and development improve competencies that drive IWB (Ong et al., 2003). Others view it as a social exchange process (Blau, 1964), where employees reciprocate organizational investment in their development with innovative behaviors (Sanders et al., 2010).

Knowledge sharing, a key dimension of OKM, significantly influences IWB (Afsar et al., 2019). It fosters a culture of social interaction where employees exchange knowledge, experiences, and skills (Lin, 2007). Knowledge sharing enhances innovation by enabling employees to leverage both tacit and explicit knowledge (Tuan, 2017). Organizations promoting knowledge-sharing practices are more likely to develop new ideas and improve business opportunities. Leadership also plays a crucial role in fostering a knowledge-sharing culture, which, in turn, enhances innovation and firm performance (Liao et al., 2018).



When knowledge sharing is prevalent, employees receive diverse insights from colleagues, improving decision-making, job performance, and firm performance (Guan et al., 2018). Transformational leaders further amplify this effect by inspiring employees to solve problems and drive innovation (Edwards et al., 2017).

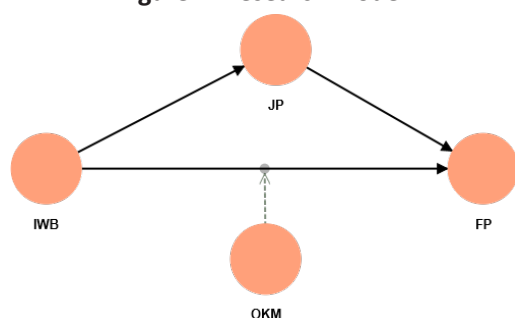
**H5:** OKM positively moderates the effect of IWB on JP and FP

### 3. Methodology

#### 3.1. Research model and measurement

The proposed research model is shown in Figure 1.

**Figure 1: Research model**



#### *Innovative work behavior*

A scale of ten items from the study of De Jong and Den Hartog (2010) (IWB1 to IWB10) was used in this study to measure IWB. Surveyors were asked to score how often they exhibit innovative behaviors at work on a 5-point scale from 1 (never) to 5 (all the time).

#### *Job performance*

Performance of auditors is measured by scales inherited from the research of Williams and Anderson (1991). They proposed 21 items (from JP1 to JP21) divided into three scale groups, including: (1) items that assessed the performance of in-role behaviours; (2) items that focus on primarily benefiting the organization; and (3) five reverse scales are used to measure neglect and failure to perform essential duties (scales with the “R” mark). These items measure the completion of directly assigned tasks, the tasks described in the job description as well as the tasks anticipated, and other factors that affect an individual’s performance evaluation. All items are rated on a 5-point scale from 1 (never) to 5 (all the time), with the exception of the five reverse scales being evaluated in reverse from 1 (all the time) to 5 (never). Then, they were translated into Vietnamese using a standard back-translation procedure (Murak, J. et al., 2022).

#### *Firm performance*

To measure perceived firm performance, 11 items from previous research by Delaney and Huselid (1996)

(FP1 to FP11) that encompass both organizational performance and market performance were used. The first measure, organizational performance, consists of seven items assessing respondents’ perceptions of their firm’s performance during the past three years as compared to that of similar organizations. The second measure, i.e., market performance, consists of four items concerning respondents’ perceptions of their firm’s performance during the past three years relative to market competitors. The respondents were asked to assess their organization’s performance in relation to its key competitors on a Likert scale ranging from 1 (much worse than the competitors) to 5 (much better than the competitors).

#### *Organisational knowledge management*

Regarding knowledge management measurement, 14 items from previous research (OKM1 to OKM14) that consist of training and development and knowledge sharing were used. The first measure, training and development, consists of 4 items adopted from the study of Sun et al. (2007). To measure knowledge sharing, the 10-item scale of Van et al. (2004) was used. Knowledge sharing is operationalized as a second-order construct derived from two constructs, including knowledge collecting and knowledge donating. All items were adjusted to be suitable for auditors and auditing firms’ characteristics. Response options ranged from 1 (totally disagree) to 5 (totally agree).

#### 3.2. Research Context and Data Collection

This study was conducted at 40 auditing firms in Vietnam, representing 20% of the total 210 auditing firms. These firms were selected based on the list published by the Vietnam Association of Practicing Auditors (VACPA). The questionnaire was reviewed by researchers and HR experts to ensure clarity and effectiveness.

Data collection took place from April to June 2024. Auditors were contacted via emails sent by their HR departments, which included a study description and a link to an online survey. Participants were assured of anonymity, with no email addresses or company names recorded. The survey aimed to assess auditors’ perceptions of firm performance, OKM, IWB, and job performance.

A total of 354 auditors responded, with 255 valid responses included in the analysis, achieving a response rate of 72%.

#### 3.3. Data analyzing method

This study applied the PLS-SEM model, suitable for small samples and complex structural models (Hair et al., 2017). The analysis involved three stages: measurement model evaluation, structural model evaluation, and hypothesis testing.

The measurement model was assessed based on item reliability, convergent validity, and discriminant validity. Items with outer loadings below 0.7 were removed (Henseler et al., 2009). The structural model was evaluated using multi-collinearity (Kock, 2015), R-square values (Hair et al., 2017), and model fit (SRMR < 0.08) (Hu & Bentler, 1999). The f-square coefficient measured effect sizes, where values < 0.02, 0.02-0.15, and > 0.15 indicated negligible, medium, and significant effects, respectively (Hair et al., 2017).

Hypothesis testing was conducted using p-values, with a significance threshold of 5% (Hair et al., 2017). The evaluation criteria are summarized in Table 1.

**Table 1: Assessment criteria for the research model**

|                              |                                  | Criteria              | Threshold                                                                                                | References                 |
|------------------------------|----------------------------------|-----------------------|----------------------------------------------------------------------------------------------------------|----------------------------|
| Measurement model assessment | Intrinsic consistency            | Cronbach's Alpha      | > 0.7                                                                                                    | Nunnally & Bernstein, 1994 |
|                              |                                  | Composite reliability | > 0.7                                                                                                    | Hair et al., 2021          |
|                              | Convergent validity              | Indicator reliability | > 0.7                                                                                                    | Henseler et al., 2009      |
|                              |                                  | AVE                   | > 0.5                                                                                                    | Hair et al., 2021          |
|                              | Discriminant validity            | HTMT                  | < 0.9                                                                                                    | Henseler et al., 2015      |
| Structural model assessment  | Multi-collinearity               | Outer VIF             | < 5                                                                                                      | Hair et al., 2021          |
|                              | Multi-collinearity               | Inner VIF             | < 3.3                                                                                                    | Kock (2015)                |
|                              | Model fit                        | SRMR                  | < 0.08                                                                                                   | Hu and Bentler, 1999       |
|                              | Explanation ability of the model | R-square              | < 0.19 ~ weak<br>0.19 to 0.33 ~ medium<br>0.33 to 0.67 ~ strong                                          | Hair et al., 2017          |
|                              | Effect size of the relationships | F-square              | very negligible (f-square < 0.02)<br>mean (0.02 < f-square < 0.15)<br>very significant (f-square > 0.15) | Hair et al., 2017          |
| Hypothesis assessment        | Statistic significant            | p-value               | < 0.05                                                                                                   | Hair et al., 2017          |

#### 4. Results and discussion

Based on the data analysis process outlined above, the assessment of the measurement model indicates that 3 items of IWB (IWB4, IWB8, IWB10), 6 items of JP (JP5, JP7, JP13, JP15, JP16, JP20), 2 items of FP (FP 4, FP7), and 3 items of OKM (OKM1, OKM6, OKM13) should be removed because their results did not meet the criteria thresholds. After removing them, the measurement model met all the criteria in Table 1. Consequently, the measurement model was confirmed to be both valid and reliable.

Regarding the structural model assessment, the results showed that the inner VIF coefficients were all less than 3.3, satisfying Kock's (2015) proposal. The SRMR coefficient was less than 0.08, satisfying the proposal of Hu and Bentler (1999), thereby indicating that the selection model was appropriate and usable. The R-square values showed that the research model explained 33.6% of job performance volatility and 20.1% of changes in firm performance. This result, although only average according to Hair et al. (2021), is relatively consistent with reality. Indeed, this study only focused on the application of IWB to individual

tasks as well as organisational tasks and omitted a number of other factors affecting them. The f-squared results indicated a strong direct relationship between IWB and JP, with an f-squared value of 0.371. In contrast, the direct relationship between IWB and Firm Performance (FP) was weak, reflected by an f-squared value of only 0.03. The results of hypothesis testing are shown in Table 2.

**Table 2: Hypothesis test**

| Direct effect                 | Path coefficient | P-Values | Statistics Significant (5%) | Direct effect                         | Path coefficient | P - Value | Statistics Significant (5%) |
|-------------------------------|------------------|----------|-----------------------------|---------------------------------------|------------------|-----------|-----------------------------|
| IWB → JP (H1)                 | 0.174            | 0.000    | Yes                         | IWB → JP                              | 0.298            | 0         | Yes                         |
| JP → FP (H2)                  | 0.257            | 0.000    | Yes                         | JP → FP                               | 0.174            | 0         | Yes                         |
| IWB → JP → FP (H4)            | 0.045            | 0.008    | Yes                         | IWB → JP → FP                         | 0.052            | 0.004     | Yes                         |
| Total effect IWB → FP (H3)    | 0.302            | 0.000    | Yes                         | Moderating effect IWB × OKM → FP (H5) | 0.102            | 0.015     | Yes                         |
| Excluding moderating variable |                  |          |                             | Including moderating variable         |                  |           |                             |

The impact of IWB on JP and the effect of JP on FP were both statistically significant at 5%. Specifically, IWB positively influenced the JP of auditors, leading to improved performance for auditing firms. Consequently, hypotheses H1 and H2 are supported. These findings indicate that when auditors integrate IWB into their tasks, their productivity increases, which in turn enhances the overall productivity of auditing firms.

Discussing the relations through the intermediate variable more closely, it can be seen that IWB both directly affects FP and mediates through JP. As the mediating role of JP is relatively effective, it can be concluded that hypothesis H4 is supported.

The path coefficient value for Hypothesis H2, at 0.257, is greater than that of Hypothesis H1, at 0.174, indicating that the impact of JP on FP is stronger than the effect of IWB on JP. The total effect of IWB on FP, accounting for both direct and indirect effects, is substantial, with an impact factor of 0.302. This suggests that when auditors engage in innovative practices, they can significantly enhance their firm's performance. The audit profession's demand for high levels of expertise and skill underscores this relationship. Additionally, unique features of the profession such as a focus on processes, the importance of frontline employees, the significance of customer-auditor interactions, and reliance on individual experiences and learning further illustrate how auditors' individual performance can greatly influence FP. This effect is amplified when auditors approach their tasks creatively.

The results also showed that OKM moderates the effect of IWP on FP. This means that the H5 hypothesis is supported. Specifically, it can be seen that with an effective knowledge management system,

auditors' creative work behaviors can be transmitted and replicated, thereby significantly improving the performance of audit firms. On the contrary, in an environment where the knowledge management system is ineffective, creative work behaviors are unlikely to be widely applied, thereby making it difficult to have a major impact on the performance of the firm. In addition, the moderating role of OKM on the influence of IWB on FP suggests that even small creative behaviors of auditors can greatly affect the productivity of the audit company when it has an effective knowledge management system.

### 5. Implications and conclusion

Auditing firms operating in developing countries such as Vietnam are not entirely under heavy pressure to innovate but still appreciate the efforts of auditors in initiating and implementing their innovative ideas. The main reason for choosing audit firms to study is because the industry offers knowledge-based services. Therefore, job performance is quite sensitive to the capacity and innovative behavior of auditors. In the context of increasing information technology and its strong impact on the field of accounting and auditing, innovation in the activities of auditors, when combined with new information technology achievements, is likely to significantly increase job performance and firm performance. Moreover, knowledge management systems in auditing firms play an important role in the enhancement of IWB and its effects on FM.

### Theoretical Implications

The present study investigates the impact of IWB on the JP of auditors and FP of Vietnamese auditing firms, taking into account the role of OKM. The important role of IWB in improving individual performance and KM in promoting IWB has been mentioned in many previous studies. However, most of the previous papers examined the relationships in the education sector, the telecommunications sector, and the industrial sector. There are few studies investigating the relationships in audit firms. The study has contributed to the literature on TPB and SET theory in a specialized service industry independent audit services.

### Managerial Implications

The audit industry is highly labor-intensive and requires skilled professionals to deliver auditing and assurance services effectively. This study demonstrates that implementing an effective knowledge management system within a knowledge-based organization can foster employees' innovative behaviors, ultimately enhancing job performance.

### Limitations and Future Work

The most significant limitation of the paper is that

this research is based on 255 auditor opinions collected in Vietnam. Further studies may overcome this limitation with more samples from different countries or different professions, such as lecturers, doctors, lawyers, etc. Hence, the comparisons of the results from different samples could lead to new conclusions.

In addition, I identify JP as a mediating variable of the impact of IWB on FP and the OKM variable as a moderating factor in the research model. There may exist many other mediating and moderating variables affecting this relationship that need to be studied further, such as the working environment or other human resource management practices.

This research measured only three JP dimensions and two FP aspects. Other scholars may use different approaches. In addition, there is a need to study which IWB aspects are strongly associated with JP and FP.

Finally, the measures used in the study are all perceived and self-assessment measures. As a result, responses can be very subjective. Other studies may use objective measures of innovative work behavior and job performance, such as surveys from supervisors.

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# EARNINGS MANAGEMENT AND ACCRUAL QUALITY: A SYSTEMATIC LITERATURE REVIEW USING THE ADO MODEL

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**Abstract:** *This study reviews the evolving research on Earnings Management (EM) and Accrual Quality (AQ) using the ADO framework. Based on 762 Scopus articles (2015-2026) and a mixed bibliometric-qualitative approach, it identifies a shift toward emerging markets and from accrual-based to real earnings management. Key drivers include capital market pressures and corporate governance, with outcomes such as increased information asymmetry, higher capital costs, and greater stock price crash risk. The study offers a unified conceptual knowledge map.*

• Keywords: earnings management, accrual quality, systematic literature review, ADO model, bibliographic analysis.

Date of receipt: 25<sup>th</sup> Feb., 2026

Date of delivery revision: 04<sup>th</sup> Mar., 2026

DOI:

Date of receipt revision: 15<sup>th</sup> Mar., 2026

Date of approval: 29<sup>th</sup> Mar., 2026

## 1. Introduction

Earnings Management (EM) and Accrual Quality (AQ) are central constructs in financial reporting research, as they determine the transparency and reliability of information in capital markets. EM refers to the deliberate intervention of managers in financial reporting to obtain private benefits (Schipper, 1989), typically through subjective judgment in accounting choices or transaction structuring to mislead stakeholders about firm performance (Healy & Wahlen, 1999). To capture this behavior, studies commonly use AQ, since accruals are a key tool for earnings manipulation (Dechow et al., 2010). Accruals consist of non-discretionary and discretionary components; a higher level of discretionary accruals (i.e., lower AQ) signals potential manipulation and divergence between accounting earnings and actual cash flows. The implications of EM and AQ are closely linked to information asymmetry in Agency Theory. Low AQ reduces the “truthful and fair” representation of financial reports, enabling managers to conceal risks or underperformance (Dechow et al., 2010). This leads to mispricing, higher adverse selection risk, and increased cost of capital. More recently, firms have adopted more sophisticated strategies by combining accrual-based earnings management (AEM) and real earnings management (REM) to meet short-term objectives. Despite extensive research, the literature remains fragmented and lacks a unified “knowledge map,” especially as focus shifts toward emerging markets (Matenda et al., (2025). Moreover, traditional models struggle to explain the influence of newer factors such as ESG and digital transformation on AQ. To address these gaps, this study employs a Systematic

Literature Review (SLR) combined with bibliometric analysis to map the evolution of EM and AQ from 2015 to 2025. It adopts the Axiom-Decision-Outcome (ADO) framework, a robust approach for synthesizing complex financial research (Aggarwal et al., 2024), to clarify EM mechanisms, strategic decisions, and their economic consequences. Therefore, this study aims to answer the following five research questions (RQs):

RQ1: How has the literature on EM and AQ evolved in terms of publication trends, geographic shifts, and subject groups from 2015 to 2026?

RQ2: What are the key antecedent factors that promote or restrict EM and influence AQ?

RQ3: What key strategic decisions do business managers make regarding EM, particularly concerning the trade-offs between AEM and REM?

RQ4: What are the main outcomes of EM and AQ for business performance, particularly regarding the cost of capital and enterprise value?

RQ5: What are the identified gaps and future research directions?

## 2. Research methodology

This study uses the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework to ensure that the screening and selection process of relevant literature is thorough, objective, and reliable.

### 2.1. Identification

In the initial identification phase, a comprehensive database search was conducted in the Scopus database on March 20, 2026.

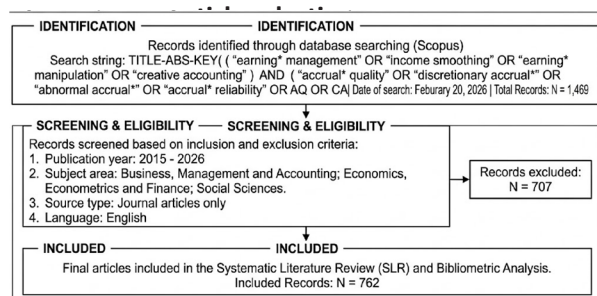
The search sequence applied to the Title, Abstract, and Keywords (TITLE-ABS-KEY) included:

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((“earning\* management” OR “income smoothing” OR “earning\* manipulation” OR “creative accounting”) AND (“accrual\* quality” OR “discretionary accrual\*” OR “abnormal accrual\*” OR “accrual\* reliability” OR AQ OR CAQ)). This comprehensive query initially yielded a total of 1,469 documents.

**Figure 1: Illustrates the sequential stages of the**



Source(s): Authors' compilation

## 2.2. Screening and Selection Criteria

To ensure the relevance and quality of the documents considered, strict inclusion and exclusion criteria were established. Preliminary results were filtered by publication year, retaining only articles published between 2015 and early of 2026. Furthermore, the sample was refined to include only documents from three main fields: Business, Management and Accounting; Economics, Econometrics and Finance; and Social Sciences. Finally, selection was limited to peer-reviewed journal articles in English, effectively excluding other source types such as books, conference proceedings, or non-English texts. This rigorous screening phase resulted in the exclusion of 707 records.

## 2.3. Included

After applying the defined constraints, the final dataset yielded 762 high-quality journal articles. This final sample formed the basis for the subsequent systematic bibliographic mapping and ADO framework analysis.

## 3. Analysis and synthesis

Following a rigorous screening process based on the PRISMA protocol, 762 selected research papers were systematically analyzed and synthesized. To provide a comprehensive understanding of the literature related to Earnings Management (EM) and Accumulated Quality (AQ), this section is structured into two main analytical streams. The first stream uses bibliographic analysis to outline the intellectual structure and build a comprehensive knowledge map of the thematic development of this field. The second stream conducts in-depth content analysis using the Axiom, Decision, and Outcome (ADO) theoretical framework to systematically classify and clarify the opportunistic decision-making behavior of business managers.

## 3.1. Theories used in literature

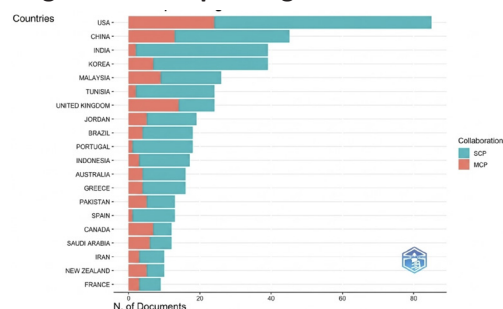
The theoretical frameworks for earnings management and accrual quality are primarily based on Agency Theory, Positive Accounting Theory (PAT), and Signaling Theory, which together explain the opportunistic and information-driven motivations behind managerial accounting choices. Furthermore, contemporary literature incorporates additional perspectives such as Management Theory, Prospect Theory, and Transaction Cost Theory to provide a multifaceted understanding of both rational and behavioral factors influencing financial reporting decisions.

## 3.2. Corresponding author's countries

Figure 2 shows that the United States leads in publications (85), followed by China (45), India (39), and South Korea (39). Other notable contributors include Malaysia (26), Tunisia (24), and the United Kingdom (24), while several countries such as Jordan, Brazil, Portugal, Indonesia, and Australia have fewer than 20 publications.

Regarding collaboration patterns, the United States and China dominate mainly through domestic research (61 and 32 SCPs, respectively), whereas the United Kingdom and Canada exhibit high international collaboration rates (58.3% MCPs). In contrast, countries like India, Portugal, and Tunisia show very low levels of international co-authorship. Overall, global research output is geographically diverse, but international collaboration remains uneven.

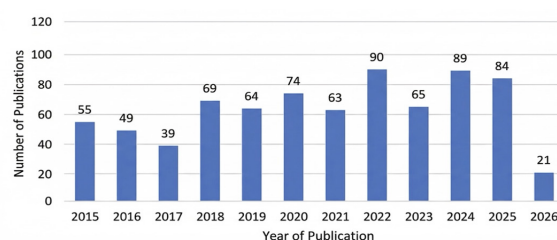
**Figure 2. Corresponding author's countries**



Source(s): Authors' compilation

## 3.3. Year of publication

**Figure 3. Number of Publications per year between 2015 and 2026 (20/2/2026)**



Source(s): Authors' compilation

Figure 3 illustrates the annual scientific output of leading countries from 2015 to early of 2026. The United States consistently dominates, surging from 27 publications in 2015 to 258 in 2026. China also shows a similar upward trend, reaching 127 publications in 2026. This exponential growth demonstrates the increasingly strong concentration of the global academic community in this field.

### 3.4. Top journals

Figure 4 illustrates a bibliographic review of the sources highlights the distinct concentration of research on earnings management and accrual accounting quality in leading accounting and finance publications. The Journal of Financial Reporting and Accounting leads with 20 entries, followed by the Journal of Quantitative Financial and Accounting Evaluation (16) and the Journal of Accounting in Emerging Economies (14). This uneven distribution, in which the top five journals together represent the majority of output, confirms the maturity of the field and its reliance on rigorous, specialized forums thereby reinforcing the validity of a systematic evaluation based on the ADO model.

Figure 4. Most relevant sources



Source(s): Authors' compilation

### 3.5. Antecedent, decision and outcome (ADO) model

This section synthesizes existing literature using the Axiom, Decision, and Outcome (ADO) theoretical framework. By analyzing empirical studies into these three constituent parts, this review outlines the motivational factors driving managers to manipulate earnings, the strategic accounting choices they make, and the ultimate economic consequences for the company and stakeholders.

#### 3.5.1. Antecedents

Earnings management (EM) is driven by financial, governance, and macroeconomic factors. Financially, managers manipulate earnings to meet forecasts, avoid losses, and improve outcomes in transactions such as IPOs and SEOs (Cohen & Zarowin, 2010). Financial distress and debt covenant pressures also incentivize EM to prevent default. From a governance perspective, strong board independence, institutional ownership, and audit committee expertise help constrain EM,

while family ownership, CEO duality, and equity-based compensation tend to intensify it. At the macro level, economic shocks, business cycles, and political instability further shape the extent and direction of EM, particularly in emerging markets.

#### 3.5.2. Decisions

This section details the specific tools and mechanisms that business managers choose to manipulate financial reporting, based on the factors mentioned above. **Accrual-Based Earnings Management (AEM):** Managers often exploit the flexibility and accounting discretion inherent in Generally Accepted Accounting Principles (GAAP) and IFRS to manipulate discretionary accruals. These accounting decisions revolve around strategies to increase earnings such as accelerating revenue and deferring expenses to project strong financial performance, or strategies to decrease earnings, particularly “big bath” accounting, to record large losses in a period during restructuring or periods of crisis uncertainty.

**Realized Earnings Management (REM):** Unlike AEM, REM involves intentionally altering actual operating activities to achieve financial objectives. Common REM tactics include offering excessive price discounts or lenient credit terms to artificially boost short-term sales, overproducing inventory to offset fixed costs and reduce the cost of goods sold, and drastically cutting critical discretionary spending such as research and development (R&D) and advertising.

**Strategic trade-offs between AEM and REM:** Managers do not use these tools in isolation; instead, they flexibly alternate between AEM and REM based on relative costs and constraints. Under close regulatory oversight or when supervised by high-quality external auditors (Big 4 firms), managers tend to shift from AEM to REM, as REM is more difficult for auditors and regulators to detect. However, while REM helps managers avoid immediate scrutiny, it has serious adverse effects on a company's operational efficiency, competitive advantage, and long-term cash flow.

#### 3.5.3. Outcomes

Earnings management (EM) negatively affects financial reporting quality, capital markets, and stakeholders. It reduces transparency and reliability of financial reports (Healy & Wahlen, 1999), increases information asymmetry, and intensifies agency conflicts (Cerqueira & Pereira, 2015). By obscuring true performance, EM weakens reporting quality and distorts stakeholders' decision-making (Waweru & Prot, 2018). This lack of transparency also leads to market misvaluation. Investors often misinterpret discretionary accruals, causing overvaluation of firms with high accruals, which later reverse and result in

negative future returns, known as accrual anomalies (Sloan, 1996). Although EM may bring short-term benefits, it harms long-term performance. Real earnings management (REM), such as cutting R&D or overproduction, reduces future cash flows and competitiveness. Additionally, information hoarding increases the risk of stock price crashes and financial distress when negative news is eventually disclosed.

#### 4. Discussion

This study delves into five research questions to explain recent trends in EM and AQ. To answer the first research question, the study examines directory mapping. Next, insights from ADO analysis shed light on the antecedents, decisions, and outcomes of earnings manipulation.

##### 4.1. Thematic and Geographical Evolution of EM and AQ

Regarding research question RQ1, bibliographic analysis reveals a geographical shift in EM and AQ research from developed countries to emerging markets such as China, India, Vietnam, Jordan, and Malaysia. Thematically, the focus has shifted from traditional accounting models to the integration of environmental, social, and governance (ESG) factors and corporate governance.

##### 4.2. Factors Leading to Earnings Management

Regarding research question 2, managers manipulate earnings to meet targets, avoid losses (Tran & Duong, 2020) and maximize valuations in stock offerings (Cohen & Zarowin, 2010). While concentrated family ownership in emerging economies exacerbates this opportunistic behavior (Khan & Kamal, 2022) effective audit committees and high-quality Big 4 audit firms would significantly limit this behavior (Almarayeh et al., 2020)

##### 4.3. Managerial Decisions on EM Strategies

For research question RQ3, managers choose between accrual-based earnings management (AEM) and real-time earnings management (REM) strategies to manipulate financial statements. AEM exploits accounting flexibility through arbitrary accruals, widely illustrated in the modified Jones model. Conversely, REM involves altering operational activities, such as reducing research and development (R&D) costs. More importantly, research literature highlights the dynamic strategic trade-offs between these mechanisms. Under close regulatory scrutiny, such as following the Sarbanes-Oxley Act (SOX), or when audited by high-quality Big 4 firms, regulators replace AEM with REM. While REM is more difficult to detect for auditors and regulators, it severely damages future operating cash flows and the long-term value of a company.

##### 4.4. Outcomes of EM on Corporate Performance

Regarding research question RQ4, the research paper emphasizes that earnings management (EM)

causes serious negative economic consequences by exacerbating information asymmetry and mispricing in the market. In terms of information asymmetry and value relevance, opportunistic earnings management significantly reduces the transparency and reliability of financial reporting. This lack of transparency increases agency costs, as insiders exploit their informational advantages, thus undermining stakeholders' ability to optimally allocate resources.

Furthermore, in relation to accounting irregularities and collapse risk, this lack of transparency leads to systematic mispricing. Investors often fail to anticipate the reversal of arbitrary accounting entries, resulting in overvaluation in the short term, followed by poor stock performance in the long term - a phenomenon known as accounting anomalies. More importantly, when managers use EM to aggressively hoard negative information, the sudden release of this accumulated bad news significantly increases the likelihood of a severe stock price crash and future financial difficulties.

##### 4.5. Identified Gaps in the Literature

Addressing RQ5, the literature reveals several key gaps for future research (Aggarwal et al., 2024). First, although EM and AQ have been widely studied, most research focuses on developed economies and traditional financial models, leaving a significant gap in emerging markets where institutional contexts differ substantially (Khan & Kamal, 2022; Matenda et al., 2025). Second, a major thematic gap concerns non-financial factors. While recent studies highlight the role of ESG in reducing reporting opacity (Firmansyah et al., 2026), the mechanisms through which ESG affects discretionary accruals remain underexplored. In addition, there is limited empirical evidence on how digital transformation and new technologies influence the monitoring and reliability of AQ (Aggarwal et al., 2024). Addressing these gaps is essential for advancing future research.

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# FACTORS AFFECTING APPLICATION OF AI IN COST MANAGEMENT ACCOUNTING IN VIETNAM'S TEXTILE AND GARMENT ENTERPRISES TODAY

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**Abstract:** *Cost management accounting in Vietnamese textile and garment enterprises has been applying artificial intelligence (AI) in several areas such as input-output cost data analysis, planning, cost standardization, and cost estimation. However, AI applications have not yet fully leveraged the value of AI and still face various risks and challenges. Authors conducted a survey of 150 textile and garment enterprises in Vietnam to evaluate the factors influencing AI application in cost management accounting, aiming to help reduce costs, improve cost control efficiency and ensure compliance with professional ethics.*

• Keywords: AI, application, influencing factors, cost management accounting, textile and garment enterprises.

Date of receipt: 04<sup>th</sup> Oct., 2025

Date of receipt revision: 20<sup>th</sup> Dec., 2025

Date of delivery revision: 09<sup>th</sup> Dec., 2025

Date of approval: 17<sup>th</sup> Jan., 2026

DOI:

## 1. Introduction

Over the past years, Vietnam's textile and garment industry has experienced strong growth and played an important role in economic development and sustainable growth orientation. Vietnam is currently among the world's top 10 textile and garment exporters. The United States is the largest market, followed by the EU, South Korea, China, and Japan. According to the Vietnam Textile and Apparel Association (VITAS), exports reached approximately USD 40.3 billion in 2023 and around USD 44 billion in 2024 and around USD 47 billion in 2025. However, amid increasingly strict green and sustainability standards, global geopolitical fluctuations, and changes in U.S. tariff policies, the Vietnamese textile and garment industry faces numerous difficulties such as production contraction, weak demand, reduced orders, high interest rates, large exchange rate fluctuations, rising input material prices, high international logistics costs, low product pricing, and unstable markets. One key solution is the application of AI in both general operations and cost management accounting. Specifically, in cost management accounting, AI can automate data entry, analyze information, build cost standards, automatically review cost items,

and generate alternative cost scenarios. Textile and garment enterprises view AI application in cost management accounting as both an opportunity and a challenge. On the one hand, AI helps optimize production processes, control standards, reduce input costs and resources, lower emissions, and build a solid foundation for a circular economy. On the other hand, enterprises face challenges related to technology investment costs, selecting suitable AI applications, identifying appropriate accounting stages for AI adoption, ensuring data security, and training human resources. Therefore, studying the factors affecting AI application in cost management accounting will help Vietnamese textile and garment enterprises reduce production costs, improve resource efficiency, and enhance cost control in the textile and garment sector.

## 2. Theoretical Framework

*This study is based on the following theoretical foundations:*

According to the *International Federation of Accountants (IFAC)*, "Management accounting is defined as the process of identifying, controlling, measuring, summarizing, analyzing, presenting, interpreting, and communicating financial and non-financial information related to an organization's

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This article is funded by the research project MHN2025-NNC-01.08



operations to managers, enabling them to plan, evaluate, control, and operate the organization effectively to ensure the responsible and efficient use of its economic resources.” In management accounting, **cost** is a core component and is considered the value of resources that have been or will be consumed in the course of performing an organization’s activities to achieve specific objectives.

According to **Tran Thi Van** in “*Current situation and some solutions to improve cost management accounting for garment enterprises in HaiPhong*”, garment enterprises are continuously improving their financial and economic information systems, especially cost management accounting systems. Thus, **cost** management accounting in textile and garment enterprises includes the following basic contents: Identifying and classifying costs; developing cost standards and budgets; monitoring cost processes from input resources to cost outcomes; analyzing cost fluctuations; providing cost management accounting reports, with a primary focus on production cost management.

According to **Nguyen Thi Hoang Yen**, in “*Applying Artificial Intelligence (AI) in Accounting Practices in Vietnam*”, AI is defined and analyzed in terms of its current application status in Vietnamese enterprises’ accounting practices. The findings of this study serve as a foundation for identifying the factors influencing AI application in cost management accounting for textile and garment enterprises.

Research team also selected Mindsponge-based Technology Acceptance Model (MTAM) was chosen for this study. MTAM integrates TAM with the Mindsponge Theory and the Bayesian Mindsponge Framework (BMF), forming a comprehensive theoretical foundation. This model allows the authors to explore factors related to the perceived usefulness and perceived ease of use of AI in cost management accounting within textile and garment enterprises, as well as the influences of cultural-social factors, personal values, and ethics associated with AI adoption in this field. Beside, Unified Theory of Acceptance and Use of Technology (UTAUT), developed by Venkatesh et al. (2003), serves as another theoretical framework explaining factors that influence individuals’ acceptance and use of technology. Accordingly, for AI applications in cost management accounting in textile and garment enterprises, the research team considers the following influencing factors: performance

expectancy of AI, infrastructure readiness, and costs associated with AI implementation.

Authors focused on the following key factors affecting the application of AI in cost management accounting within textile and garment enterprises: Awareness of AI, expectations regarding AI’s benefits, enterprise infrastructure for AI application, competence of management accountants and related personnel, cultural-social factors and ethical values.

### 3. Research Methodology and Preliminary Results

#### 3.1. Research Methodology: Using Both Quantitative and Qualitative Methods

Based on the theoretical framework, the research team conducted interviews with accountants and managers from major textile and garment enterprises in Vietnam, such as May 10, Đức Giang Garment Corporation, and Vinatex, as well as experts from software companies including MISA, FPT, SAP, and FAST. Additional insights were gathered from specialists at VITAS (Vietnam Textile and Apparel Association) and the General Statistics Office regarding the factors influencing the application of AI in management accounting within Vietnam’s textile and garment enterprises. At the same time, the team distributed survey questionnaires to textile and garment enterprises.

#### 3.2. Results

##### 3.2.1. Expert Interview

Cost management accounting in textile and garment enterprises has already incorporated AI applications and achieved certain levels of effectiveness. Experts strongly agreed that optimizing the value of AI is essential to improve cost control efficiency in management accounting and to steer the operations of textile and garment enterprises toward sustainable development. During interviews, experts from major software companies shared a common observation that approximately 80% of AI projects fail, which is twice the failure rate of other IT implementation projects. The main causes include: Overly high expectations of AI outcomes, lack of clear implementation processes, absence of performance measurement, erosion of trust due to inconsistent and unverified AI results.

The expert interview results indicate that most textile and garment enterprises currently apply AI in accounting, particularly in cost management accounting, due to its low cost and relatively high effectiveness. Free AI applications such as ChatGPT

and DeepSeek are widely used. Common cost management accounting tasks utilizing AI include establishing cost standards, price forecasting, production planning, and supplier search. Despite the benefits AI provides, textile and garment enterprises also have certain concerns, such as production data security, integration with existing enterprise resources, and the ability to fully leverage data. While AI has been applied to multiple stages of cost management accounting in the textile sector, its use is not yet fully effective or comprehensive.

### 3.2.2. Survey Results

The number of surveyed enterprises was 150, selected from over 7,000 textile and garment enterprises in Vietnam which listed under the Sustainability Committee of VITAS, with priority given to companies with high export revenues. The focus was on companies implementing digital transformation and green production for sustainable development, such as May 10, Dugarco, TNG Thainguyen, LGG Bacgiang, Canifa, Phong Phu, May HoaThọ, and May 29/3... from 1/7/2025 to 30/10/2025. All 150 survey questionnaires were collected. Of these, 60 questionnaires were conducted on-site at enterprises in Hanoi, Bacninh, HungYen, NinhBinh, HaiPhong, QuangNinh, DaNang, QuangNgai and Ho Chi Minh while the remainder were conducted online.

Regarding the respondents: 53.3% were accountants, 20% were IT staff and 26.7% were senior managers (directors, board members, etc.). In the analyzed dataset, management accountants represented the largest proportion of respondents.

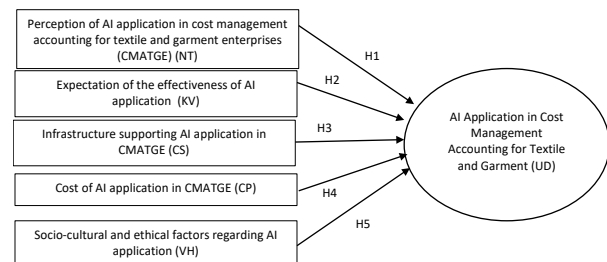
In the research sample, small and medium-sized enterprises (SMEs) accounted for the largest proportion at 70%, while large enterprises made up 30%.

Regarding the use of AI tools in cost nagement accounting within textile and garment enterprises, the majority of companies now consider AI as a key tool in their cost management accounting processes, representing the highest usage rate. This reflects a shift from traditional technology-based accounting methods to AI applications aimed at enhancing efficiency and accuracy. Traditional cost management accounting software still exists but is used at a significantly lower rate compared to AI. This indicates that there is still a lag in digital transformation, or a preference for the stability and reliability of traditional methods.

Deepseek, SAP Online, FPT.ePIT, Misa AMIS

integrated with AI, Truewind, GenAI... The high rate of AI accounting tool usage indicates a potential future trend among textile and garment enterprises toward more efficient accounting processes and advanced management accounting methods. Qualitative data collected from the survey questionnaires were cleaned and processed using SPSS software, producing the following key results:

**Figure 1: Proposed research Model**



Source: Authors

### Research hypotheses:

**H1:** Perception of AI application in cost management accounting for textile and garment enterprises (CMATGE) positively affects AI application in CMATGE in Vietnam. (NT)

**H2:** Expectation of the effectiveness of AI application in CMATGE positively affects AI application in CMATGE in Vietnam. (KV)

**H3:** Infrastructure supporting AI application in CMATGE positively affects AI application in CMATGE in Vietnam. (CS)

**H4:** Cost of AI application in CMATGE positively affects AI application in CMATGE in Vietnam. (CP)

**H5:** Socio-cultural and ethical factors regarding AI application in CMATGE positively affect AI application in CMATGE in Vietnam.(VH)

**Table 1: Measurement Scale Coding**

| No.                                                                                                                                                   | Code | Measurement Scale Description                                                                       |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|------|-----------------------------------------------------------------------------------------------------|
| I - PERCEPTION OF AI IN TEXTILE AND GARMENT COST MANAGEMENT ACCOUNTING (NT) ( included: NT1, NT2, NT3, NT4, NT5)                                      |      |                                                                                                     |
| II - EXPECTATION OF THE EFFECTIVENESS OF AI APPLICATION IN TEXTILE AND GARMENT COST MANAGEMNT ACCOUNTING (KV) (included: KV1, KV2, KV3, KV4, KV5,KV6) |      |                                                                                                     |
| III - INFRASTRUCTURE OF TEXTILE AND GARMENT ENTERPRISES FOR AI APPLICATION IN ACCOUNTING (CS) (included: CS1, CS2,CS3,CS4,CS5,CS6,CS7)                |      |                                                                                                     |
| IV - COST FOR AI APPLICATION IN COST MANAGEMENT ACCOUNTING (CP) (included: CP1, CP2,CP3,CP4)                                                          |      |                                                                                                     |
| V - SOCIO-CULTURAL AND ETHICAL FACTORS IN AI APPLICATION (VH) (included: VH1, VH2, VH3, VH4, VH5))                                                    |      |                                                                                                     |
| VI - AI APPLICATION IN COST MANAGEMENT ACCOUNTING IN TEXTILE AND GARMENT ENTERPRISE (UD)                                                              |      |                                                                                                     |
| 1                                                                                                                                                     | UD1  | AI application meet the requirements for quality information of textile cost management accounting. |
| 2                                                                                                                                                     | UD2  | AI application meet expectations of cost management accounting.                                     |
| 3                                                                                                                                                     | UD3  | Enterprises will continue to apply AI in cost management accounting.                                |

Source: Authors

**Scales and Code:**

*Independent variables: NT, KV, CS, CP, VH*

*Dependent variable: UD*

**Analysis results:** The analysis and reliability tests show that all five independent variables meet the criteria for reliability and suitability. Specifically:

**Test for Model Suitability and Correlation**

The research team conducted Exploratory Factor Analysis (EFA) for both the independent and dependent variables. The results are as follows:

The KMO measure has a value of 0.686, satisfying the condition:  $0.5 \leq \text{KMO} \leq 1$ ; the Bartlett's test shows a significance level of  $\text{Sig} = 0.000 < 0.005$ . Therefore, the Exploratory Factor Analysis (EFA) is suitable for the research data.

The variance explained test results indicate that 5 factors were extracted with the Eigenvalue = 4.683 > 1 and a total cumulative variance of 67.115% > 50%, meeting the standard criteria. Thus, 67.115% of the variation of the 5 factors is explained by the observed variables. Additionally, since the Eigenvalue > 1, the 5 extracted factors provide a good summary, confirming that the EFA model is appropriate.

**Regression analysis results:****Table 2: Regression analysis table**

| Model Summary <sup>a</sup> |                   |          |                   |                            |               |
|----------------------------|-------------------|----------|-------------------|----------------------------|---------------|
| Model                      | R                 | R Square | Adjusted R Square | Std. Error of the Estimate | Durbin-Watson |
| 1                          | .711 <sup>a</sup> | .506     | .592              | .51528                     | 1.770         |

a. Predictors: (Constant), VH, KV, CS, NT, CP

b. Dependent Variable: UD

| Coefficients <sup>a</sup> |            |                             |            |                           |      |
|---------------------------|------------|-----------------------------|------------|---------------------------|------|
| Model                     |            | Unstandardized Coefficients |            | Standardized Coefficients | Sig. |
|                           |            | B                           | Std. Error | Beta                      |      |
| 1                         | (Constant) | -.226                       | .315       |                           | .474 |
|                           | NT         | .266                        | .049       | .288                      | .000 |
|                           | KV         | .260                        | .036       | .379                      | .000 |
|                           | CS         | .220                        | .037       | .311                      | .000 |
|                           | CP         | .205                        | .052       | .206                      | .000 |
|                           | VH         | .255                        | .039       | .336                      | .000 |

a. Dependent Variable: UD

b Predictors: (Constant), VH, KV, CS, NT, CP

Source: Data analysis results from SPSS

The table above shows the hypothesis testing results using SPSS: all Sig. values are < 5%, indicating that all five independent variables have a statistically significant effect on the dependent variable. This means that all five hypotheses are accepted. The factor NT has the largest coefficient, meaning it has the highest level of influence in the research model, followed by the factors KV, VH,

CS, and CP. The regression analysis results indicate the relationship between the dependent variable and the five independent variables, which can be expressed in the following regression equation:

**Unstandardized regression equation:**

$$UD = -226 + 0.266NT + 0.260KV + 0.220CS + 0.205CP + 0.255VH$$

The regression analysis results demonstrate that hypotheses H1, H2, H3, H4, and H5 are all accepted and have been appropriately tested. According to the regression equation, there is a linear relationship with the factors.

**3.3. Discussion**

The survey and interview results confirm the widespread awareness and acceptance among Vietnamese textile enterprises regarding the value and potential of AI in cost management accounting for textile and garment enterprises. This consensus stems from the benefits AI brings to the accounting process. AI can analyze large volumes of cost data automatically and quickly, providing accurate and timely information to support business decisions, monitor fluctuations in exchange rates and tax policies, promptly update standards and budgets, and comprehensively control costs. Additionally, expectations regarding AI also significantly influence its adoption. Particularly in the current context of information security warnings and ethical concerns in AI usage, socio-cultural and ethical factors play a more critical role than cost and infrastructure considerations.

Overall, textile enterprises and experts agree that AI as a tool to make cost management accounting faster and more accurate. However, AI application in CMATGE presents both opportunities and risks. Enterprises need a responsible AI usage framework that emphasizes fairness, transparency, explainability, accountability, and data security. Experts also recommend that all AI-generated outputs in CMATGE must be carefully verified by management accountants and production managers and approved by the chief accountant and enterprise leadership. Many companies follow the trend of using AI in accounting generally and CMATGE specifically but they have not yet established clear control mechanisms, impact evaluation procedures, or selected the most appropriate AI applications. While AI saves time, it also blurs the line between human and machine tasks especially in roles requiring professional judgment and in-depth CMATGE analysis. Survey results further indicate



that CMATGE is entering a period of profound transformation. Technology adoption is inevitable but it demands careful and strict control. Without it, the risk of losing control may undermine trust in cost information provided by management accountants and affect the long-term operations of textile enterprises.

From an opportunity perspective, AI promises unprecedented breakthroughs: the ability to process millions of transactions in a short time and detect sophisticated fraud that humans may miss. Consequently, many textile enterprises are investing in paid AI systems to enhance information efficiency. However, these opportunities only translate into real value when paired with responsibility. AI may change work processes, but it cannot replace the ethics and professional expertise of management accountants or accountants in general. These findings also emphasize that to maximize AI's effectiveness in CMATGE, appropriate solutions and strategic directions must be implemented.

#### 4. Conclusion

Authors propose following conclusions on enhancing the effectiveness of AI applications in cost management accounting for the textile industry:

**First**, enterprise leadership must ensure absolute transparency in the use of AI. Any content created or supported by AI tools in CMATGE such as budget preparation, cost standard setting, or analysis of production scenarios should be clearly disclosed to all relevant stakeholders within the company. Enterprises need to simultaneously evaluate both the capabilities of AI and the complexity of CMATGE tasks, as well as the characteristics of their production processes, in order to develop an AI application strategy that is well-suited to their specific operations.

**Secondly**, Vietnamese garment enterprises need to further strengthen training on AI and AI supervision skills, as well as cultivate proper thinking about AI application in managerial cost accounting to avoid information risks that could mislead management accountants and negatively impact business operations. Management accountants need to thoroughly understand how AI operates in the specific tasks where it is applied, recognize the technology's limitations, and be able to evaluate the reasonableness of its outputs. They must learn how to "supervise AI," analyze results, and assess technological risks, understanding the way AI "thinks." Management accountants

must also uphold accounting professional ethics; regardless of technological advancement, the core principles of accounting honesty and objectivity must always be maintained. The authors propose the following model for applying AI in managerial cost accounting for garment enterprises: AI adoption: Use AI to support basic tasks in cost accounting. Leverage AI: Proactively apply AI to complex, repetitive, and large-data processes in managerial cost accounting. Monitor AI: Always thoroughly understand AI before implementing it in managerial cost accounting tasks, and supervise for transparency.

**Thirdly**, some specific solutions for optimizing value of AI are as follows:

- Organize workshops and internal training to help cost accountants get familiar with AI and applying AI in managerial cost accounting.
- Develop an AI-first training program to encourage cost accountants to actively apply AI in their work.
- Reward individuals/teams with creative AI initiatives that help optimize work.
- Remind cost accountants who do not comply with AI application.
- Train cost accountants on AI tools and how to apply AI in CMATGE.
- Develop sample documents, organize short-term courses, and practices.

The above conclusions provide guidance for Vietnamese textile enterprises to base on their actual situation in order to enhance the effectiveness of AI application in managerial cost accounting, aiming at cost savings, cost optimization, and compliance with green standards in the textile industry.

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# THE ROLE OF ENVIRONMENTAL UNCERTAINTY IN THE RELATIONSHIP BETWEEN SUPPLY CHAIN RESILIENCE AND SUPPLY CHAIN PERFORMANCE

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**Abstract:** *This study explores how supply chain resilience and environmental uncertainty influence supply chain performance in Vietnamese manufacturing firms. The study is grounded in dynamic capability theory and contingency theory. Data were collected from 379 managers. Results show both factors positively affect supply chain performance. Furthermore, the study confirms the moderating effect of environmental uncertainty.*

• Keywords: *environmental uncertainty, supply chain resilience, supply chain performance.*

Date of receipt: 25<sup>th</sup> Jan., 2026

Date of delivery revision: 28<sup>th</sup> Feb., 2026

DOI:

Date of receipt revision: 08<sup>th</sup> Mar, 2026

Date of approval: 29<sup>th</sup> Mar, 2026

## 1. Introduction

In today's business environment, modern supply chains are increasingly exposed to unexpected and unpredictable shocks, ranging from pandemics and geopolitical conflicts to climate change, market demand fluctuations, and shifting trade policies. These disruptions pose significant challenges for managers in sustaining supply chain performance. In response to such volatility, supply chain resilience has emerged as a critical strategic capability, enabling firms not only to mitigate the adverse effects of disruptions but also to recover rapidly and, in some cases, leverage crises as opportunities to enhance operational efficiency (Ivanov & Dolgui, 2021; Ponomarov & Holcomb, 2009).

Supply chain resilience is considered a dynamic capability that helps firms recover from disruptions, restructure operations, and adapt to external changes (Belhadi et al., 2021; Li et al., 2023). Resilient firms maintain customer service, reduce losses, recover faster, and improve supply chain reliability (Chowdhury & Quaddus, 2017; Riaz et al., 2025; Teece, 2007, 2014; Teece et al., 1997). However, the effect of supply chain resilience may vary with the volatility and complexity of the environment, highlighting environmental uncertainty as an important contextual factor.

Environmental uncertainty refers to the difficulty of predicting markets, customers, competitors,

technology, or policy (Jaworski & Kohli, 1993; Miller & Dröge, 1986). High uncertainty can raise safety stock costs, cause inventory imbalance, price volatility, and delivery delays, harming supply chain performance (James & George, 2018; Linn & Maenhout, 2019). Yet, agile firms may turn uncertainty into opportunities to innovate, share information, and use technology to enhance responsiveness and strengthen performance (Dağdeviren & Mirza, 2024).

According to Contingency Theory, performance improves when internal capabilities align with external conditions. Under high environmental uncertainty, firms with strong supply chain resilience can anticipate risks, adjust production, diversify suppliers, and coordinate with partners to maintain flows, creating a competitive advantage. When uncertainty is low, the performance gap between highly resilient and less resilient firms narrows. This view aligns with Dynamic Capabilities Theory, emphasizing sensing, seizing, and reconfiguring resources (Teece et al., 1997).

Although many studies confirm the positive effect of supply chain resilience on performance, evidence on the moderating role of environmental uncertainty is still limited, particularly in emerging economies like Vietnam, where supply chain digitalization is accelerating amid market and policy volatility. This study, therefore aims to (i) test the direct effect of

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supply chain resilience on performance, (ii) examine the direct impact of environmental uncertainty and (iii) explore its moderating effect on the relationship between supply chain resilience and supply chain performance.

The remainder of this paper is organized as follows. Section 2 reviews the key concepts, presents the theoretical foundations, and develops the research hypotheses. Section 3 describes the research methodology, including data collection procedures and analytical techniques. Section 4 reports the empirical findings on both the direct and moderating effects among the variables. Finally, Section 5 summarizes the main conclusions, discusses theoretical and managerial implications, acknowledges the study's limitations, and offers directions for future research.

## **2. Theoretical background and research hypotheses**

### **2.1. Theoretical background**

In today's business environment, enterprises operate under conditions of volatility, where economic, political, technological, and social factors change rapidly and are often difficult to predict. This volatility poses a strategic challenge to maintaining supply chain continuity and efficiency. To explain how organizations respond to such complexity and uncertainty, two major theoretical perspectives are frequently employed: Contingency Theory and Dynamic Capabilities Theory.

According to Contingency Theory, there is no single governance model or organizational structure that is optimal in all circumstances. Instead, organizational effectiveness depends on the degree of alignment between strategy, structure, and the external environment (Burns & Stalker, 1994; Lawrence & Lorsch, 1967). In stable environments, firms can emphasize cost optimization and standardized processes to achieve high levels of efficiency. By contrast, in volatile environments, firms must adopt more flexible structures, responsive information systems, and effective coordination mechanisms to adapt quickly to change. Within the supply chain context, Contingency Theory implies that capabilities such as supply chain resilience become particularly critical under conditions of risk and uncertainty. Supply chain resilience can thus be viewed as a mechanism that enables firms to achieve a dynamic fit with the environment, allowing them to adjust and reconfigure supply chain operations in

a timely manner to sustain performance.

In parallel with Contingency Theory, Dynamic Capabilities Theory offers a complementary lens for understanding how firms build, integrate, and reconfigure resources to sustain competitive advantage in rapidly changing environments (Teece et al., 1997). This theory highlights three core competencies: sensing, seizing, and reconfiguring, which enable organizations to adapt effectively to environmental turbulence. Within the supply chain context, supply chain resilience can be viewed as a concrete manifestation of dynamic capabilities. A resilient supply chain with strong sensing capabilities proactively gathers information, monitors market trends, and anticipates potential disruptions. Seizing capabilities are reflected in the firm's ability to rapidly implement response measures, adjust supply allocations, and modify production and distribution plans. Finally, reconfiguring capabilities enables firms to redesign supply chain networks, establish new partnerships, and optimize resource allocation to align with evolving environmental conditions.

When examining the relationship between supply chain resilience and supply chain performance, both Contingency Theory and Dynamic Capabilities Theory offer a robust theoretical foundation. Supply chain resilience enables firms to mitigate the negative effects of disruptions, sustain material flows, shorten recovery times, and enhance delivery reliability, ultimately improving key performance dimensions such as cost efficiency, quality, flexibility, and customer satisfaction. Beyond resilience, environmental uncertainty represents an important contextual variable that has been widely examined in supply chain management research. Environmental uncertainty reflects the degree of unpredictability and the lack of reliable information regarding external factors that influence business operations, including demand fluctuations, supply network complexity, policy shifts, and competitive pressures. From a contingency perspective, high levels of environmental uncertainty expose firms to greater risk and decision-making pressure, thereby necessitating stronger coordination mechanisms, information sharing, and adaptive capabilities. Consequently, environmental uncertainty not only directly influences supply chain efficiency by increasing costs, lengthening delivery times, or creating supply-demand imbalances but also shapes the extent to which supply chain resilience contributes to superior performance outcomes.

## 2.2. Research hypotheses

Grounded in Dynamic Capabilities Theory, supply chain resilience is regarded as a higher-order dynamic capability, reflected in a firm's ability to reconfigure resources and processes in response to fluctuations in the external environment, thereby safeguarding operational outcomes. Empirical studies have shown that supply chain resilience reduces disruption duration, enhances reliability and flexibility, and ultimately improves supply chain performance (Chowdhury & Quaddus, 2017; Riaz et al., 2025; Teece, 2007, 2014; Teece et al., 1997). Accordingly, supply chain resilience is expected to directly enhance supply chain performance by maintaining continuity and operational efficiency. Based on this reasoning, the following hypothesis is proposed:

*H1: Supply chain resilience has a positive effect on supply chain performance.*

In addition to the effect of supply chain resilience, environmental uncertainty is a critical contextual factor that directly influences supply chain performance. Environmental uncertainty captures the degree of unpredictability associated with market demand, raw material availability, policy fluctuations, and macroeconomic risks (Miller, 1987). According to Contingency Theory, the more complex and volatile the external environment becomes, the greater the pressure on organizations to enhance adaptability in order to sustain operational efficiency. While earlier studies suggested that environmental uncertainty can hinder performance by increasing inventory costs and the risk of disruptions (Duncan, 1972), more recent research highlights that volatile environments can also present opportunities for dynamic firms to exploit market gaps, enhance flexibility, and strengthen their competitive position (Dağdeviren & Mirza, 2024). Building on this perspective, this study anticipates a positive relationship between environmental uncertainty and supply chain performance in contexts where firms actively adapt and innovate.

*H2: Environmental uncertainty has a positive effect on supply chain performance.*

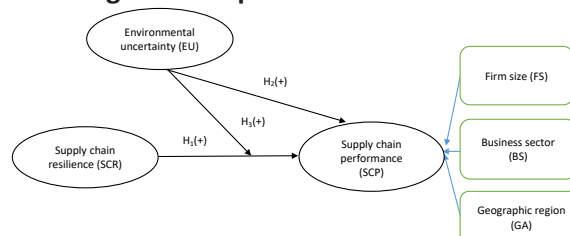
In addition to its direct influence, environmental uncertainty may moderate the relationship between supply chain resilience and supply chain performance. Under conditions of high environmental uncertainty, firms with strong supply chain resilience are likely

to outperform those with lower resilience, as they are better equipped to maintain material flows, adjust production plans rapidly, and collaborate flexibly with partners to mitigate risks. This reasoning aligns with Contingency Theory, which posits that organizational effectiveness depends on the fit between internal capabilities and the external environment. Similarly, from the perspective of Dynamic Capabilities Theory, environmental uncertainty serves as a catalyst that compels firms to activate and leverage their dynamic capabilities, thereby amplifying the positive effect of supply chain resilience on performance outcomes.

*H3: Environmental uncertainty positively moderates the relationship between supply chain resilience and supply chain performance, such that the effect of supply chain resilience on supply chain performance is stronger under high environmental uncertainty.*

The study also incorporates three control variables in the statistical analyses. The first control variable is firm size, measured using annual revenue (Dubey et al., 2020; Wamba et al., 2020). The second is the business sector, which accounts for potential differences across sectors (Dubey et al., 2020). The third control variable is geographical area, to capture possible regional variations in supply chain performance.

**Figure 1: Proposed Research Model**



Source(s): Proposed by the Authors

## 3. Research methodology

### 3.1. Measurement scales of variables

The authors developed a structured questionnaire in which all items were measured on a five-point Likert scale ranging from (1) = Strongly disagree to (5) = Strongly agree. The measurement scale for supply chain resilience (five items) was adapted from Belhadi et al. (2021), while the scale for supply chain performance (four items) was adapted from Zhao et al. (2023). The scale for environmental uncertainty (five items) was adapted from Inman and Green (2021).

To ensure linguistic and conceptual equivalence, all items were translated into Vietnamese and then back-translated into English. And the finalized questionnaire was then distributed to managers of manufacturing enterprises operating in industrial parks across Vietnam.

### 3.2. Data Collection

An online survey was conducted using a combination of convenience sampling and purposive sampling to ensure that respondents possessed relevant experience and knowledge of their enterprises' supply chain operations. The survey link was distributed to managers of manufacturing enterprises operating in industrial zones across Vietnam. After an eight-month data collection period, a total of 379 valid responses were obtained.

According to Hair (2009), a minimum sample size of approximately 100-150 is sufficient to estimate structural equation models with five or fewer constructs. As the present research model includes only three constructs, the achieved sample size of 379 comfortably exceeds this threshold and is therefore adequate for partial least squares structural equation modeling (PLS-SEM) analysis.

Following data collection, the measurement model and structural model were assessed using SmartPLS 4 software.

## 4. Findings

### 4.1. Measurement models

The evaluation of the measurement model focused on assessing the reliability and validity of the constructs.

**Table 1. Assessment of Reliability and Convergent Validity**

| Indicator | Outer Loading | CA    | CR    | AVE   |
|-----------|---------------|-------|-------|-------|
| SCR       | 0.797-0.844   | 0.888 | 0.918 | 0.691 |
| EU        | 0.757-0.860   | 0.859 | 0.899 | 0.640 |
| SCP       | 0.774-0.881   | 0.836 | 0.891 | 0.672 |

Source(s): Created by the Authors

The results indicate that all observed variables have outer loadings greater than 0.70, confirming their statistical significance in the model. The composite reliability (CR) values for all constructs exceed the recommended threshold of 0.70, ranging from 0.891 to 0.918. Similarly, Cronbach's alpha (CA) coefficients are above the minimum requirement of 0.70, with values ranging from 0.836 to 0.888, demonstrating that the measurement scales possess high internal consistency. In addition,

the outer loadings range from 0.757 to 0.881, further supporting indicator reliability, and the average variance extracted (AVE) values exceed the recommended threshold of 0.50, ranging from 0.640 to 0.691. These results collectively confirm that the measurement scales achieve both reliability and convergent validity.

Discriminant validity was subsequently assessed using the Fornell-Larcker criterion. The square root of the AVE for each construct was found to be  $\geq 0.80$  and higher than the inter-construct correlation coefficients, thereby satisfying the Fornell-Larcker criterion and confirming discriminant validity.

**Table 2. Discriminant validity assessment using the Fornell-Larcker criterion**

|     | EU     | SCP   | SCR   |
|-----|--------|-------|-------|
| EU  | 0.800  |       |       |
| SCP | 0.417  | 0.820 |       |
| SCR | -0.043 | 0.539 | 0.831 |

Source(s): Created by the Authors

In summary, all observed variables are statistically meaningful, and the measurement scales demonstrate high reliability, as well as both convergent and discriminant validity. Therefore, the collected data are appropriate for testing the proposed research hypotheses.

### 4.2. Structural model assessment

The structural model was evaluated following several steps: assessment of multicollinearity, examination of the adjusted coefficient of determination ( $R^2$ ), evaluation of path coefficients, statistical significance testing of the structural paths, and assessment of overall model fit.

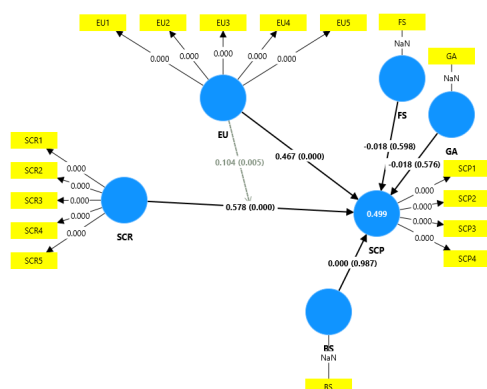
First, variance inflation factors (VIF) were calculated to examine multicollinearity among the independent variables. The results show that the maximum VIF value is 2.485, which is below the threshold of 5. Therefore, the research model is not affected by multicollinearity issues among the independent variables.

The adjusted  $R^2$  value represents the proportion of variance in the dependent variable explained by the independent variables in the model. The adjusted  $R^2$  value for SCP is 0.491, indicating that the independent variables account for 49.1% of the variance in SCP.

Next, the hypotheses were tested by identifying both direct and indirect effects. The results, presented in Figure 2 and Table 5, illustrate the structural model and the direct relationships between the constructs.



Figure 2: The Structural Model



Source(s): Created by the Authors

Table 3: Results of hypotheses testing in the structural model

| Paths(hypotheses) | $\beta$ | p-value | t-value |
|-------------------|---------|---------|---------|
| BS → SCP          | 0.000   | 0.987   | 0.016   |
| EU → SCP          | 0.467   | 0.000   | 11.203  |
| FS → SCP          | -0.018  | 0.598   | 0.527   |
| GA → SCP          | -0.018  | 0.576   | 0.559   |
| SCR → SCP         | 0.578   | 0.000   | 17.031  |
| EU x SCR → SCP    | 0.104   | 0.005   | 2.801   |

Source(s): Created by the Authors

First, the results indicate that supply chain resilience has a direct and strong positive effect on supply chain performance ( $\beta = 0.578$ ,  $p < 0.001$ ,  $t = 17.031$ ). This finding suggests that higher levels of supply chain resilience lead to significant improvements in supply chain performance, thereby supporting Hypothesis H1.

Next, environmental uncertainty was found to have a direct and positive effect on SCP ( $\beta = 0.467$ ,  $p < 0.01$ ,  $t = 11.203$ ). This result implies that under conditions of greater environmental uncertainty, firms enhance their flexibility and responsiveness, which in turn improves performance. Thus, Hypothesis H2 is supported.

Furthermore, the moderation analysis shows that the interaction term ( $EU \times SCR$ ) has a positive and significant effect on supply chain performance ( $\beta = 0.104$ ,  $p < 0.01$ ,  $t = 2.801$ ). This indicates that environmental uncertainty positively moderates the relationship between supply chain resilience and supply chain performance, such that the effect of supply chain resilience on supply chain performance becomes stronger when environmental uncertainty is higher. Accordingly, Hypothesis H3 is supported.

Finally, the results indicate that none of the three control variables firm size (FS), business sector (BS), and geographic area (GA) exert a statistically significant influence on supply chain performance,

as all p-values exceed 0.01. Therefore, potential confounding effects from these variables can be ruled out in the assessment of the main structural relationships.

In addition, the SRMR value was 0.049, which is below the recommended threshold of 0.08, indicating a good model fit.

Taken together, these results confirm that the structural model is appropriate, all research hypotheses are supported with high statistical significance, and the model demonstrates good explanatory power for the relationships under investigation.

## 5. Discussion and implications

### 5.1 Discussions

The study results reveal that supply chain resilience exerts a strong, direct, and statistically significant effect on supply chain performance ( $\beta = 0.578$ ;  $p < 0.01$ ). This finding aligns with the core proposition of Dynamic Capabilities Theory, which argues that firms must develop dynamic capabilities to sense opportunities, seize them, and continuously reconfigure resources to sustain competitive advantage in turbulent environments (Teece, 2007; Teece et al., 1997). As a critical dynamic capability, supply chain resilience enables firms to detect early warning signals of risk, mobilize and reallocate resources, and rapidly recover from disruptions. These results contribute further empirical evidence that SCR is a key driver of operational efficiency, helping firms maintain service quality, minimize disruption-related costs, and enhance overall supply chain flexibility (Belhadi et al., 2021; Chowdhury & Quaddus, 2017; Zhao et al., 2023).

Moreover, environmental uncertainty was also found to have a direct positive effect on supply chain performance. This finding is consistent with the results of many previous studies (Dağdeviren & Mirza, 2024; Inman & Green, 2022; James & George, 2018). In addition, environmental uncertainty positively moderates the relationship between supply chain resilience and supply chain performance ( $\beta = 0.104$ ;  $p < 0.01$ ). This result aligns with Contingency Theory, which asserts that organizational performance depends on the fit between internal capabilities and external environmental conditions (Donaldson, 2001). When environmental uncertainty increases, firms with higher levels of supply chain resilience are more effective in maintaining supply chain performance. This may be explained by the fact that, under

volatile conditions, firms must continuously activate resilience mechanisms, strengthen collaboration with suppliers, restructure processes, and leverage resources to mitigate negative impacts, thereby amplifying the effect of supply chain resilience on supply chain performance.

Finally, the fact that other variables such as business sector, firm size, and geographic area are not statistically significant suggests that, within the context of this study, these characteristics are not major drivers of supply chain performance, or that Vietnamese enterprises have not yet effectively leveraged these resources. This further underscores the importance of developing supply chain resilience as a strategic priority, particularly in the face of increasingly uncertain global supply chains.

### 5.2. Theoretical implications

The study reveals that supply chain resilience is the strongest driver of supply chain performance. Managers should view supply chain resilience as a strategic dynamic capability that requires continuous investment and development. Following Dynamic Capabilities Theory, firms should simultaneously build three capability groups: (i) sensing - early detection of risks and market changes, (ii) seizing - mobilizing resources and making timely decisions and (iii) reconfiguring - restructuring networks and processes when conditions shift.

Results further indicate that under high environmental uncertainty, the positive effect of supply chain resilience on supply chain performance becomes stronger. Firms should proactively develop disruption scenarios (e.g., raw material shortages, exchange rate volatility, policy changes) and accelerate digital transformation to enhance visibility and enable real-time data sharing with partners. This enables not only effective responses but also continuous learning and sustainable growth.

Finally, business sector, firm size, and geographic location show no significant effects, suggesting that resources should be reallocated toward resilience-building and responsiveness initiatives rather than dispersed across less impactful factors.

### 5.3. Limitations and future research directions

Although this study offers important theoretical and practical contributions, several limitations should be acknowledged, paving the way for future research.

*First*, the survey data were collected from manufacturing firms in selected regions, which may limit the generalizability of the findings. Future research could broaden the sample to include

more industries and compare results across sectors or countries with varying development levels to validate the model's robustness.

*Second*, the cross-sectional research design does not capture the evolution of supply chain resilience over time. As Dynamic Capabilities Theory emphasizes, dynamic capabilities reveal their value through continuous resource reconfiguration. Longitudinal studies or multi-stage case research could provide deeper insights into how resilience develops in response to environmental fluctuations.

*Third*, environmental uncertainty was measured at a general level without distinguishing between its sub-dimensions. According to Contingency Theory, each type of uncertainty may exert different pressures and require distinct responses. Future work should disaggregate uncertainty types to provide more precise managerial recommendations.

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# FACTORS INFLUENCING THE LEVEL OF CIRCULAR ECONOMY PARTICIPATION ACROSS TRANSPORTATION PROJECTS WITH DIFFERENT PROFITABILITY LEVELS THROUGH EFA ANALYSIS

PhD. Nguyen Thi Thuy Dung\*

**Abstract:** *This study examines the factors influencing implementation of the circular economy (CE) in transportation infrastructure projects (ICE-TIP) with different profitability levels in Vietnam. Using survey data from 312 professionals involved in infrastructure projects during 2020–2024, the study applies Exploratory Factor Analysis (EFA) to identify key factor structures associated with CE implementation. Projects are classified into two groups based on the Internal Rate of Return (IRR): high-profitability ( $IRR \geq 11\%$ ) and low-profitability ( $IRR < 11\%$ ). The results show that high-profitability projects exhibit a coherent four-factor structure including management policy, internal capabilities, technology adoption, and supply chain integration. In contrast, low-profitability projects display a more fragmented structure with weaker institutional and organizational elements. The findings highlight the need for differentiated policy approaches to promote CE adoption across projects with varying financial capacities.*

• Keywords: circular economy, transportation infrastructure, profitability, policy difference.

Date of receipt: 25<sup>th</sup> Feb., 2026

Date of receipt revision: 30<sup>th</sup> Mar., 2026

Date of delivery revision: 06<sup>th</sup> Mar., 2026

Date of approval: 03<sup>rd</sup> Apr., 2026

DOI:

## 1. Introduction

In the context of climate change, resource depletion, and increasing pressure for sustainable development, the circular economy (CE) model has emerged as a comprehensive approach to restructuring production and consumption patterns particularly in resource-intensive sectors such as transportation infrastructure construction (Abdulai et al., 2024).

In the field of transportation infrastructure construction, the adoption of CE principles such as modular design, use of recycled materials, lifecycle digitalization, and predictive maintenance is receiving growing attention (Awad et al., 2024).

However, practical implementation in Vietnam reveals that CE participation levels in transportation projects remain limited and uneven across project types. One of the key factors influencing CE engagement is project profitability levels (Tô & Bùi, 2025; Trần et al., 2022). Highly profitable projects are more likely to access advanced technologies and invest in digital and sustainable solutions, whereas low-profit projects are often constrained by costs, limited financial capacity, and a lack of prioritization for non-financial sustainability goals.

This raises a critical question: Are projects with different profitability levels selecting different CE solution groups? And if so, how do the factor structures influencing CE participation differ between groups? Understanding these differences forms the basis for designing tailored support policies that enable less profitable projects to still access and benefit from CE practices, while encouraging financially capable projects to take on leadership roles.

This study aims to develop and analyze a model of factors affecting CE participation in transportation infrastructure construction projects (ICE-TIP) and to compare factor structure differences between high-profitability and low-profitability project groups using Exploratory Factor Analysis (EFA). The research provides clear quantitative evidence on the differences in CE drivers and barriers across project types and offers policy recommendations to promote the wider adoption of the circular economy model across the entire transportation sector.

## 2. Literature Review

### 2.1. Policy and Regulatory Foundations for Circular Economy Implementation

In the field of transportation infrastructure construction, governmental policies and

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regulations play a pivotal role in establishing a conducive legal environment for projects to adopt circular economy (CE) practices. Several international studies have demonstrated that the presence of incentive frameworks such as tax relief, green finance, and mandatory material reuse regulations can significantly promote CE adoption in the construction sector (Khan & Mahajan, 2023).

In Vietnam, although the orientation toward CE has been embedded in various national strategies, studies reveal that implementation guidelines remain fragmented, non-binding, and especially vague in the context of transportation infrastructure (Tô & Bui, 2025; Trần et al., 2022; Vietnam, 2016). The lack of clear technical standards for material reuse and waste management often leads to passive adoption and neglect of CE practices among projects. Furthermore, studies emphasize that policy clarity, transparency, and effective enforcement mechanisms are critical in building trust and incentivizing sustainable investments (Fathalizadeh et al., 2019; Kahupi et al., 2024).

Based on these findings, management policy is considered a key factor influencing the level of circular economy participation in transportation infrastructure projects, including aspects such as regulatory clarity, financial incentives, and monitoring mechanisms.

### **2.2. Internal Resources Driving Circular Implementation**

According to the dynamic capabilities theory, innovation capacity and organizational adaptability are key to navigating transitions such as CE transformation (Teece et al., 1997). In large-scale infrastructure construction, CE implementation requires in-depth technical understanding, integrated planning capacity, and a corporate culture aligned with sustainability goals. Brglez et al. found that projects with top-level management committed to sustainability are more likely to invest in recycled materials, lifecycle assessment (LCA) tools, and resource-efficient processes (Brglez et al., 2025). In contrast, projects with limited internal capabilities and lacking CE as a strategic priority often implement circular measures superficially (Wang & Levinson, 2023). In Vietnam, Tô and Bui pointed out that a lack of green project management skills, absence of

dedicated CE departments, and weak innovation culture remain major barriers in the transportation construction sector (Tô & Bui, 2025).

Therefore, internal capabilities are expected to play an important role in shaping CE participation, particularly through leadership commitment, implementation capacity, and organizational culture.

### **2.3. Technological Foundations Enhancing Circular Implementation**

In the construction sector, technologies such as Building Information Modeling (BIM), lifecycle assessment (LCA), and material passports are essential tools to enable circularity (Bonifazi et al., 2025; Verma et al., 2025). These digital tools help projects identify reuse potential, optimize construction processes, and minimize emissions across the asset lifecycle.

In Vietnam, however, the readiness to adopt such CE technologies in transportation infrastructure projects remains low due to limited technological capabilities, lack of investment funding, and absence of integrated data systems (Ngô et al., 2020). Therefore, technology readiness is considered a critical differentiator between pioneering and lagging projects.

Thus, technology adoption is considered another major factor affecting CE participation, including the application of digital construction technologies, information systems for resource management, and technologies for recycled materials.

### **2.4. Collaborative Conditions for Circular Implementation**

CE in construction cannot be realized in isolation; it demands coordinated efforts among main contractors, material suppliers, recycling units, monitoring agencies, and investors (Arabpour & Silvius, 2023; Kahupi et al., 2024). The ability to share lifecycle data across the supply chain is essential to CE success in transportation construction projects. However, Trần et al. found that Vietnam's construction supply chain remains fragmented, lacks standardized green contracting practices, and does not yet have technical platforms for data integration among stakeholders hindering traceability, material reuse, and circular design implementation (Trần et al., 2022).



Accordingly, supply chain integration is identified as another critical factor influencing CE participation, particularly through supplier linkage, lifecycle data sharing, and the adoption of green contract models.

Based on the literature review, four conceptual factor groups were identified: management policy, internal capabilities, technology adoption, and supply chain integration. These factors were later examined using exploratory factor analysis (EFA).

### 3. Data and research methodology

#### 3.1. Research data

The data were collected from technical staff, consultants, and project managers with experience in transportation infrastructure construction projects in Vietnam during the period 2020–2024. A total of 400 survey questionnaires were distributed, of which 312 valid responses were used for analysis.

The questionnaire was designed using a 5-point Likert scale (ranging from 1 – Strongly disagree to 5 – Strongly agree) to measure the influence of various factor groups on the implementation of circular economy (CE) practices.

To clarify the relationship between financial efficiency and CE participation, the projects were classified into two groups based on the “Internal Rate of Return (IRR)” indicator:

- High-IRR group: projects with an estimated  $IRR \geq 11\%$ , based on respondents’ assessments or related financial reports.

- Low-IRR group: projects with  $IRR < 11\%$ , assessed as having modest financial performance, longer payback periods, or high cash flow risks.

This classification is informed by the Asian Development Bank’s (ADB) benchmark, where projects with an Economic IRR (EIRR) above 12% are typically approved, while those below 10% are often rejected (Wang & Levinson, 2023).

#### 3.2. Analytical method

Following the methodological frameworks of Soewin & Chinda (2018) and Van Tam (2025), this study employs Exploratory Factor Analysis (EFA) to identify the underlying structures influencing Circular Economy (CE) engagement in transportation infrastructure projects.

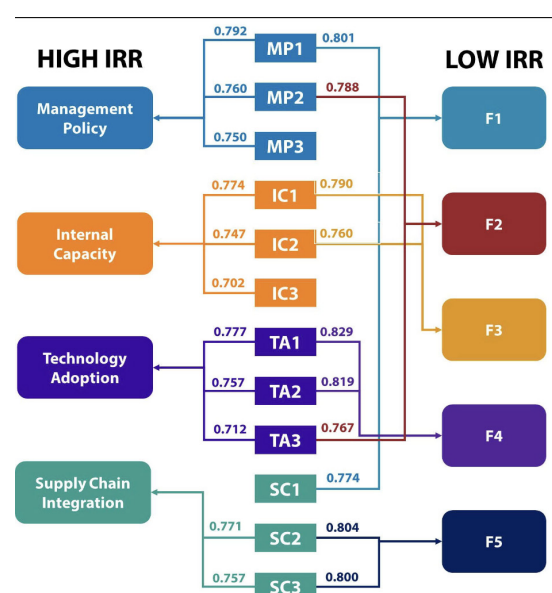
**Table 1. Key Factors and Variables Influencing Circular Economy Implementation in Transportation Infrastructure Projects**

| Factors                            | Variable | Content                                                         | Related researches                     |
|------------------------------------|----------|-----------------------------------------------------------------|----------------------------------------|
| Factor 1: Management Policy        | MP1      | Clear and coherent CE legislation                               | (Fathalizadeh et al., 2019)            |
|                                    | MP2      | Green financial incentives                                      | (Khan & Mahajan, 2023; Tô & Bui, 2025) |
|                                    | MP3      | Monitoring and sanction mechanism                               | (Fathalizadeh et al., 2019)            |
| Factor 2: Internal Capacity        | IC1      | Leadership commitment                                           | (Tô & Bui, 2025)                       |
|                                    | IC2      | Implementation capability                                       | (Brglez et al., 2025; Tô & Bui, 2025)  |
|                                    | IC3      | Organizational culture                                          | (Wang & Levinson, 2023)                |
| Factor 3: Technology Adoption      | TA1      | Application of digital technologies in sustainable construction | (Ngô et al., 2020; Verma et al., 2025) |
|                                    | TA2      | Information system for resources and waste                      | (Ngô et al., 2020)                     |
|                                    | TA3      | Technology for recycled materials and construction              | (Bonifazi et al., 2025)                |
| Factor 4: Supply Chain Integration | SC1      | Supplier linkage                                                | (Arabpour & Silvius, 2023)             |
|                                    | SC2      | Data sharing                                                    | (Kahupi et al., 2024)                  |
|                                    | SC3      | Green contract model                                            | (Arabpour & Silvius, 2023)             |

### 4. EFA results

The EFA results are presented in the following Figure:

**Fig. 1. Factor Structures (Loading factor and groups)**



Source: Designed by the author

The EFA results for high-profitability projects ( $KMO = 0.663$ ) identify four core factors Management Policy, Internal Capacity, Technology Adoption, and Supply Chain Integration explaining 60.37% of the total

variance with acceptable reliability (Cronbach's alpha: 0.554–0.681). In contrast, low-profitability projects (KMO = 0.508) exhibit a more fragmented five-factor structure despite explaining 72.14% of the variance, with lower internal consistency (alpha: 0.514–0.557). In the low-IRR subgroup, the analysis yielded a marginal KMO of 0.508 and Cronbach's Alpha coefficients ranging from 0.514 to 0.557. These relatively low reliability indices suggest a nascent stage of Circular Economy (CE) adoption and a lack of consensus in perception among the surveyed firms. Consequently, these findings are presented as exploratory evidence, serving as a preliminary baseline rather than establishing definitive structural paths.

Among projects with high profitability (IRR  $\geq$  11%), the factor analysis results reveal a clear and theoretically consistent structure. The factors influencing circular economy (CE) implementation are grouped into four distinct categories: policy, internal capacity, technology, and supply chain. Each factor cluster comprises observed variables with high loadings and no significant cross-loadings, indicating that the factors exert distinct and consistent effects on the actual implementation of CE practices in these projects. In other words, when financial conditions are favorable, projects possess sufficient resources to methodically engage with and operate various components of the CE framework from leveraging policy incentives and enhancing internal capabilities to adopting technologies and establishing green supply chain linkages. As such, the influence of each factor group is reflected independently, systematically, and in line with the original theoretical assumptions.

In contrast, the factor structure for projects with lower profitability (IRR < 11%) presents a markedly different picture. Instead of the four theoretically derived categories (policy, internal capacity, technology, supply chain), the actual analysis yields five distinct factors. A new factor emerges, combining two variables originally assigned to separate theoretical groups: MP1 (policy transparency) and SC1 (supplier linkage).

The simultaneous emergence of these two variables in one factor suggests a tightly intertwined and conditionally dependent relationship between policy and supply chain mechanisms in the practical implementation of low-efficiency projects. Specifically, in these

cases, project developers often lack the resources to independently engage with policy frameworks or establish a robust partner network. When policies are vague, lack clear technical standards, or fail to signal long-term stability, suppliers tend to remain passive reluctant to invest in recycling technologies, green materials, or long-term collaborative commitments. Conversely, if the partner network is weak, lacking capacity or innovation drive, even well-formulated policies face difficulties in real-world execution due to the absence of capable stakeholders.

As a result, in financially constrained contexts where every decision must account for short-term risks and limited cash flow the relationship between policy and supply chain is no longer structured along separate axes but becomes a tightly bound and inseparable unit of mutual influence. This explains why, in the factor analysis, MP1 and SC1 no longer load independently onto distinct factors (as seen in the high-efficiency group), but instead converge on an integrated factor.

Moreover, other factor clusters in the low-IRR group reflect the specific characteristics of these projects. For example, financial incentives (MP2) and recycled materials (TA3) appear within the same factor, suggesting that concern for recycled materials is only activated when direct financial support is available a common trait among financially limited projects. In contrast, internal capacity (IC1, IC2), digital technology (TA1, TA2), and supply chain coordination (SC2, SC3) still form separate groups, but operate within a fragmented environment, lacking holistic integration, which diminishes the effectiveness of CE implementation.

Notably, the factor analysis for the low-IRR group shows the complete absence of two key variables: MP3 (sanction mechanism) and IC3 (organizational culture). This reflects the practical reality that foundational and long-term elements such as strict enforcement mechanisms or a well-established internal culture are not perceived by these projects as directly influencing CE adoption decisions. On one hand, enforcement mechanisms may be too vague, lacking deterrent power, or inconsistently applied, preventing projects from perceiving any real compliance pressure. On the other hand, organizational culture evolves over time and requires sustained leadership commitment and internal consensus conditions

that financially struggling or short-term-oriented projects often lack the capacity to maintain.

In summary, the differences in factor structure between the two project groups stem from fundamentally distinct implementation environments. High-profitability projects typically benefit from consistent support across policy, partnerships, and internal capacity, allowing influencing factors to operate independently and as theoretically expected. In contrast, low-profitability projects suffer from the lack of such coordination, causing formerly independent factors to become interdependent and overlapping resulting in a fragmented, under-resourced, and poorly coordinated CE implementation landscape. This significantly hinders the realization of sustainable development goals aligned with circular economy principles.

### 5. Conclusion and Recommendations

Based on the Exploratory Factor Analysis (EFA), this study identifies a clear structural divergence in the factors influencing Circular Economy (CE) implementation between high-profitability and low-profitability transportation infrastructure projects. For high-return projects, factors are structured in a stable and logical manner, reflecting a comprehensive integration of institutional frameworks, technology adoption, and organizational capacity. In contrast, low-profitability projects exhibit fragmented strategies and unstable awareness, where policy, technology, and operational variables often overlap, leading to diminished economic and environmental outcomes.

The study advocates for a stratified policy framework rather than a “one-size-fits-all” approach. For high-capacity projects, the focus should be on scaling innovation through Life Cycle Management (LCM), BIM/LCA integration, and the formation of industry-wide circular alliances. These projects should be incentivized through green certifications and preferential bidding eligibility for public infrastructure tenders that prioritize sustainability criteria. Such a top-down innovation model ensures that leading projects drive the industry’s technological frontier.

Conversely, for low-capacity projects, policy support must prioritize institutional risk mitigation and foundational capacity building. Complex legal frameworks should be translated

into practical, sector-specific technical toolkits with visual aids and on-site training. CE adoption in this group should start with small-scale, low-risk recycling models such as using waste concrete for subbase layers supported by simplified access to green credit and regional circular construction labs for technology transfer.

At the macro level, inter-sectoral coordination is essential to synchronize CE deployment across regions. Future research should focus on validating these factor structures using Confirmatory Factor Analysis (CFA) and Structural Equation Modeling (SEM). Quantifying the impact of each factor group on the triple-bottom-line (financial, environmental, and social outcomes) will provide a more robust scientific foundation for long-term sustainable transportation development.

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# MAPPING SUSTAINABLE ENTREPRENEURSHIP RESEARCH IN THE CONTEXT OF CLIMATE CHANGE: A BIBLIOMETRIC ANALYSIS

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**Abstract:** *Climate change presents escalating environmental and socio-economic challenges, increasing attention to entrepreneurship as a pathway for sustainability transitions. Sustainable entrepreneurship has emerged as a mechanism through which entrepreneurial activity contributes to climate mitigation, adaptation, and sustainable development. Despite growing scholarship, research linking sustainable entrepreneurship and climate change remains fragmented. This study employs a bibliometric approach to map the development and intellectual structure of this field using 173 peer-reviewed articles indexed in Scopus and Web of Science. Performance analysis and science mapping techniques implemented in Bibliometrix and VOSviewer are applied to identify publication trends, influential sources, geographic patterns, and thematic clusters. The findings show a marked increase in research output since 2020 and a concentration of publications in sustainability-oriented journals, with strong contributions from climate-vulnerable and emerging economies. Thematic results indicate a shift toward climate-focused streams, including green entrepreneurship, environmental governance, policy frameworks, and green innovation pathways. The study offers a structured overview of the field and identifies key directions for sustainability research and practice.*

• Keywords: *sustainable entrepreneurship; climate change; green entrepreneurship; climate risk; bibliometric analysis.*

Date of receipt: 25<sup>th</sup> Feb., 2026

Date of receipt revision: 10<sup>th</sup> Mar., 2026

Date of delivery revision: 04<sup>th</sup> Mar., 2026

Date of approval: 27<sup>th</sup> Mar., 2026

DOI:

## 1. Introduction

Climate change has become one of the most critical global challenges, with widespread negative impacts on environmental systems, economic stability, and social well-being. Rising temperatures, extreme weather events, ecosystem degradation, and increasing environmental risks have intensified uncertainty across regions and industries, particularly in climate-vulnerable economies (Middermann et al., 2020; Karadayı et al., 2025). These changes not only threaten natural resources but also disrupt production systems, livelihoods, and long-term development prospects. Consequently, climate change is increasingly viewed as a complex societal challenge that requires coordinated responses across policy, business, and entrepreneurship. In response to these challenges, governments and international organisations have introduced a wide range of climate-related policies aimed at mitigation and adaptation. National climate strategies, green growth agendas, and sustainability frameworks aligned with the Sustainable Development Goals (SDGs) emphasise the need for economic transformation toward low-carbon and environmentally responsible development pathways (Ike, 2025). However, policy interventions alone are insufficient to address the scale of climate change. Their effectiveness largely

depends on how economic actors, particularly firms and entrepreneurs, respond to environmental risks and integrate sustainability objectives into their activities.

At the firm level, the adoption of sustainable business models and green innovation has emerged as a key mechanism through which climate policies are implemented in practice. Companies are increasingly encouraged to embed environmental and social considerations into their strategies, operations, and value creation processes in order to reduce environmental impacts while maintaining competitiveness (Lüdeke-Freund, 2020). Empirical evidence suggests that sustainability-oriented business practices can support climate mitigation efforts, enhance organisational resilience, and contribute to broader sustainability transitions by reshaping production, consumption, and innovation systems (Shmelev & Gilardi, 2025). In this sense, firms play an active role in translating policy ambitions into tangible climate-related outcomes. Beyond established corporations, sustainable entrepreneurship has gained growing attention as a strategic response to climate change. Sustainable entrepreneurship is no longer seen merely as a trend but as a practical solution adopted by new ventures from their inception. Sustainable entrepreneurs deliberately design business models that integrate

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economic performance with environmental protection and social value creation, thereby addressing current sustainability challenges while considering the needs of future generations (Lüdeke-Freund, 2020). In climate-threatened contexts, such as vulnerable communities and emerging economies, sustainable entrepreneurship has also been shown to support local adaptation and resilience by fostering innovation and environmentally responsible practices (Pricopoaia et al., 2024).

The academic literature on sustainable entrepreneurship has expanded rapidly over the past two decades. Research has examined a wide range of topics, including sustainable business models, entrepreneurial competencies, innovation strategies, corporate social responsibility, and entrepreneurial intentions (Lüdeke-Freund, 2020). Several systematic reviews and conceptual studies have sought to synthesise this growing body of knowledge and clarify the conceptual boundaries of sustainable entrepreneurship (Sreenivasan & Suresh, 2023; Ike, 2025). More recent studies have explicitly linked sustainable entrepreneurship to climate change, environmental risk exposure, and sustainability transitions, highlighting the influence of climate uncertainty on entrepreneurial decision-making and opportunity recognition (Middermann et al., 2020; Karadayı et al., 2025).

Despite these advances, the literature remains fragmented. Existing studies often focus on specific dimensions, such as entrepreneurial intention, innovation, education, or policy support, without offering an integrated view of how sustainable entrepreneurship research has evolved in relation to climate change. Moreover, most prior reviews rely on qualitative or narrative synthesis and provide limited insights into publication trends, thematic structures, and knowledge networks within the field. As a result, there is still a lack of comprehensive, data-driven overviews that systematically map the intellectual structure of sustainable entrepreneurship research in the context of climate change. To address this gap, the study conducts a bibliometric analysis of the literature on sustainable entrepreneurship and climate change. Using data from the Scopus and Web of Science databases, this study systematically maps publication trends, influential sources, geographic and institutional contributions, and thematic structures through bibliometric techniques. The results provide an integrated overview of how sustainable entrepreneurship research has developed in response to climate-related challenges and identify key themes,

emerging research directions, and underexplored areas.

The main contribution of this study is to provide a structured bibliometric overview of sustainable entrepreneurship research in the context of climate change. By analysing publication trends and thematic patterns, the study complements existing qualitative reviews and clarifies how entrepreneurship research contributes to climate resilience and sustainable development. The findings offer relevant insights for researchers, policymakers, and educators promoting sustainability-oriented entrepreneurship under environmental uncertainty.

The remainder of the paper is organised as follows. Section 2 describes the data collection and bibliometric procedures. Section 3 presents the results on publication trends and thematic structures. Section 4 discusses the implications of the findings. Section 5 concludes with key insights, limitations, and future research directions.

## 2. Materials and Methods

This study employs a bibliometric research design to map how the literature on sustainable entrepreneurship has developed in the context of climate change and environmental risk. Bibliometric analysis is particularly suitable when a field is interdisciplinary and conceptually diverse, as it provides a systematic and transparent way to synthesise publication patterns and knowledge structures using bibliographic metadata (Aria & Cuccurullo, 2017; Donthu et al., 2021). In line with established bibliometric practice, the study combines descriptive performance indicators with science-mapping techniques to examine both the growth of the literature and the way key concepts cluster and connect over time (Zupic & Čater, 2015).

### *Data sources and search strategy*

Bibliographic records were retrieved from Scopus and Web of Science (WoS), which are widely regarded as authoritative databases for peer-reviewed research in sustainability, environmental studies, and management. Their structured indexing and metadata consistency make them appropriate for bibliometric mapping, compared with broader databases that may contain inconsistent records. A unified keyword strategy was applied across the two databases to capture core conceptual variants of sustainable entrepreneurship and explicitly link them to climate-related issues. In Scopus, the search was conducted in TITLE-ABS-KEY, while in WoS it was conducted in the Topic (TS) field.

The query combined (i) entrepreneurship-related terms (e.g., “sustainable entrepreneurship”, “green entrepreneurship”, “environmental entrepreneurship”, “eco-entrepreneurship”, and “sustainability-oriented entrepreneurship”, including a truncation-based expression for “sustainable enterprise\*” linked to entrepreneur\*) with (ii) climate-related terms (e.g., “climate change”, “climate risk\*”, “climate uncertainty”, “climate resilience”, “environmental uncertainty”, and “environmental risk\*”) using Boolean operators. The initial search yielded 134 records from Scopus and 97 from WoS (231 in total).

#### *Inclusion and exclusion criteria*

To ensure analytical reliability and comparability, the dataset was restricted to English-language publications classified as journal Articles or Reviews. Records were exported (RIS format), merged, and screened for duplication based on title, author(s), publication year, and source information. A total of 58 duplicate records were removed, resulting in a final dataset of 173 unique documents for analysis. Prior to analysis, a preprocessing step was conducted to standardise keywords and reduce conceptual noise, addressing spelling variants, plural forms, and near-synonyms that refer to the same construct, consistent with recommended procedures in bibliometric research (Donthu et al., 2021). Non-informative or overly generic terms that did not meaningfully represent the focal domain were removed to improve the interpretability of keyword networks.

#### *Bibliometric tools and analytical techniques*

The analysis integrates performance analysis and science mapping techniques (Zupic & Čater, 2015; Donthu et al., 2021). Descriptive performance indicators (e.g., annual scientific production, most relevant sources, and country/institution contributions) were produced using Bibliometrix in R, which supports reproducible bibliometric workflows and standard performance metrics (Aria & Cuccurullo, 2017). To examine the conceptual structure of the field, keyword-based science mapping was conducted using both Bibliometrix and VOSviewer. Specifically, a multi-field keyword approach was applied to incorporate terms extracted from titles, abstracts, author keywords, and indexed keywords, thereby broadening conceptual coverage and reducing the risk of field-specific keyword omissions. Keyword co-occurrence networks were constructed using full counting, and visualisation and clustering were performed in VOSviewer, which applies association-strength normalisation and a modularity-based clustering algorithm to identify

coherent thematic clusters (van Eck & Waltman, 2010). Finally, trend topic analysis was used to examine how prominent themes have shifted over time, providing a temporal view of evolving research attention within the sustainable entrepreneurship-climate change literature (Donthu et al., 2021).

### **3. Results**

#### *3.1. Publication trends and sources analysis*

Figure 1 shows the annual scientific production of publications related to sustainable entrepreneurship in the context of climate change. The trend indicates a steady increase in the number of publications from the early 2000s, with a noticeable surge from 2020 to 2024. This rise reflects the growing urgency of climate change as a global issue, aligning with increasing scholarly interest in entrepreneurial approaches to addressing environmental risks and sustainability. In the earlier years, the field was marked by occasional studies, as sustainable entrepreneurship was treated as a distinct concept within broader environmental and business research. More recently, the volume of publications has increased significantly, signaling the growing consolidation of sustainable entrepreneurship as a central response to climate change.

This acceleration in publication volume aligns with findings by Karadayı et al. (2025), where the literature on sustainable entrepreneurship has gained more prominence in response to escalating climate challenges. The surge in research output reflects a growing recognition of the role of entrepreneurship in fostering climate adaptation and resilience, particularly as policy frameworks like the Paris Agreement and the SDGs push for innovative, entrepreneurial solutions to climate change (Sreenivasan & Suresh, 2023).

**Figure 1: Annual scientific production of publications on sustainable entrepreneurship and climate change**

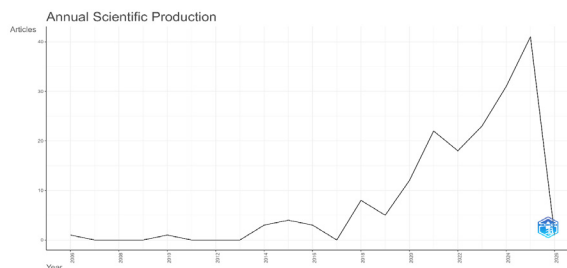


Figure 2 displays the most relevant sources publishing on sustainable entrepreneurship and climate change. The distribution indicates that research in this field is predominantly published in journals focusing on sustainability, environmental management, and business strategy. Sustainability leads the list with

fourteen articles, followed by Business Strategy and the Environment and Journal of Cleaner Production, each contributing five papers. This trend highlights the increasing intersection of entrepreneurship with sustainability, environmental management, and policy, reflecting the interdisciplinary nature of the field (Lüdeke-Freund, 2020). The dominance of sustainability-related journals underscores the growing importance of environmental issues within entrepreneurship research.

**Figure 2: Most relevant sources and their publication count**

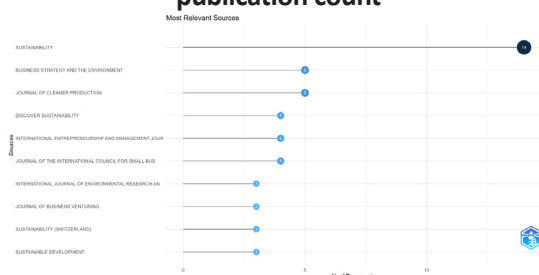


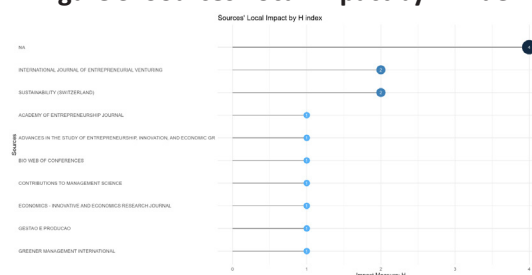
Figure 3 further explores the sources' local impact, measured by the H-index. The H-index is a measure of both the number of publications and the citations each publication receives, providing insight into the academic influence of the journals in this field. In this case, *Sustainability (Switzerland)* and the *International Journal of Entrepreneurial Venturing* show an H-index of 2, indicating that these sources have published a modest number of articles that have received moderate citations, confirming their scholarly impact. However, a significant portion of the sources, 14 in total, have an N/A H-index, indicating either a lack of sufficient citation data or that these journals are too new to have accumulated the necessary citation impact. This underscores the emerging nature of sustainable entrepreneurship research, with some journals still building their citation and scholarly influence. The presence of several sources with an N/A H-index is common in emerging research domains and does not necessarily indicate low quality, but rather reflects limited publication volume or the recency of journal inclusion in citation databases.

These publication and citation patterns indicate the growing visibility of sustainable entrepreneurship within climate change-related research, particularly at the intersection of sustainability, environmental management, and business studies.

The analysis of publication trends and sources reveals that sustainable entrepreneurship research in the context of climate change has evolved from a fragmented niche to a rapidly growing and

interdisciplinary area. The increasing volume of publications, particularly in key sustainability journals, reflects the alignment between entrepreneurship and global climate goals. However, the ongoing diversification of sources suggests that the field is still in a developmental phase, with considerable potential for further conceptual and empirical growth.

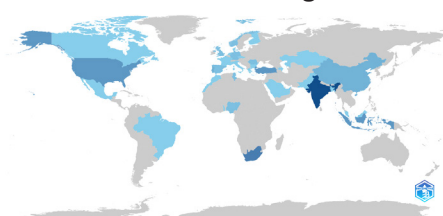
**Figure 3: Sources' local impact by H-index**



### 3.2. Geographic distribution and collaboration networks

The geographic distribution of research on sustainable entrepreneurship in the context of climate change shows a clear concentration of scientific output in a limited number of countries, alongside a broad but uneven global spread. Figure 4 illustrates the spatial distribution of country scientific production, revealing that research activity is most visible in South and Southeast Asia, parts of Europe, and selected countries in Africa and the Americas. Among these, India emerges as one of the most prominent contributors, reflected by the highest intensity of publication activity on the map. Substantial research output is also observed in the United States, Turkey, China, Indonesia, Brazil, and South Africa, indicating that scholarly attention to sustainable entrepreneurship and climate change is particularly strong in regions facing simultaneous pressures related to economic development and environmental vulnerability.

**Figure 4: Country scientific production of publications on sustainable entrepreneurship and climate change**



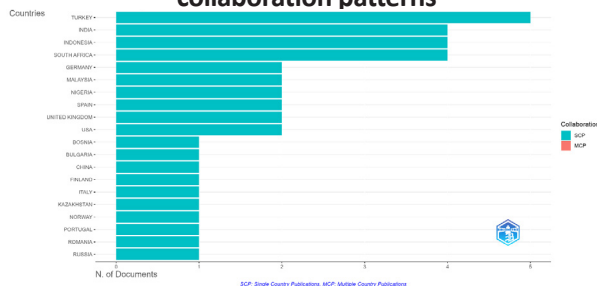
While country-level production captures overall research output, the distribution of corresponding authors' countries provides further insight into research leadership. As shown in Figure 5, Turkey records the highest number of corresponding authors,



followed closely by India, Indonesia, and South Africa. This pattern suggests that scholars based in these countries are not only active contributors but also frequently assume leading roles in shaping research directions within this field (Audretsch et al., 2021). In contrast, countries such as Germany, Malaysia, Nigeria, Spain, the United Kingdom, and the United States appear with more moderate levels of corresponding authorship, indicating a more supportive or collaborative role rather than primary leadership.

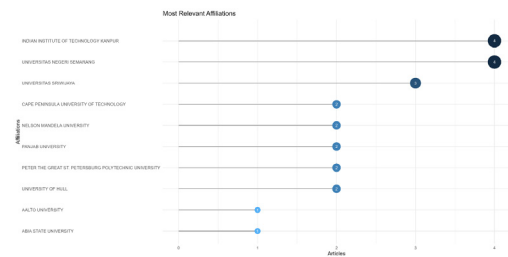
The collaboration profile further reveals that the majority of publications are classified as single-country publications (SCP), with relatively limited instances of multi-country publications (MCP) (Figure 5). The dominance of SCP across most contributing countries points to a research landscape that remains largely nationally embedded (Audretsch et al., 2021). This pattern reflects the context-specific nature of sustainable entrepreneurship research, where empirical investigations are often grounded in domestic institutional frameworks, policy environments, and socio-economic conditions associated with climate change. At the same time, the relatively low level of international co-authorship suggests that cross-border collaboration in this research area is still developing.

**Figure 5: Corresponding authors' countries and collaboration patterns**



At the institutional level, publication output is widely dispersed rather than concentrated within a small group of dominant universities. Figure 6 presents the most relevant affiliations, showing that institutions such as the Indian Institute of Technology Kanpur and Universitas Negeri Semarang are among the most productive, followed by Universitas Sriwijaya and several universities based in South Africa and Europe, including the Cape Peninsula University of Technology and Nelson Mandela University. This distribution indicates that knowledge production on sustainable entrepreneurship and climate change is driven by a diverse set of academic institutions across different regions.

**Figure 6: Most relevant affiliations in sustainable entrepreneurship and climate change research**



### 3.3. Keyword co-occurrence and thematic clusters

The intellectual structure of sustainable entrepreneurship research in the context of climate change is further clarified through keyword-based analyses, including trend topics, keyword frequency distributions across different metadata fields, and keyword co-occurrence networks. These analyses reveal both the conceptual foundations of the field and its recent thematic shifts toward climate-oriented and policy-relevant research agendas.

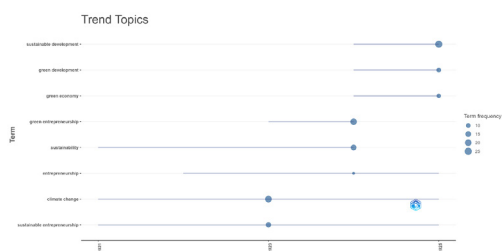
Figure 7 illustrates the temporal evolution of dominant research topics through trend topic analysis. Early studies in the dataset are primarily anchored in broad concepts such as sustainability and entrepreneurship, reflecting the formative stage of the literature where sustainable entrepreneurship was discussed largely as an extension of general sustainability and business research. From around 2023 onward, the prominence of climate change and sustainable entrepreneurship increases noticeably, indicating a clearer alignment between entrepreneurial activity and climate-related challenges. More recent years show the emergence and growing visibility of terms such as green economy, green development, and green entrepreneurship, suggesting a shift from conceptual discussions toward more applied and policy-relevant themes (Karadayı et al., 2025). This progression points to an expanding research focus on how entrepreneurial initiatives contribute to green transitions, climate mitigation, and sustainable development pathways rather than sustainability in a generic sense.

While trend topics capture temporal dynamics, the semantic emphasis of the literature is further differentiated when examining keyword distributions across different document components. Figure 8 compares the most frequent terms appearing in title keywords, abstract keywords, author keywords, and keyword plus. Title keywords are dominated by core concepts such as *sustainable entrepreneurship*, *green entrepreneurship*, and *sustainability*, indicating that



authors frame their contributions explicitly within the sustainable entrepreneurship discourse. Abstract keywords, however, display a broader thematic range, with strong visibility of *environmental*, *climate change*, *economic development*, and *green*, reflecting efforts to situate individual studies within wider environmental and socio-economic debates.

**Figure 7: Trend topics in sustainable entrepreneurship and climate change research**



Author keywords reveal a more focused and intentional representation of research priorities. Alongside *sustainable entrepreneurship* and *green entrepreneurship*, terms such as *climate change*, *sustainable development*, and *renewable energy* appear frequently, signaling deliberate attempts by authors to connect entrepreneurial activity with climate action and long-term development goals. In contrast, keyword plus, automatically generated from cited references, places stronger emphasis on *sustainable development*, *green economy*, and *environmental protection*. This pattern suggests that while authors increasingly foreground climate-oriented entrepreneurship in their own framing, the underlying knowledge base of the field remains closely tied to broader sustainable development and environmental economics literatures. The divergence between author keywords and keyword plus thus highlights an ongoing transition from general sustainability research toward a more distinct climate-entrepreneurship nexus (Lüdeke-Freund, 2020).

**Figure 8: Keyword distribution across title keywords, abstract keywords, author keywords, and keyword plus**

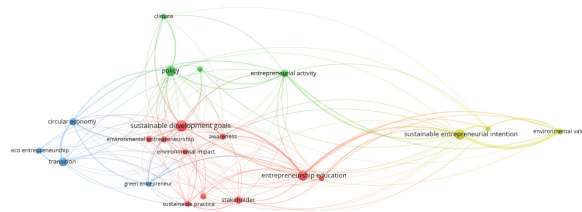


The structural relationships among key concepts are visualized in the keyword co-occurrence network shown in Figure 9. The network reveals

several interconnected thematic clusters that define the current landscape of research. One central cluster revolves around *sustainable development goals*, *environmental impact*, and *environmental entrepreneurship*, underscoring the normative and outcome-oriented orientation of the literature. Closely linked to this core is a policy-oriented cluster, where *policy*, *entrepreneurial activity*, and *climate* form dense connections, reflecting growing interest in the role of institutional frameworks and public policy in enabling sustainable entrepreneurial practices.

Another prominent cluster focuses on *entrepreneurship education*, *stakeholders*, and *sustainable practice*, highlighting the importance of human capital development, awareness, and multi-actor engagement in fostering sustainability-oriented ventures. A further cluster, centered on *sustainable entrepreneurial intention* and *environmental value*, points to an emerging micro-level research stream that examines motivational drivers, values, and behavioral intentions related to sustainable entrepreneurship. Finally, a smaller but distinct cluster around *circular economy*, *eco-entrepreneurship*, and *transition* reflects increasing attention to systemic change and circular business models as mechanisms for addressing climate challenges.

**Figure 9: Keyword co-occurrence network and thematic clusters in sustainable entrepreneurship and climate change research**



The keyword analyses demonstrate that sustainable entrepreneurship research has evolved from a broad sustainability discourse into a more differentiated field with clear thematic streams. The increasing prominence of climate-related terms, policy linkages, and intention-based perspectives indicates a shift toward actionable research that connects entrepreneurial processes with climate mitigation, adaptation, and sustainability transitions. These patterns reinforce the positioning of sustainable entrepreneurship not merely as a normative ideal but as a practical mechanism for addressing climate change across multiple levels of analysis.

## 4. Discussion

The bibliometric findings show that sustainable

entrepreneurship has become an increasingly central lens within climate change-related research. The steady growth in publications and the diversification of thematic emphases indicate that the field has moved beyond a peripheral sustainability topic toward a more consolidated area of inquiry addressing climate risks, environmental challenges, and development pathways.

The expansion of the literature after 2020 aligns with intensified global attention to climate mitigation and adaptation. Within this context, entrepreneurship is increasingly framed as a complementary mechanism to regulatory and technological responses, capable of mobilising innovation, local knowledge, and market-based solutions. Growing attention to green technologies and sustainability-oriented innovation further highlights the role of entrepreneurs as intermediaries translating technological possibilities into scalable climate solutions.

Geographic patterns suggest that sustainable entrepreneurship is particularly salient in emerging and climate-vulnerable economies, where development pressures intersect with environmental risks. The dominance of single-country studies underscores the importance of institutional and regulatory contexts in shaping entrepreneurial responses. Variations in policy coherence, governance capacity, and access to climate-related support mechanisms appear to influence both research attention and practical opportunities for sustainable entrepreneurship.

Thematic analyses reveal a shift from general sustainability narratives toward stronger engagement with climate policy frameworks and environmental governance. Sustainable entrepreneurship is increasingly examined within broader governance systems, where climate policy instruments, such as regulatory standards, green finance, and innovation incentives, shape entrepreneurial orientation toward mitigation and adaptation objectives. This perspective positions entrepreneurs as active contributors within multi-actor climate governance arrangements.

At the same time, the coexistence of policy-level, organisational, and individual-level themes, including education, entrepreneurial intention, environmental values, and circular economy, reflects the multidimensional nature of the field. Such diversity aligns with sustainability transitions research, where entrepreneurship is viewed as a niche-level force supporting broader socio-technical transformation toward low-carbon and climate-resilient systems.

## 5. Conclusion and Implications

This study provides a bibliometric overview of

sustainable entrepreneurship research in the context of climate change, highlighting its rapid expansion, increasing interdisciplinarity, and stronger integration with sustainability transitions and development agendas. The findings confirm that sustainable entrepreneurship has become an important analytical lens for understanding entrepreneurial responses to climate-related uncertainty.

The results offer several implications. For researchers, the mapping of trends, geographic patterns, and thematic clusters clarifies the evolution of the field and identifies underexplored areas, particularly cross-country comparisons and institutional influences. For policymakers, the prominence of governance- and policy-related themes underscores the importance of coherent climate frameworks, green innovation support, and sustainability-oriented finance in enabling entrepreneurial responses to environmental challenges. For educators, the emphasis on entrepreneurial intention, competencies, and sustainable business models highlights the need to embed climate awareness and sustainability principles in entrepreneurship education.

The study is limited to English-language journal articles indexed in Scopus and Web of Science, and bibliometric methods capture structural patterns rather than detailed content. Future research could expand database coverage and combine bibliometric mapping with qualitative or comparative approaches to deepen understanding of how sustainable entrepreneurship contributes to climate mitigation and adaptation across diverse contexts.

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# THE IMPACT OF ACCRUAL-BASED EARNINGS QUALITY ON THE COST OF CAPITAL: EVIDENCE FROM NON-FINANCIAL FIRMS LISTED ON THE VIETNAMESE STOCK MARKET

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**Abstract:** *This study investigates the impact of accrual-based earnings quality on the cost of capital of non-financial firms listed on the Vietnamese stock market during 2017-2023. Because accrual accounting relies on managerial estimates and judgment, it may create information risk that affects financing decisions. Using the Dechow and Dichev (2002) model as modified by McNichols (2002), the study measures earnings quality and applies panel regression techniques to examine its effect on the cost of debt, the cost of equity, and stock returns. The results show that lower earnings quality is associated with higher borrowing costs, indicating that creditors price information risk. Although the evidence for the cost of equity is weaker, the findings suggest that higher earnings quality improves information transparency and supports more efficient market pricing. Overall, the study highlights the importance of financial reporting quality in shaping firms' financing conditions in an emerging market context.*

• Keywords: accrual quality; cost of capital; cost of debt; cost of equity; non-financial listed firms; Vietnamese stock market.

JEL sodes: G32; H26; G34; M41

Date of receipt: 09<sup>th</sup> Feb., 2026

Date of delivery revision: 26<sup>th</sup> Feb., 2026

DOI:

Date of receipt revision: 10<sup>th</sup> Mar., 2026

Date of approval: 23<sup>th</sup> Mar., 2026

## 1. Introduction

Financial statements provide essential information for assessing firms' financial condition and performance. Among the reported figures, accrual-based earnings are particularly important because they support the decisions of investors, creditors, shareholders, and managers. Since accrual accounting recognizes revenues and expenses when they occur rather than when cash is received or paid, it offers a more comprehensive view of firm performance and financial position (Dechow & Dichev, 2002).

At the same time, accrual accounting may create information risk because it relies on managerial judgment, accounting estimates, and discretionary recognition choices. These features can increase estimation errors or earnings manipulation, thereby reducing the reliability of reported earnings (Dechow & Dichev, 2002; Francis et al., 2005). As a result, earnings quality has become an important topic in accounting and finance research.

This issue is especially relevant in Vietnam, where capital markets are still developing, and information asymmetry remains relatively high. Although several studies have examined accounting information quality

in Vietnam, evidence on the relationship between accrual-based earnings quality and firms' cost of capital is still limited and inconclusive. Moreover, prior studies often focus on aggregated measures of the cost of capital rather than its individual components.

Motivated by these theoretical debates and empirical gaps, this study investigates the impact of accrual-based earnings quality on the cost of capital of non-financial firms listed on HOSE and HNX. Treating accrual quality as a proxy for accounting information risk, the study examines its effect on the cost of debt and the cost of equity, thereby providing additional evidence on the economic consequences of earnings quality in an emerging market context.

## 2. Literature Review and Hypothesis Development

### 2.1. Earnings quality and the cost of capital

The relationship between accounting information quality and the cost of capital has been widely discussed in both theoretical and empirical literature. Traditional asset pricing models suggest that firm-specific information risk can be diversified away and therefore should not affect the cost of capital (Fama & French, 1993). However, later theoretical studies argue

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that information risk related to financial reporting quality may still be priced in capital markets. Easley and O'Hara (2004) show that investors demand compensation for uncertainty arising from imperfect information, while Lambert et al. (2007) demonstrate that accounting information quality can influence financing costs by affecting information asymmetry and the precision of investors' expectations about future cash flows.

Empirical evidence on this relationship remains mixed. Some studies find that higher earnings quality is associated with lower financing costs. For example, Francis et al. (2005) show that accrual quality is priced in capital markets, while Eliwa et al. (2016, 2019) document negative relationships between earnings quality and both the cost of equity and the cost of debt. In contrast, other studies report weaker or inconsistent results, suggesting that the impact of earnings quality may depend on market conditions and institutional environments (Core et al., 2008; Khan, 2008).

The effect of financial reporting quality may be particularly important in emerging markets where information asymmetry is relatively high (Leuz & Wysocki, 2016). In Vietnam, empirical evidence remains limited and inconclusive. While some studies document a negative relationship between accrual quality and financing costs (Le et al., 2021; Van et al., 2022), others report weaker effects. Therefore, further investigation is needed to clarify the relationship between accrual-based earnings quality and the cost of capital in the Vietnamese capital market.

## 2.2. Hypothesis development

Based on information asymmetry theory and the information risk framework, higher earnings quality reduces uncertainty regarding firms' financial performance and future cash flows. As a result, investors and creditors may perceive lower information risk and require lower returns when providing capital (Easley & O'Hara, 2004; Lambert et al., 2007). Therefore, firms with higher accrual quality are expected to experience lower financing costs.

In addition, creditors and equity investors may respond differently to accounting information quality due to differences in risk exposure and monitoring mechanisms. Creditors typically rely heavily on financial statements when assessing credit risk, which may make the cost of debt more sensitive to accounting information quality (Bharath et al., 2008). In contrast, equity investors may diversify

firm-specific risk through portfolio allocation, which could weaken the direct impact of earnings quality on the cost of equity. Based on these arguments, the following hypotheses are proposed:

H1: Accrual-based earnings quality is negatively associated with the cost of debt of listed firms.

H2: Accrual-based earnings quality is negatively associated with the cost of equity of listed firms.

Because the cost of equity in this study is proxied by two alternative measures, namely the earnings-to-price ratio (EP) and stock returns (RETURN), Hypothesis H2 is further decomposed into two sub-hypotheses as follows:

H2a: Accrual-based earnings quality is negatively associated with the cost of equity measured by the earnings-to-price ratio (EP).

H2b: Accrual-based earnings quality is negatively associated with the cost of equity measured by stock returns (RETURN).

## 3. Research Methodology

### 3.1. Research Model

Corresponding to hypotheses H1, H2a, and H2b, three separate empirical models are developed in which accrual-based earnings quality is the main independent variable, while cost of debt (CD), earnings-to-price ratio (EP), and stock return (RETURN) are used as the dependent variables. In addition, to examine the moderating role of audit quality, the interaction term between accrual-based earnings quality and audit quality ( $AQ \times AUDIT$ ) is incorporated into all three models.

The empirical models are specified as follows:

$$CD_{i,t} = \alpha_0 + \alpha_1 AQ_{i,t} + \alpha_2 AUDIT_{i,t} + \alpha_3 AQ_{i,t} * AUDIT_{i,t} + \alpha_4 SIZE_{i,t} + \alpha_5 LEV_{i,t} + \alpha_6 TobinsQ_{i,t} + \alpha_7 INDUSTRY + \alpha_8 YEAR + \mu_{i,t} \quad (1)$$

$$EP_{i,t} = \alpha_0 + \alpha_1 AQ_{i,t} + \alpha_2 AUDIT_{i,t} + \alpha_3 AQ_{i,t} * AUDIT_{i,t} + \alpha_4 SIZE_{i,t} + \alpha_5 LEV_{i,t} + \alpha_6 TobinsQ_{i,t} + \alpha_7 INDUSTRY + \alpha_8 YEAR + \mu_{i,t} \quad (2)$$

$$RETURN_{i,t} = \alpha_0 + \alpha_1 AQ_{i,t} + \alpha_2 AUDIT_{i,t} + \alpha_3 AQ_{i,t} * AUDIT_{i,t} + \alpha_4 SIZE_{i,t} + \alpha_5 LEV_{i,t} + \alpha_6 TobinsQ_{i,t} + \alpha_7 INDUSTRY + \alpha_8 YEAR + \mu_{i,t} \quad (3)$$

In the above models,  $i$  and  $t$  denote firm and year, respectively. EP represents the cost of equity and is measured by the earnings-to-price ratio of the firm adjusted by the industry median earnings-to-price ratio. CD denotes the cost of debt and is measured as interest expense divided by total interest-bearing debt. RETURN refers to annual stock return adjusted



for dividends. AQ is accrual-based earnings quality.

AUDIT represents audit quality and is measured as a dummy variable equal to 1 if the firm is audited by a Big 4 audit firm and 0 otherwise. SIZE is firm size, measured by the natural logarithm of total assets. LEV is leverage, measured as total interest-bearing liabilities divided by total assets. TobinsQ is the ratio of market value to book value, measured as the market value of equity plus the book value of debt divided by the book value of total assets.

Accrual-based earnings quality (AQ) is measured using the Dechow and Dichev (2002) model as extended by McNichols (2002).

First, total accruals (TAC) are computed from changes in balance-sheet components as follows:

$$TAC_{i,t} = \Delta ASSET_{i,t} - \Delta LIABILITY_{i,t} - \Delta CASH_{i,t} + \Delta DEBT_{i,t} \quad (4)$$

Where  $\Delta CA$  represents the change in current assets,  $\Delta Cash$  represents the change in cash and cash equivalents,  $\Delta CL$  represents the change in current liabilities,  $\Delta STD$  represents the change in short-term debt, and  $Dep$  denotes depreciation and amortization expenses.

#### Step 2: Estimation of the Accrual Model

In the second step, total accruals are regressed on past, current, and future operating cash flows together with additional control variables as suggested by McNichols (2002). The model is estimated as follows:

$$\frac{TAC_{i,t}}{TA_{i,t-1}} = \beta_0 + \beta_1 \frac{CFO_{i,t-1}}{TA_{i,t-1}} + \beta_2 \frac{CFO_{i,t}}{TA_{i,t-1}} + \beta_3 \frac{CFO_{i,t+1}}{TA_{i,t-1}} + \beta_4 \frac{\Delta SALES_{i,t}}{TA_{i,t-1}} + \beta_5 \frac{PPE_{i,t}}{TA_{i,t-1}} + \varepsilon_{i,t} \quad (5)$$

Where  $CFO(i, t-1)$ ,  $CFO(i, t)$ , and  $CFO(i, t+1)$  represent operating cash flows in the previous, current, and subsequent periods;  $\Delta REV(i, t)$  is the change in revenue;  $PPE(i, t)$  represents property, plant, and equipment; and  $\varepsilon(i, t)$  denotes the regression residual.

#### Step 3: Measurement of Accrual Quality (AQ)

In the final step, accrual-based earnings quality (AQ) is measured from the standard deviation of the residuals obtained from the above regression model:

$$AQ_{i,t} = STDEV(\varepsilon_i) \quad (6)$$

A larger AQ value indicates larger accrual estimation errors and therefore lower earnings quality.

The study further examines the effect of accrual-based earnings quality on the cost of equity within the Fama and French three-factor asset pricing model (FF3). Specifically, it investigates the relationship between earnings quality and systematic risk (beta) in a three-factor framework. The models are presented as follows:

$$R_{j,m} - R_{F,m} = \partial_j + \beta_j (R_{M,m} - R_{F,m}) + e_j AQ_m + \varepsilon_{j,m} \quad (7)$$

$$R_{j,m} - R_{F,m} = \partial_j + \beta_j (R_{M,m} - R_{F,m}) + s_j SMB_m + h_j HML_m + e_j AQ_m + \varepsilon_{j,m} \quad (8)$$

Where  $j$  and  $m$  denote the portfolio (asset, stock) and time period (expected to be quarterly), respectively.  $R_{j,m}$  represents the return on portfolio (asset, stock)  $j$ ;  $R_{f,m}$  denotes the risk-free rate; and  $R_{M,m}$  represents the market return.  $SMB$  (Small minus Big) is the difference between the returns of portfolios consisting of small-cap stocks and those consisting of large-cap stocks.  $HML$  (High minus Low) is the difference between the returns of portfolios composed of firms with high book-to-market ratios and those composed of firms with low book-to-market ratios.  $AQ$  represents accrual-based earnings quality.

### 3.2. Research Data Collection Method

The research data used in this study are collected from firms listed on the Ho Chi Minh City Stock Exchange (HOSE) and the Hanoi Stock Exchange (HNX) during the period 2014-2024.

Although the initial dataset covers the period 2014-2024, the accrual-based earnings quality variable (AQ) is estimated using a three-year rolling window. Consequently, the effective sample period used in the empirical analysis is reduced to 2017-2023.

After applying these selection criteria and data processing procedures, the final sample consists of 640 non-financial firms, generating 4,480 firm-year observations for the period 2017-2023.

## 4. Empirical Results

### 4.1. Descriptive Statistics

Table 1 presents the descriptive statistics of the main variables used in the regression analysis.

**Table 1. Descriptive statistics of the main variables**

| Variable  | Number of observations (N) | Mean    | SD      | Min     | Max      |
|-----------|----------------------------|---------|---------|---------|----------|
| AQ        | 4,480                      | 60.8445 | 93.6151 | 0.3698  | 955.3504 |
| AUDIT     | 4,480                      | 0.2516  | 0.4340  | 0       | 1        |
| SIZE      | 4,480                      | 24.2860 | 0.9305  | 22.0039 | 25.9992  |
| LEV       | 4,480                      | 0.3208  | 0.2111  | 0.0500  | 0.9499   |
| Tobin's Q | 4,480                      | 44.0285 | 47.4336 | 0       | 199.4092 |

Source: Author's calculations and compilation.

Table 2 reports the Pearson correlation matrix among the independent variables.

**Table 2. Pearson correlation matrix**

| Variable | AQ      | AUDIT   | AQ×AUDIT | SIZE    | LEV    | TobinsQ |
|----------|---------|---------|----------|---------|--------|---------|
| AQ       | 1.0000  |         |          |         |        |         |
| AUDIT    | -0.0737 | 1.0000  |          |         |        |         |
| AQ×AUDIT | -0.2952 | -0.0808 | 1.0000   |         |        |         |
| SIZE     | -0.3547 | 0.2672  | -0.0804  | 1.0000  |        |         |
| LEV      | 0.0520  | 0.0171  | 0.0400   | -0.1570 | 1.0000 |         |
| TobinsQ  | 0.1502  | -0.0820 | 0.0118   | -0.3450 | 0.0391 | 1.0000  |

Source: Author's calculations and compilation.

Overall, no pair of explanatory variables shows an excessively high correlation, supporting their simultaneous inclusion in the regression models

#### 4.3. Regression Results

The following tables present the estimation results for the EP, CD, RETURN, and extended Fama-French models, with the discussion focusing on the preferred specification identified by the Hausman and diagnostic tests.

##### (a) EP model

**Table 3. Comparison of EP model results: FEM, REM, and REM-Robust**

| Variable                | FEM (FE)                   | REM (RE)                   | REM-Robust              |
|-------------------------|----------------------------|----------------------------|-------------------------|
| AQ                      | -0.0000253<br>(0.450)      | -0.0000293<br>(0.343)      | -0.0000293<br>(0.594)   |
| AUDIT                   | 0.0085503<br>(0.176)       | 0.0134857<br>(0.025)       | 0.0134857<br>(0.106)    |
| AQ × AUDIT              | 0.0001275 *<br>(0.083)     | 0.0001558<br>(0.026)       | 0.0001558<br>(0.133)    |
| SIZE                    | -0.00518<br>(0.147)        | -0.0080359<br>(0.014)      | -0.0080359 *<br>(0.072) |
| LEV                     | -0.0044728<br>(0.736)      | -0.0015394<br>(0.903)      | -0.0015394<br>(0.912)   |
| TobinsQ                 | -0.0000311<br>(0.726)      | -0.000085<br>(0.237)       | -0.000085<br>(0.258)    |
| _cons                   | 0.2135827 (0.017)          | 0.2826909 ***<br>(0.001)   | 0.2826909<br>(0.010)    |
| Model statistics        | FEM (FE)                   | REM (RE)                   | REM-Robust              |
| R <sup>2</sup> within   | 0.0161                     | 0.0158                     | 0.0158                  |
| Hausman test            | p = 0.4606<br>(Choose REM) | -                          | -                       |
| LM test (Breusch-Pagan) | -                          | p = 0.0000<br>(Choose REM) | -                       |

Source: Author's calculations and compilation.

For the EP model, the Hausman test supports the random-effects specification. AQ is not statistically significant, indicating that accrual-based earnings quality is not priced consistently in the cost of equity during 2017-2023. The interaction term with Big4 auditing is significant only weakly and loses significance in the robust specification, suggesting limited evidence of a moderating effect of audit quality.

##### (b) CD model

**Table 4. Comparison of CD model results: FEM, REM, and FEM-Robust**

| Variable              | FEM (FE)                 | REM (RE)                 | FEM-Robust (cluster ID)  |
|-----------------------|--------------------------|--------------------------|--------------------------|
| AQ                    | 0.0000736***<br>(0.000)  | 0.0000745***<br>(0.000)  | 0.0000736***<br>(0.000)  |
| AUDIT                 | -0.0058614***<br>(0.000) | -0.0060422***<br>(0.000) | -0.0058614***<br>(0.000) |
| AQ×AUDIT              | 0.0000493*** (0.000)     | 0.0000507***<br>(0.000)  | 0.0000493***<br>(0.000)  |
| SIZE                  | -0.0135750*** (0.000)    | -0.0139742***<br>(0.000) | -0.0135750***<br>(0.000) |
| LEV                   | -0.0045068***<br>(0.000) | -0.0017686*<br>(0.060)   | -0.0045068***<br>(0.000) |
| TobinsQ               | 0.00000985<br>(0.147)    | 0.00000968**<br>(0.049)  | 0.00000985<br>(0.202)    |
| _cons                 | 0.3575198***<br>(0.000)  | 0.3662888***<br>(0.000)  | 0.3575198***<br>(0.000)  |
| Model statistics      | FEM (FE)                 | REM (RE)                 | NOTE                     |
| R <sup>2</sup> within | 0.6231                   | 0.6223                   |                          |

| Variable                | FEM (FE)                                            | REM (RE)                                            | FEM-Robust (cluster ID) |
|-------------------------|-----------------------------------------------------|-----------------------------------------------------|-------------------------|
| Hausman test (FE vs RE) | $\chi^2(12) = 67.99, p = 0.0000$                    | $\chi^2(12) = 67.99, p = 0.0000$                    | FE model is selected    |
| Heteroskedasticity test | $\chi^2(640) = 88720.79$<br>Prob> $\chi^2 = 0.0000$ | $\chi^2(640) = 88720.79$<br>Prob> $\chi^2 = 0.0000$ |                         |
| Autocorrelation test    | F(1, 639) = 297.293<br>Prob>F = 0.0000              | F(1, 639) = 297.293<br>Prob>F = 0.0000              |                         |

Source: Author's calculations and compilation.

Table 4 reports the estimation results of the cost of debt (CD) model using fixed effects (FE), random effects (RE), and FE with cluster-robust standard errors. The results show that AQ has a positive and statistically significant coefficient at the 1% level across all model specifications, indicating that higher accrual quality is associated with a higher level of cost of debt in the sample. In contrast, the coefficient of AUDIT is negative and highly significant, suggesting that firms audited by Big4 auditors tend to face lower borrowing costs.

Regarding model diagnostics, the Hausman test ( $\chi^2 = 67.99, p = 0.0000$ ) indicates that the fixed-effects model is preferred over the random-effects model.

##### (c) RETURN model

**Table 5. Comparison of RETURN model results: FEM, REM and FEM-Robust**

| Variable                      | FEM (FE)                         | REM (RE)                         | FEM-Robust (cluster ID)              |
|-------------------------------|----------------------------------|----------------------------------|--------------------------------------|
| AQ                            | 0.0000459***<br>(0.000)          | 0.0000458***<br>(0.000)          | 0.0000459***<br>(0.000)              |
| AUDIT                         | -0.000483**<br>(0.015)           | -0.0004831**<br>(0.015)          | -0.000483**<br>(0.046)               |
| AQ×AUDIT                      | -0.0000203***<br>(0.000)         | -0.0000201***<br>(0.000)         | -0.0000203**<br>(0.026)              |
| SIZE                          | 0.0008207*** (0.000)             | 0.0008320***<br>(0.000)          | 0.0008207***<br>(0.001)              |
| LEV                           | 0.0003999<br>(0.337)             | 0.0004932<br>(0.235)             | 0.0003999<br>(0.433)                 |
| TobinsQ                       | -0.000000612<br>(0.826)          | -0.000000821<br>(0.765)          | -0.000000612<br>(0.903)              |
| _cons                         | 0.0381645*** (0.000)             | 0.0378686***<br>(0.000)          | 0.0381645***<br>(0.000)              |
| Model statistics              | FEM (FE)                         | REM (RE)                         |                                      |
| R <sup>2</sup> within         | 0.3771                           | 0.3771                           |                                      |
| R <sup>2</sup> overall        | 0.0679                           | 0.0681                           |                                      |
| Hausman test (FE vs RE)       | $\chi^2(12) = 38.84, p = 0.0001$ | $\chi^2(12) = 38.84, p = 0.0001$ | FE model is selected                 |
| Heteroskedasticity (xttest3)  | p = 0.0000                       | p = 0.0000                       | Heteroskedasticity detected          |
| Autocorrelation (xtserial)    | F(1,639) = 9.872, p = 0.0018     | F(1,639) = 9.872, p = 0.0018     | First-order autocorrelation detected |
| Model used for interpretation | FEM Robust                       | FEM Robust                       | FE + vce(cluster ID)                 |

Source: Author's calculations and compilation.

Table 5 presents the estimation results of the RETURN model using three specifications: fixed effects (FE), random effects (RE), and FE with robust standard errors clustered by firm. The coefficient of AQ is positive and statistically significant at the 1% level across all specifications, indicating that higher accrual quality is associated with higher stock returns.

## (d) Asset pricing model

Table 6. Extended FF3 model with AQ (FE and RE)

| Variable                               | FEM (FE)                       | REM (RE)                                               |
|----------------------------------------|--------------------------------|--------------------------------------------------------|
| MKT_pct                                | -0.0227*** (0.000)             | -0.0227*** (0.000)                                     |
| SMB_pct                                | -3.4713*** (0.000)             | -3.4744*** (0.000)                                     |
| HML_pct                                | 2.7143*** (0.000)              | 2.7133*** (0.000)                                      |
| AQ                                     | 0.0054*** (0.000)              | 0.0053*** (0.000)                                      |
| _cons                                  | 2.5698*** (0.000)              | 2.5764*** (0.000)                                      |
| Evaluation metric                      | FE                             | NOTE                                                   |
| R <sup>2</sup> within                  | 0.4527                         | 0.4527                                                 |
| R <sup>2</sup> overall                 | 0.1982                         | 0.1982                                                 |
| Hausman test                           | $\chi^2(1) = 5.30, p = 0.0214$ | FE model selected (preferred over RE)                  |
| corr(u <sub>i</sub> , X <sub>b</sub> ) | -0.0368                        | FE is preferred due to correlation with the error term |
| Model selection conclusion             | FE                             | FE selected for reporting and interpretation           |

Notes: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.10$ .

Source: Author's calculations and compilation.

Table 6 reports the estimation results of the extended Fama-French three-factor (FF3) model with the inclusion of accrual quality (AQ). The results show that the traditional risk factors remain statistically significant. The coefficient of AQ is positive and statistically significant at the 1% level in both the FE and RE estimations, suggesting that higher accrual quality is associated with higher stock returns.

### 5. Discussion and Implications

The results show that accrual-based earnings quality is an important determinant of the cost of capital of listed firms in Vietnam. In the debt-cost model, the negative and significant effect of AQ indicates that better earnings quality reduces perceived credit risk and helps firms obtain debt financing at lower cost. This finding is consistent with Francis et al. (2005) and supports the information-risk perspective of Easley and O'Hara (2004).

For the cost of equity, the results also suggest that investors consider not only the level of reported earnings but also their quality and reliability when assessing firm risk. This finding is in line with Lambert et al. (2007) and is broadly consistent with prior evidence from emerging markets, such as Gray et al. (2009) and Eliwa et al. (2019). In the Vietnamese context, where information asymmetry remains relatively high, these results highlight the importance of accounting transparency for capital allocation and market valuation.

These findings also imply that improving earnings quality should be viewed as a financial strategy rather than merely a compliance issue. For firms, stronger accounting systems, better internal controls, and more transparent reporting may help reduce financing costs. For investors and lenders, earnings quality can serve as a useful indicator of information risk in valuation and credit assessment. At the regulatory level, the results support policies aimed at improving disclosure quality and promoting IFRS adoption, as better financial reporting may enhance investor confidence

and contribute to the long-term development of Vietnam's capital market.

### Conclusion

This study examines the impact of accrual-based earnings quality on the cost of capital of non-financial firms listed on the Vietnamese stock market during 2017-2023. Based on the framework of information asymmetry and information risk, it investigates whether earnings quality influences firms' financing costs through both debt and equity channels.

The results show that earnings quality is an important determinant of financing conditions in Vietnam's emerging capital market. Lower earnings quality is associated with higher borrowing costs, suggesting that creditors price information risk when assessing firms' creditworthiness. The findings also indicate that higher-quality accounting information improves financial transparency, reduces information asymmetry, and supports more efficient market pricing.

This study is subject to several limitations. The sample includes only non-financial listed firms during 2017-2023, which may restrict the generalizability of the findings. In addition, earnings quality is measured using the Dechow and Dichev (2002) model as modified by McNichols (2002), which primarily captures accrual estimation errors. Future research could extend the sample, apply alternative earnings-quality measures, or examine nonlinear effects and the moderating role of corporate governance mechanisms.

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# LITERATURE REVIEW ON CORPORATE GOVERNANCE: A BIBLIOMETRIC ANALYSIS

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**Abstract:** *This study employs bibliometric methods to analyse over 800 scholarly publications on corporate governance from 1995 to the present. The findings reveal a rising trend in the volume of research, a greater presence in academic journals, and a broadening scope of topics ranging from theoretical frameworks to practical applications.*

• Keywords: *biblioshiny, firm performance, bibliometric analysis; corporate governance, VOSviewer.*

Date of receipt: 04<sup>th</sup> Feb., 2026

Date of delivery revision: 11<sup>th</sup> Mar., 2026

DOI:

Date of receipt revision: 20<sup>th</sup> Mar., 2026

Date of approval: 31<sup>th</sup> Mar., 2026

## 1. Introduction

Corporate governance is not a new concept, yet it remains a central focus of scholarly discourse. A review of the literature from 1995 to 2025 reveals a substantial body of over 800 articles addressing various aspects of corporate governance. These publications span diverse disciplinary fields, including business, management, accounting, economics, econometrics, finance, and even legal studies - underscoring the interdisciplinary nature of CG research (Ararat et al., 2021).

Systematic reviews of the literature on corporate governance frequently employ methodological frameworks such as the Systematic Literature Review (SLR), utilizing the PRISMA protocol for document selection and coding (Kumar, 2023); Bibliometric Analysis, leveraging tools such as Bibliometrix (R) and VOSviewer for keyword clustering and citation mapping; and ProKnow-C (Knowledge Development Process – Constructivist), which facilitates the identification of core studies within specific research domains (Guterres et al., 2025).

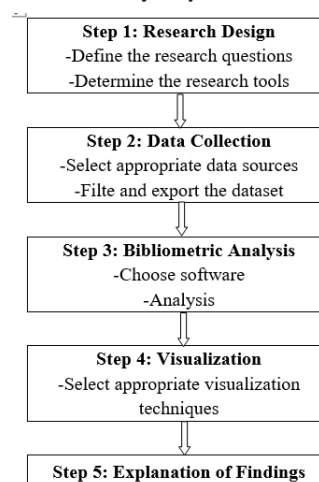
Given the volume and diversity of existing studies, this paper seeks to synthesize the extant literature using bibliometric analysis to provide a structured examination of key themes, research trends, and the intellectual structure of the CG field.

## 2. Research Methodology

### 2.1. Bibliometric Analysis Process

According to Li et al. (2023), the bibliometric analysis process is structured as follows:

**Figure 1. Five main steps in the bibliometric analysis process**



### 2.2. Data Sources and Collection Procedure Analysis Process

The data collection phase was conducted in two main stages: selecting the data source and filtering the relevant records. The data was extracted from the Scopus database, one of the largest and most comprehensive academic platforms, known for its extensive coverage, up-to-date content, and flexible export capabilities (Karagiannopoulou et al., 2023). Furthermore, Scopus offers compatibility with bibliometric software such as Biblioshiny - an R-based interface of the Bibliometrix package - for generating descriptive statistics and collaboration networks, as well as VOSviewer for co-citation, co-word, and bibliographic coupling analyses (Lima & Bonetti, 2020; Bosi et al., 2022).

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The scope of the dataset was limited to English-language peer-reviewed journal articles. The search query used was: TITLE (performance AND (“corporate governance”)) AND (LIMIT-TO (EXACTKEYWORD, “Corporate Governance”) OR LIMIT-TO (EXACTKEYWORD, “Corporate Social Responsibility”) OR LIMIT-TO (EXACTKEYWORD, “Firm Performance”) OR LIMIT-TO (EXACTKEYWORD, “Financial Performance”) OR LIMIT-TO (EXACTKEYWORD, “Performance”)) AND (LIMIT-TO (DOCTYPE, “ar”)) AND (LIMIT-TO (SUBJAREA, “BUSI”) OR LIMIT-TO (SUBJAREA, “ECON”) OR LIMIT-TO (SUBJAREA, “SOCP”)) AND (LIMIT-TO (LANGUAGE, “English”)).

Following a manual screening process to eliminate duplicates and irrelevant items, the final dataset included 883 publications from 377 academic journals, focusing on corporate governance and firm performance from 1995 to 2025.

### 3. Data Analysis and Results

Table 1 below presents a descriptive summary of the dataset obtained via Biblioshiny, encompassing research on corporate governance and firm performance over the past three decades.

**Table 1. Descriptive Statistics of the Biblioshiny Dataset**

| Description                     | Results   |
|---------------------------------|-----------|
| Timespan                        | 1995-2025 |
| Sources (Journals, Books, etc.) | 377       |
| Documents                       | 883       |
| Annual Growth Rate (%)          | 13,36%    |
| Document Average Age            | 6,89      |
| Average citations per doc       | 39,76     |
| Keywords Plus                   | 376       |
| Authors                         | 2204      |
| Single-authored Documents       | 127       |
| Co-authors per Document         | 2,79      |
| International co-authorships    | 27,97%    |

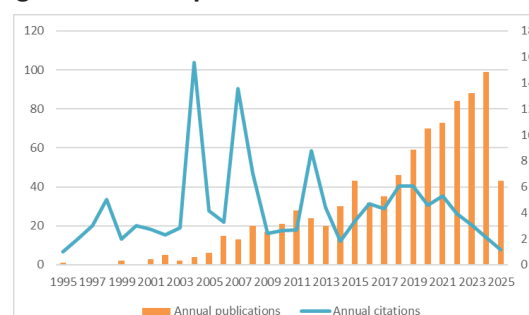
These figures indicate a significant expansion in the research domain of corporate governance and firm performance. The average annual growth rate of 13.36% highlights increasing scholarly attention to the field. The average document age of 6.89 years demonstrates the predominance of contemporary studies, while the high average citation count of nearly 40 per document confirms the academic influence of the field. The data also reveal a strong pattern of international collaboration, with 27.97% of papers involving cross-country co-authorship.

#### 3.1. Publication Volume, Countries, and Journals

Figure 2 displays the annual number of publications and citations over the research period.

During 1995–2003, both metrics remained below 5 per year, indicating limited academic engagement. Between 2004 and 2015, the number of publications and citations began to rise, although not consistently, suggesting growing but unstable attention to the topic. Since 2016, especially after 2018, the volume of publications has surged, surpassing 40 papers per year and reaching nearly 100 in 2023. However, the increase in citation counts has not kept pace with publication growth, reflecting a potential saturation in quantity with concerns over quality. This suggests the need to enhance the academic rigor and impact of future publications.

**Figure 2. Annual publications and citations trend**



Next, the author uses a Sankey diagram to show the relationship between journals, keywords, and countries.

**Figure 3. Three field analyses**

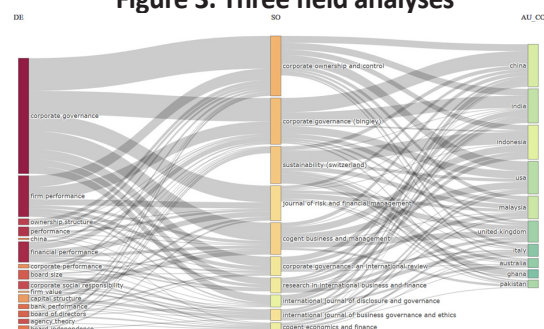


Figure 3 shows a Sankey diagram visualizing the relationships between journals, keywords, and countries. The Journal of Asian Finance, Economics and Business and Cogent Business and Management are among the most influential journals, with strong connections to a wide range of CG-related keywords. These journals play a pivotal role in disseminating research on corporate governance, especially in Asia. The most frequently appearing keyword is ‘corporate governance’, followed by ‘firm performance’ and ‘financial performance’, reflecting the dominant focus on evaluating governance impact on organizational outcomes. Notably, China, India, and Indonesia lead

in CG-related research, with strong ties to keywords, highlighting scholarly interest in emerging markets. Other active countries include the USA, Malaysia, and the UK. New contributors, such as Jordan, Ghana, Saudi Arabia, and Nigeria, are also entering the field, albeit with more limited visibility.

### 3.2. Core Research Components of CG Studies

This section examines leading journals, keywords, and authors using Biblioshiny and Excel.

#### 3.2.1. Most Influential Journals

Table 2 table below summarizes the 10 journals with the highest number of publications during the research period. In addition to the total citations (TC), total number of publications (NP) and the start of the publication year (SPY), the table also presents the H-index, a metric that combines publication volume and citation impact, the G-index, which emphasizes the influence of highly cited articles, and the M-index, which reflects the growth rate and influence of the journal over its years of operation.

Corporate Governance (Bingley) stands out with the highest H-index (21) and G-index (35), confirming its academic prominence. Sustainability (Switzerland) and Cogent Business and Management also rank high, making them suitable venues for high-quality, high-impact CG research. Newer journals such as the Journal of Risk and Financial Management and Journal of Asian Finance, Economics and Business also show strong M-index values, reflecting their emerging influence. Conversely, Corporate Ownership and Control, despite having the most publications (47), exhibits relatively modest academic impact with an H-index of 8.

**Table 2. Top 10 journals according to source impact**

| Academic Journals                                       | H-Index | G-Index | M-Index | TC   | NNP | SPY  |
|---------------------------------------------------------|---------|---------|---------|------|-----|------|
| Corporate ownership and control                         | 8       | 14      | 0.364   | 248  | 447 | 2004 |
| Corporate governance (bingley)                          | 21      | 35      | 1.750   | 1725 | 335 | 2014 |
| Sustainability (switzerland)                            | 13      | 21      | 1.444   | 484  | 227 | 2017 |
| Cogent business and management                          | 12      | 20      | 1.714   | 418  | 223 | 2019 |
| Journal of risk and financial management                | 8       | 14      | 1.333   | 257  | 114 | 2020 |
| International journal of business governance and ethics | 6       | 12      | 0.286   | 166  | 113 | 2005 |
| Corporate governance: an international review           | 9       | 11      | 0.450   | 1260 | 111 | 2006 |
| Research in international business and finance          | 9       | 11      | 0.818   | 968  | 111 | 2015 |
| Journal of asian finance, economics and business        | 8       | 9       | 1.333   | 341  | 9   | 2020 |
| International journal of disclosure and governance      | 7       | 9       | 0.583   | 191  | 9   | 2014 |

#### 3.2.2. Most cited publications

Among the top 10 most-cited articles, the primary subjects of analysis are firms - particularly listed companies in emerging markets, as well as in countries such as South Korea, the United States, and Italy. These include banks and corporations actively engaged in corporate social responsibility (CSR). Most of these studies employ methodologies such

as panel data regression, event studies, or quasi-experimental designs to examine the relationship between corporate governance and outcomes such as financial performance, risk management, board structure, and CSR implementation.

**Table 3. Top 10 most cited publications**

| Title                                                                                                                  | Authors                                            | Academic Journals                        | Global Citations |
|------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|------------------------------------------|------------------|
| Corporate governance, chief executive officer compensation, and firm performance                                       | John E. Core, Robert. Holthausen, David F. Larcker | Journal of Financial Economics           | 2499             |
| Politically connected CEOs, corporate governance, and Post-IPO performance of China's newly partially privatized firms | Joseph P.H. Fan, T.J. Wong Tianyu Zhang            | Journal of Financial Economics           | 1835             |
| Corporate governance, investor protection, and performance in emerging markets                                         | Leora F. Klapper Inessa Love                       | Journal of Corporate Finance             | 1086             |
| Corporate governance and firm performance                                                                              | Sanjai Bhagat Brian Bolton                         | Journal of Corporate Finance             | 1080             |
| Corporate Governance, Accounting Outcomes, and Organizational Performance                                              | David F. Larcker Scott A. Richardson Irem Tuna     | The Accounting Review                    | 912              |
| Corporate governance and environmental performance: is there really a link?                                            | Judith L. Walls Pascual Berrone Phillip H. Phan    | Strategic Management Journal             | 832              |
| Corporate Governance and Sustainability Performance: Analysis of Triple Bottom Line Performance                        | Nazim Hussain Ugo Rignon René P. Orij              | Journal of Business Ethics               | 815              |
| Corporate Governance Structure and Performance of Malaysian Listed Companies                                           | Roszaini Haniffa Mohammad Hudaib                   | Journal of Business Finance & Accounting | 609              |
| Risk management, corporate governance, and bank performance in the financial crisis                                    | Vincent Aebi, Gabriele Sabato, Markus Schmid       | Journal of Banking & Finance             | 608              |
| Globalizing the boardroom - The effects of foreign directors on corporate governance and firm performance              | Ronald W. Masulis, Cong Wang, Fei Xie              | Journal of Accounting and Economics      | 519              |

#### 3.2.3. Keyword Analysis

Table 4 highlights the top ten most frequently used keywords. "Corporate governance" dominates the list with 756 occurrences, reflecting its central role in the literature. High frequencies of terms such as "firm performance," "financial performance," and "performance" indicate strong scholarly interest in how governance affects business and financial outcomes.

Keywords like "ownership structure," "board size," "governance approach," and "agency theory" show that many studies focus on board mechanisms and governance structures. Meanwhile, the presence of "corporate social responsibility" and "corporate strategy" suggests a growing emphasis on the social and strategic dimensions of corporate sustainability.

**Table 4. Most frequent keywords**

| Keywords                        | Frequency |
|---------------------------------|-----------|
| corporate governance            | 756       |
| firm performance                | 218       |
| financial performance           | 168       |
| performance                     | 99        |
| ownership structure             | 57        |
| corporate social responsibility | 52        |
| governance approach             | 49        |
| corporate strategy              | 40        |
| agency theory                   | 38        |
| board size                      | 38        |

The frequency of these prominent keywords is further illustrated in Figure 4 below.

Figure 4. Word cloud using keywords



### 3.2.4. Leading Authors

Table 5. Top 10 authors

| Authors       | H-index | G-index | M-index | TC  | NP | SPY  |
|---------------|---------|---------|---------|-----|----|------|
| Locke S       | 5       | 5       | 0.278   | 208 | 5  | 2008 |
| Tabash Mi     | 5       | 9       | 0.714   | 285 | 9  | 2019 |
| Almaqtari Fa  | 4       | 5       | 0.571   | 58  | 5  | 2019 |
| Aslam E       | 4       | 4       | 0.571   | 159 | 4  | 2019 |
| El-chaarani H | 4       | 4       | 0.444   | 105 | 4  | 2017 |
| Hashim Ha     | 4       | 4       | 0.444   | 122 | 4  | 2017 |
| Khatib Sfa    | 4       | 4       | 0.800   | 307 | 4  | 2021 |
| Ong Ts        | 4       | 4       | 0.364   | 60  | 4  | 2015 |
| Shan Yg       | 4       | 5       | 0.222   | 203 | 5  | 2008 |
| Ahmad Mi      | 3       | 3       | 0.250   | 77  | 3  | 2014 |

Table 5 presents the top 10 authors with the highest H-index scores. It is noteworthy that most of these authors began publishing within the last decade. Among them, Tabash M. I. stands out with high scores across all three metrics - H-index, G-index, and M-index - along with the highest number of publications (9 articles) since 2019 and a significant number of citations (285), indicating strong research productivity, stable academic impact, and consistent recognition.

### Conclusion

This study employed bibliometric analysis to systematically examine publications indexed in the Scopus database on the topic of corporate governance (CG) over a 30-year period from 1995 to 2025, and to propose new directions for future research. A total of 883 articles were analysed using Microsoft Excel, Biblioshiny, and VOSviewer. The statistical indicators collected reveal that the field of corporate governance and firm performance is characterized by a large-scale dataset, strong interdisciplinary integration, a high level of internationalization, and considerable academic impact.

Although the number of publications has increased significantly, the slower rise in citation counts in recent years suggests a lack of consistency in research quality. This study also highlights the most relevant journals, the most-cited articles, and leading authors in the field of CG. It further reveals patterns of collaboration among author groups and countries.

From this comprehensive review, it is evident that previous studies predominantly used quantitative methods - such as regression analysis, event study, and panel data techniques - to explore the relationship between CG and financial performance, risk

management, and board structure, particularly in developed countries and selected emerging markets.

Based on the findings, several future research directions are proposed: First, regional-focused studies should be expanded, particularly those involving developing countries and comparative analyses with Southeast Asia and the Middle East. Such studies could incorporate institutional and legal frameworks to better understand how governance functions in transitional economies. Second, new research should more deeply integrate ESG and CSR dimensions. Future investigations might examine how ESG and CSR influence the relationship between CG and firm performance, or explore governance models oriented toward sustainability and crisis resilience. Third, corporate culture should be considered as a moderating factor in the CG–CSR relationship. Studies could analyse how culture and governance structures interact to affect firm performance and socially responsible behavior. Finally, in the context of technological advancement and artificial intelligence (AI), examining the role of AI in CG processes presents a promising avenue. Research could explore how digital transformation and AI applications affect decision-making, financial performance measurement, risk management, and ESG data governance - including collection, monitoring, and transparency of environmental, social, and governance information.

Altogether, these emerging research directions offer rich potential to fill the current gaps in corporate governance literature and contribute meaningfully to both academic and practical advancements in the field.

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# AN INTEGRATED RISK-BASED APPROACH TO SUSTAINABLE TOURISM DEVELOPMENT: EMPIRICAL EVIDENCE FROM HA LONG

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**Abstract:** *This study examines the role of risk in sustainable tourism development through an integrated approach, in which risk is conceptualized as a mediating variable transmitting impacts on the economic, social, and environmental outcomes of the destination of Ha Long Bay. Data were collected from 398 valid survey questionnaires using a five-point Likert scale and analyzed with advanced quantitative techniques, including Cronbach's Alpha, Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA), and Structural Equation Modeling (SEM). The empirical results indicate that management, planning, and legal risks exert the strongest influence on aggregated risk, followed by environmental pressure and tourism overcrowding. In addition, natural disaster and climate change risks as well as socio-economic risks, although exhibiting relatively weaker effects, remain statistically significant, highlighting the multidimensional and interconnected nature of risk at the destination. These findings underscore the critical importance of integrated risk management in enhancing the long-term sustainability of tourism development, particularly in coastal and heritage destinations experiencing rapid tourism growth.*

• Keywords: *tourism, risk, sustainable, sustainable development, Ha Long, Vietnam.*

Date of receipt: 04<sup>th</sup> Jan., 2026

Date of receipt revision: 09<sup>th</sup> Mar., 2026

Date of delivery revision: 27<sup>th</sup> Feb., 2026

Date of approval: 31<sup>th</sup> Mar., 2026

DOI:

## 1. Introduction

In the tourism sector, the World Tourism Organization emphasizes that sustainable tourism development requires a balance among three core pillars: economic growth, social equity, and environmental protection. Nevertheless, evidence from many destinations shows that rapid tourism expansion is frequently accompanied by the accumulation of structural risks. Hall and Amore (2018) argue that tourism risk should not be viewed solely as isolated crises, such as natural disasters or pandemics, but rather as long-term systemic pressures that gradually erode destination resilience and sustainability. From this perspective, risk can be conceptualized as an intermediary mechanism linking development pressures to sustainability outcomes.

Ha Long, the tourism center of Quang Ninh Province and home to the World Natural Heritage Site of Ha Long Bay, represents a typical case of these dynamics. Following the sharp decline during the COVID-19 pandemic (2020-2021), tourism in Quang Ninh has rebounded strongly, reaching over 21 million visitors in 2025 and generating substantial revenue. While this growth has reinforced tourism's role as a key economic driver, it has simultaneously exposed a range of emerging risks. Environmental pressures have intensified due to overcrowding, dense cruise activities, coastal urbanization, and increasing solid waste, placing

significant stress on water quality, marine ecosystems, and the karst landscape. Rising tourist volumes are also associated with heightened risks of biodiversity loss and environmental degradation, threatening the long-term sustainability of tourism resources. In addition, governance-related risks have become increasingly prominent. The rapid expansion of infrastructure, resorts, and coastal real estate has raised concerns about the preservation of Ha Long Bay's Outstanding Universal Value. Without effective regulatory frameworks and coordinated stakeholder management, short-term economic objectives may conflict with long-term conservation goals. Socio-economic risks are also evident, as the growing dependence on tourism makes the local economy vulnerable to external shocks, as demonstrated during the pandemic. Furthermore, increasing living costs and socio-cultural changes may exacerbate inequality if tourism benefits are not equitably distributed among local communities.

Risks related to safety, service quality, and destination reputation are likewise critical. Tourism-related incidents can quickly spread through global media, undermining destination image and competitiveness. At the same time, natural hazards and climate change are emerging as significant factors shaping tourism sustainability. Northern coastal Vietnam is frequently affected by typhoons, heavy rainfall, and sea-level rise,

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which disrupt tourism activities and increase safety risks. In the long term, climate change is expected to intensify extreme weather events, accelerating coastal erosion, ecosystem degradation, and landscape deterioration key assets underpinning Ha Long's tourism value.

Despite growing academic attention, most studies on sustainable tourism in Vietnam focus on individual dimensions rather than adopting a comprehensive risk-based perspective. To address this gap, this study proposes an analytical framework in which risk is conceptualized as a mediating variable, capturing the cumulative effects of multiple pressures on sustainable tourism development outcomes.

## 2. Literature Review

The concept of sustainable development underpins the triple bottom line framework, which emphasizes balancing economic growth, social equity, and environmental protection. UNWTO (2008) highlights that sustainable development should generate long-term economic benefits, preserve socio-cultural values, and minimize environmental impacts. However, maintaining this balance has become increasingly difficult in the context of rapid tourism expansion and globalization. Sharpley (2020) describes this as a "growth paradox," where the pursuit of higher visitor numbers and revenues often conflicts with resource conservation and social integrity, leading to structural imbalances favoring short-term gains. Within this context, the concept of tourism risk has gained prominence. Hall and Amore (2017) argue that risk extends beyond sudden shocks, such as disasters or pandemics, to include cumulative and systemic pressures like environmental degradation, governance failures, social conflicts, and economic dependence. These interconnected risks can undermine destination resilience if not effectively managed. Gössling et al. (2020) further demonstrate how global crises and climate change expose the vulnerability of tourism-dependent destinations.

From a governance perspective, OECD (2020) emphasize the need for integrated risk management to identify vulnerabilities and mitigate long-term impacts, particularly in heritage destinations with irreplaceable values. Theoretically, risk can be conceptualized as a mediating variable linking structural pressures to sustainability outcomes. Rather than exerting direct effects, environmental, socio-economic, and governance factors increase systemic risk, which in turn reduces the ability to maintain sustainability balance.

This perspective aligns with social-ecological systems theory (Folke et al., 2016), which views sustainability as dependent on the capacity to manage

feedback loops. Uncontrolled risks may push systems toward critical thresholds, leading to irreversible changes. Overall, integrating sustainability with risk and resilience frameworks provides a more comprehensive approach, emphasizing the role of risk accumulation in shaping long-term tourism development trajectories.

### 2.1. Risk Groups in Sustainable Tourism Development

The rapid growth in tourist arrivals has intensified concerns over overtourism, defined by UNWTO (2018) as a situation where visitor numbers exceed a destination's carrying capacity, leading to negative environmental, social, and experiential impacts. In environmentally sensitive areas such as coastal and heritage destinations, these pressures manifest through water pollution, coastal erosion, waste accumulation, biodiversity loss, and ecosystem imbalance (Gössling et al., 2020). Empirical evidence further indicates that rising tourism flows can significantly increase biodiversity risks in the absence of effective management (Xu et al., 2025).

From a social-ecological systems perspective, environmental pressure not only causes direct degradation but also weakens the adaptive capacity of destinations (Folke et al., 2016). When ecological thresholds are exceeded, systems may approach tipping points with potentially irreversible consequences. Therefore, environmental pressure and overtourism are key drivers of systemic risk in sustainable tourism development.

*H1: Environmental pressure and overtourism have a positive effect on risks in sustainable tourism development.*

### 2.2. Management, Planning, and Legal Risks (MAN)

Tourism destinations often face governance-related risks such as fragmented planning, inconsistent policy implementation, vested interests, and short-term development priorities (Dredge & Jamal, 2015). The OECD (2020) highlights that weak or poorly integrated governance systems increase vulnerability to economic and environmental shocks. In heritage contexts, such shortcomings may threaten resource integrity and Outstanding Universal Value. Moreover, governance risks are considered foundational, as they influence the capacity to manage environmental, social, and market-related risks (Hall et al., 2017). Consequently, management, planning, and legal risks play a central role in amplifying overall risk in sustainable tourism development.

*H2: Governance, planning, and legal risks have a positive effect on risks in sustainable tourism development.*

### 2.3. Socio-economic Risks (SOC)

While tourism is a key driver of economic growth, excessive dependence on it increases structural vulnerability. Gössling et al. (2020) show that the COVID-19 pandemic exposed the risks faced by destinations reliant on international tourism. Rapid tourism expansion may also lead to rising living costs, unequal benefit distribution, and socio-cultural changes (Sharpley, 2020). From the perspective of Social Exchange Theory, residents' attitudes depend on the perceived balance between benefits and costs. When costs outweigh benefits, social tensions may emerge, threatening system stability. Therefore, socio-economic risks not only directly affect local communities but also contribute to broader systemic risk in sustainable tourism development.

*H3: Socio-economic risks have a positive effect on risks in sustainable tourism development.*

### 2.4. Safety, Service Quality, and Destination Reputation Risks (SAF)

Safety and service quality are fundamental to tourism competitiveness. The World Economic Forum (2019) identifies safety and security as core pillars influencing destination performance. In the digital era, negative incidents can spread rapidly, heightening reputational risk. Moreover, inconsistent service quality and inadequate safety standards reduce tourist satisfaction and revisit intentions, thereby weakening long-term economic performance. Thus, safety, service quality, and reputation risks significantly contribute to overall risk in sustainable tourism development.

*H4: Safety and service-related risks have a positive effect on risks in sustainable tourism development.*

### 2.5. Natural Disaster and Climate Change Risks (NAT)

Climate change and natural disasters are major challenges to sustainable development. Global warming has intensified the frequency and severity of extreme weather events such as storms, floods, and heatwaves disrupting ecosystems and tourism activities (Scott et al., 2024). In tourism, climate vulnerability is considered a structural risk, particularly for coastal and nature-based destinations (Scott et al., 2019).

Natural disasters act as external shocks that can sharply reduce tourist arrivals, affecting employment and local livelihoods (UNWTO, 2018). Additionally, climate change exacerbates socio-economic risks by increasing living costs and inequality (Dogru et al., 2020). As long-term and systemic pressures, these risks simultaneously impact environmental, economic, and social dimensions (Hall et al., 2021). Without effective adaptation, they may degrade tourism resources and

amplify overall risk in sustainable tourism

*H5: Natural disaster and climate change risks have a positive effect on risks in sustainable tourism development.*

### 2.6. The Mediating Role of Risk in Sustainable Tourism Development (SUS)

In the tourism context, UNWTO (2008) emphasizes that sustainable tourism requires a balance among economic viability, social equity, and environmental protection. However, destinations often face multiple, interrelated risks, including environmental, governance, market, and safety-related risks. Hall, Prayag, and Amore (2017) argue that these risks should be viewed not as isolated events but as long-term structural pressures that gradually erode destination sustainability. Rather than exerting direct effects, risks accumulate systemically, reducing a destination's capacity to maintain balance across the three sustainability pillars.

From a resilience perspective, tourism destinations are social-ecological systems with adaptive capacities (Folke et al., 2016). High levels of accumulated risk are associated with declining economic performance, weakened social cohesion, and environmental degradation (Scott et al., 2019). Therefore, conceptualizing risk as a mediating variable is both theoretically and empirically justified, as it captures how structural pressures translate into sustainability outcomes. This approach provides a clearer understanding of how environmental, governance, socio-economic, and safety-related factors influence sustainable tourism development.

*H6: Risk in sustainable tourism development has a negative effect on sustainable tourism development.*

## 3. Research Methodology

This study employs a quantitative approach using a structured questionnaire administered to tourists in Ha Long. Data were collected through convenience sampling and on-site surveys at major tourist attractions, tourism areas, and accommodation facilities. Respondents were individuals with direct tourism experience in Ha Long. Prior to the survey, participants were informed of the research purpose and assured of anonymity and voluntary participation to reduce bias. A total of 400 questionnaires were distributed, yielding 398 valid responses after excluding incomplete or invalid ones. The data were screened, coded, and cleaned to ensure accuracy and consistency. Variables were measured using a five-point Likert scale, adapted from previous studies and adjusted to fit the Ha Long context. Data analysis was conducted using SPSS to perform descriptive statistics and assess reliability via Cronbach's Alpha, with items below 0.3

removed. Exploratory Factor Analysis (EFA) was then applied ( $KMO \geq 0.5$ ; Bartlett's test Sig.  $< 0.05$ ). Finally, Confirmatory Factor Analysis (CFA) and Structural Equation Modeling (SEM) were performed using AMOS, with model fit evaluated through indices such as Chi-square/df, CFI, TLI, and RMSEA. Hypotheses were tested based on standardized coefficients and statistical significance.

The study is based on two fundamental equations as follows:

**Equation 1 (Mediator):**

$$RIS = \beta_1 ENV + \beta_2 MAN + \beta_3 SOC + \beta_4 CLI + \beta_5 SAF + \varepsilon_1$$

**Equation 2 (Outcome):**

$$SUS = \beta_6 ENV + \beta_7 MAN + \beta_8 SOC + \beta_9 CLI + \beta_{10} SAF + \beta_{11} RIS + \varepsilon_2$$

#### 4. Research Results

The reliability analysis shows that all variable groups achieved high Cronbach's Alpha coefficients (0.861-0.906), exceeding the 0.7 threshold and indicating strong internal consistency. All observed variables have Corrected Item - Total Correlations above 0.6, confirming their strong contribution to the respective constructs, with no items requiring removal. Furthermore, the "Cronbach's Alpha if Item Deleted" values are lower than or approximately equal to the overall Alpha of each scale, suggesting that removing any item would not improve reliability. Therefore, all variables (SAF, MAN, NAT, ENV, SOC, RIS, and SUS) were retained for subsequent analyses, including EFA, CFA, and SEM.

**Table 1: KMO and Bartlett's Test**

|                                                  |                    |          |
|--------------------------------------------------|--------------------|----------|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. |                    | .902     |
| Bartlett's Test of Sphericity                    | Approx. Chi-Square | 7585.497 |
|                                                  | df                 | 406      |
|                                                  | Sig.               | .000     |

Source: SPSS Results

The KMO and Bartlett's test results confirm the suitability of the data for Exploratory Factor Analysis (EFA). The KMO value of 0.902 exceeds the minimum threshold of 0.5, indicating a high level of intercorrelation among variables and an adequate sample size. Bartlett's Test of Sphericity is statistically significant (Chi-square = 7,585.497; df = 406; Sig. = 0.000  $< 0.05$ ), demonstrating that the correlation matrix differs from an identity matrix. This confirms that the variables are sufficiently correlated to justify factor extraction.

The Total Variance Explained results indicate that seven factors with eigenvalues greater than 1 were extracted, consistent with Kaiser's criterion and the study's theoretical framework. The first factor has the highest eigenvalue (9.261), explaining 31.93% of

the total variance, highlighting its dominant role. The cumulative variance explained by all factors reaches 74.87%, exceeding the recommended threshold of 50-60%, which confirms that the model captures most of the data variability. The remaining factors (Factors 2-7) contribute between 3.96% and 11.24%, indicating a balanced distribution of explanatory power.

**Table 2: Rotated Component Matrix<sup>a</sup>**

|      | Component |      |      |      |      |      |      |
|------|-----------|------|------|------|------|------|------|
|      | 1         | 2    | 3    | 4    | 5    | 6    | 7    |
| MAN2 | .872      |      |      |      |      |      |      |
| MAN4 | .856      |      |      |      |      |      |      |
| MAN3 | .853      |      |      |      |      |      |      |
| MAN5 | .821      |      |      |      |      |      |      |
| MAN1 | .744      |      |      |      |      |      |      |
| ENV4 |           | .879 |      |      |      |      |      |
| ENV2 |           | .879 |      |      |      |      |      |
| ENV1 |           | .858 |      |      |      |      |      |
| ENV3 |           | .742 |      |      |      |      |      |
| SOC3 |           |      | .899 |      |      |      |      |
| SOC4 |           |      | .883 |      |      |      |      |
| SOC2 |           |      | .882 |      |      |      |      |
| SOC1 |           |      | .833 |      |      |      |      |
| NAT4 |           |      |      | .946 |      |      |      |
| NAT3 |           |      |      | .866 |      |      |      |
| NAT1 |           |      |      | .852 |      |      |      |
| NAT2 |           |      |      | .827 |      |      |      |
| SAF1 |           |      |      |      | .919 |      |      |
| SAF2 |           |      |      |      | .847 |      |      |
| SAF4 |           |      |      |      | .845 |      |      |
| SAF3 |           |      |      |      | .844 |      |      |
| SUS4 |           |      |      |      |      | .956 |      |
| SUS2 |           |      |      |      |      | .929 |      |
| SUS1 |           |      |      |      |      | .717 |      |
| SUS3 |           |      |      |      |      | .692 |      |
| RIS2 |           |      |      |      |      |      | .914 |
| RIS1 |           |      |      |      |      |      | .872 |
| RIS4 |           |      |      |      |      |      | .784 |
| RIS3 |           |      |      |      |      |      | .764 |

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

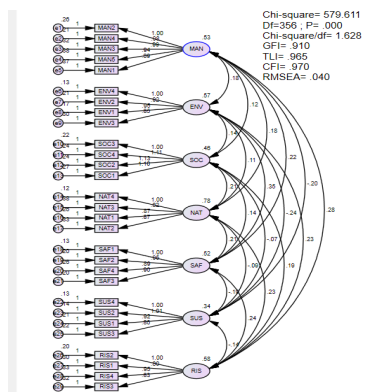
a. Rotation converged in 7 iterations.

Source: SPSS Results

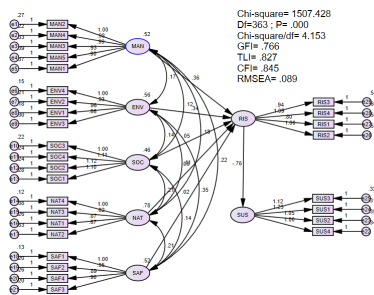
The results of the rotated factor matrix (Varimax) indicate a clear factor structure that is consistent with the proposed theoretical model. All observed variables exhibit high factor loadings, ranging from 0.692 to 0.956, exceeding the acceptable threshold of 0.5. This confirms strong convergent validity of the measurement scales.

The Confirmatory Factor Analysis (CFA) results indicate a good fit between the measurement model and the data. All fit indices meet recommended thresholds: Chi-square/df = 1.628 ( $< 3$ ), GFI = 0.910, TLI = 0.965, CFI = 0.970 ( $> 0.9$ ), and RMSEA = 0.040 ( $< 0.05$ ), confirming strong overall model fit. Convergent validity is supported, as all observed variables have high and statistically significant factor loadings (mostly above 0.7), adequately representing the latent constructs (MAN, ENV, SOC, NAT, SAF, RIS, SUS), with no items requiring removal. Discriminant validity is also achieved, as correlations among constructs are moderate and below 1, indicating no multicollinearity and confirming that the constructs are conceptually distinct.



**Figure 1: Confirmatory Factor Analysis from Research Result**

Source: Results from AMOS

**Figure 2: Structural Equation Modeling from Research Result**

Source: Results from AMOS

The Structural Equation Modeling (SEM) results indicate an acceptable overall model fit, satisfying conditions for interpreting causal relationships. The Chi-square/df value of 4.153 falls within an acceptable range for complex models, while RMSEA = 0.089 (< 0.10) suggests an adequate level of model fit.

Additionally, the goodness-of-fit indices (GFI = 0.766, TLI = 0.827, CFI = 0.845) all exceed the minimum threshold of 0.8, indicating a reasonably good fit and general support for the proposed theoretical framework. Although not optimal, the model demonstrates sufficient statistical adequacy and reliability for further analysis and discussion.

**Table 3: Regression Weights**

|     |      | Estimate | S.E.  | C.R. | P      | Label         |
|-----|------|----------|-------|------|--------|---------------|
| RIS | <--- | MAN      | .360  | .039 | 9.105  | *** Accepted  |
| RIS | <--- | ENV      | .344  | .040 | 8.563  | *** Accepted  |
| RIS | <--- | SOC      | .051  | .025 | 2.000  | .045 Accepted |
| RIS | <--- | NAT      | .056  | .020 | 2.814  | .005 Accepted |
| RIS | <--- | SAF      | .017  | .031 | .549   | .583 Rejected |
| SUS | <--- | RIS      | -.762 | .093 | -8.217 | *** Accepted  |

Source: Results from AMOS

The SEM results show varying levels of significance across causal relationships, clarifying the roles of different risk groups. Management (MAN) and environmental risks (ENV) have strong, positive, and highly significant effects on overall risk (RIS) ( $p$

< 0.001). Socio-economic risks (SOC) also positively affect RIS, though at a lower significance level ( $p = 0.045$ ). Natural and disaster-related risks (NAT) exhibit a significant positive impact ( $p = 0.005$ ), highlighting their stable influence on overall risk. In contrast, safety and service risks (SAF) are not statistically significant ( $p = 0.583$ ), suggesting a limited role in shaping RIS within this context.

Importantly, overall risk (RIS) has a strong and highly significant negative effect on sustainable tourism development (SUS) ( $p < 0.001$ ). This confirms that increasing risk levels substantially undermine sustainability outcomes and reinforces the role of RIS as a key mediating variable linking component risks to sustainable development.

## 5. Discussion

The research findings provide empirical evidence that management, planning, and legal risks constitute the most influential group affecting risks in sustainable tourism development in Ha Long, with the highest regression coefficient ( $\beta = 0.360$ ). This finding is consistent with theoretical approaches to destination governance, which emphasize that the effectiveness of public management, the coherence of planning, and the adequacy of legal frameworks play a foundational role in controlling risks arising from rapid and complex tourism development. In the context of Ha Long as a World Heritage destination, shortcomings in institutional coordination, overlapping plans, or weak law enforcement can exacerbate conflicts between short-term economic growth objectives and long-term conservation requirements, thereby increasing overall risk. This result also aligns with warnings issued by UNESCO regarding the potential degradation of Outstanding Universal Value at World Heritage Sites in the absence of effective and integrated governance mechanisms.

In addition, environmental pressure and overtourism are identified as the second most influential risk group affecting risks in sustainable tourism development in Ha Long ( $\beta = 0.344$ ). This finding reinforces arguments in international studies on overtourism, which suggest that rapid growth in visitor numbers, high tourism intensity, and resource exploitation beyond environmental carrying capacity can lead to ecosystem degradation, diminished visitor experience, and erosion of the long-term development base of destinations (UNWTO, 2018; Gössling et al., 2020). For Ha Long, where marine ecosystems and unique karst landscapes are central to tourism attractiveness, the results indicate that insufficient control of carrying capacity, waste management, and environmental protection may become serious barriers to achieving long-term sustainable tourism goals.



Beyond these dominant risk groups, natural disaster and climate change risks are also confirmed to have a positive effect on risks in sustainable tourism development in Ha Long ( $\beta = 0.056$ ). Although the magnitude of this effect is relatively modest, the finding highlights the growing importance of natural and climatic factors in shaping overall risk levels at coastal destinations. Recent studies indicate that climate change increases the frequency and intensity of extreme weather events, thereby affecting tourism safety, infrastructure, and business stability (Scott et al., 2019). Accordingly, the results emphasize the need to integrate climate adaptation and risk mitigation measures into Ha Long's sustainable tourism development strategies, rather than relying solely on traditional management solutions.

At the same time, socioeconomic risks are found to exert a positive and statistically significant effect on risks in sustainable tourism development ( $\beta = 0.051$ ). This reflects the vulnerability of destinations that are highly dependent on tourism, where community livelihoods are closely tied to fluctuations in tourism markets. Shocks such as the COVID-19 pandemic have clearly demonstrated the risks of mono-sector dependence, leading to unemployment, income loss, and increased social inequality (OECD, 2020). In the context of Ha Long, issues such as rising living costs, housing pressure, and changes in local cultural values may weaken community support for tourism, thereby indirectly increasing overall risk. This implies that sustainable tourism development is not only an environmental or managerial issue but is also closely linked to social equity and sustainable local livelihoods.

Finally, the results confirm that risks in sustainable tourism development have a very strong negative effect on sustainable development outcomes, with a regression coefficient of  $\beta = -0.762$ . This finding indicates that as risks accumulate and intensify, the economic, social, and environmental outcomes of sustainable development deteriorate significantly. It reinforces the perspective that risk functions as a central mediating variable, reflecting the simultaneous accumulation of multiple risk groups and transmitting their negative effects to sustainable development outcomes. From an academic perspective, this result contributes to extending sustainable tourism research through an integrated systemic risk approach. From a practical standpoint, the study underscores that proactive identification, governance, and mitigation of risks are not merely supportive measures but essential prerequisites for ensuring and promoting the long-term sustainable tourism development of Ha Long.

## 6. Conclusion

This study examines sustainable tourism development from an integrated risk perspective, conceptualizing risk

as a mediating variable that captures the cumulative effects of multiple risk groups on development outcomes. Using advanced quantitative techniques, including Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA), and Structural Equation Modeling (SEM), the study develops and empirically validates a risk-based analytical model for Ha Long.

The results indicate that management, planning, and legal risks have the strongest impact on overall risk, followed by environmental pressure and overtourism. This underscores the critical role of governance, planning consistency, and regulatory effectiveness in managing risks associated with rapid tourism growth. Additionally, climate change, natural disaster, and socio-economic risks, although exhibiting smaller effect sizes, remain statistically significant, highlighting the multidimensional and interconnected nature of risks in coastal and heritage destinations. Notably, overall risk exerts a strong negative effect on sustainable tourism development, confirming that increasing risk levels substantially diminish economic, social, and environmental benefits. This finding demonstrates that risk is not merely a by-product but a key determinant of long-term sustainability outcomes.

From a theoretical perspective, the study contributes by advancing a systemic risk-based framework and emphasizing the mediating role of risk in tourism development. Practically, the findings suggest a shift from reactive to proactive risk governance, including strengthening institutional capacity, improving planning, managing carrying capacity, protecting ecosystems, enhancing climate adaptation, and supporting local livelihoods. Despite limitations in scope and data, the study provides valuable empirical evidence for policy and future research. Further studies may adopt comparative, longitudinal, or mixed-method approaches to deepen understanding of risk in sustainable tourism development.

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# DOES BUSINESS STRATEGY MATTER FOR FIRMS' CASH HOLDINGS?

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**Abstract:** *This research investigates the impact of business strategy on firm's cash holdings to explain the rise of cash holdings among the U.S firms since 1970s. The study adopts Miles and Snow (1978 and 2003) business strategy classifications and employs multiple robust regressions on a sample of 233,532 firm-year observations during the period 1950-2023. Selection bias and endogeneity issues are considered in delivering the results. The finding shows that business strategy has significant impact on firm's cash holdings. Specifically, prospector type firms maintain relatively larger cash holdings compared to other business strategy types which are consistent with both their focus on innovation and investment and reduced emphasis on efficient operation and management. Our study contributes incrementally to the literature on the determinants of cash holdings at the firm level and provides insights into the firm's decision-making process related to cash holdings.*

• Keywords: *business strategy; cash holdings; propensity score matching; endogeneity.*

JEL codes: G32; G34; L20

Date of receipt: 25<sup>th</sup> Feb., 2026

Date of delivery revision: 04<sup>th</sup> Mar., 2026

DOI:

Date of receipt revision: 20<sup>th</sup> Mar., 2026

Date of approval: 26<sup>th</sup> Mar., 2026

## 1. Introduction

Effective cash management is crucial for corporations to optimize financial performance and shareholder value. An adequate cash reserve helps ensuring a firm's liquidity, supporting future investment opportunities, and meeting shareholders' income expectations. However, excessive cash holdings may be detrimental due to its opportunity costs and lower-return investments (Usman, 2022). Consequently, a significant body of literature has emerged, exploring the determinants of firms' cash holdings.

Recent research has increasingly emphasized the role of business strategy in the firm's decision making (Navissi et al. 2017), investment efficiency (Cao et al., 2022), and ultimately, firm performance (Dang et al., 2022). Additionally, there is evidence that links a firm's business strategy with annual report readability (Lim et al., 2018), financial report irregularities (Bentley et al., 2013), and internal governance (Bentley-Goode et al., 2017). These factors reflect the level of a firm's investment activities and growth opportunities, cash flow risk, information asymmetry, corporate governance, and uncertainty, which have all been associated with a firm's cash holding level.

Recently, Magerakis and Tzelepis (2020) identified a significant relationship between business strategy and

cash reserves. Their findings suggest that prospectors, characterized by a focus on innovation and market expansion, tend to maintain higher levels of cash compared to defenders, who prioritize operational efficiency and stability. Thus, this study explores the role of business strategy in explaining the increasing level of cash holdings observed among U.S firms after the 1970s.

Utilizing robust econometric modelling techniques on a sample of more than 230,000 observations of US non-financial firms during the period 1950-2023, this study found a positive association between business strategy type and cash holdings. This finding holds after controlling for firm and year fixed effects to account for time-invariant firm-specific omitted variables issue, using alternative measures of cash holdings, addressing selection bias and endogeneity concerns. The result confirms the *precautionary motivation* for firms' cash holdings suggested by the literature.

The study is significant in several ways. First, it considers the firm's cash holdings over quite a long period of more than 70 years. This time frame enables us to observe the long-term impact of business strategy on firm's cash holdings. Second, the study emphasizes the importance of business strategy in the firm's cash management decision. This supplements the extant

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This research is funded by Vietnam National Foundation for Science and Technology Development (NAFOSTED) under grant number 502.02-2021.84.

literature on the role of business strategy in the firm's decision making. Third, the study employs Miles and Snow (1978, 2003) business strategy classification which has gained substantial empirical support due to its comprehensive scope and robustness in application to identify the firm's business strategy and adopt multiple robust regressions including considering the selection bias and endogeneity issue due to the possible inter-relationship between business strategy and cash holdings.

Overall, our study contributes incrementally to the literature on the determinants of cash holdings at the firm level and provides insights into the decision-making process related to cash holdings based on a firm's underlying business strategy.

The rest of our study is structured as follows: Section 2 provides the theoretical background for the hypotheses development, Section 3 outlines the research methodology, Section 4 reports the results and Section 5 concludes the paper.

## 2. Hypothesis development

Firms must establish well-defined business strategies to remain competitiveness in the business environments (Miles et al., 1978). Miles and Snow (2003, 1978) propose four types of business strategy including prospectors, analyzers, defenders, and reactors. Accordingly, prospectors aim for innovation by continuously seeking and exploiting new business opportunities. They invest a significant amount of resources in scanning the environment for product and market opportunities, invest in multiple technologies, and operate with a flexible administrative system. As a result, they tend to exhibit greater variability in profitability and lower efficiency due to their underutilization of resources. Defenders rely on stability and cost-efficiency by focusing on a narrow product-market domain, maintaining current products and services with limited or no innovation, adapting to a single core technology, and organizing formal and intensive divisions of labor. Whereas, the analyzer is a balance and combination of the two. Therefore, the analyzer's goal is stability and flexibility. Miles et al. (1978) also emphasized that these strategies are clearly defined if the firm incorporates environmental conditions in a proactive, consistent, and stable manner. Otherwise, the firm can be classified as a reactor.

These characteristics suggest that businesses adopting a prospector strategy require greater financing sources, higher investment needs, and face greater administrative costs compared to other business strategies. Teirlinck (2020) demonstrated

that prospector businesses invest more in research and development to create new and innovative products. They also perceive greater uncertainty and environmental change than other types of businesses (Miles et al., 1978).

The *precautionary motive* studies suggest that firms hold cash to avoid unexpected cash flow shortfalls and financial distress during shocks and uncertainties when raising funds in capital markets is difficult and costly (Ferreira & Vilela, 2004). Furthermore, firms focused on innovation and investment opportunities will incur larger marginal costs if they experience a shortage of liquidity, which can result in forgoing profitable investment projects. These firms are likely to hold larger cash balances for financial flexibility purposes. Hence, it is expected that prospector businesses hold a higher cash level than other types of businesses. Thus, our hypothesis is as follows:

**H1:** *Firms following prospector strategy hold more cash than defenders and analyzers, ceteris paribus.*

## 3. Research methodology

### 3.1. Research model

We use the following baseline regression model to test the relation between the prospector strategy business type indicator and cash holdings:

$$CASH_{i,t} = \alpha + \beta BS_{i,t} + CONTROLS_{i,t-1} + \varepsilon_{i,t} \quad (1)$$

where  $CASH_{i,t}$  denotes the levels of cash holdings of firm  $i$  in year  $t$ . We use a number of different measures to proxy for cash holdings, including  $CASH_1$ ,  $CASH_2$ ,  $LogCASH_1$  &  $LogCASH_2$ . In line with previous literature (Harford et al., 2008), we measure cash holdings as the Cash and short-term investment to total assets ratio in year  $t$  ( $CASH_1$ ) and Cash and short-term investment to total assets net of cash and short-term investment in year  $t$  ( $CASH_2$ ). We also measure cash holdings as the natural logarithm of one plus Cash and short-term investment to total assets ( $logCASH_1$ ), and the natural logarithm of one plus Cash and short-term investment to total assets net of Cash and short-term investment ( $logCASH_2$ ).  $BS_{i,t}$  is a dummy variable which takes the value of one for prospector-type firms and zero for defender firms and analyzer firms. We measure business strategy following the approach by Miles and Snow (1978, 2003)<sup>1</sup>.

In line with previous studies (e.g., Harford et al., 2008), we use a set of control variables with a one-year lag ( $CONTROLS_{i,t-1}$ ) including firm size ( $SIZE$ ), market-to-book ratio ( $MB$ ), cash flow ( $CF/TA$ ), dividend payment ( $DIV$ ), acquisition activity ( $ACQ$ ).

<sup>1</sup> Details of business strategy measure can be provided upon request.



TA), R&D intensity ( $R\&D/Sales$ ), standard deviation of cash flow/assets ( $INDSIGMA$ ), capital expenditure ( $CAPEX/TA$ ), leverage ( $LEV$ ), and working capital ( $WC/TA$ ). Table 1 provides detailed definition of these variables.

Given the panel data nature, Model (1) is estimated using fixed-effects regressions. In all model specifications, we include industry and year fixed effects. Industry fixed effects help account for all time-invariant industry-level factors that might be jointly related to both dependent and independent variables. To correct for standard errors, we use firm clustering and report t-statistics in parentheses in all regressions.

### 3.2. Data sample

Our sample consists of all non-financial U.S. listed firms with available cash holdings data in the Compustat database for the period 1950–2023. Accounting data are obtained from the Compustat database. To facilitate regression analysis with lagged independent variables, we restrict the sample to firms with at least two consecutive years of data and exclude those without available business strategy classifications. We remove firms with negative total assets or negative sales in any given year. Additionally, firms in the financial and utility sectors, identified using four-digit Standard Industrial Classification (SIC) codes 6000–6999 and 4000–4999, respectively, are excluded due to their distinct regulatory environments and involvement in marketable securities and cash holdings. The final dataset comprises 233,532 firm-year observations spanning 73 years from 1950 to 2023.

## 4. Empirical results

### 4.1. Descriptive statistics

Table 1 presents the descriptive statistics for the key variables in Model (1). Regarding cash holdings, the variable  $CASH_1$ , defined as the ratio of cash and short-term investments to total assets, has a mean value of 0.1648, indicating that, on average, sample firms hold approximately 16% of their total assets in cash or liquid forms. The standard deviation of 0.1993 suggests considerable variation in cash holdings across firms, with at least one firm holding 100% of its total assets in cash. The  $CASH_2$  variable, which measures cash holdings relative to total assets net of cash and short-term investments, exhibits a higher mean, median, and variability compared to  $CASH_1$ , but maintains similar distributional characteristics.

The key business strategy indicator,  $BS$ , has a mean of 0.4711, implying that almost half of the sample firm observations are prospectors. Firms in the sample exhibit an average (median) market-to-book ( $MB$ ) ratio

of 2.1847 (1.6399), and approximately 39% of firms distribute dividends to shareholders across all sample years. In terms of innovation and investment activities, capital expenditures represent approximately 6% of total assets on average, while acquisition expenditures and R&D investments account for less than 1% and 2.43% of sales revenue, respectively. The remaining firm-level control variables exhibit values consistent with prior literature.

Table 1: Descriptive Statistics

| Variables                        | Acronym       | Description                                                                                            | Mean   | Median | Min     | Max     | SD     |
|----------------------------------|---------------|--------------------------------------------------------------------------------------------------------|--------|--------|---------|---------|--------|
| Cash holdings                    | $CASH_1$      | Cash and short-term investment/ Total assets                                                           | 0.1648 | 0.0775 | -0.8256 | 1       | 0.1993 |
|                                  | $CASH_2$      | Cash and short-term investment/ (Total assets - Cash and short-term investment)                        | 0.2121 | 0.0838 | 0.0069  | 0.8289  | 0.2577 |
|                                  | $\log CASH_1$ | $\log(1+CASH_1)$                                                                                       | 0.1395 | 0.0747 | -1.7465 | 0.6931  | 0.1515 |
|                                  | $\log CASH_2$ | $\log(1+CASH_2)$                                                                                       | 0.2460 | 0.0806 | -0.6019 | 10.9432 | 0.4698 |
| Corporate business strategy      | $BS$          | 1 for prospector-type firms and 0 for defender firms and analyzer firms                                | 0.4711 | 0      | 0       | 1       | 0.4866 |
| Firm size                        | $SIZE$        | $\log$ (Total assets)                                                                                  | 5.1285 | 4.9605 | 1.3863  | 8.2235  | 1.9272 |
| Market to book                   | $MB$          | Market to book ratio of firm equity.                                                                   | 2.1847 | 1.6399 | 0.3218  | 5.6080  | 1.5950 |
| Cash flow                        | $CF/TA$       | Earnings after interest, dividends, and taxes but before depreciation/ Total assets                    | 0.0186 | 0.0571 | -0.3261 | 0.1346  | 0.1201 |
| Dividend payment                 | $DIV$         | 1 if the firm pays a dividend in the year, otherwise 0.                                                | 0.3899 | 0      | 0       | 1       | 0.4735 |
| Acquisition activity             | $ACQ/TA$      | Acquisition/ Total assets                                                                              | 0.0067 | 0      | 0       | 0.0357  | 0.0124 |
| R&D/Sales                        | $R\&D/Sales$  | R&D expense/Sales                                                                                      | 0.0243 | 0      | 0       | 0.1155  | 0.0396 |
| Standard deviations of cash flow | $INDSIGMA$    | Yearly mean of the standard deviation of cash flow/assets over 10 years for firms in the same industry | 0.2954 | 0.0860 | 0.0216  | 1.1520  | 0.3861 |
| Capital expenditure              | $CAPEX/TA$    | Capital expenditure/ Total assets                                                                      | 0.0613 | 0.0463 | 0.0009  | 0.1561  | 0.0472 |
| Leverage                         | $LEV$         | Total debt/ Total assets                                                                               | 0.2484 | 0.2281 | 0       | 0.6257  | 0.1897 |
| Working capital                  | $WC/TA$       | Net working capital/ Total assets                                                                      | 0.0772 | 0.0555 | -0.2379 | 0.3505  | 0.1665 |

Note:  $N = 233,532$ . Source: Authors' calculations.

### 4.2. Baseline regression

Our baseline estimation results for the relation between business strategy type and cash holdings levels in Model (1) are outlined in Table 2 below. Across all model specifications in Table 2, there is a statistically significant positive association between the prospector firm and the magnitude of cash holdings.<sup>2</sup> This finding is aligned with Magerakis and Tzelepis (2020) study and supports our *Hypothesis H1* that prospector firms maintain higher cash holdings than other strategy types.

Regarding control variables, all coefficients show high statistical significance and are generally in line with our expectations. Specifically, firms with higher growth opportunities ( $MB$ ) and greater business risk ( $INDSIGMA$ ) maintain higher cash levels, whereas larger firms ( $SIZE$ ), firms which pay dividends ( $DIV$ ) and firms with more debt ( $LEV$ ) have lower cash



holdings. Firms which spend more on acquisitions or capital expenditure ( $ACQ/TA$ ) also have lower cash holdings whereas R&D intensity ( $R\&D/Sales$ ) is positively associated with cash holdings, and firms with other forms of working capital ( $CAPEX/TA$ ) maintain relatively lower cash.

**Table 2: The impact of business strategy on cash holdings**

| Variables               | CASH <sub>1</sub>      | CASH <sub>2</sub>      | logCASH <sub>1</sub>   | logCASH <sub>2</sub>   |
|-------------------------|------------------------|------------------------|------------------------|------------------------|
| BS                      | 0.044<br>(61.54)***    | 0.0463<br>(49.43)***   | 0.031<br>(57.95)***    | 0.090<br>(67.56)***    |
| SIZE                    | -0.004<br>(-16.54)***  | -0.005<br>(-20.53)***  | -0.003<br>(-18.58)***  | -0.006<br>(-13.43)***  |
| MB                      | 0.015<br>(55.40)***    | 0.017<br>(59.66)***    | 0.014<br>(58.75)***    | 0.021<br>(33.53)***    |
| CF/TA                   | -0.182<br>(-45.32)***  | -0.178<br>(-31.27)***  | -0.126<br>(-39.85)***  | -0.518<br>(-47.38)***  |
| DIV                     | -0.017<br>(-25.98)***  | -0.025<br>(-26.34)***  | -0.015<br>(-26.53)***  | -0.024<br>(-13.27)***  |
| ACQ/TA                  | -1.132<br>(-51.32)***  | -1.454<br>(-46.26)***  | -0.861<br>(-49.54)***  | -2.423<br>(-51.36)***  |
| R&D/Sales               | 1.332<br>(93.00)***    | 1.784<br>(96.23)***    | 1.023<br>(95.78)***    | 2.185<br>(61.09)***    |
| INDSIGMA                | 0.012<br>(8.24)***     | 0.013<br>(7.17)***     | 0.008<br>(8.23)***     | 0.018<br>(4.98)***     |
| CAPEX/TA                | -0.326<br>(-42.23)***  | -0.354<br>(-33.76)***  | -0.235<br>(-39.23)***  | -0.886<br>(-47.54)***  |
| LEV                     | -0.343<br>(-165.37)*** | -0.453<br>(-174.32)*** | -0.279<br>(-175.36)*** | -0.654<br>(-109.43)*** |
| WC/TA                   | -0.259<br>(-94.54)***  | -0.323<br>(-91.35)***  | -0.211<br>(-96.53)***  | -0.513<br>(-73.12)***  |
| Constant                | 0.234<br>(34.23)***    | 0.278<br>(34.48)***    | 0.193<br>(30.67)***    | 0.379<br>(30.76)***    |
| Year & Industry Effects | YI                     | YI                     | YI                     | YI                     |
| Adjusted R <sup>2</sup> | 0.5036                 | 0.4937                 | 0.5163                 | 0.3646                 |
| Observations            | 233,532                | 233,532                | 233,532                | 233,532                |

Notes: This table reports the panel regression of cash holdings on corporate business strategy using Model (1). The t-statistics shown in parentheses. Standard errors are adjusted for heteroscedasticity and clustered at the firm level. \*, \*\*, and \*\*\* denote significance levels of 10%, 5%, and 1%, respectively. Source: Authors' calculations.

### 4.3. Robustness checks

To rule out the influence of firm-level unobserved heterogeneity that may influence the relationship between business strategy type and cash holdings, we re-estimate Model (1) by including firm fixed effects and report the results in Panel A - Table 3. The coefficients of *BS* are positive and significant in all specifications, which still supports our *Hypothesis H1*.

**Table 3: Robustness checks**

| Panel A - Firm and year fixed effects |                       |                       |                       |                       |
|---------------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Variables                             | CASH <sub>1</sub>     | CASH <sub>2</sub>     | logCASH <sub>1</sub>  | logCASH <sub>2</sub>  |
| BS                                    | 0.0277<br>(43.24)***  | 0.032<br>(34.99)***   | 0.023<br>(38.58)***   | 0.067<br>(42.49)***   |
| SIZE                                  | -0.007<br>(-13.54)*** | -0.009<br>(-12.64)*** | -0.006<br>(-13.88)*** | -0.018<br>(-11.70)*** |
| MB                                    | 0.011<br>(41.63)***   | 0.012<br>(42.54)***   | 0.008<br>(43.48)***   | 0.015<br>(25.78)***   |
| CF/TA                                 | -0.053<br>(-12.75)*** | -0.047<br>(-7.39)***  | -0.034<br>(-11.56)*** | -0.148<br>(-10.37)*** |
| DIV                                   | 0.005<br>(5.35)***    | 0.007<br>(6.32)***    | 0.003<br>(5.27)***    | 0.004<br>(2.99)***    |
| ACQ/TA                                | -0.766<br>(-36.62)*** | -0.953<br>(-32.78)*** | -0.548<br>(-35.26)*** | -1.427<br>(-35.43)*** |
| R&D/Sales                             | 0.421                 | 0.634                 | 0.348                 | 0.526                 |

| Panel A - Firm and year fixed effects |                        |                        |                        |                       |
|---------------------------------------|------------------------|------------------------|------------------------|-----------------------|
| Variables                             | CASH <sub>1</sub>      | CASH <sub>2</sub>      | logCASH <sub>1</sub>   | logCASH <sub>2</sub>  |
| INDSIGMA                              | (15.38)***<br>-0.009   | (16.12)***<br>-0.009   | (15.96)***<br>-0.006   | (6.57)***<br>-0.024   |
| CAPEX/TA                              | (-7.25)***<br>-0.314   | (-5.38)***<br>-0.349   | (-6.74)***<br>-0.218   | (-6.84)***<br>-0.748  |
| LEV                                   | (-37.34)***<br>-0.288  | (-30.32)***<br>-0.354  | (-35.49)***<br>-0.254  | (-35.73)***<br>-0.467 |
| WC/TA                                 | (-101.43)***<br>-0.218 | (-102.56)***<br>-0.331 | (-105.82)***<br>-0.178 | (-67.44)***<br>-0.409 |
| Constant                              | (-63.32)***<br>0.268   | (-62.82)***<br>0.334   | (-64.47)***<br>0.219   | (-47.43)***<br>0.458  |
| Firm & Year Effects                   | (98.32)***<br>FY       | (94.33)***<br>FY       | (102.48)***<br>FY      | (62.85)***<br>FY      |
| Adjusted R <sup>2</sup>               | 0.8126                 | 0.7915                 | 0.8097                 | 0.7907                |
| Observations                          | 233,532                | 233,532                | 233,532                | 233,532               |

| Panel B - Alternative measures of cash holdings |                        |                         |
|-------------------------------------------------|------------------------|-------------------------|
| Variables                                       | CASH <sub>1</sub> TA   | CASH <sub>2</sub> TA    |
| BS                                              | 0.002<br>(34.65)***    | 0.002<br>(27.54)***     |
| SIZE                                            | -0.003<br>(-134.45)*** | -0.0044<br>(-131.57)*** |
| MB                                              | 0.001<br>(35.28)***    | 0.0010<br>(36.3)***     |
| CF/TA                                           | -0.028<br>(-43.28)***  | -0.0247<br>(-40.34)***  |
| DIV                                             | 0.002<br>(34.73)***    | 0.0029<br>(32.21)***    |
| ACQ/TA                                          | -0.022<br>(-14.39)***  | -0.038<br>(-14.88)***   |
| R&D/Sales                                       | 0.022<br>(14.57)***    | 0.0258<br>(15.42)***    |
| INDSIGMA                                        | -0.001<br>(-9.73)***   | -0.0014<br>(-9.60)***   |
| CAPEX/TA                                        | -0.013<br>(-15.44)***  | -0.0117<br>(-10.56)***  |
| LEV                                             | -0.013<br>(-68.47)***  | -0.0168<br>(-70.95)***  |
| WC/TA                                           | -0.008<br>(-35.38)***  | -0.0123<br>(-30.87)***  |
| Constant                                        | 0.017<br>(44.38)***    | 0.004<br>(24.11)***     |
| Year & Industry Effects                         | YI                     | YI                      |
| Adjusted R <sup>2</sup>                         | 0.4163                 | 0.3266                  |
| Observations                                    | 233,532                | 233,532                 |

| Panel C: PSM regression |                     |                    |                      |                      |
|-------------------------|---------------------|--------------------|----------------------|----------------------|
|                         | CASH <sub>1</sub>   | CASH <sub>2</sub>  | logCASH <sub>1</sub> | logCASH <sub>2</sub> |
| BS                      | 0.038<br>(34.44)*** | 0.023<br>(31.27)** | 0.018<br>(28.88)***  | 0.082<br>(35.99)***  |
| Constant                | 0.227<br>(24.28)*** | 0.184<br>(23.98)** | 0.174<br>(21.75)***  | 0.290<br>(22.23)***  |
| Year & Industry Effects | YI                  | YI                 | YI                   | YI                   |
| Adjusted R <sup>2</sup> | 0.3934              | 0.3497             | 0.4008               | 0.2729               |
| Observations            | 11,864              | 11,864             | 11,864               | 11,864               |

| Panel D - Endogeneity – Instrumental variable approach |                       |                       |                       |                       |
|--------------------------------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Variables                                              | CASH <sub>1</sub>     | CASH <sub>2</sub>     | logCASH <sub>1</sub>  | logCASH <sub>2</sub>  |
| BS                                                     | 0.057<br>(21.98)***   | 0.038<br>(20.13)**    | 0.04<br>(20.58)***    | 0.119<br>(21.07)***   |
| SIZE                                                   | -0.005<br>(-23.40)*** | -0.004<br>(-21.44)*** | -0.004<br>(-22.29)*** | -0.014<br>(-21.78)*** |
| MB                                                     | 0.013<br>(32.37)***   | -0.0014<br>(-34.46)** | 0.009<br>(37.99)***   | 0.018<br>(2.89)***    |
| CF/TA                                                  | -0.165<br>(-26.67)*** | 0.120<br>(-30.63)***  | -0.108<br>(-24.98)*** | -0.452<br>(-27.61)*** |
| DIV                                                    | -0.008<br>(-11.52)*** | -0.007<br>(-10.74)    | -0.008<br>(-11.22)*** | -0.019<br>(-7.77)***  |
| ACQ/TA                                                 | -1.029<br>(-40.43)*** | -1.022<br>(-34.37)*** | -0.855<br>(-38.27)*** | -1.765<br>(-37.75)*** |
| R&D/Sales                                              | 1.154<br>(61.59)***   | -1.147<br>(-60.48)**  | 0.876<br>(65.27)***   | 1.720<br>(39.63)***   |
| INDSIGMA                                               | 0.018<br>(9.95)***    | 0.015<br>(9.50)***    | 0.009<br>(7.67)***    | 0.024<br>(6.66)***    |
| CAPEX/TA                                               | -0.384                | -0.416                | -0.267                | -0.635                |

| Panel D - Endogeneity – Instrumental variable approach |                    |                    |                       |                       |
|--------------------------------------------------------|--------------------|--------------------|-----------------------|-----------------------|
| Variables                                              | CASH <sub>it</sub> | CASH <sub>it</sub> | logCASH <sub>it</sub> | logCASH <sub>it</sub> |
|                                                        | (-28.45)***        | (-32.68)***        | (-28.43)***           | (-24.72)***           |
| LEV                                                    | -0.322             | -0.570             | -0.243                | -0.519                |
|                                                        | (-110.64)***       | (-112.78)***       | (-120.70)***          | (-75.89)***           |
| WC/TA                                                  | -0.250             | -0.233             | -0.168                | -0.423                |
|                                                        | (-73.30)***        | (-64.28)***        | (-75.17)***           | (-57.59)***           |
| Constant                                               | 0.238              | 0.215              | 0.194                 | 0.378                 |
|                                                        | (31.45)***         | (29.27)***         | (33.89)***            | (27.34)***            |
| Year & Industry Effects                                | YI                 | YI                 | YI                    | YI                    |
| Adjusted R <sup>2</sup>                                | 0.4701             | 0.3961             | 0.4779                | 0.3433                |
| Observations                                           | 134,843            | 134,843            | 134,843               | 134,843               |

Notes: The *t*-statistics shown in parentheses. Standard errors are adjusted for heteroscedasticity and clustered at the firm level. \*, \*\*, and \*\*\* denote significance levels of 10%, 5%, and 1%, respectively. Source: Authors' calculations.

To account for the errors in variable measurement, we employ a pure measure of cash holdings based on just the cash balance excluding short-term investments and create two alternative cash holdings variables scaled by total assets ( $CASH_{it}/TA$ ) and total assets net of cash ( $CASH_{it}/TA$ ), respectively. The regression results presented in Panel B - Table 3 continue to demonstrate a significant and positive relation between business strategy and the firm's cash holdings.

#### 4.4. Selection bias and endogeneity considerations

To address the selection bias related to the nature of the sample selection and the business strategy classification, we employ the propensity score matching method. Specifically, for each fiscal year, we match our treatment firms to control firms based on one-to-one nearest neighbour matching without replacement using our control variables. We define the treatment firms as those with above-median industry-based business strategy scores and control firms as those with below-median business strategy scores. The outcomes of the propensity score matching process across treatment and control firms outlined show that there is no statistical difference in the mean of independent variables between the matched treatment and control firms, which indicates the comparability of the propensity matched firms.<sup>3</sup> Panel C of Table 3 provides the regression estimation results for the smaller sample of propensity matched firms. Similar to the baseline regression, we also identify a positive and statistically significant association between the prospector type indicator variable (*BS*) and cash holdings across various dependent variable specifications. The consistency of these results continues to support the existing evidence that prospector type firms maintain higher cash holdings than other business strategy classifications.

It is plausible that the underlying cash holding of firms could influence their strategic decision-making. Thus, we address this endogeneity issue due to reverse causality using the two-stage instrumental variable estimation process. We follow Kong et al. (2020) to

use the 5-year (t-5) lagged value of business strategy variable as instrumental variable for business strategy. We also use 1-year lags of control variables to address the endogeneity concern that may arise from these variables. The results reported in Panel D - Table 3 show that the *BS* coefficients are positive and statistically significant in all four specifications. This provides further support for the positive association between prospector business strategy and the magnitude of cash holdings after controlling for the presence of any endogeneity arising from the model.

**Conclusion:** This paper explains the rise of the U.S firms' cash holding after the 1970s concerning the role of business strategy. The study adopts Miles and Snow (1978 and 2003) business strategy classifications and employs multiple robust regressions on a sample of over 230,000 observations during the period 1950 - 2023. The finding shows that business strategy has significant impact on firm's cash holdings. Specifically, prospector type firms maintain relatively larger cash holdings compared to other business strategy types which are consistent with both their focus on innovation and investment and reduced emphasis on efficient operation and management. These findings are important to understanding varying cash holding and cash management policies among U.S firms and also a number of the underlying factors that are determinative of cash management decision.

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<sup>3</sup> Results are provided upon request.

# THE IMPACT OF FINANCIAL LEVERAGE ON FIRM VALUE: EVIDENCE FROM COAL JOINT STOCK COMPANIES OF VINACOMIN

PhD. Hoang Thị Thuy\* - PhD. Duong Thi Nhan\* - MBA. Phan Minh Quang\*

**Abstract:** *This study aims to show the impact of financial leverage on the value of coal joint stock companies under the Vinacomin. The study results show that factors such as financial leverage, fixed asset ratio, sales growth, etc have significant impact on firm's value. From the results of this study, the authors analyzed and proposed suggestions for further research directions on issues related to financial leverage and firm value.*

• Keywords: *firm value, financial leverage, coal joint stock companies, vinacomin.*

Date of receipt: 25<sup>th</sup> Jan., 2026

Date of delivery revision: 04<sup>th</sup> Feb., 2026

Date of receipt revision: 11<sup>th</sup> Mar., 2026

Date of approval: 23<sup>th</sup> Mar., 2026

DOI:

## 1. Introduction

In reality, the necessity for determining enterprise value is significant. Valuation is needed not only when seeking capital but also during the operation process, enabling enterprise administrators to evaluate actual performance against the established strategic objectives and expectations set for the enterprise. If these objectives are not achieved, it is necessary to identify the cause in order to adjust the enterprise plan or restructure the enterprise. According to Thi Van Trang Do et al (2021), firm value also reflects the value of assets owned by a company. It is influenced by many factors, including company size, cash flow, financial leverage, etc. The financial leverage of an enterprise affects its value (Hung et al., 2019). Financial leverage is a measure that helps businesses evaluate and balance the enterprise's current investment and financial situation. Using financial leverage helps enterprises supplement the missing capital, meet the maintenance of production and business activities, and increase the enterprise's profit margin in the future. In addition, financial leverage is also a tool to promote the increase in the after-tax profit margin of equity, helping enterprises reduce taxes payable to the state. However, financial leverage does not always bring positive results. Financial leverage can negatively impact the company if it is not used effectively. Excessive borrowing causes the

company to face financial risks, debt repayment pressure, and interest rates. If revenue is insufficient to repay the debt, the company will face financial difficulties, leading to bankruptcy. When market interest rates increase, borrowing costs increase, reducing the expected return on investments using borrowed capital and reducing the company's value.

In Vietnam, there is limited research on the relationship between financial leverage and firm value, especially for enterprises in the coal industry. Due to the characteristics of the coal mining sector, companies need production lines, machinery, and equipment, such as coal cutting machines, conveyor systems, etc., with substantial values, resulting in significant capital needs. Equity capital is not enough to finance coal mining enterprises' capital needs. Thus, companies mobilize capital from different sources, including loans from external credit institutions. Therefore, the authors collected data from coal joint stock companies under the Vietnam National Coal - Mineral Industries Holding Corporation Limited (Vinacomin) as a research sample to examine the relationship between financial leverage and firm value. The study results provide additional contributions in terms of academics and practice.

## 2. Literature review and hypothesis development

### 2.1. Literature review

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- Financial leverage and firm value have a positive relationship. According to Scott (1976), the theory of optimal capital structure has shown that in a company, there will be an optimal capital structure, which is a combination of debt and equity, whereby the cost of capital is the lowest, and the value of the enterprise is maximized. In addition to using equity, companies mobilize through loans and debt, showing that the company has used financial leverage in the process of enterprise operations. When a company borrows money, it has to pay interest, creating a tax shield for the enterprise and saving a part of the corporate income tax payable to the state. Hence, the value of the business increases with the increase in the use of financial leverage. The higher the leverage, the higher the company's profit. The more profits distributed to shareholders, the higher the stock price. According to Sutrisno et al. (2023), the company's stock price affects the value of the enterprise; the increase in stock price increases the value of the enterprise and vice versa. Vo Minh Long collected data from companies listed on the HSX in the period from 2008 to 2015 to research on the relationship between capital structure and firm value (Long, 2017). The research result: financial leverage is formed when an enterprise increases its borrowing capital because the interest creates a tax shield. The value of the enterprise will increase. Therefore, financial leverage has a positive relationship with the firm value (Le Hoang Vinh et al., 2022).

- Financial leverage and firm value exhibit an inverse relationship. There are many empirical studies conducted to investigate the relationship between financial structure and firm value, the results that the more a firm uses borrowed capital, the lower its operational performance. Anh & Thuy (2017) researched the impact of financial leverage on the performance of Vietnamese businesses with data collected from 100 companies listed on the Vietnam stock market during the period from 2012 to 2016. Research results have shown that financial leverage has a negative impact on corporate performance. When studying the relationship between

financial leverage and cement firm's profitability in VietNam stock exchange, collected data from the audited financial statements of 22 cement companies during the period from 2009 to 2016 (Thi Thuy Hanh, 2017). The result is the higher financial leverage is, the more profit decline, significant at the 1% level. Therefore, corporate managers should consider adjusting long-term debt levels with an increase in equity to enhance firm value. The lower the debt ratio, the higher the firm value. Financial leverage and firm value have an inverse relationship (Hung et al., 2019). According to the research results of Ibrahim (Ibrahim & Isiaka, 2020), financial leverage has a negative impact on corporate value and encourages recommend that company managers consider reducing long-term debt and increasing equity with the expectation of creating an increase in corporate value.

## 2.2 . Hypothesis development

Ibrahim & Isiaka (2020) studied the impact of financial leverage on firm value with evidence from a sample of selected firms listed on the Nigerian Stock Exchange. The study applies panel data analysis method using secondary data obtained from financial statements of selected companies in the period form 2014 to 2018. Research results shown: Financial leverage has a negative impact on firm value and recommends that company managers consider reducing long-term debt and increasing equity with the expectation of creating an increase in firm value.

Given that the cost of debt is often lower than that of equity capital, enterprises tend to incur higher debt levels. The reliance on debt also exposes enterprises to financial risks, and financial costs increase, reducing the company's profits and thereby reducing the value of the company. For businesses in the mining industry, assets are mainly fixed assets. This is one of the collateral assets for loans. Companies with many fixed assets tend to use more debt, thereby increasing financial leverage. According to trade-off theory, businesses using tangible assets as collateral will help reduce risks for creditors, and tangible assets can support businesses in reducing the costs of financial distress. The more



fixed assets a business has, the more its ability to borrow increases (Sarah et al, 2019) , which means the higher the financial risk.

Moreover, if the company's business is inefficient, the business cannot afford to pay costs and loans, which negatively affects the value of the business. Overuse of financial leverage can expose businesses to many risks and reduce business value, even leading to the risk of bankruptcy

Therefore, the authors propose a hypothesis that financial leverage has a negative impact on firm value.

### 3. Research methods and data

Based on the models studied by Le Hoang Vinh et al. (2022) and Anh chung et al. (2023)... with the above theoretical basis, the study establishes the following research model to test the hypothesis on the relationship between financial leverage and firm value:

$$GTDN_{it} = \alpha_0 + \alpha_i (DF Var)_{it} + \beta_i (Control Var)_{it} + \varepsilon (I)$$

**Table 1: Definition of variables in the research model**

| STT                           | Variable name          | Symbol | Measurement method                                                       | Source                                                                                                                        |
|-------------------------------|------------------------|--------|--------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| <b>A. Dependent variable</b>  |                        |        |                                                                          |                                                                                                                               |
| 1                             | Firm value             | GTDN   | Book value of debt + market value of equity / Total book value of assets | Hung et al. (2019)                                                                                                            |
| <b>B Independent variable</b> |                        |        |                                                                          |                                                                                                                               |
| 1                             | Financial leverage     | DF     | Debt to total assets                                                     | Hung et al. (2019), Arora & Gill (2022),                                                                                      |
| <b>C Control variables</b>    |                        |        |                                                                          |                                                                                                                               |
| 1                             | Tax                    | TAX    | Ratio of tax expense to total profit before tax                          | Arora & Gill (2022), Le Hoang Vinh et al. (2022)                                                                              |
| 2                             | Tangible Asset Ratios  | TANG   | Fixed assets to total assets of the company                              | Thi Van Trang & Thi Van Huyen (2021),                                                                                         |
| 3                             | Sales Growth           | GROWN  | Net revenue of the following year over net revenue of the previous year  | Long (2017) Khan & Qasem (2024)fixed and random effects regression, and feasible generalised least square (FGLS)              |
| 4                             | Return on total assets | ROA    | The ratio of firms' net income / Total assets                            | Anh chung et al. (2023), Khan & Qasem (2024)fixed and random effects regression, and feasible generalised least square (FGLS) |
| 5                             | Economic development   | GDP    | Natural logarithm of GDP                                                 | Faradila & Effendi (2023)                                                                                                     |

Source: Author's own synthesis

The study uses data from coal joint stock companies under Vinacomin during 2014-2023 as a research sample. To ensure the scientific and

empirical nature of the sample selection process, companies with unusual or missing financial data and those under five years old are excluded. This study randomly selects 70 observations of coal joint stock companies under Vinacomin.

## 4. Results and discussion

### 4.1. Descriptive statistics

Table 2 shows that low-value companies account for a relatively large proportion of the research sample.

**Table 2: Descriptive statistics of research variables**

| Variable | Obs | Mean      | Std.dev   | Min       | Max       |
|----------|-----|-----------|-----------|-----------|-----------|
| GTDN     | 70  | 0.9561559 | 0.5669424 | 0.7301123 | 5.594713  |
| DF       | 70  | 0.7810984 | 0.0822539 | 0.5664276 | 0.92063   |
| TAX      | 70  | 0.2316115 | 0.1376254 | 0         | 0.8045455 |
| TANG     | 70  | 0.5083719 | 0.3447816 | 0.0748099 | 2.985532  |
| GROWN    | 70  | 1.012944  | 0.2292524 | 0.0011746 | 1.463575  |
| ROA      | 70  | 0.1308993 | 0.0683099 | 0.0000382 | 0.291576  |
| GDP      | 70  | 5.74836   | 0.20467   | 5.453182  | 6.063785  |

Source: Author's calculation

Due to the nature of the enterprise in this sector requiring the use of very valuable fixed assets, companies need to mobilize capital from borrowing from individuals and organizations inside and outside the enterprise. Therefore, the debt ratio of coal joint stock companies mostly exceeds 50% of total capital.

### 4.2. Correlation analysis

Table 3 reveals that multicollinearity is not present in the research model.

**Table 3: Correlation matrix analysis**

| Variable | GTDN    | DF      | TAX     | TANG    | GROW   | ROA    | GDP    |
|----------|---------|---------|---------|---------|--------|--------|--------|
| GTDN     | 10.000  |         |         |         |        |        |        |
| DF       | 0.1642  | 10.000  |         |         |        |        |        |
| TAX      | -0.2071 | 0.0878  | 10.000  |         |        |        |        |
| TANG     | 0.0885  | 0.3747  | -0.1246 | 10.000  |        |        |        |
| GROW     | 0.1302  | 0.2204  | -0.0601 | 0.0727  | 10.000 |        |        |
| ROA      | -0.0559 | -0.0499 | -0.1929 | -0.0776 | 0.1703 | 10.000 |        |
| GDP      | 0.1282  | 0.0678  | -0.1449 | -0.0156 | 0.0751 | 0.2698 | 10.000 |

Source: Author's calculation

### 4.3. Regression results and discussion

To evaluate the impact of financial leverage on the value of coal joint stock companies of Vinacomin, the authors performed regression with the research model (1) using Pooled model (OLS), Fixed effects model (FEM), and random effects model (REM). Then conduct the Hausman

test and Breusch - Pagan LM test to choose the suitable model for the study.

Findings presented in Table (4) reveal the F-Test result of  $F(6.54) = 57.08$ ,  $\text{Prob} > F = 0.0000$ , so the Pool OLS model should not be used. The authors performed the Hausman Test with  $\text{Chi}^2(6) = 7.37$ ;  $\text{Prob} > \text{chi}^2 = 0.2879$ , showing that the REM model is more optimal than the FEM model. However, variable error variance exists when testing the defects of serial correlation and variable error variance. Therefore, to address the defects of the model, the authors employed the generalized least squares (GLS) model.

The regression results reveal a statistically significant negative correlation between the dependent variable (financial leverage) and firm value. The results of the GLS method are shown in column (1) of Table 4. The correlation coefficient between financial leverage and the value of coal joint stock companies is  $\alpha = -1.570$ , with a statistical significance of 1%. This finding indicates that borrowing is associated with a decrease in the value of coal joint stock companies. The results support the hypothesis proposed by the research, showing that financial leverage negatively correlates with firm value. The research results align with the conclusion of (Hung et al., 2019). Furthermore, since the business lines of the research enterprises are coal mining, their fixed assets in enterprises are often of great value and have a long payback period, requiring a large amount of investment capital. Therefore, these enterprises tend to increase their borrowing, leading to increased financial costs and reduced after-tax profits, as reflected in the financial statements. For joint stock companies, declining profits affect the psychology of investors. Investors may choose to withdraw their capital, leading to a decrease in the companies' stock prices, and a decrease in the value of the enterprises. The use of borrowed capital is related to the emergence of interest expenses, which are not fixed amounts, as interest rates fluctuate depending on market conditions. So, if the borrowed capital increases, the debt-to-equity ratio rises, and the interest rate on the

loan is higher, the business efficiency of the enterprise decreases. When companies borrow for an extended period, they may encounter rising costs due to poor management and challenging conditions in the consumer market, which can elevate their financial risks, thereby reducing their value. Therefore, businesses that want to survive and develop, increasing firm value need to effectively mobilize capital in a timely manner and utilize funding sources efficiently. Therefore, flexibility in capital structure policies is essential for all businesses, aiming to minimize costs and maximize profits, while appropriately utilizing funding sources. To effectively leverage financial leverage in the most appropriate way, businesses should base their efforts on building an optimal capital structure - a capital structure is the best mix of debt and equity financing that maximizes a company's market value while minimizing its cost of capital. Determining the Optimal Capital Structure, The enterprise relies on the optimal leverage ratio of leading industry companies to determine its own financial leverage. In addition, each year the company needs to determine the marginal cost of capital to choose the capital structure for the business.

The coefficient of fixed asset ratio is positive, showing a positive relationship with the value of the enterprise. The result in column (1) of Table 4 is 1.574, showing a positive impact on the value of joint stock companies, with a statistical significance of 1%. According to the trade-off theory, the larger the proportion of fixed assets in a business, the more assets the business has that can be used as collateral, thereby reducing the likelihood of bankruptcy. At the same time, the business has more investment opportunities, mobilize more capital for the for the business, contributing to an increase in the value of the business. According to the pecking order theory, the larger the proportion of fixed assets, the less the issue of information asymmetry, and the lower the costs related to agency problems, which contributes to increasing the value of the enterprise. For coal mining enterprises, business efficiency depends mainly on machinery and equipment technology. Due to the specific

business lines of coal companies, the more modern the machinery and equipment, the higher the labor productivity and the better the enterprise performance. The larger the company's size, the more assets the company owns, the stronger the financial potential, so the research results are appropriate.

The coefficient of Sales Growth variable is positive, 0.264, and statistically significant at the 5% level, indicating that the Sales Growth has a positive relationship with Firm value. Enterprises with more significant growth have stronger financial potential.

**Table 4: Relationship between financial leverage and the value of coal joint stock companies by gls, fem, and rem methods**

|              | (1)<br>GLS                             | (2)<br>FEM          | (3)<br>REM          |
|--------------|----------------------------------------|---------------------|---------------------|
| DF           | -1.570***<br>(-4.56)                   | -1.752**<br>(-4.63) | -1.570*<br>(-4.33)  |
| TAX          | -0.208<br>(-1.08)                      | -0.249<br>(-1.01)   | -0.208*<br>(-1.03)  |
| TANG         | 1.574***<br>(19.55)                    | 1.616***<br>(17.24) | 1.574***<br>(18.55) |
| GROW         | 0.264**<br>(2.30)                      | 0.224<br>(1.24)     | 0.264**<br>(2.18)   |
| ROA          | -0.533<br>(-1.35)                      | -0.0734<br>(-0.15)  | -0.533<br>(-1.28)   |
| GDP          | 0.445***<br>(3.44)                     | 1.370<br>(0.62)     | 0.445***<br>(3.26)  |
| _cons        | -1.323*<br>(-1.75)                     | -6.531<br>(-0.51)   | -1.323*<br>(-1.66)  |
| N            | 70                                     | 70                  | 70                  |
| F-Test       | F(6,54) = 57.08    Prob > F = 0.0000   |                     |                     |
| Hausman Test | Chi2(6) = 7.37    Prob > chi2 = 0.2879 |                     |                     |

Note : \*, \*\* and \*\*\* represent statistical significance at 10% level , 5% and 1%

In addition to the micro factors of the enterprise, there is also a macro factor affecting firm value, which is the development of the economy. When the economy grows rapidly, it creates favorable conditions for businesses to operate more efficiently. The study uses the value of the gross domestic product index to reflect Vietnam's economic environment, which affects the value of coal mining companies. The coefficient of economic development is 0.445 and statistically significant at 1%, indicating an influence of economic development on firm value; when the economy develops, the value of the enterprise also increases (Thi Van Trang

& Thi Van Huyen, 2021). Hence, the return on total assets to the firm value is not statistically significant, showing that the influence of and the return on total assets on firm value is negligible.

### Conclusion

The study used a panel data regression model to examine the relationship between financial leverage and firm value of companies participating in the Vietnamese stock market. The research results reveal an inverse relationship between financial leverage and firm value of coal joint stock companies of Vinacomin during 2014 - 2023. Therefore, in the coming time, coal mining companies need to adjust their capital structure to increase the equity and financing capacity of the enterprise. Companies must fully exploit retained profits and develop a reasonable profit distribution policy, especially retained profits for reinvestment. In addition, to increase equity, coal joint stock companies can consider options for raising additional capital, such as issuing additional shares and calling for additional capital contributions from joint ventures and associations.

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# THE DEVELOPMENT STRATEGIES FOR ACCOUNTING EDUCATION IN ARTIFICIAL INTELLIGENCE ERA

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**Abstract:** *Along with clarifying definitions of artificial intelligence (AI) in the context of accounting, the research focuses on both impacts of artificial intelligence on accounting education and propose development strategies of accounting education in the background of AI. To achieve the objectives of the study, this article used a qualitative approach that involved a systematic previous literature review to synthesise relevant published books and journals towards understanding the influences of AI on accounting education as well as viable remedies of accounting education in the age of AI. This study uniquely contributes to hot academic debate on the impact of the integration of AI into accounting education.*

• Keywords: accounting education, artificial intelligence, challenges, opportunities, artificial intelligence in education.

JEL code: M40

Date of receipt: 25<sup>th</sup> Jan., 2026

Date of delivery revision: 04<sup>th</sup> Mar., 2026

DOI:

Date of receipt revision: 20<sup>th</sup> Mar., 2026

Date of approval: 30<sup>th</sup> Mar., 2026

## 1. Introduction

The rapid advancement of artificial intelligence (AI) has profoundly impacted countless professions, including accounting. With capabilities in machine learning, natural language processing and big data analytics, AI has opened spectacular opportunities to enhance the efficiency and quality of accounting work. Hence, studies have shown that the “Big 4” accounting firms - KPMG, PwC, EY, and Deloitte - have heavily invested in technological innovation and are using AI in various ways in accounting and auditing (Tandiono, 2023). Undoubtedly, AI performs a number of daily professional tasks of accountants. According to the McKinsey Global Institute (2023), approximately 50% of activities in the accounting sector could be automated through AI technologies in the next decades. The report also notes that AI will not only replace manual tasks but also transform the role of accountants from record-keepers to analysts and strategic advisors. Evidently, with its ability to process information accurately and handle large databases, AI reduces errors and enhances data analysis efficiency. The combination of human intelligence and AI capabilities promises to elevate the accounting profession, contributing to improved business performance and economic growth.

Notwithstanding, accountants are subjected to numerous challenges like job displacement, requirements for advanced technological skills and continuous training, ethical and data security concerns, investment costs and technological barriers. To harness AI as a powerful support mechanism rather than allowing it to become a threat to the profession training programs that equip accounting students with core knowledge and soft skills in the context of AI adoption in accounting activities are essential. Hence, the urgent need to prepare accounting workforces equipped with appropriate skills becomes incredibly vital in the current context.

The advances in adopting AI in accounting practices and improvement in AI's ability in answering accounting questions call for changes in accounting education to embrace AI. There are already attempts to incorporate AI into accounting education. However, there remains limited understanding of the extent to which accounting scholars have examined its implications for accounting education. Moreover, the rapid advancement of technology and the increasing adoption of AI in accounting sector have led employers to favour graduates who possess strong technological competencies, including AI-related skills. Furthermore, the degree to which current Vietnamese accounting education aligns with

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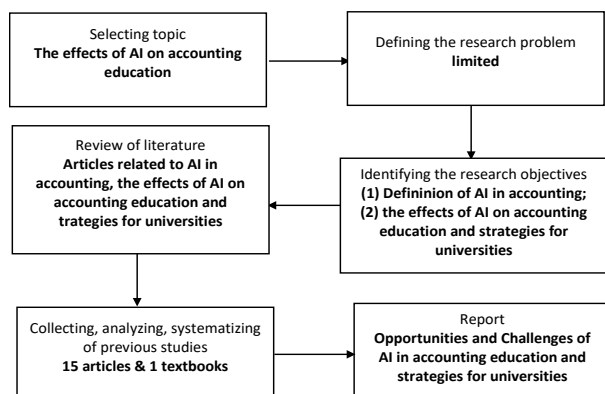
these evolving industry expectations remains unclear. To bridge this gap, this study aims to examine impacts of AI on accounting education consisting of both challenges and opportunities. Based on that, the research proposes viable strategies for universities regarding accounting education in the era of AI.

## 2. Research methodology

The articles were identified through comprehensive searches in various academic databases, including Google Scholar, ScienceDirect, Web of Science, and Scopus, resulting in a total of 37 initial records identified. The search terms used included combinations of keywords such as “artificial intelligence,” “accounting education,” “Challenges,” “opportunities,” and “AI integration in education.

After reading the related materials, 15 articles and 1 textbooks were chosen that fit with the aims of the present issues about definitions of AI in accounting, effects of AI on accounting education as well as viable remedies for accounting education at universities. The research process is described as Figure1 below:

**Figure 1: The research process**



Source: Created by the author

## 3. Research findings

### 3.1. Defininions of artificial intelligence in accounting

Beryl Odonkore et al., (2023) stated that Artificial Intelligence (AI) in accounting encompasses a wide range of technologies that are fundamentally reshaping how financial information is processed, analyzed, and utilized. Rather than simply automating routine tasks, AI represents a profound shift in the way organizations manage financial data and make strategic decisions. At its

core, AI in accounting refers to the application of machine learning, natural language processing, and other advanced computational techniques to enhance and streamline accounting operations. These technologies enable accountants to analyze vast amounts of financial data with exceptional speed and precision, offering insights that would be difficult or even impossible to obtain using traditional methods. The integration of AI in accounting also extends to robotic process automation (RPA), which automates repetitive and routine tasks. RPA in accounting can handle tasks like data entry, reconciliation, and report generation, freeing up human accountants to focus on more strategic activities.

Machine learning, a crucial subset of AI, plays a particularly transformative role. It involves algorithms that learn from historical data to make predictions and informed decisions. In accounting, machine learning models are widely used for tasks such as fraud detection, risk assessment, and financial forecasting (Zakaria, 2021). As these models continually refine their accuracy through exposure to more data, they produce increasingly reliable and meaningful analyses, thereby enhancing the quality of financial decision-making.

Natural language processing (NLP) is another critical component of AI in accounting. NLP technologies enable computers to understand, interpret, and generate human language. In the context of accounting, NLP is used to analyze unstructured financial data, such as reports and documents, facilitating more efficient data processing and compliance monitoring (Kovalenko et al., 2021).

### 3.2. The impact of artificial intelligence on accounting education

Recent studies indicate that integrating AI technologies into accounting education not only enhances learning outcomes but also equips students more effectively to meet the evolving demands of the accounting profession. According to Lan Zhang et al. (2021), for decades, traditional accounting education has functioned as the principal conduit for preparing qualified professionals. Yet, the advent of the artificial intelligence (AI) era has triggered a stark divergence between the skills cultivated through conventional training and those demanded by today's digital economy.

The practice of manual ledger entry is now unequivocally antiquated, while mastery of computerized accounting systems has become indispensable. Unfortunately, the trajectory of current accounting curricula has not kept pace with these technological innovations, resulting in educational frameworks that lag markedly behind the evolving professional landscape. In this context, the structural deficiencies of existing programs are both evident and concerning. The study indicated that in an era where AI, big data, and financial sharing have become the defining pillars of corporate finance, academic curricula remain paradoxically stagnant.

Despite these technological shifts, manual accounting continues to occupy a disproportionately large share of practical coursework in universities. While it is true that many institutions have initiated the digitization of instruction by integrating accounting softwares, this effort is insufficient. Critical, cutting-edge concepts like Shared Financial Centers and intelligent robotic process automation are notably absent from the student syllabus. If educational institutions fail to align their programs with the contemporary pace of industry evolution, graduates will face significantly inflated learning costs upon entering the workforce, as they will require extensive retraining. Furthermore, this misalignment heightens the risk of post-graduation unemployment and diminished professional competitiveness. Ultimately, such failures erode the institution's societal standing, perpetuating a vicious cycle of reputational decline.

IFAC indicates that AI exerts a profound influence on accounting students by enabling them to access unprecedented knowledge and skill sets, thereby enhancing the overall effectiveness of the learning process. Traditional classrooms often struggle to address the individual learning needs of students due to time limitations and large class sizes. However, AI can continuously analyse data and deliver personalized learning experiences by identifying students' weaknesses, detecting areas where they face difficulties through diagnostic assessments, and providing additional practice tailored to those specific needs. The integration of AI into accounting and auditing training, while highly promising, also presents several notable challenges. One major concern is that AI systems

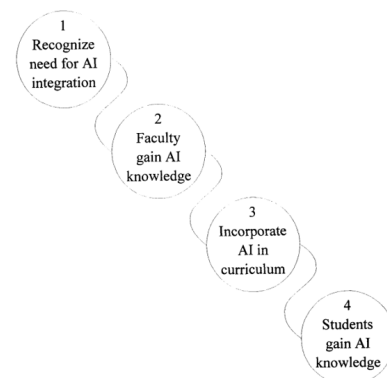
may inadvertently reinforce biases embedded in their training data, potentially leading to unfair or unreliable outcomes. It is also argued that although AI can significantly enhance the training process, it might simultaneously foster an excessive level of dependence among learners. Furthermore, the use of AI raises serious questions regarding data privacy and security, prompting educators and institutions to reconsider how sensitive information is collected, stored, and protected.

### 3.3. The development strategy of accounting education in the context of AI

The use of AI in accounting education has important implications for a broad array of stakeholders, particularly universities. Several remedies should be taken into serious account to address the challenges in accounting education.

*For universities:*

**Figure 1. Steps for integrating AI into the accounting curriculum**



*Source: Brown et al., 1995*

- Integrating artificial intelligence into the accounting curriculum: Universities should update accounting curricula to include AI concepts, AI applications in accounting, data analytics, and programming. Alongside technical improvements, soft skills such as critical thinking, teamwork, communication, and natural language processing should be reinforced. Ethics education already central to the accounting profession must also be updated to address issues arising from AI use. Four steps can be followed to integrate AI into the curriculum (Figure 1). First, faculty must recognize the need for AI integration, that is, the need for future accountants to become familiar with AI. Second, faculty must become informed about AI. One of the biggest barriers

to change is the lack of accounting educator knowledge about AI. Third, knowledgeable professors and departments can then intelligently implement appropriate changes to the accounting curriculum. Fourth, the enlightened professors and the changes in the curriculum will affect student knowledge about AI.

- Strengthening teacher training in the era of artificial intelligence: Teachers constitute the core strength of higher education institutions and serve as the primary guarantee of quality in accounting education. In the rapidly evolving era shaped by new technological waves, colleges must continue to enhance teacher development and training. Students' access to up-to-date knowledge depends largely on how quickly teachers can acquire and master emerging concepts. Therefore, colleges should remove the disciplinary barriers that exist between different courses, enabling financial accounting teachers to gain expertise in management accounting and vice versa, thereby improving the overall quality of instruction across both fields. Moreover, educational institutions should organize training programs that bring together all faculty members to study intelligent, information-based accounting systems, with the goal of building an interdisciplinary teaching team equipped with advanced, technology-driven knowledge.

- Strengthening corporate partnerships: universities should organize dialogue sessions, seminars, and guest lectures with industry professionals. Internship opportunities must be expanded to provide real-world experience. Business feedback should inform curriculum development, and training agreements should be established to ensure graduate competencies align with employer expectations. Along with that, Furthermore, institutions should actively invite distinguished professors, successful entrepreneurs, and seasoned practitioners to deliver lectures and share their industry insights, thereby guaranteeing that both faculty and students remain abreast of the latest trends in the accounting sector. Consequently, modern concepts such as artificial intelligence and big data can be effectively integrated into the curriculum of every semester.

- Changing appraisal methods: It is vital to

emphasize the integration of theory and practice. Obviously, the current appraisal method, which combines routine performance with a final examination to determine the student's final grade, often results in a deficiency of practical experience and neglects the cultivation of comprehensive student qualities. In contemporary society, given the rapid proliferation of Artificial Intelligence (AI), the accounting industry now necessitates a significantly higher standard of comprehensive competency from its practitioners. Therefore, the format for calculating students' final grades should be redesigned, specifically by reducing the weighting of final exam scores and incorporating practical application. This entails constructing a multivariate grading system composed equally of theoretical knowledge and practical skill. Furthermore, students' acquisition of necessary professional qualification certificates such as those in basic accounting, registered accountancy, and tax can be incorporated as part of the overall performance evaluation. Professional knowledge competitions should also be factored into the assessment process.

- Enhancing learning resources and self-Study capacity: The university should equip students with AI-related software, online learning platforms, and accounting tools to promote experimentation and independent research. Self-study is essential in an AI-driven environment. Competitions and project-based learning activities should be organized to encourage applied research and knowledge integration

#### *For lecturers*

Transforming pedagogical models and embracing innovation are crucial as AI becomes increasingly integrated into education. In many universities, accounting instruction still relies heavily on basic presentation software, a practice that often results in slow and ineffective knowledge absorption among students. A forward-looking approach requires adopting a new perspective specifically, establishing an informatized teaching platform that enhances accessibility for learners. Such a platform can deliver course materials, lectures, and assignments directly to students' mobile devices through web-based systems or dedicated applications.

Furthermore, incorporating incentive

mechanisms, such as a barrage-style real-time comment and reward system, promotes immediate interaction between teachers and students across multiple digital environments. This innovative model not only enables students to track their academic performance conveniently but also significantly increases their motivation and engagement. From the instructor's standpoint, these platforms, supported by Big Data analytics, provide comprehensive insights into students' backgrounds, learning attitudes, and mastery of course content. As a result, teachers can refine their instructional strategies and gradually build a repository of more effective teaching practices. Ultimately, this collaborative, data-driven process facilitates continuous improvement for both educators and learners.

#### 4. Conclusion

Based on the aforementioned facts, it can be inferred that AI has transformed a wide range of industries, including accounting. Although interest in the influence of AI on the accounting profession has grown rapidly, there remains limited clarity regarding the extent to which this topic has been explored within accounting education. Against this backdrop, the study investigates influences of AI on accounting education. This study uniquely contributes to hot academic debate on the impact of the integration of AI into accounting education. The study's findings potentially to provide accounting educators, and other similar diiplines, with valuable insights to optimize the potential of AI in fostering education quality in the context of AI.

The paper focus on clarifying viable solutions for Vietnamese universities to educate accounting workforces effectively in the age of AI regarding related parties, particularly universities. Integrating artificial intelligence into the accounting curriculum and enhancing teacher training are crucial steps to modernize education. In addition, enriching learning resources, strengthening corporate partnerships, and innovating assessment methods collectively help learners develop stronger practical skills. These measures ensure that training programs remain relevant and responsive in the AI-driven era.

Future research could prioritise the development and implementation of more

contemporary accounting curricula, particularly those that integrate emerging technologies such as artificial intelligence. This may involve examining the effectiveness of various pedagogical approaches for embedding AI into accounting education, as well as identifying strategies that can better engage students with AI-related tools and concepts.

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# SCALE AND GROWTH IN CAPITAL SOURCES OF LOGISTICS SERVICE BUSINESSES LISTED ON THE VIETNAM STOCK EXCHANGE

MSc. Hoang Thi Thuy Hang\*

**Abstract:** *This research conducts a comprehensive evaluation of the growth dynamics and structural shifts in the capital scale of listed logistics service (LLS) enterprises on the Vietnamese stock exchange over the volatile five-year period from 2020 to 2024. Utilizing descriptive statistical methods, the study meticulously examines the disparities in capital mobilization and accumulation by employing a dual-classification framework based on firm size and business specialization. Specifically, the sample is bifurcated using a total asset threshold of 1,000 billion VND to facilitate a comparative analysis between 20 Large-Scale Businesses (LSB) and 38 Small-Scale Businesses (SSB), thereby uncovering the degree of financial polarization within the industry. Furthermore, the study accounts for the inherent operational diversity of the logistics sector by categorizing 58 enterprises into three distinct sub-sectors: Transportation (TRA), Warehousing (WAR) and Transportation Support (TRASP). By synthesizing these empirical observations through the lens of average capital values and comparative indicators, the research provides nuanced insights into the current financial health of the industry, identifying key trends in leverage patterns and internal resource development that are essential for sustaining competitiveness in the modern economic landscape.*

• Keywords: capital scale, capital structure, retained earnings, vietnam stock market.

Date of receipt: 25<sup>th</sup> Jan., 2026

Date of delivery revision: 04<sup>th</sup> Feb., 2026

DOI:

Date of receipt revision: 20<sup>th</sup> Mar., 2026

Date of approval: 30<sup>th</sup> Mar., 2026

## 1. Introduction

Along with the rapid expansion of e-commerce and international trade, demand for transportation and logistics services has increased substantially, making the logistics industry a key driver of economic development. In this context, the ability of logistics enterprises to mobilize and manage capital effectively has become increasingly critical for sustaining growth, improving service capacity, and enhancing competitiveness.

However, logistics enterprises differ significantly in terms of firm size and business characteristics, leading to substantial variation in capital requirements and financial structures. Large-scale firms, particularly in capital-intensive segments such as transportation, often require substantial financial resources to invest in fleets, infrastructure, and technology, while small-scale firms and asset-light service providers typically operate with more modest capital bases and different financing strategies. These structural differences imply that capital scale and capital composition cannot be uniformly assessed across the industry.

Against this backdrop, this study examines the differences in the scale and structure of capital sources among logistics service enterprises listed on the Vietnamese stock market, with a particular focus on firm size and business segment. By comparing capital development across these groups, the study aims to provide empirical evidence on financial polarization, leverage patterns, and internal capital accumulation within the logistics sector.

## 2. Literature review

Forbes (2007b) finds that smaller enterprises faced considerable financial constraints to expand the size of capital for the particular situation of the Chilean encaje, and that these constraints diminished with firm size. An additional group of empirical research focuses on the connection between gaining capital and the size of the company. Bekaert et al. (2011) show that the loss of capital constraints positively impacts capital stock growth. With an emphasis on Eastern European nations, Larraín and Stumpner (2017) discover that capital expansion boosts overall productivity by facilitating a more effective distribution of capital among enterprises

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and creating more earnings after tax, which leads to better capital gain.

Some research falls into the larger category of micro-to-macro literature agenda. Generally, different companies with a wide range of policies or other factors that cause input misallocation across different fields can be studied and quantified using models of heterogeneous firms (Hopenhayn and Rogerson, 1993). Financial capital expansion can significantly skew the allocation of productive elements, as Buera et al. (2011) demonstrated in a model with sectors that vary in their degree of financial dependency. In a model with one old and one modern productive sector, new technologies lead to misallocation, resulting in less capital expansion, as suggested by Midrigan and Xu (2014). Evidence from Chen and Irarrázabal (2015) suggests that financial character may have a significant role in explaining Chile's output and capital-expanding

### 3. Data and method

The study uses data collected from publicly announced financial statements combined with analysis of annual reports of businesses to understand the actual business situation associated with the fluctuations of businesses. data

When divided by size, listed enterprises in the industry are divided according to the 1,000 billion mark. With this division milestone, 58 listed enterprises in the industry are divided into 20 small enterprises and 38 large enterprises.

When divided by business lines, there are 3 main industry groups: the transportation industry, the warehousing industry and the transportation support industry with the number of companies being 23, 13 and 22 enterprises respectively.

### 4. Research results

#### 4.1. Scale of capital sources

##### 4.1.1. Scale of Total Capital

**Table 4.1. Average total capital size of LLS companies on the Vietnamese stock market during the period 2020 - 2024 (Billion VND)**

|       | 2020     | 2021     | 2022     | 2023      | 2024      | 5-year A |
|-------|----------|----------|----------|-----------|-----------|----------|
| OM    | 3,023.48 | 3,326.18 | 3,737.27 | 4,142.85  | 4,602.74  | 3,766.51 |
| SSB   | 338.56   | 360.00   | 342.56   | 380.03    | 421.67    | 368.56   |
| LSB   | 7,416.99 | 8,179.92 | 9,292.26 | 10,300.20 | 11,444.50 | 9,326.78 |
| TRA   | 6,237.33 | 6,727.51 | 7,504.54 | 8,307.94  | 9,196.73  | 7,594.81 |
| WAR   | 1,041.62 | 1,270.15 | 1,250.88 | 1,497.15  | 1,680.26  | 1,348.01 |
| TRASP | 834.64   | 985.17   | 1,268.00 | 1,351.81  | 1,526.87  | 1,193.30 |

Source: Compiled by the author

Vietnam's logistics market exhibits a pronounced financial polarization, as large-scale firms possess average asset sizes dozens of times greater than those

of small-scale firms, despite the numerical dominance of small enterprises. The presence of major aviation companies such as Vietnam Airlines (HVN) and VietJet Air (VJC), with total assets amounting to tens of thousands of billion VND, significantly elevates the industry-wide average, reflecting the highly capital-intensive nature of the transport sector. This massive asset base acts as a critical financial lever, enabling large-scale firms to enjoy superior access to large credit facilities, bond issuance, and capital mobilization through the stock market to finance cross-border infrastructure investment projects.

Financial capacity is determined not only by absolute capital size but also by asset structure shaped by sectoral characteristics. The transport sector leads in capital scale due to the requirement to own high-value fixed assets such as aircraft and vessels, which in turn generates substantial depreciation expenses and debt management pressures, directly affecting short-term liquidity. In contrast, the warehousing and logistics support segments, with lower average capital levels, tend to adopt asset-light business models, allowing greater financial flexibility, lower liquidity risk, and stronger resilience to adverse market shocks.

#### 4.1.2. Scale of Debts

**Table 4.2. Average size of borrowed capital of LLS companies on the Vietnamese stock market during the period 2020 - 2024 (Billion VND)**

|       | 2020    | 2021     | 2022     | 2023     | 2024     | 5-year A |
|-------|---------|----------|----------|----------|----------|----------|
| OM    | 1,942.3 | 2,242.56 | 2,761.92 | 3,176.82 | 3,302.89 | 2,685.3  |
| SSB   | 103.49  | 114.61   | 88.32    | 114.75   | 141.11   | 112.46   |
| LSB   | 4,951.4 | 5,724.67 | 7,136.89 | 8,187.47 | 8,476.70 | 6,895.4  |
| TRA   | 4,379.1 | 4,914.02 | 6,184.51 | 7,109.90 | 7,330.46 | 5,983.6  |
| WAR   | 382.73  | 469.00   | 363.58   | 536.40   | 643.93   | 479.12   |
| TRASP | 316.47  | 497.69   | 600.95   | 625.21   | 663.44   | 540.75   |

Source: Compiled by the author

The period from 2020 to 2024 witnessed a continuous increase in the overall debt level, reflecting the significant capital needs to maintain operations and recover from the pandemic. However, financial capacity showed a clear differentiation: while small businesses maintained a safe financial structure with debt accounting for only about one-third of total capital, large businesses were heavily reliant on borrowed capital (up to 65%).

The disparity in financial capacity becomes even more apparent when considering industry specifics, where the Transportation group records an overwhelmingly high level of debt, 10 to 20 times greater than the Warehousing and Transportation Support group. Due to the capital-intensive nature of investing in expensive vehicles, transportation businesses are forced to accept higher financial

risks to maintain competitiveness. Conversely, the Warehousing and Transportation Support group, with significantly lower debt levels, demonstrates a healthy financial structure, giving these businesses better financial leeway to withstand market shocks or easily adapt their business models when necessary.

#### 4.1.3. Scale of equity capital

**Table 4.3. Average size of equity capital of LLS companies on the Vietnamese stock market during the period 2020 - 2024 (Billion VND)**

|       | 2020     | 2021     | 2022     | 2023     | 2024     | 5-year A |
|-------|----------|----------|----------|----------|----------|----------|
| OM    | 1,081.12 | 1,111.93 | 984.01   | 966.03   | 1,303.40 | 1,089.30 |
| SSB   | 235.07   | 247.93   | 254.23   | 265.25   | 280.56   | 256.61   |
| LSB   | 2,465.56 | 2,525.77 | 2,178.19 | 2,112.76 | 2,977.13 | 2,451.88 |
| TRA   | 1,858.24 | 1,774.87 | 1,320.03 | 1,198.04 | 1,866.26 | 1,603.49 |
| WAR   | 658.89   | 808.21   | 887.30   | 960.76   | 1,036.33 | 870.30   |
| TRASP | 518.17   | 598.33   | 689.85   | 726.59   | 872.76   | 681.14   |

Source: Compiled by the author

The overall equity capital of the sample showed unstable fluctuations, particularly a sharp decline in 2022-2023 before recovering in 2024, indicating that the internal financial capacity of logistics businesses was significantly impacted by previous business losses. The differentiation continued, with large-scale businesses possessing nearly 10 times more equity capital than small-scale businesses. However, while the small-scale group accumulated equity capital steadily and sustainably year after year, the large-scale group showed significant instability in its capital structure, reflecting the challenges faced by large businesses in preserving capital amidst negative global market fluctuations.

By sector, the Transportation group, despite holding the largest equity capital, recorded a significant decline in average value from 2020 to 2023 (a decrease of nearly 35%) due to accumulated losses, significantly eroding its financial capacity and self-sufficiency. Conversely, the Warehousing and Transportation Support group demonstrated very positive financial health with continuously growing equity capital over the years. This shows that warehousing and support businesses not only have a good ability to self-finance their investments but also maintain a safe financial foundation, less dependent on external debt compared to capital-intensive transportation businesses.

#### 4.1.4. Scale of owner's equity

**Table 4.4. Average size of owner's equity capital contributions of LLS companies on the Vietnamese stock market during the period 2020 - 2024 (Billion VND)**

|     | 2020     | 2021    | 2022     | 2023    | 2024     | 5 year A |
|-----|----------|---------|----------|---------|----------|----------|
| OM  | 861.11   | 886.82  | 903.39   | 928.85  | 991.93   | 914.42   |
| SSB | 142.54   | 149.86  | 154.05   | 165.98  | 172.05   | 156.90   |
| LSB | 2,036.97 | 2,092.7 | 2,129.57 | 2,177.1 | 2,333.55 | 2,154.01 |

|       | 2020     | 2021    | 2022     | 2023    | 2024     | 5 year A |
|-------|----------|---------|----------|---------|----------|----------|
| TRA   | 1,764.02 | 1,775.9 | 1,778.17 | 1,780.2 | 1,846.84 | 1,789.05 |
| WAR   | 319.64   | 360.45  | 364.87   | 412.88  | 433.53   | 378.27   |
| TRASP | 237.13   | 268.29  | 307.06   | 343.62  | 428.14   | 316.85   |

Source: Compiled by the author

The disparity in financial capacity between the groups is significant, with the capital contribution of the large-scale group being nearly 14 times greater than that of the small-scale group (SSB). While the SSB group maintains a modest capital contribution of around VND 150 billion, limiting their ability to undertake groundbreaking investment projects, the LSB group possesses a solid charter capital foundation, creating a significant advantage in securing loans and establishing financial credibility in the international market.

In terms of sectors, the Transportation industry holds an absolute advantage in terms of capital contribution (averaging over VND 1,700 billion), reflecting the specific need for large "seed" capital to establish a fleet and infrastructure. A notable highlight is the Warehousing and Transportation Support sector, where capital contribution has grown rapidly (the Transportation Support group nearly doubled in 5 years), indicating a trend of shifting investment capital towards segments with more stable profit margins and lower risks. This steadily growing capital contribution serves as a crucial foundation for businesses to improve their financial safety ratios, reduce debt pressure, and create room for strategic capital increase plans in the future.

#### 4.1.5. Size of the development investment fund

**Table 4.5. Average size of development investment funds of LLS companies on the Vietnamese stock market during the period 2020 - 2024 (Billion VND)**

|       | 2020   | 2021   | 2022   | 2023   | 2024   | 5 year A |
|-------|--------|--------|--------|--------|--------|----------|
| OM    | 106.78 | 111.21 | 121.75 | 136.43 | 153.01 | 125.83   |
| SSB   | 32.79  | 32.79  | 36.85  | 38.15  | 40.21  | 36.16    |
| LSB   | 227.86 | 239.53 | 260.67 | 297.26 | 337.58 | 272.58   |
| TRA   | 130.78 | 141.27 | 148.58 | 164.24 | 184.59 | 153.89   |
| WAR   | 72.75  | 73.94  | 83.92  | 96.15  | 110.24 | 87.40    |
| TRASP | 101.80 | 101.80 | 116.05 | 131.16 | 145.26 | 119.21   |

Source: Compiled by the author

The differentiation in self-financing capacity is evident, with the large-scale group possessing nearly eight times the fund size of the small-scale group (SSB).

By sector, the Transportation industry leads in accumulated fund value, reflecting the enormous need for reinvestment capital to maintain and modernize the fleet and vehicles. However, the Warehousing and Transportation Support group shows impressive fund accumulation rates, especially the Warehousing group with a fund growth of nearly 52% in just 5 years. This strengthens the sustainable financial capacity



of the support service groups, creating a high-quality “reserve capital” to readily seize new investment opportunities or cope with risks without weakening the core equity capital structure.

#### 4.1.6. Scale of retained earnings after tax

**Table 4.6. Average size of retained after-tax profits of LLS companies on the Vietnamese stock market during the period 2020 - 2024 (Billion VND)**

|       | 2020    | 2021     | 2022    | 2023    | 2024   | 5 year A |
|-------|---------|----------|---------|---------|--------|----------|
| OM    | (171.9) | (154.94) | 22.79   | 3.33    | 257.82 | (8.59)   |
| SSB   | 2.36    | 7.59     | 6.21    | 10.69   | 13.09  | 7.99     |
| LSB   | (479.0) | (441.32) | 52.00   | (9.65)  | 689.02 | (37.79)  |
| TRA   | (475.3) | (506.94) | (477.2) | (60.34) | 539.38 | (196.1)  |
| WAR   | 37.08   | 90.46    | 94.84   | 43.32   | 61.44  | 65.43    |
| TRASP | 21.77   | 68.04    | 503.03  | 46.25   | 79.51  | 143.72   |

Source: Compiled by the author

The retained earnings of the entire group showed extremely volatile fluctuations, clearly reflecting the ups and downs in the financial capacity of the logistics industry under the impact of global economic shocks. While the small-scale group maintained stable positive accumulation and consistent growth year after year, the large-scale group suffered heavy losses with deeply negative retained earnings in the initial period.

By sector, the Transportation industry is the focal point of financial risk, recording consistently negative retained earnings for the first four years, severely reducing equity capital and limiting self-financing capacity. Conversely, the Warehousing and Transportation Support group demonstrates sustainable financial capacity and impressive resilience with consistently positive retained earnings, creating a secure financial foundation. In particular, the breakthrough of the Transportation Support group in 2022 shows their ability to seize opportunities to increase accumulation, helping these businesses maintain a competitive advantage.

#### Conclusion

The analysis of capital sources of logistics service enterprises listed on the Vietnamese stock market during the period 2020-2024 reveals a highly differentiated financial structure across firm sizes and business segments, reflecting both structural characteristics of the industry and divergent financial strategies.

**First**, the results confirm a pronounced polarization in capital scale. Large-scale businesses dominate the industry in terms of total capital, borrowed capital, equity, and internal funds, largely driven by the capital-intensive nature of transportation activities.

**Second**, the capital structure of large-scale firms is characterized by high financial leverage. In contrast, small-scale firms and asset-light segments such as

warehousing and transportation support maintain more conservative debt ratios, contributing to stronger financial resilience.

**Third**, the evolution of equity capital and owner's equity contributions highlights contrasting patterns of financial sustainability. Large-scale and transportation enterprises experienced significant volatility in equity capital, especially during 2022-2023, reflecting the erosion of internal financial capacity due to accumulated losses. Meanwhile, warehousing and transportation support firms demonstrated steady and consistent growth in equity and contributed capital, underscoring their stronger self-financing capacity and lower dependence on external debt.

**Fourth**, the continuous growth of development investment funds across all groups signals a strategic shift toward strengthening internal capital accumulation. Large-scale firms maintain a clear advantage in absolute fund size; however, the rapid growth rate observed in warehousing and support services indicates improving long-term financial sustainability.

**Finally**, retained earnings after tax exhibit strong cyclicalities, reflecting the sensitivity of the logistics industry to global economic shocks. Large-scale and transportation firms suffered prolonged negative retained earnings in the early years, severely constraining internal financing capacity. The sharp recovery in 2024 marks an important turning point, helping to rebuild equity and restore investment potential. In contrast, warehousing and transportation support firms maintained consistently positive retained earnings, demonstrating superior resilience and more stable accumulation mechanisms.

Overall, the findings suggest the coexistence of two distinct financial development paths within Vietnam's logistics industry: (i) a capital-intensive, high-leverage growth model led by large transportation enterprises, accompanied by elevated financial risk; and (ii) a more balanced and sustainable growth model adopted by warehousing and logistics support firms, based on asset-light operations and steady internal capital accumulation.

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# OWNERSHIP STRUCTURE, TAX AVOIDANCE, AND FINANCIAL PERFORMANCE: EVIDENCE FROM LISTED FIRMS IN VIETNAM

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**Abstract:** *This study investigates the impact of ownership structure on firm financial performance, with tax avoidance acting as a mediating mechanism in the context of Vietnam. Using panel data from 426 non-financial firms listed on the Vietnamese stock market over the period 2015-2024, the study employs fixed-effects estimations to examine both the direct and indirect relationships among ownership structure, tax avoidance, and financial performance. The empirical results indicate that ownership structure exerts heterogeneous effects on corporate tax avoidance and firm performance. In particular, state ownership significantly reduces the level of tax avoidance, whereas institutional ownership and foreign ownership encourage tax planning strategies. Furthermore, tax avoidance exhibits a strong and statistically significant positive association with financial performance, suggesting that it serves as an important transmission channel through which ownership structure influences firm outcomes. These findings imply that tax avoidance may generate financial value when it operates under appropriate governance mechanisms and monitoring structures. The study contributes to the corporate governance literature by providing new empirical evidence on the behavioral channel linking ownership structure and firm performance in an emerging market setting.*

• Keywords: ownership structure; tax avoidance; financial performance; corporate governance; emerging markets.

JEL codes: G32; H26; G34; M41

Date of receipt: 25<sup>th</sup> Jan., 2026

Date of delivery revision: 04<sup>th</sup> Mar., 2026

DOI:

Date of receipt revision: 20<sup>th</sup> Mar., 2026

Date of approval: 30<sup>th</sup> Mar., 2026

## 1. Introduction

Firm financial performance represents a central indicator reflecting a firm's ability to create value and utilize resources efficiently. As such, it plays a critical role in the decision-making processes of key stakeholders, including shareholders, investors, creditors, and government authorities. Over the past decades, the relationship between ownership structure and firm financial performance has been widely examined in the corporate governance literature. However, empirical findings remain inconclusive. Prior studies suggest that ownership structure may influence financial performance through monitoring mechanisms and managerial incentives, yet the direction and magnitude of these effects vary significantly across different types of ownership. In addition, most existing studies primarily focus on the direct relationship between ownership structure and financial performance, while the underlying mechanisms through which ownership structure affects firm outcomes remain insufficiently explored.

Tax avoidance has emerged as a potentially important intermediate mechanism that reflects managerial strategic choices when balancing

short-term financial benefits and long-term risks. Although tax avoidance may enhance cash flows and increase after-tax profits, its impact on financial performance is not uniform and appears to depend heavily on ownership structure and the broader corporate governance environment, particularly in emerging markets. Consequently, empirical evidence regarding the mediating role of tax avoidance remains fragmented and inconclusive.

Addressing this research gap, this study examines both the direct and indirect effects of ownership structure on the financial performance of non-financial firms listed on the Vietnamese stock market, with tax avoidance considered as a mediating variable. Specifically, the study investigates how different forms of ownership shape firms' tax avoidance behavior and how this behavior subsequently influences financial performance. By doing so, the study contributes additional empirical evidence to the corporate governance literature in emerging economies. Furthermore, the findings provide important implications for corporate managers and policymakers in designing effective governance mechanisms and tax policies that balance the

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objectives of financial performance improvement and long-term sustainability.

## 2. Literature review and hypothesis development

In the context of an increasingly institutionalized market economy, ownership structure has been widely recognized as a core governance mechanism shaping managerial behavior and corporate outcomes. The distribution of ownership among the state, managerial shareholders, institutional investors, and foreign investors not only influences the monitoring of managers but also shapes strategic decisions related to resource allocation and cost management, thereby affecting firm financial performance.

International empirical evidence suggests that ownership structure plays an important role in determining financial performance; however, the direction and magnitude of this relationship remain inconclusive. More recent evidence from Nie and Ye (2022) confirms a nonlinear relationship between state ownership and financial performance and shows that foreign ownership improves performance only up to a certain threshold before the effect begins to decline. In complex ownership environments, Yurtoglu (2000) finds that firms operating under pyramid ownership structures tend to exhibit lower financial performance because excessive control rights relative to cash flow rights increase agency costs. These findings suggest that the impact of ownership structure on financial performance is not universal but depends on ownership type and the degree of control concentration.

The mixed empirical evidence discussed above implies that the relationship between ownership structure and financial performance may not operate solely through direct effects but may also be transmitted through internal strategic decisions within firms. From the perspective of agency theory, an increase in managerial ownership aligns the interests of managers with those of shareholders, thereby encouraging decisions that maximize firm performance. In contrast, state ownership may reduce financial performance because state shareholders often prioritize political and social objectives over profit maximization (Jensen & Meckling, 1976; Qi, Wu, & Zhang, 2000). Based on these arguments, the study proposes the following hypotheses:

$H_{1a}$ : State ownership is negatively associated with financial performance.

$H_{1b}$ : Managerial ownership is positively associated with financial performance.

$H_{1c}$ : Institutional ownership is positively associated with financial performance.

$H_{1d}$ : Foreign ownership is positively associated with financial performance.

However, these theoretical perspectives also suggest that ownership structure may influence not only the final outcome of financial performance but also intermediate strategic decisions within firms, among which tax avoidance represents an important financial decision. According to resource dependence theory, non-state shareholders tend to view taxation as a cost that should be minimized in order to improve profitability, whereas state shareholders often associate tax payments with broader public objectives and socio-economic stability (Boubakri, Cosset, & Saffar, 2008; Pfeffer, 1973). Consequently, state ownership is expected to reduce the level of tax avoidance, while managerial ownership, institutional ownership, and foreign ownership may create stronger incentives for firms to engage in tax avoidance strategies aimed at maximizing financial benefits.

Based on this reasoning, the study proposes the following hypotheses:

$H_{2a}$ : State ownership negatively affects tax avoidance.

$H_{2b}$ : Managerial ownership positively affects tax avoidance.

$H_{2c}$ : Foreign ownership positively affects tax avoidance.

$H_{2d}$ : Institutional ownership positively affects tax avoidance.

In the Vietnamese context, where ownership structures are diverse and often characterized by specific ownership thresholds, Phung and Mishra (2016) show that the effects of state ownership and foreign ownership on financial performance are nonlinear and depend on ownership levels. This finding highlights the complexity of internal corporate behaviors, such as tax avoidance, which may serve as an important transmission channel through which ownership structure influences financial performance. Nevertheless, international evidence on the mediating role of tax avoidance remains inconclusive. Prayitno, Tarmidi, and Oktris (2023) find no mediating effect of tax avoidance, whereas Raslan and Hussein Thabet (2024) demonstrate that tax avoidance may function as either a positive or negative mediator depending on the type of ownership. These differences indicate that tax avoidance should not be viewed as an independent factor but rather as a behavioral channel shaped by ownership structure and accompanying governance mechanisms.

Accordingly, this study expects tax avoidance to act as a mediating mechanism linking ownership

structure and firm financial performance in Vietnam. From the perspective of information asymmetry theory, although tax avoidance may generate short-term cash flow benefits, it can also increase the complexity and opacity of financial reporting. This may make it more difficult for investors to accurately assess firm performance and may ultimately increase the firm's cost of capital (Akerlof, 1970; Stiglitz, 1975). Based on this reasoning, the study proposes the following hypothesis:

*H3: Tax avoidance negatively affects firm profitability.*

### 3. Research Methodology

#### 3.1. Research Model

This study develops an empirical modeling framework to examine the impact of ownership structure on firm financial performance, with tax avoidance acting as a mediating mechanism. Using firm-level panel data across time, the study estimates two equations sequentially to identify the mediating role of tax avoidance.

First, the following equation is employed to analyze the determinants of corporate tax avoidance:

$$TA_{it} = \beta_0 + \beta_1 MO_{it} + \beta_2 GOV_{it} + \beta_3 INST_{it} + \beta_4 FORE_{it} + \gamma CONTROLS_{it} + \mu_i + \varepsilon_{it} \quad (1)$$

where  $TA_{it}$  represents the level of tax avoidance of firm  $i$  in year  $t$ . In this model, tax avoidance is explained by several components of ownership structure, including managerial ownership, state ownership, institutional ownership, and foreign ownership. In addition, the model controls for firm characteristics such as financial leverage, firm size, capital intensity, audit quality, and loss status. This specification allows the study to determine whether ownership structure significantly influences firms' tax avoidance behavior, thereby providing the basis for testing the mediating role of tax avoidance.

Next, Equation (2) examines the joint effects of tax avoidance and ownership structure on firm financial performance, measured by return on assets (ROA):

$$ROA_{it} = \beta_0 + \beta_1 TA_{it} + \beta_2 MO_{it} + \beta_3 GOV_{it} + \beta_4 INST_{it} + \beta_5 FORE_{it} + \gamma CONTROLS_{it} + \mu_i + \varepsilon_{it} \quad (2)$$

In addition to ownership variables, the model incorporates several control variables capturing key firm characteristics, including capital structure, firm size, growth opportunities, and cash flow generation. The inclusion of cash holdings enables the model to account for the direct benefit of tax avoidance through increased internal cash flow, while also considering potential agency costs arising when excess cash is

not effectively monitored. The mediating role of tax avoidance is confirmed if ownership structure significantly affects tax avoidance in Equation (1), and tax avoidance, in turn, significantly influences financial performance in Equation (2) after controlling for firm-specific characteristics.

#### 3.2. Estimation Method

This study employs panel data of non-financial firms listed on the Vietnamese stock market over the period 2015-2024 to examine the direct, mediating, and moderated mediating effects of ownership structure on firm financial performance, with tax avoidance serving as the mediating variable. The use of panel data allows the analysis to control for unobservable firm-specific characteristics that remain constant over time, thereby mitigating potential bias arising from inherent firm heterogeneity.

The regression models are estimated sequentially using pooled ordinary least squares, the fixed-effects model, and the random-effects model. The selection of the most appropriate model is determined through the F-test and the Hausman test. The results indicate that the fixed-effects model is preferred in most cases, suggesting the presence of firm-specific heterogeneity across the sample firms.

To ensure the robustness and reliability of the estimation results in the presence of heteroskedasticity and serial correlation, the study employs cluster-robust standard errors at the firm level. This approach helps produce consistent and reliable inference for panel data estimations.

The mediating role of tax avoidance is examined by simultaneously estimating the mediation equation (Equation 1) and the outcome equation (Equation 2). Mediation is confirmed when ownership structure significantly affects tax avoidance in Equation (1), and tax avoidance subsequently has a statistically significant effect on financial performance in Equation (2) after controlling for firm characteristics.

#### 3.3. Variable Measurement

Table 1 presents the measurement of variables used in this study.

**Table 1. Variables measurement**

| Variables                    | Code | Measurement                                           | Source                                   |
|------------------------------|------|-------------------------------------------------------|------------------------------------------|
| <b>Dependent variable</b>    |      |                                                       |                                          |
| Return on asset              | ROA  | Net income/Total assets                               | (Phung & Mishra, 2016)                   |
| <b>Independent Variables</b> |      |                                                       |                                          |
| State ownership              | GOV  | The percentage of state ownership                     | (Tao, Laixiang, & Liang, 2009; Vo, 2020) |
| Managerial ownership         | MO   | The percentage of shares held by managers of the firm | (Qi, Wu, & Zhang, 2000)                  |

| Variables                  | Code   | Measurement                                                                                        | Source                              |
|----------------------------|--------|----------------------------------------------------------------------------------------------------|-------------------------------------|
| Institution ownership      | INST   | The percentage of institutional ownership                                                          | (Khanna & Rivkin, 2001; Yeh, 2019)  |
| Foreign ownership          | FORE   | The percentage of foreign ownership                                                                | (Rashid, 2020)                      |
| <b>Mediating Variables</b> |        |                                                                                                    |                                     |
| Tax avoidance              | TA     | Statutory tax rate – (Cash taxes paid / Pretax income) with observations restricted to 0 < ETR < 1 |                                     |
| <b>Control Variables</b>   |        |                                                                                                    |                                     |
| Leverage                   | LEV    | Total liabilities/Total assets                                                                     | Control Variables                   |
| Firm size                  | SIZE   | Ln(Book value of total assets)                                                                     | (Tao, Laixiang, & Liang, 2009)      |
| Capital intensity          | GROWTH | Tangible fixed assets / Total assets                                                               | (Al-Ahdal et al., 2023; Shan, 2019) |
| Cash holdings              | CASH   | Cash and cash equivalents / Total assets                                                           | (Khanna & Rivkin, 2001; Yeh, 2019)  |
| Audit quality              | BIG4   | BIG4 = 1 if firm audited by Big 4 companies; 0 otherwise                                           | (Khanna & Rivkin, 2001)             |
| Loss status                | LOSS   | LOSS = 1 if the firm reports a loss in a given year; 0 otherwise                                   | (Skousen, Smith, & Wright, 2009)    |

Source: Author's compilation based on prior studies.

#### 4. Data and Descriptive Statistics

To examine the impact of ownership structure on firm financial performance with the mediating role of tax avoidance in the Vietnamese context, this study constructs a balanced panel dataset of non-financial firms listed on the Ho Chi Minh City Stock Exchange and the Hanoi Stock Exchange during the period 2015-2024. The data are collected from the Vietstock database and audited annual financial statements of listed firms. Consistent with prior studies, firms operating in the financial sector are excluded from the sample due to their distinct accounting regulations and financial structures compared with non-financial firms. The final sample covers ten economic sectors based on the Industry Classification Benchmark (ICB) at the level-2 classification. Firms with missing data, firms that were delisted, or firms that were not listed for a sufficient number of years during the study period are removed to ensure the consistency and comparability of the panel dataset. After applying these screening criteria, the final dataset consists of 426 listed non-financial firms, corresponding to 4,260 firm-year observations.

To provide an initial overview of the characteristics of the research sample, descriptive statistics for all variables used in the analysis are presented in Table 2.

**Table 2: Descriptive statistics**

| Variable                     | Observations | Mean  | Std. Dev. | Min    | Max   |
|------------------------------|--------------|-------|-----------|--------|-------|
| <b>Financial performance</b> |              |       |           |        |       |
| ROA                          | 4,260        | 0.123 | 0.169     | -0.055 | 0.761 |
| <b>Ownership structure</b>   |              |       |           |        |       |
| MO                           | 4,260        | 10.32 | 15.53     | 0      | 93.52 |
| GOV                          | 4,260        | 18.95 | 25.25     | 0      | 96.72 |
| INST                         | 4,260        | 35.94 | 29.23     | 0      | 99.78 |
| FORE                         | 4,260        | 5.83  | 13.83     | 0      | 94.11 |
| <b>Mediator variable</b>     |              |       |           |        |       |
| TA                           | 4,260        | 0.009 | 0.111     | -0.298 | 0.244 |

| Variable                 | Observations | Mean   | Std. Dev. | Min    | Max    |
|--------------------------|--------------|--------|-----------|--------|--------|
| <b>Control variables</b> |              |        |           |        |        |
| LEV                      | 4,260        | 0.774  | 0.368     | 0      | 1.785  |
| SIZE                     | 4,260        | 27.504 | 1.595     | 23.8   | 31.669 |
| GROWTH                   | 4,260        | 0.001  | 0.395     | -0.945 | 1.56   |
| CAPINT                   | 4,260        | 0.188  | 0.196     | 0      | 0.836  |
| LOSS                     | 4,260        | 0.054  | 0.226     | 0      | 1      |
| BIG4                     | 4,260        | 0.263  | 0.44      | 0      | 1      |
| CASH                     | 4,260        | 0.048  | 0.055     | 0      | 0.31   |

Source: Author's calculation

The descriptive statistics summarize the basic characteristics of the 4,260 firm-year observations of non-financial listed firms during the study period. Financial performance, measured by ROA, has an average value of 0.123 with a standard deviation of 0.169, indicating considerable variation in profitability across firms and suggesting the coexistence of both highly profitable and less efficient firms in the sample. Regarding ownership structure, institutional ownership represents the largest proportion with an average of 35.94%, followed by state ownership at 18.95% and managerial ownership at 10.32%, while foreign ownership accounts for a relatively smaller share at 5.83%. This ownership distribution reflects a common characteristic of listed firms in Vietnam, where institutional investors and the state continue to play important roles in corporate governance and strategic decision-making.

The mediating variable, tax avoidance, exhibits a relatively low mean value but a noticeable dispersion, suggesting considerable heterogeneity in tax avoidance practices among firms. For the control variables, firm size appears relatively stable, whereas growth and capital intensity display higher variability, reflecting differences in investment strategies, development cycles, and operating conditions among firms within the sample.

#### 5. Results

##### 5.1. Mediating Equation

The study result presents the Pearson correlation matrix among the variables used in the research model, together with the variance inflation factors (VIF) to assess potential multicollinearity. The results indicate that most correlation coefficients among the independent variables are relatively small, suggesting weak linear relationships.

The multicollinearity test further confirms this observation, as all VIF values are close to 1 and remain well below the commonly accepted threshold. The average VIF is 1.09, indicating that multicollinearity is not a serious concern in the model. Therefore, the regression estimates in the subsequent analysis are expected to be stable and reliable.



Table 3: Model Selection Tests

| Test                | Statistic                  | Degrees of Freedom | P-value | Conclusion                                         |
|---------------------|----------------------------|--------------------|---------|----------------------------------------------------|
| F test (OLS vs FEM) | F = 4.97                   | (425, 3824)        | 0.00    | Fixed effects exist; pooled OLS is not appropriate |
| Hausman test        | $\chi^2 = 55.68$           | 10                 | 0.00    | Reject H0; fixed-effects model is preferred        |
| Modified Wald test  | $\chi^2 = 1.4 \times 10^5$ | 426                | 0.00    | Heteroskedasticity is present                      |
| Wooldridge test     | F = 47.511                 | (1, 425)           | 0.00    | Serial correlation is present                      |

Source: Author's calculation

The results of the model selection tests indicate that the fixed-effects model is the most appropriate specification for the panel dataset. The F test comparing pooled OLS and the fixed-effects model yields an F statistic of 4.97 (p-value = 0.00), confirming the presence of firm-specific effects and suggesting that the pooled OLS estimator is inappropriate.

The Hausman test further supports this result by rejecting the null hypothesis of no systematic difference between the fixed-effects and random-effects estimators ( $\chi^2 = 55.68$ ; p-value = 0.00), indicating that the fixed-effects model should be preferred. In addition, the diagnostic tests reveal violations of classical regression assumptions. The Modified Wald test indicates the presence of heteroskedasticity across firms ( $\chi^2 = 1.4 \times 10^5$ ; p-value = 0.00), while the Wooldridge test confirms the existence of first-order serial correlation in the panel data (F = 47.511; p-value = 0.00). Given these results, the subsequent estimations employ the fixed-effects model with cluster-robust standard errors at the firm level to obtain consistent and reliable inference.

Table 4: Fixed-Effects Regression Results (FEM)

| Variable                                     | Coefficient | Std. Error | t-statistic | P-value | Significance |
|----------------------------------------------|-------------|------------|-------------|---------|--------------|
| MO                                           | 0.0001      | 0.0001     | 0.82        | 0.415   |              |
| GOV                                          | -0.001      | 0.0001     | -16.38      | 0       | ***          |
| INST                                         | 0.0002      | 0.0001     | 3.83        | 0       | ***          |
| FORE                                         | 0.0001      | 0.0001     | 1.78        | 0.075   | *            |
| LEV                                          | -0.0047     | 0.0022     | -2.13       | 0.034   | **           |
| SIZE                                         | -0.0073     | 0.0038     | -1.89       | 0.059   | *            |
| GROWTH                                       | -0.007      | 0.0024     | -2.86       | 0.004   | ***          |
| CAPINT                                       | 0.0166      | 0.0153     | 1.08        | 0.28    |              |
| LOSS                                         | -0.2225     | 0.0051     | -43.81      | 0       | ***          |
| BIG4                                         | -0.1159     | 0.0040     | -28.92      | 0       | ***          |
| Constant                                     | 0.2617      | 0.1063     | 2.46        | 0.014   | **           |
| <b>Model statistics</b>                      |             |            |             |         |              |
| Observations: 4.260                          |             |            |             |         |              |
| Number of firms: 426                         |             |            |             |         |              |
| R <sup>2</sup> (within): 0.6772              |             |            |             |         |              |
| F-statistic: 426.77                          |             |            |             |         |              |
| Prob > F: 0.0000                             |             |            |             |         |              |
| Standard errors: clustered at the firm level |             |            |             |         |              |

Source: Author's calculation

The estimation results indicate heterogeneous effects of ownership structure on tax avoidance and

provide partial support for the proposed hypotheses. State ownership exhibits a negative and statistically significant coefficient (-0.001,  $p < 0.01$ ), suggesting that a one-percentage-point increase in state ownership reduces tax avoidance by approximately 0.001 units. This finding supports Hypothesis H2<sub>a</sub> and reflects the monitoring and disciplinary role of the state in constraining aggressive tax strategies.

In contrast, managerial ownership does not show a statistically significant effect ( $p = 0.415$ ), indicating that Hypothesis H2<sub>b</sub> is not supported. Foreign ownership has a positive effect on tax avoidance and is statistically significant at the 10% level ( $p = 0.075$ ), providing weak support for Hypothesis H2<sub>c</sub>. Institutional ownership shows a positive and significant effect at the 1% level ( $\beta = 0.0002$ ), supporting Hypothesis H2<sub>d</sub>, while foreign ownership also exhibits a positive effect but with weaker significance at the 10% level ( $p = 0.075$ ). These results suggest that institutional and foreign investors may encourage tax planning strategies that enhance firms' financial flexibility.

Regarding the control variables, leverage and revenue growth both show significant negative effects on tax avoidance, while firm size is weakly significant at the 10% level. In addition, loss status and Big4 auditing significantly reduce tax avoidance, highlighting the importance of financial conditions and external monitoring in constraining opportunistic tax behavior. Capital intensity does not show a significant effect. With a within R<sup>2</sup> of 0.6772 and an F-statistic significant at the 1% level, the model demonstrates strong explanatory power. The estimates remain reliable after adjusting the standard errors for firm-level clustering.

## 5.2. Outcome Equation

The correlation matrix indicates that the linear relationships among the variables are generally low to moderate, suggesting that the risk of information overlap among the explanatory variables is limited. The VIF results further show that all values remain below commonly accepted thresholds, with an average VIF of 1.40. This confirms that the model does not suffer from serious multicollinearity and is suitable for subsequent regression analyses.

Table 5: Model selection tests

| Test                      | Statistic        | Degrees of freedom | P-value | Conclusion                                         |
|---------------------------|------------------|--------------------|---------|----------------------------------------------------|
| F test (OLS vs FEM)       | F = 2.01         | (425, 3822)        | 0.00    | Fixed effects exist; pooled OLS is not appropriate |
| Hausman test (FEM vs REM) | $\chi^2 = 67.06$ | 12                 | 0.00    | Reject H0; the fixed-effects model is preferred    |

| Test               | Statistic                  | Degrees of freedom | P-value | Conclusion                     |
|--------------------|----------------------------|--------------------|---------|--------------------------------|
| Modified Wald test | $\chi^2 = 7.7 \times 10^6$ | 426                | 0.00    | Presence of heteroskedasticity |
| Wooldridge test    | F = 4.851                  | (1, 425)           | 0.0159  | Presence of serial correlation |

Source: Author's calculation

The results of the model selection tests indicate that the fixed-effects model is appropriate for the dataset. Specifically, the F test comparing the pooled OLS model and the fixed-effects model yields an F-statistic of 2.01 with a p-value of 0.00, indicating the presence of firm-specific fixed effects and suggesting that the pooled OLS model is not suitable. The Hausman test further rejects the null hypothesis ( $\chi^2 = 67.06$ ; p-value = 0.00), confirming that the fixed-effects model is preferred over the random-effects model.

In addition, diagnostic tests reveal the presence of heteroskedasticity (Modified Wald test,  $\chi^2 = 7.7 \times 10^6$ ; p-value = 0.00) and serial correlation over time (Wooldridge test, F = 4.851; p-value = 0.0282). Therefore, subsequent estimations employ appropriate error corrections to ensure the consistency and reliability of the empirical results.

**Table 6: Fixed-Effects Regression Results (FEM)**

| Variable                                     | Coefficient | Std. Error | t-statistic | P-value | Significance |
|----------------------------------------------|-------------|------------|-------------|---------|--------------|
| TA                                           | 1.5725      | 0.0593     | 26.5300     | 0.0000  | ***          |
| MO                                           | 0.0000      | 0.0001     | -0.0300     | 0.9770  |              |
| GOV                                          | -0.0002     | 0.0001     | -1.3600     | 0.1750  |              |
| INST                                         | 0.0002      | 0.0001     | 1.9500      | 0.0510  | *            |
| FORE                                         | 0.0005      | 0.0001     | 3.5200      | 0.0000  | ***          |
| LEV                                          | -0.0026     | 0.0051     | -0.5000     | 0.6140  |              |
| SIZE                                         | -0.0118     | 0.0069     | -1.7000     | 0.0890  | *            |
| GROWTH                                       | -0.0073     | 0.0061     | -1.1900     | 0.2350  |              |
| CAPINT                                       | 0.0527      | 0.0296     | 1.7800      | 0.0760  | *            |
| LOSS                                         | 0.3119      | 0.0163     | 19.1300     | 0.0000  | ***          |
| BIG4                                         | 0.1812      | 0.0094     | 19.2200     | 0.0000  | ***          |
| CASH                                         | 0.0141      | 0.0686     | 0.2100      | 0.8380  |              |
| Constant                                     | 0.3517      | 0.1911     | 1.8400      | 0.0660  | *            |
| <b>Model statistics</b>                      |             |            |             |         |              |
| Observations: 4,260                          |             |            |             |         |              |
| Number of firms: 426                         |             |            |             |         |              |
| R <sup>2</sup> (overall): 0.3950             |             |            |             |         |              |
| F-statistic: 91.90                           |             |            |             |         |              |
| Prob > F: 0.0000                             |             |            |             |         |              |
| Standard errors: clustered at the firm level |             |            |             |         |              |

Source: Author's calculation

The estimation results indicate that tax avoidance has a strong and statistically significant positive effect on financial performance, with a coefficient of 1.5725 (p-value < 0.01). This finding rejects Hypothesis H3, which predicted a negative relationship between tax avoidance and profitability. The result suggests that, in an emerging market context such as Vietnam, tax avoidance may function as an important channel through which firms improve financial resources and convert them into better operational performance. In this sense, tax avoidance may serve not only as

an opportunistic behavior but also as a financial management strategy that reduces tax burdens and enhances short-term cash flows.

Among the ownership variables, institutional ownership and foreign ownership exhibit positive effects on financial performance. Institutional ownership is weakly significant at the 10% level, while foreign ownership is strongly significant at the 1% level, providing partial support for Hypotheses H1<sub>c</sub> and H1<sub>d</sub>. These findings suggest that institutional and foreign investors may contribute to improved firm performance through monitoring mechanisms and managerial expertise. In contrast, managerial ownership and state ownership do not show statistically significant effects in the outcome equation, indicating that Hypotheses H1<sub>a</sub> and H1<sub>b</sub> are not supported in the direct relationship with financial performance.

Regarding the control variables, firm size shows a negative effect that is weakly significant at the 10% level, while capital intensity also displays a positive effect at the same significance level. Loss status and auditing by Big4 firms both exhibit large positive coefficients and strong statistical significance, indicating substantial differences in financial performance across firms depending on their financial conditions and governance environments. With a within R<sup>2</sup> of 0.3950 and an F-statistic significant at the 1% level, the model demonstrates acceptable explanatory power, and the estimates remain reliable after adjusting the standard errors for firm-level clustering.

## 6. Discussion and Implications

### 6.1. Discussion

The empirical findings indicate that tax avoidance plays a central role in the relationship between ownership structure and the financial performance of listed firms in Vietnam. The strong and statistically significant positive effect of tax avoidance on financial performance suggests that, within the context of an emerging market, the benefits derived from tax savings can be transformed into financial resources that enhance firm profitability. From a financial perspective, a reduction in tax obligations increases after-tax cash flows, providing firms with additional capacity to reinvest, strengthen liquidity, or reduce reliance on external financing. In the Vietnamese context, where the cost of capital remains relatively high and access to long-term financing is uneven across firms, the additional cash flows generated through tax avoidance may quickly translate into

improved operational outcomes.

Furthermore, the impact of ownership structure on tax avoidance reveals the distinct roles of different shareholder groups in shaping corporate financial strategies. State ownership exhibits a significant negative effect on tax avoidance, reflecting stronger incentives for compliance due to accountability pressures, reputational concerns, and policy objectives. This finding is consistent with the governance context in Vietnam, where firms with state ownership are often subject to stricter oversight and tend to prioritize regulatory compliance over aggressive tax optimization. In contrast, institutional ownership and foreign ownership both show positive effects on tax avoidance, suggesting that these shareholder groups may encourage tax planning strategies aimed at enhancing cash flows and firm value.

In the outcome equation, foreign ownership demonstrates a strong positive effect on financial performance, while institutional ownership shows a weakly positive and marginally significant effect. These results suggest that professional investors, particularly foreign shareholders, may contribute to improved firm performance through enhanced monitoring and governance expertise. In contrast, state ownership and managerial ownership do not exhibit statistically significant effects on financial performance. The absence of a direct effect of state ownership, combined with its significant influence on tax avoidance, highlights the indirect role of the state in shaping corporate outcomes through firms' tax strategies. Overall, the results suggest that tax avoidance may create financial value when it operates within a governance structure that balances monitoring incentives and strategic tax planning in Vietnamese firms.

## 6.2. Implications

Based on the empirical findings, this study provides several key implications for three major stakeholder groups.

**First**, for regulators and policymakers, the results indicate that tax avoidance may generate financial value in the context of emerging markets; however, this effect is conditional and depends on ownership structure as well as monitoring mechanisms. Therefore, tax policies should be designed in a way that balances the objective of government revenue collection with the need to provide firms with reasonable financial flexibility. At the same time, improving the quality of enforcement and transparency is essential to limit opportunistic tax

avoidance practices. The disciplinary role of state ownership further suggests that governance standards and accountability mechanisms may serve as more effective regulatory tools than purely administrative interventions.

**Second**, for firms, the findings imply that tax avoidance may function as a short-term financial management tool when implemented within an appropriate risk management framework. Firms should carefully weigh the benefits of additional cash flows against potential compliance risks, particularly in a context where institutional and regulatory environments continue to evolve.

**Third**, for investors, especially institutional and foreign investors, ownership structure not only directly influences financial performance but also shapes corporate tax behavior. Consequently, firm evaluation should consider tax strategies, governance quality, and the sustainability of earnings simultaneously, rather than relying solely on short-term financial outcomes.

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# BUSINESS RESULTS OF THE BIG4 BANKING GROUP - THROUGH NUMBERS

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**Abstract:** *This study aims to evaluate the business performance of the four largest banks in Vietnam (the Big4 group), including: Joint Stock Commercial Bank for Foreign Trade of Vietnam (VCB); Joint Stock Commercial Bank for Investment and Development of Vietnam (BIDV); Vietnam Joint Stock Commercial Bank for Industry and Trade (CTG); Vietnam Bank for Agriculture and Rural Development (AGR) in 2023 and 2024. The author uses qualitative and quantitative research methods, statistical and comparative methods, data analysis methods collected from the Reports and Website of the State Bank of Vietnam (SBV), individual financial statements and business performance reports of the Big4 group and related domestic and foreign studies. Through the results of the study of business activities (total assets, capital mobilization, outstanding loans, bad debt ratio, pre-tax profit and payment to the State budget) of the Big4 group, the author proposes a number of solutions and recommendations to improve the business performance of the Big4 group in the coming years.*

• Keywords: *business activities, total assets, capital mobilization, outstanding loans, bad debt ratio, pre-tax profit, payment to the state budget, big4.*

Date of receipt: 27<sup>th</sup> Feb., 2026

Date of delivery revision: 10<sup>th</sup> Mar., 2026

DOI:

Date of receipt revision: 25<sup>th</sup> Mar., 2026

Date of approval: 31<sup>th</sup> Mar., 2026

## 1. Introduction

For banks, the situation of total assets, capital mobilization, outstanding loans, bad debt ratio, pre-tax profit and payment to the State budget play an important role in directly affecting the efficiency of business operations, the safety of the bank and strengthening customer confidence. Therefore, improving the business performance capacity of commercial banks is an issue that has been and is being concerned by bank managers as well as the banking industry. Compared to other countries in the region, the business performance of commercial banks in Vietnam in general and the Big4 group in particular is currently quite modest. In order to improve their capacity in general operations and increase their competitiveness, the Big4 group needs to have solutions to improve their business performance... because this is an important factor, helping the Big4 group to operate safely, sustainably and be able to compete with other commercial banks in the region and the world in the current conditions.

## 2. Research method

### 2.1. Data collection method

The data used in the study is secondary data collected from the reports and websites of the State Bank of Vietnam, from individual financial statements, business performance reports of the BIG4 group in 2023-2024 and domestic and foreign

studies related to the business performance of commercial banks.

### 2.2. Data analysis method

The study uses qualitative and quantitative research methods, statistical and comparative methods to evaluate the business performance of the BIG4 group. Through the collected results, the author uses the analytical method to make comments and suggestions, recommendations to improve the business performance capacity of the BIG4 group in the coming years.

## 3. Research results

### 3.1. Total assets of the Big4 group

As of December 31, 2024, the total assets of the Big4 banking group reached VND 9,394 trillion, an increase of VND 1,243 trillion compared to 2023, in particular, all 4 banks reached over VND 2 million billion. Of which, BIDV reached VND 2,709 trillion, an increase of VND 451 trillion compared to 2023, continuing to lead the commercial banking system in Vietnam. CTG reached VND 2,361 trillion, an increase of VND 350 trillion; AGR reaches VND 2,239 trillion, an increase of VND 196 trillion, and VCB reaches VND 2,085 trillion, an increase of VND 246 trillion compared to 2023.

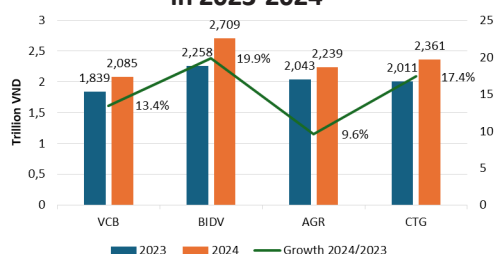
Total assets of the Big4 banking group in 2024 will grow by 15.2% compared to 2023. Of which,

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BIDV will grow by 19.9% and hold the first position in the Big4 group; CTG will grow by 17.4%, ranking second; VCB will grow by 13.4%, ranking third, and AGR will grow by 9.6%, ranking fourth.

**Figure 1: Assets of the Big4 banking group in 2023-2024**



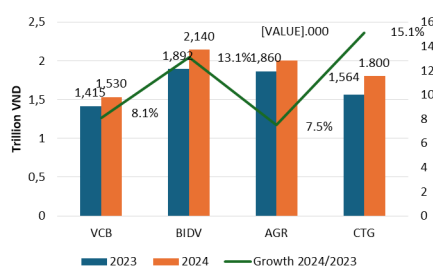
Source: Separate financial statements of Big4 group in 2023-2024

### 3.2. Capital mobilization of BIG4 group

As of December 31, 2024, capital mobilization of Big4 banking group reached VND 7,470 trillion, an increase of VND 739 trillion compared to 2023. Of which, BIDV reached VND 2,140 trillion, an increase of VND 248 trillion compared to 2023, continuing to lead the commercial banking system in Vietnam. AGR reached VND 2,000 trillion, an increase of VND 140 trillion; CTG reaches VND 1,800 trillion, an increase of VND 236 trillion, and VCB reaches VND 1,530 trillion, an increase of VND 115 trillion compared to 2023.

Capital mobilization of the Big4 banking group in 2024 will grow by 10.9% compared to 2023. Of which, CTG ranks first with a growth rate of 15.1%; BIDV ranks second with a growth rate of 13.1%; VCB ranks third with a growth rate of 8.1% and AGR ranks fourth with a growth rate of 7.5%.

**Figure 2: Capital mobilization of the Big4 banking group in 2023-2024**



Source: Individual financial statements of Big4 group in 2023-2024

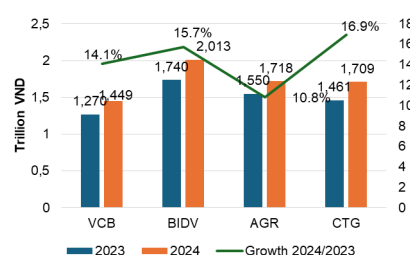
### 3.3. Outstanding loans of BIG4 group

As of December 31, 2024, outstanding loans of Big4 banks reached 6,889 trillion VND, an increase of 868 trillion VND compared to 2023. Of which, BIDV's outstanding loans reached 2,013 trillion VND, continuing to hold the top position in the Big4 group and being the only bank to reach over 2 million

billion VND. However, the gap between BIDV and 2023 was wider: with the 2nd ranked bank (AGR) at 295 trillion VND; with the 3rd ranked bank (CTG) at 304 trillion VND and with the 4th ranked bank (VCB) at 564 trillion VND.

Outstanding loans of the Big4 banks in 2024 will grow by 14.4% compared to 2023. Of which, CTG ranks first with a growth rate of 16.9%; BIDV ranks second with a growth rate of 15.7%; VCB ranks third with a growth rate of 13.7% and AGR ranks fourth with a growth rate of 10.8%.

**Figure 3: Outstanding loans of the Big4 banks in 2023-2024**



Source: Separate financial statements of Big4 group in 2023-2024

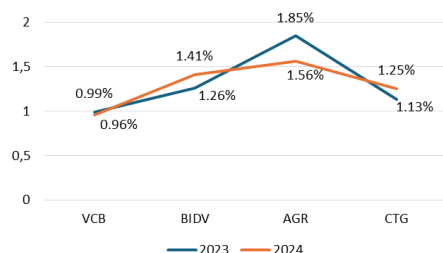
### 3.4. Bad debt ratio of BIG4 group

In recent years, due to the impact of the COVID-19 pandemic and typhoon Yagi, all aspects of life and society have been greatly affected. Businesses and people are facing difficulties, reduced income, leading to more difficulties in debt repayment... Therefore, bad debt of commercial banks in general and Big4 group in particular is inevitable.

As of December 31, 2024, bad debt of Big4 banking group is VND 109,278 billion, an increase of VND 23,278 billion (up 27.1%) compared to the end of 2023. In which: bad debt balance of VCB increased by 10.7% compared to the end of 2023. Total bad debt from group 3 to group 5 is VND 13,964 billion. The bad debt ratio decreased from 0.99% to 0.96% (down 0.03 percentage points) compared to the end of 2023, continuing to lead the list of banks with the lowest bad debt ratio; BIDV's bad debt balance from groups 3 to 5 increased by 29.8%, to VND 29,036 billion. Of which, debt with the possibility of losing capital (group 5) increased by 52% compared to the end of 2023, from VND 13,025 billion to more than VND 19,801 billion. The bad debt ratio increased from 1.26% to 1.41% (up 0.15 percentage points) compared to the end of 2023; AGR's bad debt balance increased by 30.2% compared to the end of 2023. Total bad debt from groups 3 to 5 is VND 44,805 billion. The bad debt ratio decreased from 1.85% to 1.56% (down 0.29 percentage points) compared to the end of 2023;

CTG's bad debt balance increased by 29.3% to VND 21,473 billion, mainly due to the outstanding debt of group 5 (debt with the possibility of losing capital) increasing by 47.5%, from VND 9,379 billion to VND 13,832 billion, with group 3 debt (substandard debt) and group 4 debt (doubtful debt) increasing slightly. The bad debt ratio increased from 1.13% to 1.25% (up 0.12 percentage points) compared to the end of 2023.

**Figure 4: Bad debt ratio of Big4 banks in 2023-2024**



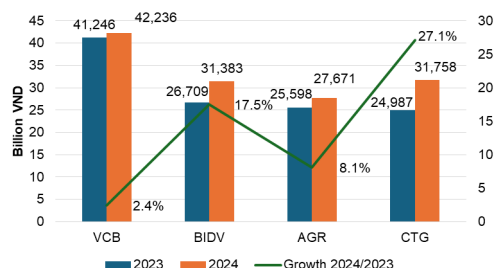
Source: Separate financial statements of Big4 group in 2023-2024

### 3.5. Pre-tax profit of BIG4 group

As of December 31, 2024, pre-tax profit of Big4 banking group reached VND 133,058 billion, an increase of VND 14,518 billion compared to 2023. Of which, VCB reached VND 42,236 billion, an increase of VND 990 billion; BIDV reached VND 31,383 billion, an increase of VND 4,674 billion; AGR reached VND 27,671 billion, an increase of VND 2,073 billion, and CTG reached VND 31,758 billion, an increase of VND 6,771 billion compared to 2023.

Pre-tax profit of the Big4 banking group in 2024 increased by 12.2% compared to 2023. Of which, CTG ranked first with a growth rate of 27.1%; BIDV ranked second with a growth rate of 17.5%; AGR ranked third with a growth rate of 8.1% and VCB ranked fourth with a growth rate of 2.4%.

**Figure 5: Pre-tax profit of the Big4 banking group in 2023-2024**



Source: Business performance report of Big4 group in 2023-2024

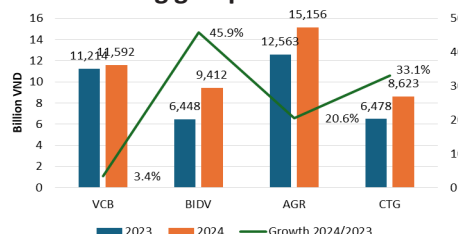
### 3.6. State budget contribution of BIG4 group

As of December 31, 2024, the state budget contribution of Big4 banks reached VND 44,783

billion, an increase of VND 8,080 billion compared to 2023. Of which, VCB reached VND 378 billion, an increase of VND 1 billion; BIDV reached VND 9,412 billion, an increase of VND 2,964 billion; AGR reached VND 15,156 billion, an increase of VND 2,593 billion and CTG reached VND 8,623 billion, an increase of VND 2,145 billion compared to 2023.

State budget contribution of Big4 banks in 2024 increased by 22.0% compared to 2023. Of which, BIDV ranked first with a growth rate of 45.9%; CTG ranked 2nd with a growth rate of 33.1%; AGR ranked 3rd with a growth rate of 20.6% and VCB ranked 4th with a growth rate of 3.4%.

**Figure 6: State budget contributions of the Big4 banking group in 2023-2024**



Source: Business performance report of Big4 group in 2023-2024

## 4. Some solutions and recommendations

From the above analysis results, the author proposes some solutions and recommendations to contribute to enhancing the business performance of the Big4 group in the coming years. Specifically:

### *First, strengthen capital mobilization*

- Based on the socio-economic development situation, capital sources and actual needs of banks such as: the beginning of the year, the middle of the year, the end of the year, or the seasonal nature of lending sectors... the capital mobilization policy of the Big4 group needs to be flexible to attract customers. At the same time, the Big4 group also needs to increase support and advice to customers on issues related to the finance - banking sector, more importantly, helping customers have an investment portfolio, choose the types of services that the group provides... thereby, helping the Big4 group to further strengthen its close relationship with customers.

- The Big4 group needs to pay attention to increasing the scale of term capital to meet the medium and long-term capital needs of entities when the economy recovers. Although the scale and ratio of non-term capital in 2023-2024 tend to increase, it has brought large and cheap capital to the Big4 group, contributing to increasing profits thanks to the large difference between mobilization interest rates and lending interest rates... However, if we do

not pay attention to attracting medium and long-term capital, it will significantly affect the implementation of medium and long-term credit for entities in the economy. Therefore, the Big4 group also needs to pay attention to mobilizing term capital sources, especially medium-term capital because the demand for capital to expand production and business in the medium and long term may increase when the economy stabilizes and grows.

**Second, adjusting the loan portfolio**

- Continue to develop banking services, develop and provide convenient services to customers, attract and expand market share, create a fundamental change from service income in the total income of the bank. Sustainable growth of service activities to reduce dependence on credit activities with many potential risks on the basis of gradually adjusting the loan portfolio as a basis for reducing the credit ratio, increasing non-credit activities, this is the goal of commercial banks, but the implementation is not easy. Because credit is always considered the most basic activity of banking business but also brings the most losses, if credit risks occur. Accordingly, reducing the credit ratio, reducing interest income from credit activities, while increasing the proportion of service activities... increasing income from non-credit activities will ensure safety in the business activities of banks.

- Exploit and use capital effectively, in accordance with the nature of business and operations in the banking sector. The Big4 group needs to focus on lending capital to the production and business sector, invest reasonably in government bonds and SBV bills to diversify the investment portfolio, to ensure stability in operations when the market fluctuates.

- Balance capital sources to develop lending according to the priority orientation of the State Bank in the coming years, such as: lending to develop the private economy, green economy, lending to enterprises in rural areas, remote areas, etc...

**Third, control the bad debt ratio.**

Focus on improving credit quality, improving the capacity to assess, appraise, and manage credit risks to reduce provisioning costs, and synchronously apply solutions to control the bad debt ratio at the lowest level. In particular, it is necessary to pay attention to the human factor of the Big4 group, because this is the most effective, sustainable, and long-term solution to reduce the bad debt ratio. The lack of capacity, lack of expertise, and poor ethics of credit officers will lead to errors in appraisal, analysis, and evaluation when making lending decisions, increasing the possibility

of bank capital loss.

For existing bad debts, the Big4 group needs to have solutions and develop plans to promptly handle them to minimize the bad debt ratio by urging customers to repay debts, collecting debts, and selling bad debt assets... gradually speeding up capital recovery, avoiding capital backlog that affects the bank's business operations.

**Fourth, promote the implementation of the Digital Transformation Strategy and the Information Technology Development Strategy**

- Synchronously implement digital transformation solutions and accelerate the implementation of key IT projects, focusing on increasing the scale and transaction value of digital banking services... on the basis of stable and continuous operation management of the newly converted Core Banking system and IT systems. Manage the operation of the security system, detect and prevent, promptly handle risks, ensure the safety of the IT systems of the Big4 group in the context of some banks being attacked by hackers causing damage.

- Develop and improve risk management projects, tools/models, as a foundation for modern, professional risk management activities, towards international practices such as independent testing projects for market risk measurement models, liquidity risks; Equip ALM system solutions; Upgrade and expand anti-money laundering systems...

**Conclusion:** Based on the research results on the business activities of the Big4 banking group in 2023 and 2024, the author has proposed a number of solutions and recommendations for the Big4 group to improve its business performance in the coming years. Thereby, it is hoped that the Big4 group can achieve its set goals, have more favorable conditions in implementing its business plan, and meet the capital adequacy ratio not only according to the requirements of the State Bank but also according to international standards. On the other hand, gradually improve the competitiveness of each bank in the group in the domestic and international markets.

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# ARTIFICIAL INTELLIGENCE IN THE TELECOM SECTOR: ORGANIZATIONAL AND SOCIAL IMPACTS WITH INSIGHTS FROM VIETNAM

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**Abstract:** *This paper conducts an integrative literature review to synthesize global insights on these impacts and contextualizes them within Vietnam's dynamic digital landscape. Framed by the Technology-Organization-Environment (TOE) framework, Socio-Technical Systems (STS) theory, and Innovation Diffusion Theory (IDT), the analysis identifies three core dimensions of AI impact: organizational efficiency and transformation, workforce and innovation culture, and societal outcomes. The findings indicate that globally, AI enhances operational efficiency through predictive analytics and automation, while simultaneously transforming workforce roles and raising critical ethical concerns regarding privacy, transparency, and digital equity. In Vietnam, AI deployment in telecommunications, observed primarily in customer service, network monitoring, and fraud detection, is expanding, yet remains constrained by legacy infrastructure, a shortage of AI expertise, and evolving regulatory frameworks. The study concludes by proposing a context-sensitive analytical framework, comprising three interconnected pillars, Organizational Transformation, Human and Cultural Adaptation, and Societal and Customer Outcomes, to guide both managerial strategy and policymaking in developing economies.*

• Keywords: artificial intelligence, telecom sector, organizational transformation, social impact, vietnam, developing economies.

Date of receipt: 28<sup>th</sup> Feb., 2026

Date of delivery revision: 07<sup>th</sup> Mar., 2026

DOI:

Date of receipt revision: 10<sup>th</sup> Mar., 2026

Date of approval: 31<sup>th</sup> Mar., 2026

## 1. Introduction

The global telecommunications sector is in the midst of a paradigm shift, increasingly propelled by the integration of Artificial Intelligence (AI). AI technologies are revolutionizing core telecom operations, enabling enhanced efficiency through predictive network maintenance, automated customer service platforms, and data-driven resource allocation (Borges et al., 2021; Strinati & Barbarossa, 2021). This transition extends beyond mere operational upgrades, fundamentally reshaping organizational models, workforce requirements, and customer relationships, thereby establishing AI as a critical lever for future competitiveness (Dwivedi et al., 2021). While extensive research has documented the multifaceted impacts of AI within the telecom industries of developed nations, a significant knowledge gap persists regarding how these organizational and social dynamics unfold in the unique contexts of developing economies. Factors such as varying levels of digital infrastructure, regulatory maturity, and skilled human capital mean that the global understanding of AI adoption remains

partial without contextualized studies (Wirtz et al., 2022). This gap is particularly salient in Vietnam, a nation undergoing rapid digitalization where a state-influenced telecom sector is a key enabler of the National Digital Transformation Program (2025–2030) (Socialist Republic of Vietnam, 2022). Therefore, this paper addresses the central research problem: the scant understanding of how AI adoption specifically influences organizational structures and societal outcomes in the telecom sector of developing countries like Vietnam. To address this problem, the study sets forth three key objectives: (1) to review and synthesize global literature on the organizational and social impacts of AI in telecom; (2) to evaluate Vietnam's readiness, opportunities, and challenges in adopting AI; and (3) to propose an analytical framework tailored to the conditions of developing economies.

## 2. Conceptual and Theoretical Background

### 2.1. Artificial Intelligence in Telecommunications

In the telecommunications sector, Artificial Intelligence (AI) encompasses a suite of technologies, including machine learning (ML),

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deep learning, and natural language processing (NLP), that enable systems to perform tasks typically requiring human intelligence, such as learning, reasoning, and problem-solving. The scope of AI in telecom is vast, integrating these technologies across network infrastructure, service platforms, and customer interfaces to create more autonomous and efficient operations. Its application is pivotal in several key area as in Table 1.

**Table 1: AI Applications in the Telecommunications Sector and Their Primary Impacts**

| Application Domain                  | Specific Use Cases                                                                     | Organizational Impact                                                                           | Societal & Customer Impact                                                                                       |
|-------------------------------------|----------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
| Network Optimization                | Predictive traffic management, Dynamic resource allocation, Network slicing            | Reduced Operational Expenditure (OPEX), enhanced network reliability & capacity                 | Improved Quality of Service (QoS), fewer dropped calls & higher data speeds                                      |
| Predictive Maintenance              | Anomaly detection in network hardware, Failure prediction using sensor data            | Minimized network downtime, extended equipment lifecycle, optimized capital expenditure (CAPEX) | Increased service reliability, proactive issue resolution, stronger trust in digital infrastructure              |
| Customer Service Automation         | AI-powered chatbots, Virtual assistants for troubleshooting                            | Lower call center volumes, reduced operational costs, 24/7 service availability                 | Instant responses to common queries, convenient self-service, potential frustration with limited problem-solving |
| Fraud Detection & Security          | Real-time analysis of Call Detail Records (CDRs), Identification of subscription fraud | Protection of operator revenue, enhanced security of network infrastructure                     | Safeguarding of customer data and accounts, reduced risk of financial loss from fraud                            |
| Service Personalization & Marketing | Tailored service plan recommendations, Targeted promotional offers                     | Increased Average Revenue Per User (ARPU), improved customer retention & loyalty                | Enhanced customer experience, perception of value, potential concerns over data privacy                          |

## 2.2. Theoretical Perspectives on AI Impacts

The Technology - Organization - Environment (TOE) framework provides a foundational lens, positing that the adoption and impact of an innovation are influenced by three contexts: the technological context (the available AI tools), the organizational context (firm size, resources, and skills), and the external environmental context (regulatory landscape and competitive pressures). This framework is particularly useful for comparing the different adoption conditions between developed and developing economies.

The Socio-Technical Systems (STS) theory emphasizes that optimal organizational performance is achieved through the synergistic integration of the social subsystem (e.g., people, skills, culture) and the technical subsystem (e.g., AI algorithms, infrastructure). An STS perspective is crucial for analyzing how AI implementation disrupts existing workflows, necessitates workforce reskilling, and requires cultural adaptation within

telecom organizations.

The Innovation Diffusion Theory (IDT) helps explain the rate and pattern at which AI spreads through the telecom sector, influenced by the innovation's perceived relative advantage, compatibility, and complexity. By synthesizing these perspectives, this paper examines the impact of AI across three core dimensions: (1) efficiency, focusing on operational gains and data-driven decision-making; (2) workforce transformation, encompassing the evolution of job roles and the emergence of skill gaps; and (3) societal outcomes, including both positive effects like enhanced service personalization and challenges such as privacy concerns and algorithmic bias.

## 3. Research Approach

This study employs an integrative literature review as its primary research method. This approach is particularly suited for the research objectives as it aims to critically analyze and synthesize existing literature on a topic to generate new theoretical frameworks and perspectives. The review synthesizes research published between 2010 and 2024, a period that captures the rise of modern machine learning techniques and their application within telecommunications.

The data collection was conducted through a structured search across major academic databases renowned for their rigor and relevance in technology and business studies, including Scopus, Web of Science, IEEE Xplore, and ScienceDirect. The search strategy utilized a combination of keywords such as "Artificial Intelligence," "AI," "telecommunication," "telecom," "organizational impact," "social impact," "workforce," and "ethics." The initial pool of identified literature was refined using inclusion and exclusion criteria, prioritizing peer-reviewed journal articles, conference proceedings, and seminal reviews that directly addressed the intersection of AI and the telecommunications sector.

Following an initial coding of key findings, the synthesized evidence was grouped into three primary thematic categories that directly correspond to the dimensions of impact outlined in the theoretical framework:

(1) **Organizational Impacts:** This theme consolidates findings related to changes in operational efficiency, business process automation, strategic decision-making, and the challenges

of integrating AI with legacy systems and data governance.

(2) **Workforce and Innovation Culture:** This category encompasses literature focusing on AI-driven job transformation, the evolving demand for digital skills, reskilling initiatives, and the role of leadership and organizational culture in fostering an environment conducive to AI-led innovation.

(3) **Customer and Social Implications:** This theme aggregates insights concerning the enhancement of customer experience through personalization and predictive services, as well as the broader societal consequences, including ethical dilemmas around data privacy, algorithmic bias, and digital equity.

#### **4. Analytical Findings**

##### **4.1. Organizational Efficiency and Transformation**

The integrative review reveals that AI adoption significantly enhances organizational efficiency and drives transformation within telecom operators. A primary benefit is the marked improvement in operational agility and automation. AI-powered network orchestration allows for dynamic resource allocation, leading to substantial reductions in operational expenditures (OPEX) and improved service quality. Furthermore, AI transforms decision-making from reactive to predictive, enabling managers to optimize infrastructure investments and develop data-driven strategies (Mikalef & Gupta, 2021). However, this transformation faces significant challenges. The integration of AI is often hampered by legacy systems, which create data silos and hinder the seamless flow of information required for AI models (Verhoef et al., 2021). Effective data governance also emerges as a critical hurdle, as AI's performance is contingent on access to vast, high-quality, and well-managed data assets. Additionally, the increased connectivity and data-dependency elevate cybersecurity risks, necessitating robust security frameworks to protect network integrity and customer data.

##### **4.2. Workforce and Innovation Culture**

The analysis indicates that AI is catalyzing a significant workforce transformation in the telecom sector. While it automates routine, repetitive tasks, it simultaneously creates demand for new roles focused on data analysis, AI system management, and strategic innovation. This shift underscores a critical need for digital skills and continuous learning. Organizations must invest in comprehensive

reskilling and upskilling programs to equip their employees with the competencies needed to work alongside AI technologies. Beyond technical skills, successful AI adoption is deeply linked to cultural adaptability and leadership. Fostering an AI-driven innovation culture requires leaders who can articulate a clear vision, encourage experimentation, and break down traditional silos to promote collaboration between technical and business units (Fountain et al., 2019). A culture resistant to change remains a major barrier, highlighting that technological implementation must be coupled with proactive organizational development.

##### **4.3. Customer and Societal Implications**

From the customer perspective, AI enables a profoundly enhanced customer experience through personalization and predictive service. By analyzing customer data, AI can power recommendation systems for tailored service plans and enable proactive issue resolution, thereby increasing satisfaction and loyalty. On a broader societal scale, however, these advancements raise pressing ethical concerns. Data privacy is a paramount issue, as the extensive data collection required for personalization must be handled with strong consent mechanisms and in strict compliance with regulations like the GDPR. A lack of transparency or "explainability" in AI decision-making processes can erode customer trust and make it difficult to identify and mitigate algorithmic biases. Finally, there is a risk that AI-driven services could exacerbate digital inequality. If advanced, AI-powered services are primarily accessible to affluent or urban populations, it may widen the digital divide, leaving underserved communities further behind. This underscores the need for equitable AI strategies that consider broader societal outcomes.

#### **5. Vietnam Context: Readiness and Challenges**

##### **5.1. Overview of Vietnam's Telecom Sector**

Vietnam's telecommunications market is one of the most dynamic in Southeast Asia, yet it remains highly concentrated, dominated by a few major state-owned enterprises (SOEs) and one key private player. The market is primarily led by the military-owned Viettel Group, the Vietnam Posts and Telecommunications Group (VNPT), and the MobiFone Corporation, which together hold a commanding share of the subscriber base (World Bank, 2021). This structure has been effective in achieving rapid nationwide network

coverage but also presents unique challenges for agility and innovation. The sector's evolution is critically guided by the government's National Digital Transformation Program (2025–2030). This overarching strategy aims to develop a digital government, economy, and society, with digital infrastructure as a core foundation (Socialist Republic of Vietnam, 2022). Consequently, telecom operators are not only commercial entities but are also tasked with being the primary enablers of this national vision, driving the deployment of next-generation networks.

This concentrated market structure, while enabling rapid, large-scale infrastructure rollout, can also influence the pace and nature of innovation. The significant role of state-owned enterprises means that strategic directives and national priorities often shape investment decisions in technology adoption, including AI, alongside commercial considerations.

### **5.2. AI Adoption in Vietnam's Telecom Industry**

The adoption of AI within Vietnam's telecom industry is in its nascent stages but is gaining momentum, driven by both competitive pressures and national policy. Leading carriers have started integrating AI into core operations. A common starting point has been the deployment of customer service chatbots on websites and mobile apps to automate responses to common queries and reduce the load on human agents (Nguyen et al., 2021). In network operations, AI is being piloted for network monitoring and traffic prediction, aiming to optimize performance and preemptively manage congestion in increasingly complex 4G and 5G environments. Furthermore, AI and machine learning models are being applied to fraud prevention systems to detect unusual calling patterns and subscription fraud. A promising development is the trend of emerging collaborations, where major telecom operators are partnering with domestic tech firms and global technology giants to co-develop AI solutions, leveraging external expertise to accelerate their capabilities.

Beyond these initial applications, there is growing recognition of the potential for AI in demand forecasting and personalized marketing. However, the progression towards more advanced uses, such as fully autonomous network operations or AI-driven business model innovation, remains a longer-term objective, contingent on overcoming extant infrastructural and talent barriers.

### **5.3. Key Challenges and Opportunities**

Despite the proactive stance, Vietnam faces several interconnected challenges in scaling AI adoption in telecom. A significant technical hurdle is limited data integration and interoperability. Data often remains locked in silos within large, legacy-oriented organizations, preventing the creation of the unified data lakes necessary for training robust AI models (Nguyen et al., 2021). This is compounded by a critical shortage of AI-skilled human resources. The demand for data scientists and AI specialists far outstrips the supply, leading to intense competition for talent across the economy (World Bank, 2021). However, these challenges are balanced by compelling opportunities. Supportive government policies, including the National Digital Transformation Program and the National Strategy on AI Research and Development, provide a strong top-down impetus and framework for investment (Socialist Republic of Vietnam, 2022). The ongoing national 5G rollout presents a greenfield opportunity to build AI-driven network management and orchestration directly into new infrastructure, bypassing some legacy integration issues. Finally, Vietnam's growing integration into regional digital and AI ecosystems offers avenues for knowledge transfer, investment, and collaboration that can help bootstrap local expertise and innovation (World Bank, 2021).

## **6. Discussion and conclusion**

### **6.1. Integrative Analysis of Global and Local Insights**

The integrative review reveals a complex interplay between global AI trends and Vietnam's unique context. While the global telecom sector is leveraging AI for advanced automation and predictive analytics (Mikalef & Gupta, 2021), Vietnam's adoption remains in the early stages, focused primarily on customer service chatbots and basic network monitoring (Nguyen et al., 2021). This gap is not due to a lack of ambition but is significantly mediated by key contextual factors. Firstly, the state of infrastructure, while rapidly improving, still grapples with legacy systems that hinder the data integration required for sophisticated AI, a challenge less pronounced in more mature markets (World Bank, 2021). Secondly, the regulatory environment, though supportive through initiatives like the National Digital Transformation Program, is still evolving its specific



frameworks for data sharing, privacy, and ethical AI, creating uncertainty for investors and operators (Socialist Republic of Vietnam, 2022). Finally, the human capital constraint acts as a critical brake on implementation. This contrasts with developed economies that have a more robust pipeline of data scientists and AI specialists (Wilson & Daugherty, 2018). Therefore, the impacts of AI in Vietnam are not merely delayed but are being reshaped; the focus is necessarily on incremental efficiency gains and foundational capability building, rather than the disruptive, AI-first business models emerging elsewhere.

**Table 2: A Comparative Analysis of AI Drivers and Challenges in Telecommunications: Global vs. Vietnamese Context**

| Dimension                      | Global Perspective (Synthesized from Literature)                                                   | Vietnamese Context (Derived from Local Analysis)                                                                              |
|--------------------------------|----------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| Primary Drivers                | Intense market competition, cost optimization, creation of new revenue streams                     | National policy directives (e.g., National Digital Transformation Program), modernization pressure, role as a digital enabler |
| Focus of Applications          | Autonomous networks, AI-driven business model innovation, advanced customer analytics              | Basic chatbots, fundamental network monitoring, rule-based fraud detection                                                    |
| Technical & Data Hurdles       | Integration with complex legacy systems, governance of large-scale data ecosystems                 | Predominance of legacy infrastructure, data silos within large SOEs, data quality and interoperability issues                 |
| Human Capital Challenges       | Cultural resistance, reskilling of existing workforce, managing human-AI collaboration             | Acute shortage of high-level AI and data science talent, need for foundational training and talent pipeline development       |
| Regulatory & Ethical Landscape | Compliance with stringent regulations (e.g., GDPR), public scrutiny on algorithmic bias and ethics | Evolving and incomplete regulatory frameworks for data sharing, privacy, and ethical AI, balancing innovation with control    |

## 6.2. Managerial and Policy Implications

The findings suggest several critical implications for both telecom managers and policymakers in Vietnam. For telecom firms, strategic action must focus on long-term capability building. This includes: (1) Talent development through partnerships with universities, targeted upskilling programs, and creating attractive career paths for AI specialists (Brougham & Haar, 2018); (2) Establishing ethical AI governance frameworks that ensure transparency, fairness, and data privacy to build customer trust and ensure regulatory compliance (Martin, 2019); and (3) Investing in modern data infrastructure to break down internal silos and create the high-quality, interoperable data assets that are the lifeblood of AI (Borges et al., 2021).

For policymakers in Vietnam, the recommendations are threefold: (1) Foster vibrant AI ecosystems by funding R&D, providing grants for AI startups, and creating innovation sandboxes where telecoms and tech firms can test new solutions

(World Bank, 2021). (2) Actively promote public-private collaboration to tackle grand challenges, such as using AI to improve network resilience in rural areas or to develop personalized digital literacy tools. (3) Develop and enforce national standards for data quality and interoperability across the telecom sector, which would reduce integration costs and accelerate the development of industry-wide AI solutions.

**Table 3: A Strategic Roadmap for AI Adoption in a Typical Vietnamese Telecom Operator**

| Phase                                                     | Key Initiatives & Focus Areas                                                                                                                                                                                                                                                                                         | Expected Outcomes & Capabilities                                                                                                                                                                                                                 |
|-----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Phase 1: Foundation (Present – 2027)</b>               | <ul style="list-style-type: none"> <li>Data standardization and governance framework.</li> <li>Deployment of AI chatbots for customer service.</li> <li>Pilot projects for AI-driven network monitoring.</li> <li>Organization-wide AI literacy programs.</li> </ul>                                                  | <ul style="list-style-type: none"> <li>Established data foundation.</li> <li>Initial OPEX reduction in customer service.</li> <li>Enhanced visibility into network performance.</li> <li>Cultivated foundational digital culture.</li> </ul>     |
| <b>Phase 2: Scaling &amp; Integration (2027 – 2030)</b>   | <ul style="list-style-type: none"> <li>Enterprise-wide rollout of predictive maintenance.</li> <li>Advanced AI for fraud detection and security.</li> <li>Development of strategic partnerships for talent and technology.</li> <li>Formulation and implementation of an AI ethics and governance charter.</li> </ul> | <ul style="list-style-type: none"> <li>Significant reduction in network downtime.</li> <li>Improved revenue assurance and security.</li> <li>Strengthened in-house AI capabilities.</li> <li>Increased customer and regulator trust.</li> </ul>  |
| <b>Phase 3: Optimization &amp; Leadership (Post-2030)</b> | <ul style="list-style-type: none"> <li>Development towards autonomous network operations.</li> <li>Launch of AI-native services and business models.</li> <li>Deep integration of AI in strategic decision-making.</li> <li>Contribution to national AI ecosystem and standards.</li> </ul>                           | <ul style="list-style-type: none"> <li>Market leadership in service innovation.</li> <li>New, sustainable revenue streams.</li> <li>Full transition to an AI-powered organization.</li> <li>Enhanced national digital competitiveness</li> </ul> |

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# THE MULTIDIMENSIONAL IMPACT OF ARTIFICIAL INTELLIGENCE ADOPTION ON DIGITAL TRANSFORMATION IN SMALL AND MEDIUM-SIZED ENTERPRISES IN VIETNAM

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**Abstract:** *This study examines the multidimensional impact of artificial intelligence (AI) adoption on the digital transformation of small and medium-sized enterprises (SMEs) in Vietnam. Drawing on the Resource-Based View (RBV), Dynamic Capability Theory, and the Technology-Organization-Environment (TOE) framework, the study proposes a model that conceptualizes AI adoption across three dimensions: Operational AI, Analytical AI, and Customer-Facing AI, while treating digital transformation as a single composite construct reflecting the overall level of organizational digitalization. Using PLS-SEM with survey data from 200 Vietnamese SMEs, the results confirm that all three AI dimensions exert significant positive effects on digital transformation. Operational AI demonstrates the strongest impact ( $\beta = 0.38$ ), followed by Analytical AI ( $\beta = 0.27$ ) and Customer-Facing AI ( $\beta = 0.19$ ). Firm size positively moderates the relationship between Analytical AI and digital transformation, while industry sector moderates the effect of Customer-Facing AI. The findings provide valuable empirical evidence on the differentiated pathways through which AI drives digital transformation in an emerging economy context, with practical implications for SME managers and policymakers.*

• **Keywords:** *artificial intelligence, digital transformation, small and medium-sized enterprises, operational AI, analytical AI, customer-facing AI, PLS-SEM, Vietnam.*

Date of receipt: 28<sup>th</sup> Feb., 2026

Date of delivery revision: 12<sup>th</sup> Mar., 2026

DOI:

Date of receipt revision: 20<sup>th</sup> Mar., 2026

Date of approval: 31<sup>th</sup> Mar., 2026

## 1. Introduction

Artificial intelligence (AI) has emerged as one of the most transformative technologies of the digital era, reshaping how firms operate, compete, and create value (Brynjolfsson & McAfee, 2017). However, AI is not a monolithic technology, different forms of AI application, such as operational AI, analytical AI, and customer-facing AI, may influence digital transformation through distinct mechanisms and to varying degrees. Understanding these differences carries important theoretical and practical implications, particularly for small and medium-sized enterprises (SMEs) whose constrained resources necessitate careful prioritization of AI investment to maximize digital transformation outcomes.

In Vietnam, SMEs account for more than 97% of all active enterprises and contribute approximately 45% of national GDP; yet their pace of digital transformation remains relatively slow compared to large enterprises and to regional peers. According to the Ministry of Information and Communications, only around 20% of Vietnamese SMEs have deployed at least one AI-enabled solution, compared to rates

exceeding 50% in Singapore and South Korea. This gap raises a critical question: which AI adoption pathway delivers the greatest digital transformation impact given the resource constraints and limited digital infrastructure characteristic of Vietnamese SMEs?

Although the relationship between AI adoption and digital transformation has been addressed in recent literature (Mikalef, Conboy, & Krogstie, 2021), most studies treat AI adoption as a unidimensional construct, stopping short of disaggregating and comparing the effects of distinct AI forms on digital transformation outcomes. This constitutes the theoretical and empirical gap the present study seeks to address.

Specifically, the paper pursues three research questions: (1) How do the three dimensions of AI adoption (Operational AI, Analytical AI, and Customer-Facing AI) affect digital transformation in SMEs? (2) Which AI dimension exerts the strongest overall effect? (3) How do contextual factors such as firm size and industry sector moderate these relationships?

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The paper makes three contributions. Theoretically, it proposes and empirically tests a multidimensional AI-impact model treating the three AI dimensions as distinct predictors of a single digital transformation construct enabling direct comparisons of their relative effects. Empirically, it provides quantitative evidence from an emerging economy with a sample of 200 SMEs. Practically, the findings equip Vietnamese SME managers with evidence-based guidance on which AI investment to prioritize given their specific resource context.

## 2. Theoretical Background and Hypothesis Development

### 2.1. Theoretical Foundations

#### (1) Resource-Based View (RBV)

The Resource-Based View (Barney, 1991) posits that sustainable competitive advantage derives from resources that are valuable, rare, inimitable, and non-substitutable (VRIN criteria). In the digital economy, AI can serve as a strategic technological resource capable of satisfying these criteria when embedded in firm-specific operational processes. More importantly, from the Resource-Based View (RBV), it can be inferred that different forms of AI applications will influence different organizational capabilities: Operational AI improves process efficiency, Analytical AI strengthens data capabilities, and Customer-Facing AI expands market-facing capabilities, thereby generating differential contributions to overall digital transformation.

#### (2) Dynamic Capability Theory

Dynamic Capability Theory (Teece, Pisano, & Shuen, 1997) emphasizes a firm's capacity to sense opportunities, seize resources, and reconfigure organizational assets in volatile environments. Within this framework, each AI dimension activates a distinct reconfiguration mechanism: Operational AI drives process reconfiguration, Analytical AI drives data capability reconfiguration, and Customer-Facing AI drives customer-centric business model reconfiguration. Each mechanism contributes to overall digital transformation through a different pathway, yet all ultimately converge on the common outcome of higher organizational digitalization.

### Technology-Organization-Environment (TOE) Framework

The TOE framework (Tornatzky, Fleischer, & Chakrabarti, 1990) explains that technology adoption outcomes are shaped jointly by technological, organizational, and environmental factors. In the

present research context, TOE provides the theoretical rationale for why firm size and industry sector moderate the AI-digital transformation relationship: larger firms possess greater resources to leverage Analytical AI, while service-sector firms operate in environments more conducive to exploiting Customer-Facing AI. Both contextual factors may amplify or constrain the digital transformation impact of each AI dimension.

### 2.2. Construct Definitions and Measurement

AI adoption is defined as the degree to which a firm deploys and integrates AI technologies into its business operations to automate processes, analyze data, and enhance customer interactions (Wamba-Taguimdje et al., 2020). The study operationalizes AI adoption across three dimensions.

The first dimension, Operational AI, captures the extent to which a firm uses AI to automate operational processes, optimize supply chains, and improve production efficiency. This form of AI is the most prevalent among SMEs owing to its relatively lower deployment cost and comparatively clear short-term impact on operational performance.

The second dimension, Analytical AI, reflects the extent to which a firm uses AI for data analysis, market trend forecasting, and business decision support. Analytical AI demands a sufficiently large data foundation and robust digital infrastructure, making it more common among larger SMEs.

The third dimension, Customer-Facing AI, captures the extent to which a firm deploys AI at customer touchpoints - including chatbots, personalized recommendation systems, and customer behavior analytics. This form of AI is growing rapidly among SMEs in the commerce and service sectors.

Digital transformation is defined as the degree to which a firm integrates digital technologies across its entire operations, resulting in fundamental changes in how value is created and delivered to customers (Vial, 2019). Following Matt et al. (2015), who argue that digital transformation is a holistic organizational transition that cannot be cleanly partitioned into independent sub-dimensions, this study treats digital transformation as a single composite construct reflecting the firm's overall level of digitalization. This approach is particularly appropriate for SMEs, where the boundaries between process digitalization, data integration, and business model innovation are rarely distinct.

### 2.3. Hypothesis Development

Building on the three theoretical foundations above, the study develops five hypotheses concerning

the effects of each AI dimension on digital transformation and the moderating role of contextual factors. H1: Operational AI has a positive effect on digital transformation in SMEs; H2: Analytical AI has a positive effect on digital transformation in SMEs; H3: Customer-Facing AI has a positive effect on digital transformation in SMEs; H4: Firm size positively moderates the relationship between Analytical AI and digital transformation; H5: Industry sector moderates the relationship between Customer-Facing AI and digital transformation.

### 3. Research Methodology

#### 3.1. Research Design and Data Collection

The study adopts a quantitative cross-sectional survey design. Primary data were collected via a structured questionnaire administered to owners, chief executives, and senior managers of Vietnamese SMEs. Eligibility criteria required firms to: (1) qualify as SMEs under Decree 80/2021/ND-CP, (2) have deployed at least one AI or digital technology solution, and (3) have been in operation for a minimum of two years.

Sample size was determined following the PLS-SEM “10-times rule”, which requires a minimum sample of ten times the largest number of indicators associated with any single latent variable or the maximum number of paths directed at any endogenous construct (Hair et al., 2022). With the AI adoption construct comprising 12 indicators, the minimum required sample was 120 observations. To ensure adequate statistical power and generalizability, a final valid sample of 200 observations was targeted and achieved.

#### 3.2. Measures

All variables were measured using five-point Likert scales (1 = strongly disagree to 5 = strongly agree). The AI adoption scale comprises 12 items reflecting the three dimensions: Operational AI items capture process automation and internal decision support; Analytical AI items reflect the firm’s capacity to extract insights from data for managerial purposes; and Customer-Facing AI items assess the degree to which AI personalizes service delivery and enhances customer experience. Items were adapted from Wamba-Taguimdje et al. (2020) and Mikalef & Gupta (2025).

The digital transformation scale comprises 6 items measuring the firm’s overall digitalization level. The items collectively reflect three complementary aspects: (i) process digitalization (extent of digitizing

production, business, and internal management activities), (ii) data integration and exploitation (ability to link, share, and use data in decision-making), and (iii) business model innovation (using digital technology to create new value, distribution channels, or customer service modalities). This approach draws on Vial (2019) and Matt et al. (2015), treating digital transformation as a unitary latent construct indicative of the firm’s digital maturity.

Moderating variables include firm size, measured by number of employees and annual revenue in line with prior research on SME performance and digital transformation, and industry sector, classified into three groups: manufacturing, commerce, and services, to capture differences in technological characteristics and digital transformation propensity across industries.

#### 3.3. Analytical Approach

Partial Least Squares Structural Equation Modeling (PLS-SEM) was conducted using SmartPLS 4.0. The analysis followed a two-step procedure. Step 1 evaluated the measurement model by examining reliability (Cronbach’s Alpha and composite reliability, CR), convergent validity (average variance extracted, AVE), and discriminant validity (Heterotrait-Monotrait ratio, HTMT). Step 2 evaluated the structural model through path coefficients, the coefficient of determination  $R^2$ , and bootstrapped significance tests using 5,000 subsamples. The moderating effects of firm size and industry sector were tested via PLS-SEM interaction analysis.

### 4. Results

#### 4.1. Sample Characteristics

The final sample comprised 200 Vietnamese SMEs with diverse profiles. By firm size, micro-enterprises (fewer than 10 employees) accounted for 27.5%, small enterprises (10-50 employees) for 46.5%, and medium enterprises (51-200 employees) for 26.0%. By industry sector, manufacturing represented 31.0%, commerce 39.5%, and services 29.5%. Most firms had been in operation for five or more years (68.5%). Respondents were predominantly business owners or CEOs (72.0%), with the remainder being managers responsible for digital transformation.

In terms of AI adoption levels, Customer-Facing AI was the most widely deployed (66.5% of firms reported at least some adoption), followed by Operational AI (59.0%) and Analytical AI (47.5%). This pattern reflects a tendency among Vietnamese SMEs to prioritize consumer-facing and



process-automation AI before investing in the data infrastructure required for analytical applications.

**Table 1. Sample Characteristics (N = 200)**

| Characteristic            | Frequency (n) | Percentage (%) |
|---------------------------|---------------|----------------|
| <b>Firm Size</b>          |               |                |
| Micro (< 10 employees)    | 55            | 27.5           |
| Small (10-50 employees)   | 93            | 46.5           |
| Medium (51-200 employees) | 52            | 26.0           |
| <b>Industry Sector</b>    |               |                |
| Manufacturing             | 62            | 31.0           |
| Commerce                  | 79            | 39.5           |
| Services                  | 59            | 29.5           |
| <b>Years in Operation</b> |               |                |
| Fewer than 5 years        | 63            | 31.5           |
| 5 years or more           | 137           | 68.5           |

#### 4.2. Measurement Model Evaluation

Prior to hypothesis testing, the measurement model was assessed for reliability and validity following established PLS-SEM criteria (Hair et al., 2017). Results are reported in Table 2.

All Cronbach's Alpha values exceeded the 0.70 threshold, ranging from 0.81 to 0.86. Composite reliability (CR) values were all above 0.85, confirming strong internal consistency. Average variance extracted (AVE) ranged from 0.52 to 0.63, surpassing the 0.50 threshold and confirming convergent validity. All indicator loadings exceeded 0.60 and were statistically significant at  $p < 0.001$ .

Discriminant validity was assessed using the HTMT criterion. All HTMT values among the three AI dimensions were below 0.85, confirming that the three AI constructs are empirically distinct. Regarding common method bias, Harman's single factor test revealed that a single factor explained only 22.8% of total variance well below the 50% threshold, indicating that common method bias is unlikely to be a serious concern.

**Table 2. Measurement Model Results**

| Construct                   | Cronbach's $\alpha$ | CR   | AVE  | Items | HTMT (max) |
|-----------------------------|---------------------|------|------|-------|------------|
| Operational AI (OAI)        | 0.84                | 0.88 | 0.60 | 4     | 0.72       |
| Analytical AI (AAI)         | 0.81                | 0.86 | 0.55 | 4     | 0.76       |
| Customer-Facing AI (CFAI)   | 0.86                | 0.90 | 0.63 | 4     | 0.68       |
| Digital Transformation (DT) | 0.85                | 0.89 | 0.52 | 6     | -          |

#### 4.3. Structural Model and Hypothesis Testing

Following confirmation of measurement model quality, the structural model was evaluated and all five hypotheses were tested via bootstrapping with 5,000 subsamples. Results are presented in Table 3.

The coefficient of determination  $R^2 = 0.58$  indicates that the three AI adoption dimensions collectively explain 58% of the variance in digital transformation - a moderate-to-high level of explanatory power in PLS-SEM applications (Hair et al., 2017). Effect

sizes ( $f^2$ ) were 0.24 for Operational AI (medium), 0.14 for Analytical AI (small-to-medium), and 0.09 for Customer-Facing AI (small), consistent with the observed ranking of path coefficients.

Regarding direct effect hypotheses (H1-H3), all three were supported at  $p < 0.001$ . Operational AI exhibited the largest path coefficient ( $\beta = 0.38$ ,  $t = 6.14$ ), followed by Analytical AI ( $\beta = 0.27$ ,  $t = 4.32$ ) and Customer-Facing AI ( $\beta = 0.19$ ,  $t = 3.07$ ). A bootstrapped difference test confirmed that the gap between H1 and H3 was statistically significant ( $p = 0.012$ ), while the difference between H1 and H2 approached significance ( $p = 0.063$ ).

Regarding moderating hypotheses (H4-H5), both were supported. PLS-SEM interaction analysis revealed that firm size positively and significantly moderated the Analytical AI - digital transformation relationship ( $\beta = 0.13$ ,  $t = 2.24$ ,  $p = 0.025$ ), confirming H4. Specifically, the effect of Analytical AI on digital transformation was substantially stronger for medium-sized enterprises ( $\beta = 0.35$ ) than for micro-enterprises ( $\beta = 0.18$ ). Industry sector similarly moderated the Customer-Facing AI - digital transformation relationship ( $\beta = 0.16$ ,  $t = 2.58$ ,  $p = 0.010$ ), confirming H5. Multi-group analysis (MGA) showed this effect was strongest in the services sector ( $\beta = 0.31$ ), followed by commerce ( $\beta = 0.23$ ) and manufacturing ( $\beta = 0.11$ ).

**Table 3. Hypothesis Testing Results (N = 200, Bootstrap = 5,000)**

| H  | Relationship                                            | $\beta$ | SE    | t-value | p-value | Result    |
|----|---------------------------------------------------------|---------|-------|---------|---------|-----------|
| H1 | Operational AI $\rightarrow$ Digital Transformation     | 0.38*** | 0.062 | 6.14    | 0.000   | Supported |
| H2 | Analytical AI $\rightarrow$ Digital Transformation      | 0.27*** | 0.063 | 4.32    | 0.000   | Supported |
| H3 | Customer-Facing AI $\rightarrow$ Digital Transformation | 0.19*** | 0.062 | 3.07    | 0.002   | Supported |
| H4 | Firm Size $\times$ Analytical AI $\rightarrow$ DT       | 0.13**  | 0.058 | 2.24    | 0.025   | Supported |
| H5 | Industry $\times$ Customer-Facing AI $\rightarrow$ DT   | 0.16**  | 0.062 | 2.58    | 0.010   | Supported |

#### 5. Discussion

##### 5.1. Operational AI as the Primary Digital Transformation Driver

The finding that Operational AI exerts the strongest effect on digital transformation ( $\beta = 0.38$ ,  $f^2 = 0.24$ ) can be explained through two complementary mechanisms. From an RBV perspective, deploying Operational AI compels the entire organizational system to adapt: processes are standardized, digital infrastructure is upgraded, and a data-driven culture begins to take root, generating broad spillover effects on overall digital transformation. From a practical standpoint, Operational AI offers Vietnamese SMEs a higher-return, lower-risk entry point into digital transformation compared to Analytical or Customer-



Facing AI, enabling deeper and more pervasive deployment that accumulates into a larger aggregate effect. These findings are consistent with Dynamic Capability Theory (Teece, Pisano, & Shuen, 1997): the capacity to reconfigure operational processes constitutes the foundational layer on which deeper forms of digital transformation are built.

### 5.2. Complementary Roles of Analytical AI and Customer-Facing AI

Although Analytical AI ( $\beta = 0.27$ ) and Customer-Facing AI ( $\beta = 0.19$ ) exhibit weaker individual effects, both dimensions play important and non-substitutable complementary roles in the digital transformation process. Analytical AI generates strategic-level transformation by shifting firms from experience-based to evidence-based decision-making, a hallmark of deep digital transformation. Its impact is, however, constrained by the data infrastructure and analytical workforce requirements that exceed the capacity of many micro and small enterprises, which explains why firm size emerges as a significant moderator (H4 supported). Customer-Facing AI, despite carrying the smallest path coefficient, demonstrates particularly pronounced digital transformation impact in service and commerce sectors where customer experience is the primary competitive differentiator, a pattern captured by the significant moderation of industry sector (H5 supported).

### 5.3. Managerial Implications

The findings yield four actionable managerial implications for Vietnamese SMEs. First, resource-constrained SMEs should prioritize Operational AI as the strategic first step in their digital transformation roadmap, as it delivers the broadest impact and simultaneously builds the foundation for subsequent AI investments. Second, SMEs that have established robust Operational AI capabilities should expand into Analytical AI to deepen their digital transformation, particularly if they have achieved sufficient scale to exploit data analytics effectively. Third, service and commerce SMEs should treat Customer-Facing AI as a co-priority alongside Operational AI, given that the effect of this AI dimension is significantly amplified in their respective industry environments. Fourth, policymakers designing SME digitalization support programs should adopt context-sensitive approaches differentiated by firm size and industry sector rather than applying uniform frameworks.

### Conclusion

This study examined the multidimensional impact of AI adoption on digital transformation among

Vietnamese SMEs, with digital transformation operationalized as a single composite construct. Three main contributions are offered. Theoretically, the study proposes and tests a model that disaggregates AI adoption into three distinct dimensions and assesses each dimension's independent effect on a unified digital transformation construct - enabling direct effect-size comparisons that prior unidimensional approaches could not provide. Empirically, results from 200 Vietnamese SMEs confirm that all three AI dimensions positively and significantly predict digital transformation, with Operational AI leading ( $\beta = 0.38$ ), followed by Analytical AI ( $\beta = 0.27$ ) and Customer-Facing AI ( $\beta = 0.19$ ); together, the three dimensions explain 58% of digital transformation variance. Practically, the evidence-based ranking of AI effects provides SME managers with actionable investment sequencing guidance and equips policymakers with a contextual framework for designing targeted digitalization support.

Several limitations merit acknowledgment. The cross-sectional design precludes strong causal inference; longitudinal studies would better capture the temporal dynamics of AI-driven digital transformation. Additionally, the sample is confined to AI-adopting SMEs, which may introduce selection bias. Future research should explore the mediating roles of organizational capabilities, digital culture, and digital readiness in the AI-digital transformation relationship, and should test the model's generalizability across other ASEAN emerging economies.

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# ARTIFICIAL INTELLIGENCE IN FINANCE: OPPORTUNITIES, CHALLENGES AND MANAGEMENT POLICIES

PhD. Pham Quang Huy\*

**Abstract:** *This article explores AI's growing role in finance, enhancing efficiency, investment decisions, and customer service. Despite clear benefits, challenges remain data security, talent shortages, and outdated regulations. The author calls for flexible policies, regulatory sandboxes, data protection, and workforce training. Collaboration between financial institutions and research bodies is essential for sustainable AI adoption and digital transformation in the financial sector.*

• Keywords: *artificial intelligence, finance, data security, management policies, sustainable development.*

Date of receipt: 30<sup>th</sup> Jan., 2026

Date of delivery revision: 12<sup>th</sup> Mar., 2026

DOI:

Date of receipt revision: 20<sup>th</sup> Mar., 2026

Date of approval: 29<sup>th</sup> Mar., 2026

## 1. Introduction

In the context of the Fourth Industrial Revolution, the rapid and widespread development of digital technologies, particularly AI, has created significant changes across various sectors, with the financial industry being one of the most heavily impacted. AI is not just a supporting tool but a core factor in the digital revolution in providing financial services, ranging from automating processes, analyzing big data, to optimizing financial products and delivering personalized services. AI is helping banks, insurance companies, financial institutions, and fintech firms improve operational efficiency, reduce costs and increase transparency while promoting access to financial services for potential customer groups, especially those who are difficult to reach through traditional financial services. The application of AI in finance is not just about automating old processes but also creating new, more flexible, and accessible financial service models, meeting the growing consumer demand for convenience, speed and personalization.

However, while AI presents many opportunities for the financial industry, the implementation of this technology is not automatic and comes with its own set of challenges. AI in finance requires a stable operating environment with appropriate policies and regulations to ensure that the application of technology does not lead to data security risks, customer privacy issues, or legal complications arising from the use of new technologies. Specifically, the rapid development of AI applications in finance is ahead of existing regulations and legal frameworks, leading to a lack of consistency in controlling and managing the technology. The absence of a flexible regulatory framework and the ability to make timely adjustments creates legal gaps

that financial institutions could exploit, posing risks to both consumers and the financial market in general. Additionally, the shortage of specialized AI talent, along with data security concerns, may hinder the safe and effective implementation of AI.

Therefore, researching and evaluating the opportunities, challenges, and management policies for AI in the financial industry is crucial. Appropriate policies and management strategies not only help ensure the sustainable development of AI in finance but also help financial institutions optimize the potential of technology while protecting consumer rights and preventing potential risks. Creating a flexible legal environment that encourages innovation while simultaneously protecting consumers and minimizing risks will be key to driving AI's robust growth in the financial sector, thereby improving the efficiency of the national financial system and promoting the development of the digital economy.

## 2. Opportunities from ai applications in finance

AI presents a wide range of significant opportunities for the financial sector, helping financial organizations optimize operational efficiency and improve customer experience. AI can enhance traditional business processes, reduce costs, streamline workflows, and deliver financial services with higher accuracy and speed compared to traditional methods. One of the most prominent applications of AI in finance is automating the credit approval process. Machine learning algorithms can quickly and accurately analyze customer data, making credit decisions based on factors such as credit history, income, spending habits, and other elements that are difficult for humans to assess in a short time. A study by McKinsey (2020) shows that applying AI in the credit approval process can reduce processing time

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by up to 60% and minimize human error. This not only helps save operational costs but also provides a fast and easily accessible service to customers, particularly those with unclear credit histories, thereby promoting financial inclusion.

In addition to automating the credit approval process, AI also helps financial organizations make more accurate and efficient investment decisions. Predictive models using deep learning algorithms can analyze vast amounts of financial and non-financial data, uncovering trends and predicting future market movements. A study by PwC (2020) shows that financial organizations applying AI can improve profit predictions and reduce investment risks by up to 30% compared to traditional investment methods. This means that AI helps minimize financial risks and maximize profits while creating a safer and more sustainable investment environment.

One of the standout strengths of AI in the financial sector is its ability to analyze and process Big Data vast amounts of unstructured data that traditional technologies cannot process in real time. By analyzing customer behavior from data such as transaction history, personal information, data from mobile devices, social networks, and other external data sources, AI can uncover hidden patterns in customer behavior. Machine learning models use this data to make more accurate financial decisions and personalize financial products, thereby optimizing the services and products offered to customers. In fact, large banks such as JPMorgan Chase and Bank of America have applied AI to analyze customer data and offer appropriate financial solutions while optimizing investment strategies.

Furthermore, AI helps financial organizations improve customer service through technologies like AI chatbots and virtual assistants. Banks and insurance companies are using these systems to provide 24/7 customer service, answering general inquiries and assisting with more complex financial issues. AI chatbots can handle thousands of customer inquiries daily without human intervention, reducing costs and improving customer satisfaction. According to a report by Juniper Research (2020), using AI in customer service helps save up to 30% in costs and increases customer care efficiency by 40%, while maintaining high service quality. This not only helps financial organizations reduce costs but also enhances the user experience, offering convenience and saving time for customers, especially as the demand for financial services grows and workloads increase.

### 3. Challenges in implementing AI

Although AI brings many opportunities and significant benefits to the financial industry, the implementation and application of AI also face numerous challenges that directly affect the

effectiveness and sustainability of AI-powered financial solutions. One of the biggest challenges is data security and privacy. The financial sector regularly handles sensitive data related to customers' personal finances, including account information, transaction history, and other important details. Therefore, protecting this data from cyber-attacks and misuse is extremely important. A study by IBM (2020) shows that cyberattacks in the financial sector have increased by 25% in recent years, and financial losses due to data breaches can amount to billions of dollars annually. Financial organizations must ensure they comply with data security regulations and customer privacy laws, such as the EU General Data Protection Regulation (GDPR) and other security standards, to prevent data leaks, loss of trust, and significant financial damages.

Additionally, the shortage of skilled personnel in AI within the financial sector is another major challenge. While AI is being widely applied in areas such as risk management, investment optimization, and customer service, many financial organizations, particularly small and medium-sized enterprises (SMEs), still lack teams of experts capable of implementing and operating complex AI solutions. According to a survey by PwC (2021), 75% of financial organizations report that the shortage of AI expertise is one of the key barriers to adopting this technology in their operations. This creates a large gap between larger organizations and smaller ones in AI adoption, making it difficult for smaller businesses to keep up with trends and fully leverage AI's potential. To address this issue, financial organizations need to invest in workforce training, develop collaborative programs with universities and research institutions to provide experts with the necessary skills to implement advanced AI solutions.

Another critical challenge is the lack of coherence in the legal framework. While some countries have begun to develop legal frameworks for AI implementation in finance, regulations in many areas have not kept up with the rapid pace of technological development. This makes it difficult for financial organizations to deploy new AI solutions and creates dangerous legal gaps that could lead to unforeseen risks. According to a report by the Organization for Economic Cooperation and Development (OECD, (2021)), over 40% of countries lack clear regulations on AI in the financial sector, making it challenging to control AI activities and potentially creating legal risks. Consequently, financial organizations face a lack of clear legal responsibility in AI-related activities, which may lead to legal disputes or consumer protection issues.

Finally, financial organizations also face difficulties in integrating AI into existing systems. Incorporating traditional systems with new AI technologies requires substantial investments in technology, time, and



resources. Many financial organizations, especially those lacking modern technology infrastructure, struggle with compatibility between AI and legacy systems, creating obstacles to implementing AI in current business processes.

#### 4. Management policies to promote AI in finance

To ensure the sustainable development of AI in the financial sector, it is essential to establish a flexible, transparent, and appropriate policy framework. The government and regulatory bodies must coordinate to develop policies that encourage innovation while ensuring safety, protecting consumer rights, and maintaining stability in the financial system. These policies not only help drive AI adoption but also create a sustainable development environment while mitigating the potential risks that AI may pose.

One important policy is the establishment of controlled testing mechanisms, also known as sandboxes. Sandboxes allow businesses to test new AI models in a controlled environment, helping to minimize unforeseen risks and protect consumers from negative impacts during the testing process. According to the Bank of England's report (2020), sandbox mechanisms have fostered innovation in the financial sector, particularly in financial technology (Fintech) applications such as peer-to-peer lending (P2P lending), Insurtech, and digital banking. Regulators can use sandboxes to monitor new AI products, thereby gaining a deeper understanding of how these technologies function while improving regulatory policies. This not only helps minimize legal risks but also allows for the creation of regulations that keep pace with the rapid development of technology.

In addition to the sandbox mechanism, establishing a strict regulatory system for data security and privacy in the implementation of AI is crucial. Financial institutions applying AI must comply with data security regulations and customer privacy laws. A report by PwC (2021) indicates that over 50% of financial companies consider data security issues to be one of the biggest barriers to applying AI in their operations. Therefore, regulators must provide clear guidelines on the collection, processing, and protection of customers' financial data. Security policies must align with international standards, such as the EU's General Data Protection Regulation (GDPR) or ISO/IEC 27001 for information security, to protect consumers in an increasingly complex and evolving digital world.

An indispensable factor in promoting AI in finance is the training and development of AI expertise within the financial sector. The government and financial organizations need to collaborate to create specialized AI training programs for staff, helping them enhance their skills, understand AI applications, and foster creativity in implementing AI solutions. According to a

McKinsey & Company survey (2020), more than 70% of financial companies believe that the shortage of AI-skilled personnel is a key factor hindering the adoption of this technology in their operations. Therefore, creating training programs and skill development opportunities for employees in the financial sector will enhance AI application capabilities and creativity, contributing to the sustainable growth of the financial industry.

In addition to workforce training, promoting partnerships between universities, research institutes, and businesses should also be encouraged. Universities and research institutes can provide research and development foundations, while businesses can contribute by providing real data and testing opportunities. Such a collaborative model will enhance research capacity, while also generating innovative AI products and effectively applying them in the financial sector.

#### Conclusion

AI is becoming a crucial factor in the financial industry, offering significant opportunities but also facing numerous challenges. AI can enhance financial performance, from automating credit approval processes, optimizing investment decisions, to improving customer experience. However, the implementation of AI in finance is not a straightforward process and comes with various issues that need to be addressed, particularly concerning data security, a shortage of skilled labor, and a lack of consistency in the legal framework.

For AI to develop sustainably in the financial industry, there is a need for flexible, transparent, and appropriate management policies that encourage innovation while protecting consumer rights and ensuring system security. A controlled testing mechanism (sandbox) and data security regulations must be implemented to minimize risks and create a safe development environment for AI. In particular, human resource training and cooperation between financial institutions, universities, and research institutes are crucial to help the financial industry overcome current challenges and maximize AI's potential.

With appropriate policies, AI can become a key driver in modernizing the financial sector, enhancing the competitiveness of the national financial system, and contributing to the development of the digital economy. However, to achieve this, establishing and implementing a consistent and feasible legal framework is a prerequisite to create a favorable environment for the future development of AI in the financial industry.

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# INTEGRATING AI AND ESG TO BUILD SUSTAINABLE BRAND LOYALTY: IMPLICATIONS FOR CLIMATE-RESILIENT DEVELOPMENT IN EMERGING MARKETS

MSc. Vu Xuan Truong\*

**Abstract:** *Climate-resilient development requires not only technological innovation but also behavioral shifts toward sustainable consumption. Grounded in stakeholder theory and green consumer behavior, this study proposes an AI-driven sustainable brand loyalty framework integrating ESG-oriented branding with data analytics to support climate resilience. Addressing a key research gap, the study examines how brands can foster climate-friendly consumer behavior in emerging markets. The model suggests that ESG-aligned brand values enhance green trust, which drives engagement and sustainable brand loyalty, while AI enables effective prediction and personalization of green behaviors. Using Vietnam's smartphone retail sector as an illustrative context, the framework shows how AI-enabled strategies can promote recycling, extend product life cycles, and encourage green choices while strengthening long-term relationships. By positioning brands as agents of sustainable consumption, the study extends climate resilience discourse beyond technological solutions and provides practical implications for policymakers and businesses in emerging markets.*

• Keywords: artificial intelligence, brand loyalty, ESG, green consumer behavior, climate resilience, emerging markets.

Date of receipt: 30<sup>th</sup> Jan., 2026

Date of delivery revision: 17<sup>th</sup> Mar., 2026

DOI:

Date of receipt revision: 20<sup>th</sup> Mar., 2026

Date of approval: 29<sup>th</sup> Mar., 2026

## 1. Introduction

Global development agendas increasingly emphasize climate-resilient pathways that integrate environmental sustainability, technological innovation, and behavioral change amid rising climate risks. While existing discourse focuses on technological solutions such as renewable energy and green infrastructure, growing evidence highlights the decisive role of consumer behavior in shaping climate outcomes (White et al., 2019). Accordingly, brands have emerged as key actors in influencing environmentally responsible consumption.

In emerging markets such as Vietnam, where urbanization and digital transformation are accelerating, the role of brands in promoting sustainable behavior remains underexplored. The convergence of ESG branding, artificial intelligence (AI), and consumer loyalty offers significant potential for advancing climate-resilient development. However, limited research has examined how AI-driven branding can effectively build sustainable brand loyalty aligned with climate goals.

This study develops a conceptual framework integrating stakeholder theory and green consumer behavior to explain how ESG-aligned brand values, supported by AI-enabled personalization, drive

sustainable consumption and long-term loyalty. Using Vietnam's smartphone retail sector as an illustrative context, brand loyalty is reconceptualized as a behavioral mechanism contributing to climate resilience.

Specifically, the study aims to propose, empirically test, and contextualize an AI-enhanced ESG branding framework while examining the roles of trust, engagement, and personalization in shaping pro-environmental consumer behavior.

## 2. Literature review & theoretical foundations

### 2.1. Brand Loyalty in the context of sustainability

Brand loyalty is a fundamental determinant of marketing success, reflected in both repeat purchase behavior and psychological attachment to a brand (Chaudhuri & Holbrook, 2001). In sustainability contexts, loyalty extends beyond transactional dimensions to encompass value congruence, emotional bonds, and shared ethical commitments between consumers and brands (Nguyen et al., 2020). Consumers are more likely to remain loyal to brands perceived as environmentally responsible and authentically committed to sustainability (Chen, 2010; Hur et al., 2013). However, the impact of sustainability values on loyalty remains complex and context-dependent, particularly in emerging markets where

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green awareness is still evolving.

### 2.2. Green trust and ESG-oriented branding

Green trust refers to consumers' confidence in the sincerity and performance of a brand's environmental claims (Chen & Chang, 2013). It plays a mediating role between ESG branding and consumer loyalty by reducing skepticism and concerns about greenwashing. The rise of ESG-branded products reflects increasing consumer demand for responsible business practices and corporate engagement in environmental and social issues (Fatemi et al., 2018). Empirical evidence confirms that ESG initiatives enhance trust, brand credibility, and consumer retention (He & Harris, 2020). However, existing models largely overlook the role of data-driven personalization, through which AI can significantly strengthen the effectiveness of ESG-based strategies.

### 2.3. Artificial intelligence in branding and consumer engagement

Emerging AI models, including machine learning, predictive analytics, and natural language processing, are transforming the customer engagement and brand interaction landscape (Davenport, 2020). AI enables brands to process consumer data, predict consumers' desires, and personalize communication at the moment, leading to increased satisfaction and loyalty (Chatterjee et al., 2022). In sustainability-related contexts, AI could be used, for example, by helping to segment 'green' customers, identify 'climate-aware' consumers, and develop loyalty schemes to reward sustainable behaviors. However, the application of AI in sustainability-oriented branding is embryonic, both in the theoretical and practical sense, especially in digitally immature or ESG infrastructure-deprived markets.

### 2.4. Theoretical foundations: Stakeholder theory and green consumer behavior

This study draws on stakeholder theory (Freeman, 1984), which posits that firms are responsible not only to shareholders but also to broader stakeholders, including consumers, communities, and the environment. Within this perspective, ESG-oriented branding serves as a strategic approach that embeds environmental stewardship into stakeholder value creation. At the same time, green consumer behavior theory (Peattie, 2010; White et al., 2019) explains the psychological drivers of sustainable consumption, including environmental attitudes, perceived control, and social norms.

Together, these frameworks suggest that when brands credibly signal ESG values and leverage AI-

driven personalization to engage consumers, they can build green trust, foster engagement, and cultivate long-term loyalty that supports climate-resilient development.

### 2.5. Research gap and contribution

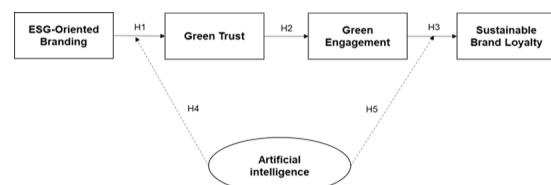
Although prior research acknowledges the growing importance of sustainability in branding and the increasing role of AI in marketing, limited attention has been given to their intersection in shaping brand loyalty for climate adaptation. In particular, the potential of AI-enabled personalization to enhance ESG communication and stimulate green consumer engagement remains underexplored, especially in emerging markets where climate and digitalization challenges co-evolve. This study addresses this gap by integrating ESG branding, green trust, AI analytics, and brand loyalty into a unified framework, offering a new theoretical perspective on how brands can foster behavioral climate resilience.

### 3. Conceptual framework and propositions

To explain how ESG-oriented branding and artificial intelligence jointly drive sustainable brand loyalty in climate-resilient development, this study proposes a conceptual framework (Figure 1) comprising four core constructs: ESG-oriented brand values, green trust, green consumer engagement, and sustainable brand loyalty.

Artificial intelligence functions as a capability enabler, linking these constructs through personalized, segmented, and predictive consumer engagement approaches.

**Figure 1. Proposed framework: AI-Driven Sustainable Brand Loyalty for Climate-Resilient Development**



Source: Authors' elaboration based on stakeholder theory and green consumer behavior.

ESG-oriented branding signals a brand's environmental and social responsibility through credible and authentic communication, thereby strengthening green trust by reducing consumer skepticism and reinforcing perceived legitimacy (He & Harris, 2020; Chen & Chang, 2013). In markets where greenwashing may weaken consumer confidence, trust becomes especially important because it shapes whether consumers genuinely believe that a firm is committed to environmental stewardship.

Green trust, in turn, promotes stronger consumer engagement at both the emotional and behavioral levels. When consumers believe a brand's sustainability claims, they are more likely to participate in its green initiatives, support its ecological values, and develop deeper cognitive and emotional attachment to the brand (Suki, 2016). Such engagement then contributes to sustainable brand loyalty, expressed not only through repeat purchases but also through advocacy, resistance to competing offers, and long-term commitment (Hur et al., 2013). In the context of climate resilience, this form of loyalty extends beyond transactional outcomes, as loyal consumers are more likely to adopt and maintain green consumption practices encouraged by the brand in line with sustainable development objectives.

Artificial intelligence can further strengthen this mechanism by enabling personalized consumer experiences, optimized message delivery, and loyalty programs aligned with sustainable behavior (Davenport et al., 2020; Chatterjee et al., 2022). Through AI-driven recommendations, behavioral targeting, and feedback systems, brands can improve the relevance and credibility of ESG communication and reinforce consumer responses to sustainability initiatives. Accordingly, AI is expected to strengthen both the relationship between ESG-oriented branding and green trust, and the relationship between green consumer engagement and sustainable brand loyalty.

H1: ESG-oriented branding positively affects green trust.

H2: Green trust positively affects green consumer engagement.

H3: Green consumer engagement positively affects sustainable brand loyalty.

H4: AI-powered personalization positively moderates the relationship between ESG-oriented branding and green trust.

H5: AI-driven targeting and feedback positively moderate the relationship between green consumer engagement and sustainable brand loyalty.

#### 4. Methodology and research implications

##### 4.1. Research design and data collection

This study employed a quantitative research design using a structured questionnaire to collect cross-sectional data from consumers in Vietnam's smartphone retail sector. A total of 420 valid responses were obtained through a mixed-mode approach, combining online distribution via Google Forms and offline intercept surveys at major retail outlets in Hanoi, Ho Chi Minh City, and Da Nang. To enhance representativeness, stratified sampling was applied

based on age, gender, and geographic location. Screening questions ensured that all respondents had purchased a smartphone within the past 12 months, with ineligible responses excluded. The combination of online and offline methods helped mitigate digital access bias while capturing diverse consumer perspectives across regions and demographic groups.

**Table 1. Demographic profile of respondents (Summary)**

| Category  | Value                     | Frequency | Percentage (%) |
|-----------|---------------------------|-----------|----------------|
| Age Group | 18 - 24                   | 108       | 25.71          |
|           | 25 - 34                   | 167       | 39.76          |
|           | 35 - 44                   | 79        | 18.81          |
|           | 45+                       | 66        | 15.71          |
| Gender    | Female                    | 205       | 48.81          |
|           | Male                      | 203       | 48.33          |
|           | Other / Prefer not to say | 12        | 2.86           |
| Region    | Danang                    | 57        | 16.33          |
|           | Hanoi                     | 152       | 43.55          |
|           | Ho Chi Minh city          | 140       | 40.11          |

*Source: Authors' compilation from survey data*

To ensure measurement validity, all constructs were adapted from established scales in prior studies. Minor wording adjustments were made to fit the context of Vietnam's smartphone retail sector.

**Table 2. Measurement constructs and sources**

| Construct                 | No. of items                               | Source                                   |
|---------------------------|--------------------------------------------|------------------------------------------|
| ESG-oriented branding     | 3                                          | He & Harris (2020); Fatemi et al. (2018) |
| Green trust               | 3                                          | Chen & Chang (2013)                      |
| Green engagement          | 4 items (one item removed during analysis) | Hollebeek et al. (2014)                  |
| Sustainable brand loyalty | 3                                          | Hur et al. (2013);                       |
| AI enablement             | 4                                          | Chatterjee et al. (2022);                |

##### 4.2. Measurement model evaluation

Outer loading results show that most indicators exceed the recommended threshold of 0.70, indicating satisfactory reliability (Hair et al., 2021). Items for AI enablement, brand loyalty, ESG branding, and green trust exhibit strong loadings ranging from approximately 0.72 to 0.91, supporting convergent validity and internal consistency. For green engagement, three indicators (GE1, GE2, GE4) meet the acceptable threshold ( $> 0.70$ ), while GE3 records a lower loading (0.624). Although above the minimum level of 0.60, this value is suboptimal and may weaken AVE and composite reliability. Accordingly, GE3 was removed to improve measurement quality and ensure adequate convergent validity, consistent with PLS-SEM best practices.

**Table 3. Outer loadings after measurement refinement**

| Construct | AI    | BL    | ESG   | GE | GT | AI x GE | AI x ESG |
|-----------|-------|-------|-------|----|----|---------|----------|
| AI1       | 0.763 |       |       |    |    |         |          |
| AI2       | 0.882 |       |       |    |    |         |          |
| AI3       | 0.816 |       |       |    |    |         |          |
| AI4       | 0.774 |       |       |    |    |         |          |
| BL1       |       | 0.746 |       |    |    |         |          |
| BL2       |       | 0.798 |       |    |    |         |          |
| BL3       |       | 0.807 |       |    |    |         |          |
| ESG1      |       |       | 0.896 |    |    |         |          |
| ESG2      |       |       | 0.833 |    |    |         |          |



| Construct | AI | BL | ESG   | GE    | GT    | AI x GE | AI x ESG |
|-----------|----|----|-------|-------|-------|---------|----------|
| ESG3      |    |    | 0.810 |       |       |         |          |
| GE1       |    |    |       | 0.775 |       |         |          |
| GE2       |    |    |       | 0.910 |       |         |          |
| GE4       |    |    |       | 0.773 |       |         |          |
| GT1       |    |    |       |       | 0.851 |         |          |
| GT2       |    |    |       |       | 0.883 |         |          |
| GT3       |    |    |       |       | 0.762 |         |          |
| AI x ESG  |    |    |       |       |       |         | 1.000    |
| AI x GE   |    |    |       |       |       | 1.000   |          |

Source: Authors' calculation using SmartPLS 4.0,  $n = 420$ , bootstrap = 5,000 subsamples

To ensure the robustness of the revised measurement model, particularly after excluding GE3, we assessed the reliability and convergent validity of each construct using standard indicators. The summary of these metrics is provided in Table 4.

**Table 4. Construct Reliability and Validity**

| Construct | Cronbach's Alpha | Composite reliability (rho_a) | Composite reliability (rho_c) | Average variance extracted (AVE) |
|-----------|------------------|-------------------------------|-------------------------------|----------------------------------|
| AI        | 0.811            | 0.817                         | 0.888                         | 0.725                            |
| BL        | 0.671            | 0.680                         | 0.820                         | 0.603                            |
| ESG       | 0.814            | 0.815                         | 0.889                         | 0.728                            |
| GE        | 0.681            | 0.685                         | 0.824                         | 0.610                            |
| GT        | 0.735            | 0.738                         | 0.850                         | 0.653                            |

Source: Authors' calculation using SmartPLS 4.0,  $n = 420$ , bootstrap = 5,000 subsamples

To assess internal consistency and convergent validity, Cronbach's Alpha, Composite Reliability, and Average Variance Extracted (AVE) were examined. As reported in Table 4, all constructs demonstrate acceptable reliability and validity. Cronbach's Alpha ranges from 0.671 (BL) to 0.814 (ESG), indicating moderate to strong consistency, with BL remaining acceptable for exploratory research (Hair et al., 2017). Composite reliability values exceed 0.68, confirming satisfactory construct reliability. All AVE values are above the 0.50 threshold (Fornell & Larcker, 1981), ranging from 0.603 to 0.728, indicating adequate convergent validity. Overall, the measurement model is robust and suitable for subsequent structural analysis.

#### 4.3. Structural model evaluation

The structural model was assessed using SmartPLS 4.0 with bootstrapping (5,000 subsamples;  $n = 420$ ). As shown in Table 5, six of seven hypotheses are supported, confirming the robustness of the model.

**Table 5. Path Coefficients: Mean, Standard Deviation, t-values, and p-values**

| Hypothesis                | Original sample (O) | Sample mean (M) | Standard deviation (STDEV) | T statistics | P values |
|---------------------------|---------------------|-----------------|----------------------------|--------------|----------|
| AI $\rightarrow$ BL       | 0.223               | 0.224           | 0.043                      | 5.129        | 0.000    |
| AI $\rightarrow$ GT       | 0.139               | 0.139           | 0.039                      | 3.577        | 0.000    |
| AI x ESG $\rightarrow$ GT | 0.098               | 0.098           | 0.041                      | 2.406        | 0.016    |
| AI x GE $\rightarrow$ BL  | 0.068               | 0.072           | 0.048                      | 1.423        | 0.155    |
| ESG $\rightarrow$ GT      | 0.532               | 0.532           | 0.035                      | 14.988       | 0.000    |
| GE $\rightarrow$ BL       | 0.339               | 0.341           | 0.047                      | 7.254        | 0.000    |
| GT $\rightarrow$ GE       | 0.410               | 0.411           | 0.042                      | 9.719        | 0.000    |

Source: Authors' calculation using SmartPLS 4.0,  $n = 420$ , bootstrap = 5,000 subsamples

AI enablement has significant positive effects on brand loyalty ( $\beta = 0.223$ ,  $t = 5.129$ ,  $p < 0.001$ ) and green trust ( $\beta = 0.139$ ,  $t = 3.577$ ,  $p < 0.001$ ), highlighting

its role in enhancing both cognitive and behavioral aspects of sustainable brand perception. ESG-oriented branding also shows a strong impact on green trust ( $\beta = 0.532$ ,  $t = 14.988$ ,  $p < 0.001$ ), reinforcing the importance of value-based positioning. The sequential relationships from green trust to green engagement ( $\beta = 0.410$ ,  $t = 9.719$ ,  $p < 0.001$ ) and from engagement to brand loyalty ( $\beta = 0.339$ ,  $t = 7.254$ ,  $p < 0.001$ ) are supported, indicating the role of engagement in translating trust into loyalty. The interaction between AI and ESG branding significantly enhances green trust ( $\beta = 0.098$ ,  $t = 2.406$ ,  $p = 0.016$ ), whereas the interaction between AI and green engagement on brand loyalty is not significant ( $\beta = 0.068$ ,  $t = 1.423$ ,  $p = 0.155$ ), suggesting context-dependent effects.

Overall, the findings confirm that AI, ESG values, trust, and engagement jointly drive sustainable brand loyalty in the digital era.

**Table 6. Coefficient of Determination ( $R^2$ ) and Effect Size ( $f^2$ ) Summary**

| Endogenous Variable   | $R^2$ | $R^2$ Adjusted | Predictor | $f^2$ |
|-----------------------|-------|----------------|-----------|-------|
| GT (Green Trust)      | 0.301 | 0.296          | ESG       | 0.403 |
|                       |       |                | AI        | 0.027 |
|                       |       |                | AI x ESG  | 0.013 |
| GE (Green Engagement) | 0.168 | 0.166          | GT        | 0.202 |
| BL (Brand Loyalty)    | 0.221 | 0.215          | GE        | 0.134 |
|                       |       |                | AI        | 0.057 |
|                       |       |                | AI x GE   | 0.007 |

Source: Authors' calculation using SmartPLS 4.0,  $n = 420$ , bootstrap = 5,000 subsamples

The model's explanatory power was assessed using  $R^2$  and adjusted  $R^2$  values. As shown in Table 6, the model explains 30.1% of the variance in Green Trust (GT), 16.8% in Green Engagement (GE), and 22.1% in Brand Loyalty (BL), indicating moderate explanatory power (Hair et al., 2021). Effect size ( $f^2$ ) results highlight the relative importance of predictors. ESG-oriented branding has a large effect on GT ( $f^2 = 0.403$ ), confirming its central role in trust formation, while the moderating effect of AI on this relationship is small ( $f^2 = 0.013$ ). For GE, green trust shows a moderate effect ( $f^2 = 0.202$ ), reinforcing the trust–engagement link. Brand loyalty is primarily driven by green engagement ( $f^2 = 0.134$ ), followed by AI ( $f^2 = 0.057$ ), whereas the interaction between AI and engagement is negligible ( $f^2 = 0.007$ ).

Overall, the results underscore the importance of ESG branding and green trust in driving engagement and loyalty, alongside the emerging but nuanced role of AI.

#### 4.4. Research implications

The findings provide several theoretical implications for sustainable brand loyalty and technology-enabled green marketing. Firstly, the significant impact of ESG-oriented branding on Green Trust (GT) ( $\beta = 0.532$ ,  $p <$

0.001) underscores the central role of sustainability in trust formation. This reinforces stakeholder theory and confirms that consumers expect brands to contribute to environmental and social well-being (White et al., 2019; Kumar & Christodouloupoulou, 2014). Secondly, the sequential path from GT to Green Engagement (GE) ( $\beta = 0.410$ ,  $p < 0.001$ ) and from GE to Brand Loyalty (BL) ( $\beta = 0.339$ ,  $p < 0.001$ ) supports a process-based loyalty mechanism in which trust drives engagement, leading to long-term loyalty. This finding extends prior consumer-brand relationship frameworks in sustainability contexts (Hollebeek et al., 2014). Thirdly, the direct effects of AI on BL ( $\beta = 0.223$ ,  $p < 0.001$ ) and GT ( $\beta = 0.139$ ,  $p < 0.001$ ) highlight its role as both a trust enabler and loyalty driver, rather than merely a technical tool (Davenport et al., 2020). Fourthly, AI significantly moderates the relationship between ESG-oriented branding and green trust ( $\beta = 0.098$ ,  $p = 0.016$ ), although the effect size remains small ( $f^2 = 0.013$ ), indicating that AI enhances trust only when it is meaningfully integrated into ESG communication. In contrast, the moderating effect of AI on the relationship between green engagement and brand loyalty is not statistically significant ( $p = 0.155$ ), suggesting potential limitations in the effectiveness of AI-enhanced engagement. Finally, the model demonstrates moderate explanatory power, explaining 30.1% of the variance in green trust, 16.8% in green engagement, and 22.1% in brand loyalty.

Overall, these findings validate key theoretical relationships and extend loyalty frameworks by incorporating ESG and AI dynamics in sustainable consumer research.

## 5. Practical and policy implications

### 5.1. Managerial implications for retail and technology brands

The findings of this study provide meaningful guidance for retail, consumer electronics, and digital ecosystem firms aiming to strengthen sustainable brand loyalty in the context of climate-resilient development. Three strategic areas emerge as particularly relevant:

#### 5.1.1. Embed ESG values into brand DNA

Brand DNA refers to the underlying values, purpose, and behavioral principles that define a brand's identity and long-term positioning. Embedding ESG values into this core requires more than short-term campaigns; it demands an integrated approach whereby sustainability is reflected across operations, product design, supply chains, and brand communications. This authentic alignment fosters *green trust*, a critical enabler of sustainable consumer commitment. For

retail and smartphone brands, this may involve sourcing responsibly, adopting circular design practices, and transparently disclosing ESG performance to signal genuine climate concern.

#### 5.1.2. Leverage AI for personalized sustainability engagement

AI-driven tools allow firms to analyze behavioral data to deliver real-time, personalized sustainability experiences. Retailers can classify customers by environmental profiles, recommend low-carbon product options, and incentivize eco-actions such as recycling or using energy-efficient devices. Personalized sustainability messages across platforms increase perceived relevance and reinforce brand-consumer connection. This study confirms that AI enhances both green trust and loyalty, validating the use of AI not just for operational efficiency, but also as a strategic tool in green branding.

#### 5.1.3. Transitioning from transactional to behavioral loyalty

Traditional loyalty programs (often price-driven) are insufficient to drive long-term climate-aligned brand relationships. Instead, brands should nurture behavioral loyalty, incentivizing sustainable behaviors via gamified eco-challenges, digital rewards, and community-based recognition systems. Smartphone brands, for instance, can reward users for extending product life, engaging in take-back programs, or sharing sustainability stories. These experiences transform loyalty into a value-based bond, supporting broader environmental goals.

## 5.2. Policy implications for climate and branding strategy in Vietnam

This study provides implications for policymakers in developing national branding and environmental governance frameworks that promote sustainable consumption and climate-resilient development.

#### 5.2.1. Integrating green loyalty into national brand strategy

Vietnam's national brand strategy should move beyond export competitiveness to incorporate sustainability as a core identity. Government agencies such as the Ministry of Industry and Trade (MOIT) and the Ministry of Information and Communications (MIC) can integrate "green loyalty" mechanisms into initiatives like the Vietnam Value program by encouraging certified sustainable brands to adopt digital loyalty systems that reward climate-friendly behaviors. These mechanisms can function as soft-power tools to strengthen Vietnam's ESG-oriented brand image internationally.

### 5.2.2. Promoting AI adoption in ESG communications

To support the integration of AI in green marketing, relevant ministries and local agencies should provide regulatory guidance and fiscal incentives (e.g., tax reliefs, digital transformation grants) to help small and medium-sized enterprises (SMEs) adopt responsible AI in customer engagement. Public-private partnership platforms could be established to showcase best practices and provide open-source tools that enable AI-enhanced sustainability messaging, aligned with climate resilience goals.

### 5.2.3. Strengthening data governance and green digital infrastructure

As AI-enabled branding becomes more reliant on consumer data, policy makers must ensure the development of ethical data governance frameworks that protect consumer rights while supporting innovation. In parallel, investments in green digital infrastructure (e.g., energy-efficient data centers, ESG-compliant digital platforms) are needed to reduce the carbon footprint of digital brand ecosystems.

### 5.2.4. Mobilizing intermediary institutions and associations

Trade associations, green innovation hubs, and ESG-focused industry alliances (e.g., Vietnam Association for Supporting Industries or VCCI's Sustainable Business Council) can play a key role in scaling up the AI × ESG × Loyalty model. These institutions can offer toolkits, conduct training, and certify sustainable loyalty initiatives that align with SDGs, particularly Goal 12 (responsible consumption) and Goal 13 (climate action).

## 6. Conclusion and future research

### 6.1. Conclusion

This study contributes to climate-resilient development literature by proposing and empirically validating an AI-driven framework for sustainable brand loyalty. The model integrates ESG-oriented branding, green trust, consumer engagement, and artificial intelligence within stakeholder theory and green consumer behavior. It reframes brand loyalty as a strategic mechanism for fostering pro-environmental behavior in emerging markets. Empirical evidence from Vietnam's smartphone retail sector confirms the model's explanatory and predictive validity. ESG-oriented branding significantly enhances green trust, which subsequently drives engagement and long-term loyalty. Additionally, artificial intelligence emerges as both a direct driver of trust and loyalty and a moderator that strengthens the link between ESG communication and consumer perception, highlighting the synergistic role of sustainability and intelligent technology.

Theoretically, this study extends branding literature by incorporating AI-enabled dynamics into existing loyalty and sustainability frameworks. Practically, it provides actionable insights for firms and policymakers seeking to align branding strategies with climate resilience, ESG priorities, and digital transformation.

### 6.2. Future research directions

While this study provides a solid foundation, several directions merit further research. Future studies should extend the framework across industries such as fashion, food and beverage, and transportation to improve generalizability. Longitudinal approaches and behavioral data would offer deeper insights into the evolution of green loyalty over time. Further research should also examine consumer perceptions of AI-enabled sustainability, particularly regarding transparency, fairness, and data privacy. Comparative studies across emerging markets with different ESG awareness and digital conditions may reveal context-specific pathways. Incorporating a multistakeholder perspective, including NGOs, digital platforms, and green communities, would further enrich the model.

Overall, as economies move toward climate-resilient development, brands supported by ethical AI play an increasing role in shaping consumer behavior. ESG-driven loyalty, enhanced through personalization, offers a pathway to both competitive advantage and collective resilience, contributing to academic and practical advancements in emerging markets.

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# DETERMINANTS OF CREDIT GROWTH IN VIETNAMESE COMMERCIAL BANKS

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**Abstract:** *This study examines the internal bank-specific and macroeconomic determinants of credit growth in Vietnamese commercial banks over the period 2018-2023. Given the central role of bank credit in supporting economic growth, identifying the key drivers of lending expansion is of particular importance in emerging economies. Using panel data from Vietnamese commercial banks, the study employs Pooled OLS, Fixed Effects, Random Effects, and Generalized Least Squares (GLS) estimations to ensure robust empirical results. The findings indicate that deposit growth and the loan-to-deposit ratio have a positive and statistically significant impact on credit growth, while bank size and capital adequacy are negatively associated with lending expansion, reflecting more conservative strategies adopted by larger and well-capitalized banks. In addition, GDP growth supports credit expansion, whereas inflation constrains lending activity. Overall, the results highlight the importance of funding capacity, balance sheet conditions, and macroeconomic factors in shaping credit growth dynamics in Vietnam, offering policy-relevant implications for banking management and monetary authorities.*

• Keywords: credit growth; commercial banks; Vietnam; panel data analysis.

Date of receipt: 26<sup>th</sup> Feb., 2026

Date of delivery revision: 07<sup>th</sup> Mar., 2026

DOI:

Date of receipt revision: 13<sup>th</sup> Mar., 2026

Date of approval: 27<sup>th</sup> Mar., 2026

## 1. Introduction

Existing empirical studies identify two broad groups of factors influencing bank credit growth: internal bank-specific characteristics and macroeconomic conditions. Bank-specific factors commonly examined include deposit growth, capital adequacy, bank size, profitability, liquidity indicators, and asset quality, while macroeconomic variables typically include GDP growth and inflation. Nevertheless, prior research reports mixed and sometimes contradictory findings regarding the direction and magnitude of these effects, reflecting differences in institutional contexts, economic cycles, and methodological approaches. Moreover, many studies focus on either internal or macroeconomic determinants in isolation, limiting the ability to capture the combined effects shaping credit growth dynamics.

Against this background, this study investigates the determinants of credit growth in Vietnamese commercial banks by jointly examining internal bank-specific factors and macroeconomic conditions over the period 2018-2023. Using panel data regression techniques, including Fixed Effects, Random Effects, and Generalized Least Squares (GLS) estimations, the study aims to identify key drivers of credit expansion while addressing common econometric issues associated with panel data. By providing updated empirical evidence from Vietnam, this

research contributes to the literature on bank credit growth in emerging markets and offers policy-relevant implications for banking management and monetary authorities seeking to promote sustainable credit expansion while preserving financial stability.

## 2. Literature review

The determinants of bank credit growth have been extensively examined in the banking and financial economics literature. Credit growth is shaped by both banks' internal financial conditions and broader macroeconomic dynamics, as emphasized in the credit supply and credit cycle frameworks (Bernanke & Gertler, 1989; Kiyotaki & Moore, 1997). Accordingly, existing empirical studies generally classify the drivers of credit growth into two main groups: internal bank-specific factors and macroeconomic conditions.

### 2.1. Internal bank-specific determinants of credit growth

Internal characteristics of banks are widely recognized as key drivers of lending behavior. Among these, funding capacity and liquidity conditions are consistently found to exert a strong influence on credit growth. Deposit growth and liquidity-related indicators, such as the loan-to-deposit ratio (LDR), reflect a bank's ability to mobilize resources and transform deposits into loans. Empirical evidence from Vietnam and other emerging economies suggests that higher deposit growth enhances lending capacity

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and supports credit expansion (Nguyen et al., 2020a; Nguyen, 2021a; Norawati et al., 2022). Similarly, LDR is often found to be positively associated with credit growth, although excessively high levels may raise liquidity risk and constrain future lending (Chun & Ardaaragchaa, 2024).

Bank size and capital adequacy represent another important group of internal determinants. Larger banks may benefit from economies of scale and broader market access; however, several empirical studies indicate that large institutions tend to adopt more conservative lending strategies due to stricter regulatory oversight and stronger risk management requirements (Nguyen, 2019; Nguyen et al., 2020a). In line with the credit supply framework, higher capital adequacy strengthens banks' balance sheets but may also reduce leverage and limit short-term credit expansion (Bernanke & Gertler, 1989). Empirical findings on the impact of capital ratios on credit growth remain mixed, with evidence of negative or statistically insignificant effects depending on institutional context (Nguyen et al., 2020b; Chun & Ardaaragchaa, 2024).

Profitability indicators, commonly measured by return on assets (ROA) or return on equity (ROE), are also frequently incorporated into credit growth models. More profitable banks are generally expected to expand lending to exploit growth opportunities and enhance returns. Empirical evidence from Vietnamese commercial banks supports a positive association between profitability and credit growth, although the magnitude and significance of this relationship vary across model specifications (Nguyen, 2021b; Nguyen et al., 2020b). These mixed results suggest that profitability interacts with other internal characteristics, such as bank size and capital structure, rather than acting as an independent driver of credit expansion.

Asset quality, particularly the non-performing loan (NPL) ratio, is widely viewed as a key constraint on credit growth. High NPL levels weaken banks' balance sheets, increase provisioning costs, and encourage more restrictive lending policies. This mechanism is consistent with the agency cost and balance sheet channel, whereby deteriorating asset quality limits banks' ability and willingness to supply credit (Bernanke & Gertler, 1989). Empirical studies document a negative relationship between NPLs and credit growth in both developed and emerging economies (Nkusu, 2011; Chun & Ardaaragchaa, 2024), although the effect may be statistically insignificant when NPL ratios remain at manageable levels.

## **2.2. Macroeconomic determinants of credit growth**

In addition to bank-specific factors, macroeconomic conditions play a crucial role in shaping credit growth dynamics. Economic growth, typically proxied by GDP growth, is widely regarded as a key driver of bank lending. According to the credit cycle theory, periods of economic expansion are associated with rising asset values and borrower net worth, which stimulate credit demand and reinforce lending growth (Kiyotaki & Moore, 1997). Empirical evidence from Vietnam and other emerging economies confirms a positive relationship between GDP growth and credit expansion (Nguyen et al., 2020a; Nguyen et al., 2020b).

Inflation represents another important macroeconomic factor influencing credit growth. Its effect on bank lending is theoretically ambiguous; however, in emerging economies, high inflation often increases uncertainty, weakens purchasing power, and raises credit risk. Consequently, banks tend to adopt more cautious lending behavior during inflationary periods. Empirical studies generally report a negative impact of inflation on credit growth, particularly under tighter monetary policy conditions (Nguyen, 2019; Reinhart & Rogoff, 2010).

## **2.3. Research gap**

Although the existing literature provides valuable insights into the determinants of credit growth, several limitations remain. Empirical findings on key variables such as bank size, capital adequacy, and inflation are often inconsistent, reflecting differences in institutional settings and economic conditions. Many studies examine internal bank-specific factors and macroeconomic variables separately, rather than within an integrated analytical framework. Evidence from Vietnam remains fragmented and largely based on earlier data periods, despite significant changes in the banking system and macroeconomic environment in recent years.

To address these gaps, the present study adopts a comprehensive approach by jointly examining internal bank-specific characteristics and macroeconomic conditions in explaining credit growth in Vietnamese commercial banks over the period 2018-2023. By doing so, the study aims to provide updated empirical evidence and contribute to a more coherent understanding of credit growth dynamics in a transitional banking system.

## **3. Model and Methodology**

### **3.1. Research Model and Hypotheses**

Based on established theories on bank lending behavior and empirical evidence from emerging economies, this study examines the determinants of

credit growth in Vietnamese commercial banks by jointly considering internal bank-specific factors and macroeconomic conditions. The empirical model is specified as follows:

$$CGit = \beta_0 + \beta_1 DGit + \beta_2 SIZEit + \beta_3 CAPit + \beta_4 ROAit + \beta_5 LDRit + \beta_6 NPLit + \beta_7 GDPit + \beta_8 INFit + \varepsilon it$$

Where:

CGit: Credit growth rate of bank *i* in year *t*.

DGit: Deposit growth rate of bank *i* in year *t*.

CAPit: Equity-to-total-assets ratio of bank *i* in year *t*.

ROAit: Return on assets of bank *i* in year *t*.

LDRit: Loan-to-deposit ratio of bank *i* in year *t*, reflecting the use of mobilized funds for lending.

SIZEit: Bank size of bank *i* in year *t*, typically measured by the natural logarithm of total assets.

NPLit: Non-performing loan ratio of bank *i* in year *t*.

GDPit: National GDP growth rate in year *t*.

INFit: National inflation rate in year *t*.

$\varepsilon it$ : Random error term.

**Deposit Growth (DG):** Deposit growth reflects a bank's ability to mobilize stable funding sources, thereby enhancing its lending capacity and supporting credit expansion. From a credit supply perspective, higher deposit growth relaxes funding constraints and enables banks to extend more loans.

H1: Deposit growth has a positive impact on credit growth in Vietnamese commercial banks.

**Bank Size (SIZE):** Bank size, commonly measured by the natural logarithm of total assets, reflects the scale and scope of banking operations. While larger banks may benefit from economies of scale and broader market access. As a result, bank size may be negatively associated with credit growth in emerging banking systems (Nguyen, 2019; Nguyen et al., 2020a).

H2: Bank size negatively affects credit growth in Vietnamese commercial banks.

**Capital Ratio (CAP):** The capital-to-assets ratio represents a bank's financial strength and capacity to absorb risks. According to the credit supply and agency cost framework, higher capital adequacy improves balance sheet resilience but may also limit leverage and constrain short-term lending growth (Bernanke & Gertler, 1989).

H3: Capital ratio has a negative impact on credit growth in Vietnamese commercial banks.

**Return on Assets (ROA):** Return on assets (ROA) reflects a bank's profitability and operational efficiency.

More profitable banks are generally expected to expand lending in order to exploit growth opportunities and enhance returns.

H4: ROA positively affects credit growth in Vietnamese commercial banks.

**Loan-to-Deposit Ratio (LDR):** The loan-to-deposit ratio indicates the extent to which mobilized funds are transformed into loans. A higher LDR reflects more intensive utilization of deposits for lending activities, which is expected to support credit expansion.

H5: LDR has a positive impact on credit growth in Vietnamese commercial banks.

**Non-Performing Loans (NPL):** The non-performing loan (NPL) ratio is commonly used as an indicator of asset quality and credit risk in banking studies. From a theoretical perspective, higher NPL levels are expected to weaken banks' balance sheets and constrain credit supply through the agency cost and balance sheet channel (Bernanke & Gertler, 1989). However, in the context of this study, the estimated coefficient of NPLs is statistically insignificant in the GLS model and is therefore not discussed further, suggesting that asset quality did not constitute a binding constraint on credit growth during the sample period.

H6: NPLs negatively affect credit growth in Vietnamese commercial banks.

**GDP Growth:** GDP growth reflects overall economic conditions and credit demand in the economy. According to the credit cycle theory, economic expansion improves borrower net worth and collateral values, thereby stimulating credit demand and reinforcing bank lending growth (Kiyotaki & Moore, 1997).

H7: GDP growth has a positive impact on credit growth in Vietnamese commercial banks.

**Inflation:** Inflation affects credit growth through multiple channels, including uncertainty, purchasing power, and credit risk. High inflation often raises macroeconomic instability and weakens lending incentives, prompting banks to adopt more cautious credit policies.

H8: Inflation has a negative impact on credit growth in Vietnamese commercial banks.

### 3.2. Research Methodology

The study employs an unbalanced panel dataset of Vietnamese commercial banks over the period 2018-2023, constructed from banks' financial statements and official macroeconomic statistics. To estimate the model, standard panel data regression techniques are applied. Fixed Effects (FEM) and Random

Effects (REM) models are initially estimated to account for unobserved bank-specific heterogeneity. Model selection tests indicate that the Fixed Effects specification is more appropriate.

To address potential heteroskedasticity and autocorrelation commonly observed in panel data, the Generalized Least Squares (GLS) method is subsequently employed. The GLS estimates are therefore used as the primary basis for interpretation and discussion of the empirical results, as they provide more efficient and robust coefficient estimates.

#### 4. Research results

##### 4.1. Descriptive analysis

**Table 1. Descriptive Statistics Results**

| Variable | Obs | Mean   | Std. Dev. | Min    | Max    |
|----------|-----|--------|-----------|--------|--------|
| CG       | 200 | 0.175  | 0.102     | -0.113 | 0.667  |
| DG       | 200 | 0.147  | 0.11      | -0.105 | 0.718  |
| SIZE     | 200 | 32.956 | 1.114     | 30.578 | 35.372 |
| CAP      | 200 | 0.086  | 0.031     | 0.041  | 0.185  |
| ROA      | 200 | 0.01   | 0.007     | -0.007 | 0.032  |
| LDR      | 200 | 0.963  | 0.15      | 0.554  | 1.498  |
| NPL      | 200 | 0.02   | 0.025     | 0.005  | 0.297  |
| GDP      | 200 | 0.057  | 0.019     | 0.026  | 0.081  |
| INF      | 200 | 0.03   | 0.005     | 0.018  | 0.035  |

Source: Computed by the authors using Stata 15

**Descriptive analysis** was conducted on 200 observations collected from the financial statements of Vietnamese commercial banks. The results indicate that the dependent variable, credit growth (CG), had a mean value of 0.175, ranging from -0.113 to 0.667, reflecting substantial variability across banks. The deposit growth variable (DG) had an average of 0.147, indicating a generally positive but uneven trend.

Control variables such as SIZE (log of total assets), CAP (equity-to-assets ratio), ROA, LDR, and NPL were all within reasonable ranges, reflecting the operational and capital safety characteristics of the banking system. Meanwhile, macroeconomic variables such as GDP and INF exhibited low variation, suggesting a relatively stable economic environment during the study period.

##### 4.2. Correlation analysis

**Table 2. Pearson Correlation Results (r)**

| Variables | 1      | 2      | 3      | 4      | 5      | 6      | 7     | 8     | 9 |
|-----------|--------|--------|--------|--------|--------|--------|-------|-------|---|
| (1) CG    | 1      |        |        |        |        |        |       |       |   |
| (2) DG    | 0.491  | 1      |        |        |        |        |       |       |   |
| (3) SIZE  | 0.039  | 0.081  | 1      |        |        |        |       |       |   |
| (4) CAP   | -0.107 | -0.104 | -0.229 | 1      |        |        |       |       |   |
| (5) ROA   | 0.185  | 0.111  | 0.463  | 0.429  | 1      |        |       |       |   |
| (6) LDR   | 0.238  | 0.016  | 0.295  | 0.31   | 0.608  | 1      |       |       |   |
| (7) NPL   | -0.074 | -0.079 | -0.153 | -0.028 | -0.256 | -0.165 | 1     |       |   |
| (8) GDP   | 0.064  | 0.027  | -0.082 | -0.016 | -0.061 | -0.042 | 0.048 | 1     |   |
| (9) INF   | -0.076 | 0.118  | -0.026 | -0.037 | -0.068 | -0.071 | 0.062 | 0.515 | 1 |

Source: Computed by the authors using Stata 15

The Pearson correlation coefficients indicate a positive relationship between credit growth (CG)

and deposit growth (DG) ( $r = 0.491$ ), return on assets (ROA) ( $r = 0.185$ ), and loan-to-deposit ratio (LDR) ( $r = 0.238$ ), which is consistent with the hypothesis that these factors promote credit expansion. Conversely, CG exhibits a negative correlation with the capital ratio (CAP) ( $r = -0.107$ ) and non-performing loans (NPL) ( $r = -0.074$ ), reflecting a more cautious lending approach in banks facing higher risks or possessing strong capital foundations. No correlation coefficient between independent variables exceeds 0.8, indicating that multicollinearity is not a serious concern in the model.

##### 4.3. Multicollinearity Test

**Table 3. Results of the Multicollinearity Test**

| Variables | VIF   | 1/VIF |
|-----------|-------|-------|
| ROA       | 2.701 | 0.37  |
| SIZE      | 1.808 | 0.553 |
| CAP       | 1.798 | 0.556 |
| LDR       | 1.606 | 0.622 |
| INF       | 1.394 | 0.717 |
| GDP       | 1.374 | 0.728 |
| NPL       | 1.085 | 0.922 |
| DG        | 1.071 | 0.934 |
| Mean VIF  | 1.605 | .     |

Source: Computed by the authors using Stata 15

The VIF results indicate that all variables have VIF values less than 10, with an average of 1.605. This confirms the absence of significant multicollinearity and ensures the appropriateness of conducting linear regression analysis. Lựa chọn mô hình

##### 4.4. Model Selection

In this study, selecting an appropriate regression model is a crucial step to ensure the accuracy of the estimated results. To determine the most suitable model, two key diagnostic tests are performed: the F-test (comparing Pooled OLS and Fixed Effects Model (FEM)) and the Hausman test (comparing FEM and Random Effects Model (REM)).

**Table 4. Model Selection Test Results**

| Diagnostic Test            | Test Statistic              | Result |
|----------------------------|-----------------------------|--------|
| F-test (Pooled OLS và FEM) | Prob > F = 0.0000 < 0.05    | FEM    |
| Hausman test (FEM và REM)  | Prob > chi2 = 0.0000 < 0.05 | FEM    |

Source: Computed by the authors using Stata 15

Both the F-test and Hausman test yield statistically significant results ( $p < 0.05$ ), leading to the selection of the Fixed Effects Model (FEM) as the most appropriate for analysis.

##### 4.5. Testing for Heteroskedasticity and Autocorrelation

**Table 5. Results of Testing for Heteroskedasticity and Autocorrelation**

| Diagnostic Test             | Test Statistic            | Result                         |
|-----------------------------|---------------------------|--------------------------------|
| Heteroskedasticity (Wald)   | Prob>chi2 = 0.0000 < 0.05 | Presence of heteroskedasticity |
| Autocorrelation (Wooldrige) | Prob>F = 0.0012 < 0.05    | Presence of autocorrelation    |

Source: Computed by the authors using Stata 15



The results of the Wald and Wooldridge tests respectively indicate the presence of heteroscedasticity and autocorrelation. Therefore, to ensure the efficiency and reliability of the estimates, the GLS method is additionally employed.

#### 4.6. Regression results

**Table 6. Summary of the FEM, REM, and GLS regression results**

|                | (FEM)                  | (REM)                   | (GLS)                   |
|----------------|------------------------|-------------------------|-------------------------|
| VARIABLES      | CG                     | CG                      | CG                      |
| DG             | 0.429***<br>(0.0552)   | 0.435***<br>(0.0548)    | 0.443***<br>(0.0421)    |
| SIZE           | -0.0885***<br>(0.0224) | -0.0203***<br>(0.00741) | -0.0210***<br>(0.00499) |
| CAP            | -1.027***<br>(0.377)   | -0.909***<br>(0.260)    | -1.035***<br>(0.220)    |
| ROA            | -3.910**<br>(1.820)    | 2.294*<br>(1.351)       | 2.154**<br>(0.913)      |
| LDR            | 0.514***<br>(0.0780)   | 0.189***<br>(0.0513)    | 0.173***<br>(0.0370)    |
| NPL            | 0.0525<br>(0.247)      | 0.0697<br>(0.246)       | -0.0371<br>(0.229)      |
| GDP            | 0.374<br>(0.331)       | 0.812**<br>(0.356)      | 0.590***<br>(0.212)     |
| INF            | -3.267***<br>(1.145)   | -3.770***<br>(1.283)    | -2.742***<br>(0.746)    |
| Constant       | 2.737***<br>(0.703)    | 0.717***<br>(0.252)     | 0.752***<br>(0.178)     |
| Observations   | 200                    | 200                     | 200                     |
| R-squared      | 0.389                  |                         |                         |
| Number of NAME | 25                     | 25                      | 25                      |

Standard errors in parentheses \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$

Source: Computed by the authors using Stata 15

The regression results from FEM, REM, and GLS show that:

DG has a positive and highly significant effect ( $p < 0.01$ ), confirming the role of deposit growth in credit expansion.

SIZE and CAP have negative effects and are significant at the 1% level, reflecting the cautious stance of large banks or those with strong capital bases.

ROA shows inconsistent signs across models but is statistically significant in REM and GLS, partially supporting the hypothesis about the role of profitability in credit expansion.

LDR has a positive and significant effect in all models ( $p < 0.01$ ), indicating a positive relationship between capital utilization capacity and credit growth.

NPL is statistically insignificant, hence there is insufficient basis to conclude its influence on credit growth.

GDP has a positive and significant effect in REM and GLS, while INF has a negative and significant effect across all three models, showing that credit is influenced by macroeconomic conditions.

#### 5. Discussion of the research findings and Recommendations

##### 5.1. Discussion of the research findings

The empirical results from the FEM, REM, and GLS estimations provide important insights into the determinants of credit growth in Vietnamese commercial banks and are largely consistent with the existing theoretical and empirical literature.

First, deposit growth (DG) exhibits a positive and highly significant impact on credit growth across all model specifications. This finding is strongly aligned with prior empirical evidence from Vietnam and other emerging economies, which emphasizes the central role of funding mobilization in supporting lending activities (Nguyen et al., 2020a; Nguyen, 2021a; Norawati et al., 2022). From a credit supply perspective, higher deposit growth enhances banks' lending capacity by relaxing funding constraints, thereby facilitating credit expansion.

Second, bank size (SIZE) is found to have a negative and statistically significant effect on credit growth. This result is consistent with empirical studies on Vietnamese commercial banks, which suggest that larger institutions tend to adopt more conservative lending strategies due to stricter regulatory oversight and stronger risk management frameworks (Nguyen, 2019; Nguyen et al., 2020a). This behavior is also consistent with the agency cost and balance sheet framework proposed by Bernanke and Gertler (1989), whereby banks with stronger balance sheets may prioritize asset quality over aggressive credit expansion.

Third, the capital adequacy ratio (CAP) shows a negative and highly significant relationship with credit growth. While higher capital levels enhance banks' resilience to shocks, they may simultaneously constrain lending through lower leverage. This finding supports the credit supply argument that well-capitalized banks may pursue more cautious growth strategies, particularly under Basel II and Basel III regulatory requirements (Bernanke & Gertler, 1989; Nguyen et al., 2020b). Similar empirical patterns are also reported by Chun and Ardaaragchaa (2024), although the magnitude of the effect varies across institutional settings.

Fourth, the impact of profitability, measured by return on assets (ROA), exhibits heterogeneous effects across estimation methods. While the FEM results suggest a negative association between profitability and credit growth, the REM and GLS estimates indicate a positive and statistically significant relationship. This pattern is consistent with prior empirical evidence on Vietnamese commercial banks, which shows that the effect of profitability on lending behavior is sensitive

to model specification and unobserved bank-specific characteristics (Nguyen, 2021b; Nguyen et al., 2020b). Importantly, these findings imply that profitability does not exert a uniform influence on credit expansion but instead operates conditionally, interacting with other internal factors such as capital structure, risk appetite, and strategic orientation, rather than acting as an independent driver of credit growth.

Fifth, the loan-to-deposit ratio (LDR) demonstrates a positive and statistically significant effect on credit growth across all models. This finding confirms that more intensive utilization of mobilized funds supports credit expansion, as documented in previous studies on bank lending behavior (Nguyen et al., 2020a; Chun & Ardaaragchaa, 2024). Nevertheless, excessively high LDR levels may increase liquidity risk, highlighting the need for prudent liquidity management.

Seventh, GDP growth exhibits a positive and statistically significant effect on credit growth in the REM and GLS models. This result is consistent with the credit cycle theory of Kiyotaki and Moore (1997), which posits that economic expansion strengthens borrower balance sheets and stimulates credit demand. Empirical evidence from Vietnam similarly confirms the procyclical nature of bank lending (Nguyen et al., 2020a; Nguyen et al., 2020b).

Finally, inflation (INF) shows a negative and statistically significant relationship with credit growth across all models. This finding aligns with macrofinancial instability arguments, which suggest that higher inflation increases uncertainty and credit risk, thereby constraining bank lending (Reinhart & Rogoff, 2010). Empirical studies on Vietnamese banks also document a negative impact of inflation on credit expansion, particularly during periods of tighter monetary conditions (Nguyen, 2019).

## 5.2. Recommendations

*First*, given the positive effects of deposit growth and the loan-to-deposit ratio on credit expansion, commercial banks should strengthen capital mobilization while maintaining prudent liquidity management. Diversifying deposit products can enhance funding capacity, but the loan-to-deposit ratio should be kept within safe thresholds to avoid liquidity pressures.

*Second*, in light of the negative relationship between bank size, capital adequacy, and credit growth, credit strategies should be aligned with banks' scale and capital structure. Large and well-capitalized banks should continue to prioritize asset quality and risk control, while adopting more selective and targeted lending to improve credit efficiency without

undermining financial safety.

*Third*, considering the positive association between profitability and credit growth, enhancing operational efficiency remains essential for sustainable lending expansion. Improving cost management, streamlining lending processes, and strengthening risk-adjusted performance can support banks' capacity to expand credit.

*Fourth*, given the significant influence of GDP growth and inflation on credit dynamics, banks should closely monitor macroeconomic conditions and regulatory signals. Credit policies should remain flexible across economic cycles, expanding cautiously during periods of strong growth and tightening under inflationary pressures to preserve credit quality and financial stability.

## Conclusion

This study empirically confirmed key internal and macroeconomic determinants of credit growth in Vietnamese commercial banks. It highlights the crucial roles of funding capacity, risk management, and the broader economic environment in shaping lending dynamics. The research contributes to the academic understanding of credit expansion in transitional economies and provides practical insights for banking strategy and policymaking.

However, the study's scope is constrained by its specific data period and selected variables. Future research could extend the analysis to longer timeframes, incorporate additional micro- and macroeconomic factors, and explore non-linear relationships or sector-specific effects to offer more granular insights into Vietnam's evolving banking landscape.

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# TAX AVOIDANCE AND EARNINGS QUALITY: EVIDENCE FROM VIETNAM

PhD. Cao Tan Huy\*

**Abstract:** *This study examines the conditional role of corporate tax avoidance in earnings persistence among non-financial listed firms in Vietnam. Earnings persistence is measured by the association between current pre-tax book income and one-year-ahead pre-tax income. Using panel data comprising 1,610 firm-year observations from 2019-2023, the analysis employs pooled OLS, fixed-effects, and FGLS estimations. The results indicate that current earnings exhibit substantial persistence; however, this association weakens when firms engage in higher levels of tax avoidance. Interaction terms between tax avoidance and current earnings are consistently negative and statistically significant, suggesting that tax avoidance does not directly affect future earnings but instead alters the dynamic mapping of earnings over time. Earnings decomposition further reveals that this weakening operates through both operating cash flows and accruals, with a more pronounced impact on accruals.*

• Keywords: earnings persistence; tax avoidance; cash flows; accruals; Vietnam.

Date of receipt: 27<sup>th</sup> Feb., 2026

Date of delivery revision: 07<sup>th</sup> Mar., 2026

DOI:

Date of receipt revision: 17<sup>th</sup> Mar., 2026

Date of approval: 29<sup>th</sup> Mar., 2026

## 1. Introduction

Earnings persistence is a core attribute of earnings quality, indicating how much current earnings can be sustained into future accounting periods. This attribute plays a central role in firm valuation and investment decision-making, as earnings are informative only to the extent that they are repeatable and predictive of future cash flows (Hanlon, 2005). Consequently, identifying factors that weaken the association between current and future earnings has become a central focus of accounting and finance research.

Corporate tax avoidance has increasingly been viewed as an important conditioning factor in the association between current and future earnings. Although tax avoidance may generate short-term benefits through improved cash flows and higher after-tax earnings (Hanlon & Heitzman, 2010), it is also associated with greater managerial discretion, short-term accounting adjustments, and a higher risk of earnings reversals (Frankel & Litov, 2009). As a result, tax avoidance may weaken the linkage between current and future earnings.

Recent empirical evidence further indicates that the effect of tax avoidance on earnings quality is heterogeneous and channel-dependent. While some studies document short-term cash-flow benefits, others show that aggressive tax avoidance is associated with greater information uncertainty and lower earnings persistence over time (McGuire et al., 2013; Chen et

al., 2024). However, evidence on how tax avoidance affects earnings persistence through the cash-flow and accrual components remains limited.

Addressing this gap, this study examines the conditioning role of corporate tax avoidance in earnings persistence, as measured by the association between current and one-year-ahead pre-tax book income. Earnings are further decomposed into operating cash flows and accruals to identify the channels through which tax avoidance affects earnings sustainability in an emerging-market setting such as Vietnam.

## 2. Theoretical background and hypothesis development

### 2.1. Earnings persistence and tax avoidance

Earnings persistence is the extent to which current earnings predict future earnings, thereby capturing a firm's ability to sustain operating performance over time (Schipper & Vincent, 2003). Although accounting earnings, particularly pre-tax earnings, are generally persistent, prior studies document substantial cross-firm variation in persistence that depends critically on earnings structure and the surrounding information environment (Sloan, 1996; Frankel & Litov, 2009).

In this context, firms' financial and tax-related behaviors may shape the association between current and future earnings. Empirical evidence indicates that corporate tax avoidance is often linked to greater managerial discretion and more accounting

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adjustments, thereby increasing the transitory component of reported earnings. Frankel and Litov (2009) show that firms engaging more aggressively in tax avoidance are also more likely to engage in earnings management, while Hanlon and Heitzman (2010) argue that tax avoidance increases information risk and the likelihood of earnings reversals. These findings imply that tax avoidance affects not only the level of reported earnings but also the dynamic linkage between current and future earnings.

Accordingly, when tax avoidance is accompanied by greater discretion and higher informational opacity, the mapping of current earnings into future earnings is expected to weaken. In this setting, tax avoidance acts as a conditioning factor that reduces earnings persistence rather than as a direct determinant of future earnings.

**Hypothesis H1:** Corporate tax avoidance weakens the association between current and future earnings.

## 2.2. Tax avoidance and the channels of earnings persistence

Accounting earnings can be decomposed into two fundamental components: operating cash flows and accruals. The seminal literature shows that cash flows are generally more persistent, whereas accruals are less persistent because of estimation errors and managerial discretion (Sloan, 1996; Richardson et al., 2006). Examining these components is therefore essential for identifying the channels through which tax avoidance affects earnings persistence.

From a theoretical perspective, tax avoidance may alter the earnings structure through both components. By shifting the timing of tax expense recognition, exploiting deferrals, or restructuring transactions, firms can generate transitory earnings effects that are primarily reflected in accruals. Accruals arising from such tax-related adjustments are more likely to reverse in subsequent periods, thereby weakening earnings persistence (Dechow & Dichev, 2002).

The effect of tax avoidance on operating cash flows is less direct yet still economically meaningful. When tax avoidance is linked to short-term operational decisions or heightened uncertainty about tax enforcement and compliance, the sustainability of future operating cash flows may decline. Empirical evidence shows that tax-aggressive firms exhibit greater cash-flow volatility and lower cash-flow predictability over time (Hanlon & Heitzman, 2010; Chen et al., 2024).

Taken together, these arguments suggest that tax avoidance weakens the association between current

and future earnings across both earnings components. However, because accruals are more directly affected by managerial discretion and tax-related accounting adjustments, the attenuation of earnings persistence is expected to be more pronounced through the accrual channel than through operating cash flows.

**Hypothesis H2:** Corporate tax avoidance weakens the association between current and future earnings through both operating cash flows (PTCF) and accruals (PTACC).

## 3. Research design

### 3.1. Sample and data

The study uses a balanced panel of non-financial firms listed in Vietnam from 2019 to 2023, based on audited financial statements. Financial institutions are excluded due to their distinct reporting structures and regulatory environments. After removing observations with missing data and addressing outliers, the final sample comprises 1,610 firm-year observations.

### 3.2. Variable measurement

Earnings persistence is measured following Hanlon (2005) and Blaylock et al. (2012) using the association between current pre-tax book income (PTBI<sub>it</sub>) and one-year-ahead pre-tax book income (PTBI<sub>it+1</sub>). Pre-tax income is scaled by total assets. To examine underlying mechanisms, earnings are decomposed into operating cash flows (PTCF) and accruals (PTACC), with PTACC defined as the difference between pre-tax income and operating cash flows.

Tax avoidance (TAXAD) is measured using a dummy variable for firms with relatively high levels of tax avoidance, allowing the analysis to focus on the conditioning role of tax avoidance in earnings persistence rather than its direct effect on future earnings. Control variables include firm size (FSIZE), financial leverage (LEV), asset tangibility (TANG), and firm age (OLDS), which account for heterogeneity in risk, asset structure, and firm life cycle.

### 3.3. Empirical models

To test Hypothesis H1, the following baseline persistence model is estimated:

$$PTBI_{it+1} = \beta_0 + \beta_1 PTBI_{it} + \beta_2 TAXAD_{it} + \beta_3 (TAXAD_{it} \times PTBI_{it}) + Controls_{it} + \varepsilon_{it}$$

The coefficient  $\beta_3$  captures the conditioning effect of tax avoidance on the association between current and future earnings.

To test Hypothesis H2, earnings are decomposed into cash-flow and accrual components:

$$PTBI_{i,t+1} = \beta_0 + \beta_1 PTCF_{i,t} + \beta_2 PTACC_{i,t} + \beta_3 TAXAD_{i,t} + \beta_4 (TAXAD_{i,t} \times PTCF_{i,t}) + \beta_5 (TAXAD_{i,t} \times PTACC_{i,t}) + Controls_{i,t} + \varepsilon_{i,t}$$

The interaction coefficients  $\beta_4$  and  $\beta_5$  identify the channels through which tax avoidance influences earnings persistence.

The study uses pooled OLS as a baseline estimator and fixed-effects models to control for unobserved firm-specific heterogeneity. Feasible generalized least squares (FGLS) is also applied to account for heteroskedasticity and serial correlation in the panel data. All specifications include year and industry fixed effects.

## 4. Results and discussion

### 4.1. Descriptive statistics and correlations

Descriptive statistics in Table 1 show that the tax avoidance indicator (TAXAD) has a mean of 0.1981, implying that approximately 19.8% of firm-year observations are classified as high-tax-avoidance firms.

**Table 1. Descriptive statistics**

| Variable            | N     | Mean    | Std. Dev. | Min     | Max     |
|---------------------|-------|---------|-----------|---------|---------|
| PTBI <sub>t+1</sub> | 1,610 | 0.0580  | 0.0816    | -0.1521 | 0.3732  |
| PTBI <sub>t</sub>   | 1,610 | 0.0635  | 0.0809    | -0.1453 | 0.3856  |
| PTCF                | 1,610 | 0.0563  | 0.1212    | -0.2733 | 0.4250  |
| PTACC               | 1,610 | 0.0068  | 0.1151    | -0.3466 | 0.3376  |
| TAXAD               | 1,610 | 0.1981  | 0.3987    | 0.0000  | 1.0000  |
| FSIZE               | 1,610 | 12.0868 | 0.6822    | 10.5648 | 13.7537 |
| LEV                 | 1,610 | 0.4698  | 0.2295    | 0.0312  | 0.8975  |
| TANG                | 1,610 | 0.1867  | 0.1984    | 0.0000  | 0.8628  |
| OLDS                | 1,610 | 31.4534 | 14.5671   | 10.0000 | 96.0000 |

Notes: PTBI<sub>t+1</sub> and PTBI<sub>t</sub> denote pre-tax book income in years  $t+1$  and  $t$ , scaled by average total assets; PTCF is operating cash flows, scaled by average total assets; PTACC is accruals, defined as pre-tax book income minus operating cash flows, scaled by average total assets; TAXAD is a tax avoidance dummy based on the effective tax rate (ETR), equal to one if the gap between the statutory tax rate and the cash effective tax rate falls within the top 20% of the sample, and zero otherwise; FSIZE is the natural logarithm of total assets; LEV is total liabilities divided by total assets; TANG is tangible assets divided by total assets; OLDS is firm age, measured as the number of years since establishment.

Table 2 presents the correlation matrix. Current pre-tax earnings (PTBI<sub>t</sub>) are strongly and positively correlated with one-year-ahead earnings (PTBI<sub>t+1</sub>) ( $\beta = 0.735$ ,  $p < 0.01$ ), providing preliminary evidence of earnings persistence.

All variance inflation factors (VIFs) are below conventional thresholds, with a maximum of 3.32, indicating no serious multicollinearity concerns.

**Table 2. Correlation matrix and variance inflation factors (VIFs)**

| Variable            | PTBI <sub>t+1</sub> | PTBI <sub>t</sub> | PTCF      | PTACC     | TAXAD     | FSIZE    | LEV       | TANG     | OLDS  | VIF  |
|---------------------|---------------------|-------------------|-----------|-----------|-----------|----------|-----------|----------|-------|------|
| PTBI <sub>t+1</sub> | 1.000               |                   |           |           |           |          |           |          |       | -    |
| PTBI <sub>t</sub>   | 0.735***            | 1.000             |           |           |           |          |           |          |       | 1.68 |
| PTCF                | 0.502***            | 0.411***          | 1.000     |           |           |          |           |          |       | 3.22 |
| PTACC               | -0.005              | 0.283***          | -0.744*** | 1.000     |           |          |           |          |       | 3.32 |
| TAXAD               | 0.083***            | -0.046*           | -0.001    | -0.037    | 1.000     |          |           |          |       | 1.56 |
| FSIZE               | 0.058**             | 0.068***          | 0.001     | 0.049**   | 0.017     | 1.000    |           |          |       | 1.20 |
| LEV                 | -0.449***           | -0.440***         | -0.258*** | -0.030    | -0.116*** | 0.289*** | 1.000     |          |       | 1.45 |
| TANG                | 0.064**             | 0.055**           | 0.259***  | -0.243*** | 0.138***  | 0.112*** | -0.104*** | 1.000    |       | 1.14 |
| OLDS                | 0.033               | 0.039             | 0.069***  | -0.043*   | -0.074*** | -0.063** | 0.110***  | 0.065*** | 1.000 | 1.06 |

Notes: This table reports Pearson correlation coefficients. VIF denotes the variance inflation factor for each explanatory variable. \*, \*\*, and \*\*\* indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

### 4.2. Regression analysis

Table 3 presents the baseline persistence regressions. Across all specifications, current pre-tax book income (PTBI<sub>t</sub>) is positive and highly significant in explaining one-year-ahead pre-tax income, confirming earnings persistence in the sample. The estimated coefficient on PTBI<sub>t</sub> equals 0.750 ( $p < 0.01$ ) under pooled OLS, 0.178 ( $p < 0.01$ ) in the fixed-effects model, and 0.751 ( $p < 0.01$ ) under FGLS.

More importantly, the interaction term between tax avoidance and current earnings (TAXAD  $\times$  PTBI<sub>t</sub>) is negative and statistically significant at the 1% level across all models. The interaction coefficients are -0.364 ( $p < 0.01$ ) for OLS, -0.283 ( $p < 0.01$ ) for fixed effects, and -0.288 ( $p < 0.01$ ) for FGLS. These results indicate that the mapping from current to future earnings weakens significantly for firms with higher tax avoidance. Taken together, the evidence in Table 3 suggests that tax avoidance acts as a conditioning factor that attenuates earnings persistence, thereby supporting Hypothesis H1.

**Table 3. The conditional role of tax avoidance in earnings persistence**

| Variables                        | Dependent variable: PTBI <sub>t+1</sub> |                      |                        |
|----------------------------------|-----------------------------------------|----------------------|------------------------|
|                                  | OLS                                     | FE                   | FGLS                   |
| PTBI <sub>t</sub>                | 0.750***<br>(0.021)                     | 0.178***<br>(0.031)  | 0.751***<br>(0.018)    |
| TAXAD                            | 0.041***<br>(0.004)                     | 0.039***<br>(0.004)  | 0.025***<br>(0.002)    |
| TAXAD $\times$ PTBI <sub>t</sub> | -0.364***<br>(0.039)                    | -0.283***<br>(0.043) | -0.288***<br>(0.032)   |
| FSIZE                            | 0.009***<br>(0.002)                     | 0.073***<br>(0.016)  | 0.006***<br>(0.001)    |
| LEV                              | -0.056***<br>(0.007)                    | -0.143***<br>(0.020) | -0.035***<br>(0.004)   |
| TANG                             | -0.005<br>(0.007)                       | -0.099***<br>(0.019) | -0.006<br>(0.004)      |
| OLDS                             | 0.000**<br>(0.000)                      | -0.006***<br>(0.001) | 0.000***<br>(0.000)    |
| Constant                         | -0.084***<br>(0.024)                    | -0.557***<br>(0.178) | -0.052***<br>(0.013)   |
| Year fixed effects               | No                                      | Yes                  | Yes                    |
| Industry fixed effects           | No                                      | Yes                  | Yes                    |
| Observations                     | 1,610                                   | 1,610                | 1,610                  |
| R <sup>2</sup> / Wald $\chi^2$   | 0.596                                   | 0.168 (within)       | 4,708.03               |
| F / $\chi^2$ test                | F = 337.39***                           | F = 25.72***         | $\chi^2 = 4,708.03***$ |

Notes: Robust standard errors are reported in parentheses. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 4 extends the analysis by decomposing earnings into operating cash flows (PTCF) and accruals (PTACC). Across all specifications, both components show positive and statistically significant associations with future earnings. In the FGLS model, the estimated coefficients are 0.732 ( $p < 0.01$ ) for PTCF and 0.633 ( $p < 0.01$ ) for PTACC, indicating that both cash-flow and accrual components contribute to earnings persistence.

However, the interaction terms between tax avoidance and each earnings component are consistently negative and highly significant. Specifically, the

coefficients on  $TAXAD \times PTCF$  are  $-0.306$  ( $p < 0.01$ ),  $-0.248$  ( $p < 0.01$ ), and  $-0.261$  ( $p < 0.01$ ) under OLS, fixed effects, and FGLS, respectively. Similarly, the coefficients on  $TAXAD \times PTACC$  are  $-0.293$  ( $p < 0.01$ ),  $-0.216$  ( $p < 0.01$ ), and  $-0.258$  ( $p < 0.01$ ) across the three estimators. These results indicate that tax avoidance weakens earnings persistence through both cash-flow and accrual channels.

Although the direct coefficient on  $TAXAD$  is positive in the baseline specifications, reflecting short-term earnings benefits, the negative interaction effects indicate that these benefits are accompanied by a pronounced deterioration in earnings persistence. Overall, the evidence in Table 4 supports Hypothesis H2 and clarifies that the adverse implications of tax avoidance for earnings persistence operate through both components of earnings, with economically meaningful effects across estimation methods.

**Table 4. Channels through which tax avoidance affects earnings persistence**

| Variables                      | Dependent variable: PTBI <sub>it</sub> |                           |                           |
|--------------------------------|----------------------------------------|---------------------------|---------------------------|
|                                | OLS                                    | FE                        | FGLS                      |
| PTCF                           | 0.747***<br>(0.020)                    | 0.249***<br>(0.030)       | 0.732***<br>(0.018)       |
| PTACC                          | 0.590***<br>(0.021)                    | 0.125***<br>(0.028)       | 0.633***<br>(0.019)       |
| TAXAD                          | 0.038***<br>(0.004)                    | 0.036***<br>(0.004)       | 0.025***<br>(0.003)       |
| $TAXAD \times PTCF$            | $-0.306^{***}$<br>(0.040)              | $-0.248^{***}$<br>(0.042) | $-0.261^{***}$<br>(0.034) |
| $TAXAD \times PTACC$           | $-0.293^{***}$<br>(0.038)              | $-0.216^{***}$<br>(0.040) | $-0.258^{***}$<br>(0.033) |
| FSIZE                          | 0.011***<br>(0.002)                    | 0.088***<br>(0.015)       | 0.008***<br>(0.001)       |
| LEV                            | $-0.064^{***}$<br>(0.007)              | $-0.146^{***}$<br>(0.019) | $-0.045^{***}$<br>(0.005) |
| TANG                           | $-0.024^{***}$<br>(0.007)              | $-0.098^{***}$<br>(0.019) | $-0.018^{***}$<br>(0.004) |
| OLDS                           | 0.000***<br>(0.000)                    | $-0.006^{***}$<br>(0.001) | 0.000***<br>(0.000)       |
| Constant                       | $-0.100^{***}$<br>(0.024)              | $-0.759^{***}$<br>(0.174) | $-0.070^{***}$<br>(0.014) |
| Year fixed effects             | No                                     | Yes                       | Yes                       |
| Industry fixed effects         | No                                     | Yes                       | Yes                       |
| Observations                   | 1,610                                  | 1,610                     | 1,610                     |
| R <sup>2</sup> / Wald $\chi^2$ | 0.615                                  | 0.218 (within)            | 4,229.17                  |
| F / $\chi^2$ test              | F = 283.67***                          | F = 29.58***              | $\chi^2 = 4,229.17^{***}$ |

Notes: Robust standard errors are reported in parentheses. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively.

### 4.3. Discussion and conclusion

The empirical results indicate that tax avoidance serves as a conditioning factor that weakens earnings persistence. The interaction coefficients between  $TAXAD$  and current earnings (PTBI) are consistently negative and statistically significant across specifications, suggesting that when firms engage in tax avoidance, the persistence of current earnings into subsequent accounting periods declines markedly. This finding supports Hypothesis H1 and is consistent with the argument that tax avoidance increases the

informational uncertainty of reported earnings, thereby reducing their predictive ability over time (Hanlon, 2005; Blaylock et al., 2012).

The earnings decomposition analysis further clarifies the underlying mechanism, as both interaction terms,  $TAXAD \times PTCF$  and  $TAXAD \times PTACC$ , are negative and statistically significant. This evidence indicates that the adverse effect of tax avoidance is not confined to the accrual channel, emphasized in foundational studies (Sloan, 1996; Dechow et al., 2010), but also extends to operating cash flows. Relative to prior evidence that primarily focuses on accruals (Hanlon, 2005; Blaylock et al., 2012), these findings suggest that the influence of tax avoidance on earnings dynamics is more pervasive, impairing multiple components of earnings simultaneously.

From a theoretical perspective, the results align with the view that tax avoidance reflects greater managerial discretion in allocating earnings and tax obligations over time. When tax avoidance is linked to complex transaction structures and a less transparent information environment, both cash flows and accruals become less stable, increasing the transitory components of earnings and jointly reducing earnings persistence, thereby supporting Hypothesis H2. In the Vietnamese context, where tax and accounting systems are still evolving and enforcement remains uneven, these findings underscore that tax avoidance should be interpreted not merely as tax optimization but also as a source of heightened information asymmetry and operational risk, which ultimately undermines the sustainability of earnings. Accordingly, this study contributes emerging-market evidence and highlights the importance of institutional context in interpreting the relationship between tax avoidance and earnings quality.

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# CARBON BORDER ADJUSTMENT MECHANISM AND VIETNAM'S EXPORTS: EVIDENCE FROM A MARKET-LEVEL EVENT-STUDY DESIGN

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**Abstract:** As climate policy increasingly intersects with international trade, carbon border measures such as the European Union's Carbon Border Adjustment Mechanism (CBAM) may reshape export patterns in developing economies. This paper provides one of the first empirical assessments of CBAM using monthly HS6-level trade data for Vietnam. Exploiting the introduction of CBAM's transitional phase in October 2023, a difference-in-differences event-study design is employed to compare exports to the EU with those to the United States. An interrupted time series model is used as a robustness check. The results indicate a significant and persistent decline in export volumes to the EU following CBAM implementation, with no evidence of pre-trend differences. The findings highlight the growing impact of green trade barriers and the challenges they pose for developing exporters.

• Keywords: carbon border adjustment mechanism; international trade and environment; exports; carbon regulation; Vietnam.

Date of receipt: 28<sup>th</sup> Feb., 2026

Date of delivery revision: 07<sup>th</sup> Mar., 2026

DOI:

Date of receipt revision: 10<sup>th</sup> Mar., 2026

Date of approval: 31<sup>th</sup> Mar., 2026

## 1. Introduction

In recent years, climate policy has increasingly reshaped the architecture of international trade. As economies commit to decarbonization under the Paris Agreement, trade instruments are being adapted to address carbon leakage and competitive distortions. Among these, the European Union's Carbon Border Adjustment Mechanism (CBAM) represents a major attempt to integrate carbon pricing into cross-border trade. Introduced under the European Green Deal, CBAM requires imports to bear a carbon cost equivalent to that faced by EU producers, thereby preserving environmental integrity while limiting relocation of carbon-intensive production (European Commission, 2021).

Unlike traditional tariffs, CBAM links market access to embedded emissions and imposes detailed reporting requirements on foreign exporters. Although its transitional phase began in October 2023 without financial obligations, anticipated compliance costs and regulatory uncertainty may already influence trade behavior.

These features make CBAM a distinct form of trade friction, particularly for exporters from developing economies with limited capacity for emissions monitoring.

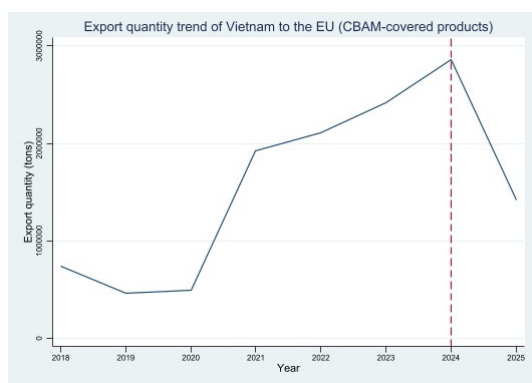
For export-oriented countries such as Vietnam, these challenges are substantial. The EU is one of Vietnam's largest trading partners, with bilateral trade reaching approximately USD 73 billion in 2025 (General Department of Vietnam Customs, 2025). However, several key export sectors, such as iron and steel, cement, aluminum, and fertilizers, fall directly within the scope of CBAM. These industries are energy-intensive and exhibit heterogeneous environmental performance, raising concerns about compliance costs and competitiveness. Figure 1 presents the trend in Vietnam's export quantities to the EU for CBAM-covered products from 2018 to mid-2025. The descriptive evidence suggests noticeable adjustments following the introduction of the transitional phase. While financial obligations were not yet imposed, the policy shift may have altered expectations and

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export dynamics, motivating a rigorous empirical assessment.

Existing studies on CBAM are largely theoretical or simulation-based, often relying on computable general equilibrium models (Bellora & Fontagné, 2023). Empirical evidence based on realized trade data remains limited, particularly for developing countries. Building on the theoretical arguments and empirical gaps discussed above, this study examines not only whether CBAM affects Vietnam's exports, but also how such effects vary across markets and evolve over time. In particular, the analysis investigates whether the implementation of CBAM is associated with a decline in export quantities of covered products to the EU, relative to a comparable non-CBAM market. By exploiting variation across destinations and over time, the study further assesses whether the impact of CBAM reflects its market-specific policy nature and whether export responses exhibit dynamic adjustment patterns around the introduction of the transitional phase in October 2023. This framework enables a comprehensive evaluation of both the magnitude and the temporal evolution of CBAM-induced trade effects.

**Figure 1. Export Quantity of Vietnam's CBAM-Covered Products to the EU, 2018-2025**



Source: Authors' calculations based on UN Comtrade data

## 2. Literature Review

In recent decades, trade policy instruments implemented by importing countries have played an increasingly important role in shaping international trade flows. A large body of literature shows that tariffs, non-tariff barriers, and technical regulations increase trade costs, restrict market access, and reduce

export competitiveness (Bernal, Cummins, & Gasparini, 2017). These policy changes are often treated as quasi-exogenous shocks, making them suitable for causal identification using difference-in-differences and event-study approaches.

With the growing urgency of climate change, environmental policies have emerged as a new form of trade-related regulation. Carbon taxes, emissions trading systems (ETS), and environmental standards imposed by importing countries can increase production and compliance costs for exporters, particularly in carbon-intensive industries such as steel, cement, and fertilizers. While the Porter hypothesis suggests that environmental regulation may enhance long-run competitiveness through innovation (Porter & van der Linde, 1995), empirical evidence typically points to short-run competitiveness losses, especially for developing countries (Aichele & Felbermayr, 2015).

Importantly, most existing studies focus on domestic environmental regulations rather than border adjustment mechanisms. In contrast, border carbon measures operate directly through trade channels by imposing carbon-related costs on imports. The CBAM represents the most prominent example of such a policy. Introduced under the European Green Deal, CBAM aims to prevent carbon leakage by aligning the carbon cost of imports with the EU's internal carbon pricing system. Although its transitional phase, starting in October 2023, focuses on emissions reporting rather than financial obligations, it may already generate trade frictions due to compliance requirements and regulatory uncertainty. Furthermore, the existing literature on CBAM is largely based on simulation methods, particularly computable general equilibrium (CGE) models. These studies generally predict negative impacts on exports from carbon-intensive economies and highlight potential shifts in global trade patterns (Bellora & Fontagné, 2023). However, such analyses rely on strong assumptions and do not capture actual trade responses. Empirical evidence based on observed trade data remains limited, especially for developing countries.

## 3. Research methodology and model

### 3.1. Research methodology

This study adopts a quasi-experimental difference-in-differences (DID) design to identify the causal impact of CBAM on Vietnam's exports (Bertrand et al., 2004). The identification exploits cross-market variation, with the EU as the treated market following CBAM implementation in October 2023 and the United States as the control market. At the first step, a monthly HS6-level panel dataset is constructed to capture product-market variation over time. At the second step, a DID model is estimated and extended into a dynamic event-study specification to test the parallel trends assumption and trace the evolution of export responses (Autor, 2003). At the final step, an Interrupted Time Series (ITS) model on EU-only data (Bernal et al., 2017) is implemented to detect structural breaks at the policy threshold. This multi-step strategy strengthens causal inference and mitigates concerns about confounding global shocks.

### 3.2. Empirical model

To quantify the impact of CBAM on Vietnam's exports, we estimate the following event-study DID specification:

$$\ln(Y_{pmt}) = \alpha_{pm} + \delta_t + \sum_{k \neq -1} \beta_k [1\{relt_t = k\} \times CBAM_p \times EU_m] + \varepsilon_{pmt}$$

where  $Y_{pmt}$  denotes export quantity of product  $ppp$  to market  $mmm$  in month  $t$ .

In the baseline specification, the primary dependent variable is the natural logarithm of export quantity:

$$\ln\_qty = \ln(1 + \text{quantity\_kg})$$

The logarithmic transformation mitigates the influence of extreme values and preserves zero trade observations, which are non-negligible in high-frequency product-level trade data. The variable  $CBAM_p$  identifies products covered under the CBAM regulation, and  $EU_m$  indicates the treated market. The variable  $relt_t$  measures the number of months relative to October 2023, with  $k = -1$  omitted as the reference category. The model includes productmarket fixed effects  $\alpha_{pm}$ , which absorb all time-invariant comparative advantage patterns across product-destination pairs. Monthly fixed effects  $\delta_t$  control

for global trade shocks common to all markets. Standard errors are clustered at the HS6-product level to account for serial correlation and heteroskedasticity within product-level export flows. The coefficients  $\beta_k$  represent dynamic treatment effects. Pre-treatment coefficients ( $k < 0$ ) serve as a diagnostic test of the identifying assumption. Post-treatment coefficients ( $k \geq 0$ ) capture the magnitude and persistence of export adjustments following CBAM implementation.

To complement the baseline model, we estimate the following Interrupted Time Series specification using EU-only data:

$$\ln(Y_{pt}) = \alpha_p + \theta_{moy} + \beta_1 Post_t + \beta_2 Trend_t + \beta_3 (Post_t \times Trend_t) + u_{pt}$$

where  $Post_t$  equals one from October 2023 onward, and  $Trend_t$  captures linear time dynamics. Product fixed effects  $\alpha_p$  absorb time-invariant heterogeneity, while seasonal fixed effects  $\theta_{moy}$  account for intra-year trade seasonality. The coefficient  $\beta_1$  measures the immediate level shift at the time of CBAM introduction, and  $\beta_3$  captures changes in export growth trajectories after policy implementation.

### 4. Data and descriptive statistics

This study employs monthly bilateral trade data at the HS6  $\times$  destination  $\times$  month level to examine the impact of CBAM on Vietnam's exports. The sample spans multiple years before and after the introduction of CBAM's transitional phase in October 2023, providing sufficient pre- and post-policy observations for dynamic analysis. Trade data are sourced from the European Commission's Comext database and UN Comtrade, which provide detailed information on export quantities and values by HS6 product and destination. The sample is restricted to CBAM-covered products, including sectors such as iron and steel, aluminum, cement, and fertilizers. Observations are constructed at the product-market-month level for two destinations: the European Union (EU) and the United States (US). The EU is defined as the treated market, while the US serves as a control market, as it does not implement a comparable border carbon adjustment mechanism during the study period. This cross-market structure enables identification of CBAM-specific effects while controlling for



common global trade shocks. Export quantities are measured in kilograms, and the final dataset contains approximately 10,500 product-market-month observations after standard data cleaning procedures. Observations with missing values are excluded, and HS6 product codes are harmonized to ensure consistency over time. The resulting panel dataset exhibits substantial cross-product heterogeneity and temporal variation, providing a suitable empirical setting to identify the causal impact of CBAM on Vietnam's exports.

Table 1 reports summary statistics for the main variables, showing a balanced sample of approximately 10,500 product-market-month observations with substantial cross-product and temporal variation. The dataset exhibits sufficient pre- and post-treatment coverage and variability to support reliable identification in the event-study DID framework.

**Table 1. Descriptive Statistics**

| Variable             | Obs    | Mean      | Std.Dev    | Min     | Max           |
|----------------------|--------|-----------|------------|---------|---------------|
| $\ln_{q_{it}}$       | 10,513 | 8.868     | 5.502      | 0.000   | 22.411        |
| $quantity_{it}$      | 10,513 | 4,511,677 | 74,400,000 | 0.000   | 5,410,000,000 |
| EU                   | 10,551 | 0.509     | 0.500      | 0.000   | 1.000         |
| Post                 | 10,551 | 0.242     | 0.428      | 0.000   | 1.000         |
| treated              | 10,551 | 0.509     | 0.500      | 0.000   | 1.00p0        |
| re1t                 | 10,551 | -24.000   | 26.269     | -69.000 | 21.000        |
| Post <sub>tale</sub> | 10,551 | 0.374     | 0.484      | 0.000   | 1.000         |
| CBAM                 | 10,551 | 1.000     | 0.000      | 1.000   | 1.000         |

Source: Calculations by the authors

## 5. Results

### 5.1. Event-study evidence

Table 2 reports the dynamic Difference-in-Differences (event-study) estimates, where the dependent variable is the logarithm of export quantity. The coefficients capture the relative change in Vietnam's CBAM-covered exports to the EU compared to the US, at different months around the policy's transitional implementation (October 2023).

The post-policy coefficients ( $k \geq 0$ ) are consistently negative and statistically significant. At the implementation month ( $k = 0$ ), export quantity declines by approximately 2.53 log points ( $p = 0.003$ ). The magnitude remains economically large and statistically significant in the subsequent months, including  $k = 1$  ( $-2.68$ ,  $p = 0.001$ ),  $k = 2$  ( $-1.64$ ,  $p = 0.041$ ),  $k = 3$  ( $-2.71$ ,  $p$

$= 0.001$ ),  $k = 6$  ( $-1.93$ ,  $p = 0.003$ ),  $k = 12$  ( $-2.04$ ,  $p = 0.007$ ), and  $k = 18$  ( $-2.09$ ,  $p = 0.013$ ).

These estimates indicate a substantial and persistent relative contraction in export volumes to the EU following the introduction of CBAM. Importantly, the graphical representation in Figure 2 shows that pre-treatment coefficients ( $k < 0$ ) fluctuate around zero and are statistically insignificant, supporting the parallel trends assumption underlying the DID framework. After  $k = 0$ , the coefficients shift sharply downward and remain negative, suggesting that CBAM is associated with a sustained deterioration in Vietnam's export performance to the EU relative to the control market.

Overall, the event-study results provide strong causal evidence that the transitional phase of CBAM coincides with a significant and economically meaningful decline in export quantities of affected products.

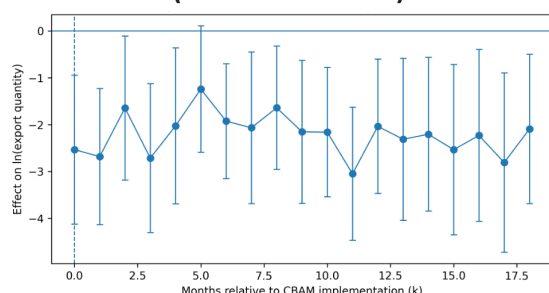
**Table 2. Event-Study Estimates: Impact of CBAM on Export Quantity**

| Event time (k) | Coefficient | Standard Error (SE) | p     |
|----------------|-------------|---------------------|-------|
| k=0            | -2.532      | (0.811)             | 0.003 |
| k=1            | -2.682      | (0.741)             | 0.001 |
| k=2            | -1.644      | (0.785)             | 0.041 |
| k=3            | -2.714      | (0.812)             | 0.001 |
| k=6            | -1.925      | (0.626)             | 0.003 |
| k=12           | -2.035      | (0.732)             | 0.007 |
| k=18           | -2.091      | (0.815)             | 0.013 |

Source: Calculations by the authors

To complement the regression results, Figure 2 visualizes the dynamic treatment effects by plotting event-time coefficients and their 95% confidence intervals from the baseline specification. First, the pre-treatment coefficients ( $k < 0$ ) are centered around zero and statistically insignificant, providing visual support for the parallel trends assumption and indicating no pre-policy divergence between the EU and US markets. Second, starting at  $k = 0$ , the coefficients shift downward and remain negative throughout the post-treatment period, suggesting a persistent and economically meaningful decline in exports rather than a temporary adjustment. Third, the structural break aligns closely with the timing of CBAM implementation, with no evidence of gradual pre-trends, reinforcing the interpretation that the observed effects are attributable to the policy rather than to external shocks.

**Figure 2. Event-study estimates of the impact of CBAM on Vietnam's exports (EU relative to US)**



Notes: The figure plots the estimated event-time coefficients ( $\beta_k$ ) from the difference-in-differences event-study specification. The omitted category is  $k = -1$  (the month prior to CBAM implementation in October 2023). Vertical bars represent 95% confidence intervals. Standard errors are clustered at the HS6-product level.

Source: Authors' estimates based on UN Comtrade data.

## 5.2. Robustness Check: Interrupted Time Series (EU-only)

To assess robustness, Table 3 reports Interrupted Time Series (ITS) estimates using EU-only data for CBAM-covered products, testing for a structural break at the policy cutoff (October 2023).

Prior to CBAM, exports exhibit a positive and statistically significant trend for both value and quantity, indicating steady growth in shipments to the EU. The level-shift coefficient (post) is positive and significant, suggesting no immediate collapse in exports at the implementation date.

However, the interaction term between the post period and the time trend ( $t\_post$ ) is negative and statistically significant, indicating a marked slowdown in export growth after CBAM's introduction. This pattern implies that the policy is associated with a deterioration in the growth trajectory rather than an abrupt level shock.

The magnitude of the slope change is somewhat larger for export value than for quantity, suggesting that firms may initially adjust through pricing or product composition before fully responding in terms of volumes.

Overall, the ITS results are consistent with the event-study findings. While the DID estimates capture a relative decline in exports to the EU compared to the US, the ITS analysis confirms a structural break in the underlying export trajectory. Together, these results strengthen the conclusion that CBAM is associated with a

meaningful slowdown in Vietnam's exports to the EU during its transitional phase.

**Table 3. Interrupted Time Series (ITS) Estimates for EU Exports**

| Variables    | (1) ln_val | (2) ln_qty |
|--------------|------------|------------|
| Post         | 4.013**    | 2.998*     |
|              | (1.650)    | (1.579)    |
| t            | 0.035***   | 0.024***   |
|              | (0.007)    | (0.007)    |
| t × Post     | -0.056**   | -0.039*    |
|              | (0.022)    | (0.021)    |
| Observations | 5,334      | 5,331      |

Notes: Robust standard errors in parentheses.

$p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

## 5.3. Discussions

The empirical results provide consistent evidence that the European Union's Carbon Border Adjustment Mechanism (CBAM) is associated with a statistically significant decline in Vietnam's exports of covered products to the EU relative to the control market. The event-study estimates show that negative effects emerge immediately after October 2023 and persist over time, suggesting that CBAM operates as a trade-relevant policy shock rather than purely an environmental measure. This finding aligns with simulation-based studies, such as Do (2025), while extending them by providing causal evidence based on observed trade data.

Second, the absence of significant pre-treatment coefficients supports the parallel trends assumption, reinforcing the validity of the identification strategy (Bertrand et al., 2004). The clear structural break at the policy implementation date and the sustained divergence thereafter indicate that the observed decline is unlikely to be driven by common global shocks.

Third, the dynamic pattern suggests that the impact of CBAM is persistent rather than transitory. The continued negative effects imply structural adjustment costs for exporters, consistent with the literature on carbon-related trade measures (Bellora & Fontagné, 2023). The ITS results further confirm that while no immediate collapse occurs, the post-CBAM growth trajectory weakens significantly.

Fourth, the presence of negative effects during the transitional phase points to anticipatory behavior. Firms may adjust shipments and

contracts in response to reporting requirements and expected future costs, even before full financial obligations are enforced.

Finally, the magnitude of the decline supports the view that CBAM may disproportionately affect developing economies, where firms face higher compliance costs and limited access to green technologies (UNCTAD, 2021). Overall, the findings highlight the early and persistent trade impacts of emerging green trade barriers.

## 6. Conclusion and Policy Implications

This study investigates the impact of the EU's Carbon Border Adjustment Mechanism (CBAM) on Vietnam's exports of covered products using monthly HS6-level bilateral trade data and a quasi-experimental identification strategy. By combining an event-study Difference-in-Differences framework with an Interrupted Time Series robustness design, the paper aims to provide causal and dynamic evidence on how CBAM has affected export performance during its transitional phase. The empirical results consistently indicate that CBAM is associated with a statistically significant and persistent decline in Vietnam's export volumes to the EU. The negative effects emerge immediately after October 2023 and remain stable over time, suggesting that CBAM functions as a trade-relevant policy shock rather than a purely environmental regulation. The ITS results further show that while no abrupt collapse occurs at the policy threshold, the post-CBAM growth trajectory weakens significantly, implying a structural slowdown in export dynamics. Together, these findings highlight that even during the reporting-only transitional phase, CBAM has already reshaped trade patterns.

The findings of this study carry several important policy implications for Vietnam in the context of climate-related trade measures. First, the government should develop a coherent national strategy for CBAM adaptation, integrating trade, industrial, and climate policies. The empirical results show that CBAM already affects export dynamics during the transitional phase, implying that reactive and fragmented responses may be costly. A coordinated roadmap identifying vulnerable sectors, compliance gaps, and phased support mechanisms is therefore essential to

mitigate export losses. Second, strengthening domestic carbon measurement, reporting, and verification (MRV) systems is critical. Since CBAM operates through carbon accounting requirements rather than traditional tariffs, compliance capacity becomes a key determinant of competitiveness. Improving technical standards, harmonizing reporting frameworks with EU requirements, and providing centralized guidance, especially for small and medium-sized enterprises, would reduce compliance uncertainty and transaction costs. Third, policy support should move beyond short-term compensation and instead incentivize structural upgrading. Rather than shielding firms from immediate export declines, targeted instruments, such as preferential green finance, carbon-efficient technology subsidies, and export promotion for low-emission products, can facilitate long-term competitiveness in carbon-constrained markets. Fourth, Vietnam should combine adaptation with export diversification. Given that CBAM may gradually reshape global trade patterns, reducing over-reliance on a single market while upgrading product sophistication can enhance resilience against future environmental trade measures.

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# BUDGETING PRACTICES FOR MARKETING IN VIETNAMESE SMES: AN EXPLORATORY QUALITATIVE STUDY

MSc. Mai Mai\*

**Abstract:** *This study explores marketing budgeting practices in Vietnamese small and medium-sized enterprises (SMEs) using an exploratory qualitative approach. Drawing on semi-structured in-depth interviews with SME owners and managers, the study examines budgeting methods, decision-making processes, and key constraints shaping marketing expenditure. The findings reveal that marketing budgeting in SMEs is predominantly informal, owner-driven, and strongly influenced by cash flow considerations, with limited use of systematic performance measurement. While these practices diverge from normative budgeting frameworks advocated in marketing literature, they reflect SMEs' conscious assessments of feasibility under conditions of resource constraints and uncertainty. The study further identifies a perceived mismatch between normative budgeting models and SME realities, which is better explained through effectuation logic than through managerial deficiency. By integrating marketing budgeting theory with SME marketing and effectuation perspectives, the study contributes context-sensitive insights into marketing budgeting practices in emerging market SMEs.*

• Keywords: marketing budgeting; small and medium-sized enterprises (SMEs); effectuation logic; marketing decision-making; qualitative research; Vietnam; emerging markets.

Date of receipt: 21<sup>th</sup> Jan., 2026

Date of delivery revision: 07<sup>th</sup> Mar., 2026

DOI:

Date of receipt revision: 12<sup>th</sup> Mar., 2026

Date of approval: 27<sup>th</sup> Mar., 2026

## 1. Introduction

Marketing budgeting is a critical component of marketing management, guiding how firms allocate resources to achieve business objectives. Classical literature recommends structured approaches such as the percentage-of-sales method, competitive parity, and the objective-and-task method (Kotler & Keller, 2016). These approaches, however, assume clear objectives, stable resources, and adequate analytical capacity conditions that are often difficult to sustain in small and medium-sized enterprises (SMEs) operating under resource constraints.

In Vietnam, SMEs account for approximately 97% of all active enterprises (Asian Development Bank, 2023), yet most face limitations related to capital availability, data infrastructure, and specialized marketing expertise. Prior studies indicate that SME marketing activities tend to be informal and experience-driven rather than based on systematic planning processes (Carson et al., 1995; Gilmore et al., 2001). Such characteristics shape how SMEs determine and adjust their marketing budgets, but empirical evidence on this issue remains limited in the Vietnamese context.

Prior research suggests that marketing decision-making in SMEs is often informal, short-term oriented, and strongly influenced by owner judgment

and resource constraints (Carson et al., 1995; Gilmore et al., 2001). Limited access to performance metrics further constrains the adoption of analytical budgeting approaches. From this perspective, marketing budgeting in SMEs may be better understood as an *adaptive decision-making process shaped by feasibility considerations* rather than as a deviation from normative planning models. Effectuation logic, which emphasizes available means over predictive planning (Sarasvathy, 2001), offers a useful lens for interpreting this behavior.

Accordingly, this study explores the marketing budgeting methods used by Vietnamese SMEs, their budgeting decision-making processes, key constraints, and the extent to which their practices align with existing theoretical frameworks. Using an exploratory qualitative design with in-depth interviews, the study seeks to provide context-sensitive insights into marketing budgeting under conditions of uncertainty and resource limitation.

## 2. Literature Review

### 2.1. Marketing budgets and budgeting methods

In marketing management, the marketing budget reflects a firm's commitment of financial resources to marketing activities aimed at achieving business objectives. Classical marketing literature conceptualizes budgeting as a structured planning

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process and identifies several commonly used approaches. Kotler and Keller (2016) outline four widely adopted methods: the affordable method, the percentage-of-sales method, competitive parity, and the objective-and-task method.

(1) *The affordable method* determines marketing expenditure based on what a firm believes it can afford after covering other operational costs. While simple and flexible, this method is inherently reactive and does not explicitly link spending to strategic objectives. (2) *The percentage-of-sales method* allocates marketing budgets as a fixed proportion of current or expected revenue, offering ease of implementation but often reinforcing short-term, revenue-driven decision-making. (3) *The competitive parity method* sets the marketing budget by benchmarking against competitors' spending levels. This method assumes the availability of reliable information on competitors and a relatively stable competitive environment, conditions that may be difficult to meet for smaller firms. And (4) *The objective-and-task method* is considered the most analytically rigorous approach, as it requires firms to define specific marketing objectives and estimate the costs of achieving them. However, its application depends heavily on data availability, analytical capabilities, and planning expertise, which are often limited in small and medium-sized enterprises.

These differences suggest that while normative budgeting models emphasize strategic alignment, their practical applicability may vary significantly across organizational contexts, particularly for resource-constrained SMEs.

## 2.2. Marketing practices and decision-making in SMEs

Prior studies on SME marketing consistently emphasize distinctive organizational characteristics, including simple structures, strong owner involvement, limited marketing expertise, and reliance on informal, experience-based decision-making (Sureka et al., 2023; Carson et al., 1995; Gilmore et al., 2001). Marketing decisions in SMEs are often centralized in the owner-manager, with limited formal planning and weak performance measurement systems.

These characteristics have important implications for marketing budgeting. SMEs frequently face constraints related to cash flow volatility, limited access to market data, and the absence of specialized marketing personnel (Sureka et al., 2023). As a result, budgeting decisions tend to prioritize short-term affordability and operational survival over

long-term strategic alignment. Prior studies suggest that marketing decisions in SMEs are often adjusted reactively in response to immediate business conditions rather than based on predefined strategic objectives (Carson et al., 1995; Gilmore et al., 2001).

This body of literature highlights a persistent tension between the structured budgeting frameworks advocated in marketing textbooks and the practical realities faced by SMEs, particularly in resource-constrained environments.

## 2.3. Effectuation logic and marketing budgeting in SMEs

To better understand this tension, recent entrepreneurship research offers the concept of *effectuation logic* as an alternative lens for analyzing SME decision-making. Effectuation emphasizes action based on available means, acceptable loss, and flexibility under uncertainty rather than predictive planning and goal-driven optimization (Sarasvathy, 2001).

In the context of marketing budgeting, effectuation logic suggests that SME managers are likely to allocate resources based on what they currently possess such as available cash, personal experience, and existing relationships rather than on detailed forecasts or formal budgeting models. This perspective aligns closely with empirical observations of SME marketing practices and provides a theoretical explanation for why normative budgeting frameworks may be perceived as impractical or unrealistic by small firms.

By integrating insights from marketing budgeting literature, SME marketing research, and effectuation theory, this study positions marketing budgeting in SMEs as an adaptive decision-making process shaped by resource constraints and managerial perceptions of feasibility rather than purely by strategic planning principles.

## 3. Research methodology

This study employed an exploratory qualitative research design to investigate marketing budgeting practices among Vietnamese small and medium-sized enterprises (SMEs). A qualitative approach was considered appropriate given the limited empirical understanding of marketing budgeting behavior in SMEs within emerging market contexts.

Data were collected through *twelve semi-structured in-depth interviews* with SME owners or managers directly involved in marketing and financial decision-making. Firms were selected using *purposive sampling*, based on criteria including firm

size, operational experience, and active engagement in marketing budgeting decisions (Palinkas et al., 2015). The sample covered SMEs from different industries to capture diverse perspectives.

The number of interviews was determined based on the principle of *theoretical saturation*. Following Guest, Bunce, and Johnson (2006), saturation was considered achieved when additional interviews no longer generated new themes relevant to marketing budgeting practices. After approximately ten interviews, recurring patterns became evident, and two additional interviews were conducted to confirm theme stability.

Interviews lasted between 45 and 60 minutes, were audio-recorded with participant consent, and transcribed verbatim. Data were analyzed using *thematic analysis* following the procedures outlined by Braun and Clarke (2006). Initial codes were generated inductively from the data and subsequently grouped into higher-order themes through iterative comparison.

Ethical considerations were strictly observed. All personal and organizational identifiers were anonymized, and collected data were securely stored and used solely for research purposes.

#### 4. Research results

Based on the analysis of twelve in-depth interviews, four major themes were identified that reflect how Vietnamese SMEs determine and manage their marketing budgets. The presentation of findings includes descriptive frequencies and illustrative quotations to strengthen the credibility of the qualitative analysis.

**First, reliance on the affordable method.** A majority of SMEs (10 out of 12) indicated that their marketing budgets are determined primarily by *available cash flow*, adjusting expenditures according to monthly or quarterly revenue performance. This demonstrates a heavy dependence on the affordable method, which is common among firms with unstable cash flow. Among SMEs operating for more than five years (3 out of 12), the affordable method is sometimes *combined with the percentage-of-sales approach* to maintain a minimum level of marketing spending. More advanced methods such as *the objective-and-task approach* were not applied due to limited data and insufficient analytical capability.

*Illustrative quotes:*

“We increase or decrease the budget depending on how profitable the month is.” (Firm 3 - F&B)

“We know the objective-task method exists, but we lack the data and skills to apply it.” (Firm 8 - Education)

#### *Second, informal and owner-driven budgeting processes*

Budgeting procedures are largely informal, with decisions made through ad hoc discussions rather than documented planning. Nearly all SMEs (11 out of 12) reported that they do not have a formal budgeting process. Budget decisions are highly *owner-driven*, relying on intuition and experience rather than systematic planning. Only one firm showed minimal written documentation of the budget.

*Illustrative quotes:*

“I make the final decision. Staff can suggest, but I approve the budget.” (Firm 5 - Retail)  
 “We don’t follow a specific plan; we spend when needed and stop when it doesn’t work.” (Firm 1 - Trading)

The owner-manager plays a central role in approving or adjusting the budget, while the marketing and finance departments have limited influence. This structure results in flexibility but reduces consistency and long-term planning capability.

#### *Third, lack of data and performance measurement*

SMEs face significant challenges in tracking marketing expenditures and evaluating campaign effectiveness. Most SMEs (9 out of 12) do not track marketing spending or record data suitable for performance evaluation. Only two firms monitor basic indicators such as simple conversion rates.

*Illustrative quotes:*

“We know how much we spend on Marketing, but not how much they return. We just look at monthly revenue.” (Firm 6 - Services)

Most firms do not maintain detailed records of marketing costs or calculate key metrics such as ROI or conversion rates. As a result, budgeting decisions rely heavily on subjective assessment rather than data-driven evaluation.

#### *Finally, perceived mismatch between normative budgeting frameworks and SME realities*

Across the interviews, respondents consistently expressed a perceived mismatch between formal marketing budgeting frameworks presented in textbooks and their own operational realities. All twelve SMEs indicated that normative approaches such as the objective-and-task method or competitive



parity were viewed as difficult to apply in practice due to limited data, unstable cash flow, and the absence of specialized marketing personnel.

Rather than rejecting these frameworks outright, respondents emphasized that such methods were “theoretically sound but practically unrealistic” for small firms operating under uncertainty. Budgeting decisions were therefore shaped by what respondents perceived as feasible within their constraints, reinforcing an adaptive and experience-based approach.

*Illustrative quotes include:*

“Those methods look good in theory, but for small companies like ours, they are hard to implement.” (Firm 10 - Retail)

“To follow those frameworks properly, you need data and people. We don’t have that.” (Firm 11 - Services)

This theme highlights that the gap between theory and practice is not merely a lack of managerial capability, but reflects SMEs’ conscious assessment of feasibility and relevance in their specific context.

**Table 1. Summary of Marketing Budgeting Practices in Vietnamese SMEs**

| Theme                                        | Number of SMEs (n=12) | Percentage (%) | Description                                                |
|----------------------------------------------|-----------------------|----------------|------------------------------------------------------------|
| Affordable method                            | 10                    | 83.3%          | Budget based on available cash flow                        |
| Combination with % of revenue                | 3                     | 25%            | Applied by SMEs operating > 5 years                        |
| Informal, owner-driven budgeting             | 11                    | 91.6%          | Budget decisions dominated by owner                        |
| Basic written budgeting                      | 1                     | 8.3%           | Minimal documentation                                      |
| No performance measurement                   | 9                     | 75%            | No use of KPI/ROI metrics                                  |
| Perceived mismatch with normative frameworks | 12                    | 100%           | Formal budgeting frameworks viewed as impractical for SMEs |

## 5. Discussion

This study provides empirical insights into how Vietnamese SMEs determine and manage their marketing budgets under conditions of resource constraints and uncertainty. By integrating normative budgeting theory, SME marketing literature, and effectuation logic, the findings contribute to a more nuanced understanding of marketing budgeting as an adaptive decision-making process rather than a purely strategic planning exercise.

**First**, the dominance of the affordable method observed in the findings is consistent with recent research showing that SMEs rarely adopt sophisticated budgeting practices, instead relying on cash flow and short-term financial feasibility (Sureka et al., 2023). Rather than indicating managerial shortcomings, this pattern reflects SMEs’ prioritization of financial survivability and flexibility in uncertain environments. The affordable method allows firms to adjust marketing expenditure responsively, aligning

with the practical realities of volatile revenue streams commonly faced by SMEs.

**Second**, the prevalence of *informal, owner-driven budgeting* reinforces insights from SME marketing literature and is further supported by evidence that SMEs often rely on intuition and experience rather than systematic analysis (Nakpodia, 2021; Carson et al., 1995; Gilmore et al., 2001). In this context, budgeting decisions are closely tied to the owner-manager’s experience and judgment. While such practices may diverge from formalized budgeting models, they represent a rational response to organizational simplicity and limited managerial specialization.

**Third**, the *lack of systematic performance measurement* further constrains SMEs’ ability to adopt analytical budgeting approaches. Consistent with Mintz and Currim (2013), the absence of reliable metrics reduces the perceived value of linking marketing expenditure to formal objectives. Without credible performance indicators, advanced methods such as the objective-and-task approach are viewed as difficult to operationalize, reinforcing reliance on simpler budgeting heuristics.

**Most importantly**, the findings highlight a *perceived mismatch between normative budgeting frameworks and SME realities*. SMEs do not reject formal budgeting models due to ignorance or resistance to strategy; rather, they consciously assess these frameworks as theoretically sound but practically infeasible given their constraints. This perception-based gap underscores the limitations of applying large-firm budgeting prescriptions uncritically to small businesses.

*Effectuation logic* (Sarasvathy, 2001) offers a compelling explanatory lens for this mismatch. Under effectuation, decision-makers focus on available means, acceptable loss, and adaptability rather than predictive planning. Viewed through this lens, SME marketing budgeting emerges as an alternative form of rationality shaped by feasibility and relevance rather than by optimization against predefined objectives. This perspective helps reconcile the divergence between normative theory and observed practice, positioning SME budgeting behavior as adaptive rather than deficient.

## 6. Implications

The findings of this study offer several implications for SME managers, practitioners, and policymakers.

**First**, the dominance of affordable and owner-driven budgeting practices suggests that marketing budgeting in SMEs should be approached as a

*feasibility-oriented process* rather than an attempt to replicate large-firm planning models. Instead of adopting comprehensive budgeting frameworks wholesale, SMEs may benefit from *lean budgeting processes* that prioritize clarity, flexibility, and ease of implementation under resource constraints.

**Second**, the persistent lack of performance measurement indicates the need for *incremental improvements* rather than sophisticated analytics. Simple tracking tools such as basic campaign records, customer response indicators, or short-term sales feedback can enhance managerial awareness without imposing excessive complexity. Such tools can help SMEs gradually strengthen budgeting discipline while remaining aligned with their operational realities.

**Third**, the perceived mismatch between normative budgeting frameworks and SME contexts highlights the importance of *context-sensitive support mechanisms*. Training programs and advisory services should focus on adapting selected elements of formal budgeting methods to SME conditions, rather than promoting standardized “best practices” designed for larger organizations. Policymakers and support institutions may play a role by providing accessible guidance and practical templates tailored to SMEs operating in uncertain environments.

**Overall**, these implications emphasize that improving marketing budgeting in SMEs requires alignment with managerial perceptions of feasibility and relevance, rather than the imposition of rigid strategic models.

## 7. Limitations and Future Research

Despite providing valuable insights into marketing budgeting practices among Vietnamese SMEs, this study has several limitations that should be acknowledged.

**First**, the research adopts an exploratory qualitative design based on a relatively small sample of twelve SMEs. While this approach enables in-depth understanding of managerial perspectives and decision-making processes, the findings cannot be generalized to the entire SME population.

**Second**, the analysis relies primarily on self-reported information from business owners and managers. Such responses may be subject to recall bias or subjective interpretation when describing budgeting practices.

**Third**, the study focuses exclusively on SMEs operating in Vietnam. Institutional environments, market dynamics, and cultural factors may influence managerial behavior differently across countries,

which may limit the transferability of the findings to other contexts.

Future research could address these limitations by employing quantitative or mixed-method research designs to examine marketing budgeting practices across larger SME samples. Further studies may also investigate how budgeting behavior evolves across different stages of firm development or across industry sectors. In addition, comparative research exploring the relationship between effectuation-oriented and causation-oriented decision-making may provide deeper insights into how different managerial logics shape marketing budgeting practices under varying levels of uncertainty.

## 8. Conclusion

This study examined marketing budgeting practices among Vietnamese small and medium-sized enterprises (SMEs) using an exploratory qualitative approach. The findings indicate that marketing budgeting in SMEs is largely informal, owner-driven, and strongly influenced by available cash flow, with most firms relying on the affordable method rather than formal planning models.

Although these practices differ from normative marketing budgeting frameworks, the results suggest that they represent adaptive responses to limited resources, data constraints, and operational uncertainty. In this context, marketing budgeting in SMEs can be understood as a pragmatic decision-making process shaped by available means and managerial judgment.

Overall, the study provides empirical insights into marketing budgeting behavior in Vietnamese SMEs and highlights the relevance of effectuation logic as a useful perspective for interpreting managerial decision-making under conditions of uncertainty.

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# OPPORTUNITIES, CHALLENGES AND RECOMMENDATIONS FOR INFORMAL LABOR IN VIETNAM IN THE DIGITAL ERA

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**Abstract:** *Informal labor is one of the forces that plays an important role in the economic development of a country. Therefore, studying the issues of informal labor in Vietnam in the context of our country's increasingly deep integration into the world economy is very necessary, especially in the current digital age. In this article, the author focuses on the issues of opportunities, challenges and solutions for informal labor in Vietnam in the current digital age.*

• Keywords: *informal labor, digital era, international labor organization (ILO).*

Date of receipt: 29<sup>th</sup> Jan., 2026

Date of delivery revision: 09<sup>th</sup> Mar., 2026

DOI:

Date of receipt revision: 11<sup>th</sup> Mar., 2026

Date of approval: 29<sup>th</sup> Mar., 2026

## 1. Introduction

Vietnam is currently experiencing a “golden population” period, because the working-age population is twice as large as the non-working-age population. Each year, the working-age population participating in the labor market accounts for a relatively high proportion, approximately over 75%. However, a significant portion of Vietnam’s labor still accepts vulnerable jobs, without social insurance coverage and no labor contracts. These are informal jobs. For a country with a large population and a low level of economic development like Vietnam, informal labor is an indispensable component, playing an important role in addressing employment issues and generating income for labor. Although informal labor negatively impacts the income, safety, and health of labor, in many cases, they are compelled to accept informal jobs as an unavoidable choice to make a living, despite the given limited social welfare conditions or the insufficient income from their informal jobs.

## 2. Opportunities and Challenges for Vietnam’s Informal Labor in the Digital Era

### 2.1. The Current Situation of Informal Labor in Vietnam

In recent years, “informal labor” and the “informal economy sector” have attracted increasing attention in socio-economic research and labor statistics in Vietnam. According to the International Labour Organization (ILO, 2021), identifying informal labor helps reveal sources of low-quality employment that contribute to poverty and weaken workers’ social welfare. The ILO defines informal labor as employment in both formal and informal sectors that does not provide legal or social protection and is not adequately regulated by

labor laws, taxation, social security, or employment benefit schemes. In Vietnam, the General Statistics Office (2017) defines informal labor as workers engaged in precarious, unstable, and low-income jobs, often without labor contracts or without compulsory social insurance, allowances, and other social benefits. Such work is commonly unregistered, temporary, short-term, or inconsistent with legal standards. Thus, informal labor can be understood as labor engaged in informal jobs.

**Figure 1: The ILO’s Model of Informal Labor by Employment Position and Sector of Activity**

| Sector              | Types of jobs |        |             |        |             |          |             |          |             |  |
|---------------------|---------------|--------|-------------|--------|-------------|----------|-------------|----------|-------------|--|
|                     | Freelancers   |        | Freelancers |        | Freelancers |          | Freelancers |          | Freelancers |  |
|                     | Informal      | Formal | Informal    | Formal | Informal    | Informal | Formal      | Informal | Formal      |  |
| Formal Sector       |               |        |             |        | 1           | 2        |             |          |             |  |
| Informal Sector (a) | 3             |        | 4           |        | 5           | 6        | 7           | 8        |             |  |
| Informal Sector (b) | 9             |        |             |        |             | 10       |             |          |             |  |

Source: *Concept of informal labor in Viet Nam: summary definition and criteria for determination (April 2013, updated in January 2014)*

According to the 2016 *Informal Labor Report* by the General Statistics Office and the International Labour Organization (ILO, 2018), informal labor refers to employment in which workers do not participate in social insurance, particularly compulsory social insurance, and do not have labor contracts of three months or more. In this sense, informal labor is identified primarily by the absence of social insurance, regardless of whether the worker is employed in the formal or informal sector. Under Vietnamese law, workers without social insurance are generally not entitled to labor welfare and other employment-related benefits. As many informal workers also lack formal labor contracts, they are in a weak position when

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negotiating with employers over income and social insurance rights, and are not adequately protected under the Labour Code. Consequently, they do not benefit from risk-sharing mechanisms or retirement protection when they are no longer able to work. Even when registration and tax obligations are fulfilled, workers are still considered informal if they are not covered by social insurance. Thus, non-participation in social insurance serves as the key criterion for distinguishing informal from formal labor.

According to the latest report from the General Statistics Office (2025), the number of workers engaged in informal employment, including those in agricultural, forestry, and fishery households, reached 33.2 million. Although the decline remains modest, this indicates a positive improvement in the labor market as macroeconomic conditions have become more favorable across most sectors compared with the same period of the previous year.

**Figure 2: Informal Labor in Vietnam in the last quarter of 2024 and Throughout 2024**

| Quarter IV/2024                                                 |                                                      |                                     | Year 2024                                                       |                                                      |                                     |
|-----------------------------------------------------------------|------------------------------------------------------|-------------------------------------|-----------------------------------------------------------------|------------------------------------------------------|-------------------------------------|
| Number of individuals engaged in informal employment in general | Proportion of workers engaged in informal employment | Compared to QIV/2023                | Number of individuals engaged in informal employment in general | Proportion of workers engaged in informal employment | Compared to QIV/2023                |
| 33.2 million people                                             | 63.6%                                                | A decrease of 1.5 percentage points | 33.5 million people                                             | 64.6%                                                | A decrease of 0.5 percentage points |

Source: The General Statistics Office (2025)

According to the General Statistics Office (2025), in 2024, informal workers accounted for 64.6% of total employment, down 0.5 percentage points from the previous year. Although lower than the averages of low-income countries (88.3%) and lower-middle-income countries (81.5%), this rate remained significantly higher than the global average (57.8%). Among informal workers, about 77.5% had no technical or professional qualifications. Informal employment was concentrated mainly in rural areas (74.1%, compared to 49.2% in urban areas) and remained high for both men (67.6%) and women (61.0%). The average monthly income of wage earners reached 8.7 million VND, up 9.2% from 2023; however, income disparities persisted by gender and residence, with men earning 9.1 million VND compared to 8.1 million VND for women, and urban workers earning 9.7 million VND compared to 7.8 million VND in rural areas.

In recent years, despite government efforts to expand the formal labor sector and create more jobs, the situation of informal and unstable employment has improved only modestly, especially after the severe impacts of the Covid-19 pandemic in 2020

and 2021. The General Statistics Office (2022) noted that informal labor in Vietnam exists not only in the informal sector but also substantially within the formal sector, and it continues to contribute significantly to national GDP. Vietnam's informal labor force is highly diverse, including workers in registered enterprises, cooperatives, household businesses, agricultural households, platform-based work, freelancing, domestic work, and other independent or low-skilled occupations.

In general, informal workers tend to have low and unstable incomes due to limited skills, even though income levels vary across occupations and regions. Workers in more developed areas often enjoy better income and working conditions than those in disadvantaged areas, but overall access to policy support remains low, incomes are still limited, and social networks are not strong enough to create significant opportunities for upward mobility. In terms of employment status, informal workers are mainly self-employed workers and family workers, with women more likely than men to engage in highly vulnerable jobs. Their wages are lower than those of formal workers in all employment positions, and most belong to the lower income groups.

Informal workers also face difficult living and working conditions. This group is highly diverse in occupation, age, and migration status, but many share common disadvantages such as cramped housing, insecure jobs, poor working environments, and limited labor protection. Informal employment is concentrated mainly in agriculture, forestry, fisheries, manufacturing, construction, and wholesale and retail trade, with about 90% of informal workers engaged in agriculture, forestry, fisheries, construction, and household-related work. By age, informal employment accounted for 83.7% among workers aged 15-19 and over 90% among those aged 60 and above.

Although informal labor plays an important role in the national economy, it is highly vulnerable to external shocks. Therefore, addressing informal labor has become a major policy priority in Vietnam's effort to build a more resilient, competitive, and sustainable economy in the digital age. However, as of 2024, more than 90% of informal workers were not covered by any type of insurance, while nearly 79% worked without a written labor contract or under only verbal agreements. This reflects both workers' limited awareness of social insurance and the insufficient attractiveness of current insurance policies. As a result, many informal workers remain exposed to job insecurity, weak bargaining power, limited access to welfare benefits, and inadequate working conditions.

## 2.2. Opportunities and Challenges for Informal Labor in Vietnam in the Digital Era

### *\* Some Political and Legal Foundations for Reducing Informal Labor in Vietnam*

In recent years, the Party and the State have issued various guidelines and policies to protect the rights and improve the welfare of informal workers. Resolution No. 15-NQ/TW (2012) called for the development of policies encouraging farmers and informal workers to participate in voluntary social insurance, while also reviewing and supplementing regulations requiring employers to contribute to social insurance in accordance with the law. Resolution No. 21-NQ/TW (2012) further emphasized expanding State support for participants in social insurance and health insurance, especially voluntary social insurance for farmers and workers in the informal sector. Resolution No. 28-NQ/TW (2018) continued this orientation by setting targets to expand social insurance coverage, including greater participation by farmers and informal workers. The Documents of the 13th National Congress of the Communist Party also stressed the need to promote digital transformation, develop the digital economy and digital society, improve the quality of human resources, accelerate labor restructuring, particularly in rural areas, and reduce the proportion of workers in the informal sector. In the same direction, Decision No. 38/QĐ-TTg dated January 11, 2024, set specific targets for 2025, including expanding social insurance, unemployment insurance, and health insurance coverage, with particular attention to farmers and informal workers. Thus, along with economic development, informal labor inevitably exists in all economies, especially in developing countries such as Vietnam. However, in the current digital era, despite the country's large labor force, informal workers remain highly vulnerable to economic and social shocks.

### *\* Some Fundamental Characteristics of the Digital Era*

According to a United Nations resolution (2014), the digital era has several key characteristics. First, it is driven by global digital transformation, which fundamentally reshapes modes of social development, lifestyles, and activities through digital platforms. Second, it has created a global virtual space that increasingly interacts with the physical world, with strong connectivity that transcends geographical boundaries. Third, the digital era is expected to have profound and long-term impacts on the development of nations, businesses, and individuals.

In this context, many countries have actively implemented strategies and policies to promote digital transformation, the digital economy, and international

integration. In Southeast Asia, many countries have also introduced national strategies to advance the digital economy, while ASEAN has gradually promoted regional digital integration through related frameworks and initiatives. In Vietnam, deeper international integration and the expansion of trade agreements have brought both positive and negative impacts on the economy, including the informal sector and informal workers. Therefore, the digital era presents both opportunities and challenges for informal labor in Vietnam today..

### *- Opportunities*

*First, informal labor is expected to increase, along with commitments to acceptable working conditions for workers, thereby helping to raise incomes for informal laborers.*

The newly signed agreements, combined with new policies, are creating employment opportunities with higher incomes for informal workers who possess technical expertise and strong labor skills. Therefore, informal workers must actively improve their skills, as this will be a prerequisite for seizing high-income jobs and accessing better social protection. The documents of the 13th National Congress of the Communist Party of Vietnam (2021) set out the general development goals for 2030: "The average annual growth rate of labor productivity will exceed 6.5%; the proportion of trained workers holding degrees and certificates will reach 35-40%; and the share of agricultural laborers in the total workforce will fall below 20%." Many forecasts also suggest that agricultural land area may be significantly reduced due to the integration process, causing many rural workers to lose their jobs. They will have to migrate to urban areas to seek employment, often accepting informal jobs, which would further increase the number of informal workers. Particularly in recent years, under the impact of the Fourth Industrial Revolution, new forms of the informal economy have emerged, such as the "circular economy," the "sharing economy," the "freelance economy," and the "Gig economy" — All based on online platforms (through technology applications) such as online shopping, delivery services (shippers), and ride-hailing services (Grab, Uber, etc.). These are new types of employment based on technology applications, which are rapidly developing and significantly expanding the informal labor force in Vietnam.

*Second, digital transformation will open up opportunities for many new industries and jobs that require fewer workers but demand higher labor quality. In the digital era, digital transformation will create unprecedented opportunities for vocational training activities targeting informal workers. Those who can*

take advantage of digital transformation and acquire new skills through vocational training will be able to access higher-quality jobs, thus improving their productivity and income. For instance, in online sales, many workers who have completed vocational training courses at Employment Service Centers have started opening online stores on platforms such as Shopee, Facebook, Zalo, and GrabFood. This has enabled them to reach a broader customer base and significantly increase their revenue. In the field of digital content creation, some workers have learned how to produce tutorial videos, share knowledge, and manage content on platforms like YouTube, TikTok, and Instagram.

#### **- Challenges**

*Firstly, maintaining a high rate of informal labor poses a significant challenge to achieving labor protection goals.*

A persistently high level of informal labor makes it difficult for the government to monitor and manage working conditions, as well as workers' participation in social insurance schemes. Moreover, according to a forecast by the World Bank (2025), the incomes of informal workers may be improved, the rate of income growth will be much lower than that of workers in higher-income percentiles. The digital era is also transforming the labor market, eliminating many traditional and manual occupations, leading to job losses in various sectors worldwide. Notably, the informal labor sector is facing indirect pressure from the Fourth Industrial Revolution. Both globally and in Vietnam, the digital economy — characterized by the widespread use of the Internet, digital technologies, smart devices, and robotics - is increasingly replacing traditional roles, serving and fulfilling human needs across various fields.

*Secondly, for informal workers themselves, an inevitable challenge is the increasingly fierce competition in the international labor market.*

Limited technical expertise and professional qualifications may prevent informal workers from shifting to new jobs, even when their current jobs no longer guarantee a minimum standard of living. In particular, the new-generation trade agreements that Vietnam has recently signed play an important role in narrowing the informal labor market. For example, agreements such as the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) and the EU-Vietnam Free Trade Agreement (EVFTA) require Vietnam to pay greater attention to social development and environmental protection alongside economic growth. The European Union has clearly stated that the EVFTA will have profound impacts on Vietnam's economy, employment, labor standards,

environment, and social cohesion.

### **3. Some Proposed Solutions for Informal Labor in Vietnam in the Digital Era**

*First, strengthening training and retraining efforts, and improving the quality of human resources in a practical and effective manner, are essential to enhance the professional skills of Labor and enable their transition to formal employment.*

The State should introduce appropriate policies to create opportunities and favorable conditions for Labor in the informal sector to participate in training, retraining, and skills enhancement programs, in order to meet the occupational skill requirements of the labor market based on online platforms and technological applications. The State should continue to implement existing vocational education policies, focusing on equipping Labor in the informal sector with the capacity to transition into formal employment — where labor relations are regulated and better social security is ensured — with an emphasis on developing essential basic skills to adapt to the Fourth Industrial Revolution. It is necessary to supplement and complete policies to effectively manage employment risks and ensure more sustainable social security for Labor in the informal labor market. In addition, it is important to research and introduce policies to support informal Labor in developing vocational skills and accessing employment services (e.g., exemption or reduction of training fees and job placement service fees) so they can secure jobs through technological applications in the sharing economy, the Gig economy, etc., or transition into formal employment.

*Second, improving policy mechanisms to encourage Labor and employers to enter into labor contracts and participate in social insurance schemes.*

The State should establish mechanisms and policies to provide emergent social assistance from annually allocated budgets or from surplus funds of the Unemployment Insurance Fund; and to support health insurance purchases for poor and near-poor households. Research should be conducted to promulgate compulsory social insurance policies for Labor in the informal sector working in the sharing economy and Gig economy who earn high incomes, through income tax monitoring and a contributory-benefit mechanism using the “nominal individual account” model. There should be control mechanisms requiring employers to be responsible for signing labor contracts and paying social insurance contributions for workers. Furthermore, it is important to promote communication campaigns and provide clear guidance to workers about the importance and benefits of social insurance (SI), while expanding voluntary SI



options for the public. Strengthening the monitoring of the implementation of labor regulations in formal enterprises and business establishments employing labor is also essential.

*Third, focusing on local economic development and promoting labor structure transformation toward industrialization and modernization to create favorable conditions for attracting investment from large enterprises and generating more employment opportunities.*

It is necessary to expand the national employment service system, particularly in urban areas, to facilitate access to high-tech and online employment services. This expansion would provide labor market information, employment services, and labor supply-demand matching within the informal labor market segment, as well as connect the labor supply from the informal sector to the labor demand in the formal sector, thereby accelerating the transition of informal labor into formal employment where better social security systems are in place.

*Fourth, reforming administrative procedures based on the maximum application of information technology.*

It is crucial to continue simplifying administrative procedures at public service agencies, especially within the social insurance sector, to maintain efficient “one-stop-shop” transaction models. Maximizing the application of information technology in administrative transactions and continuously improving the quality of personnel will better meet the growing demand for voluntary social insurance participation among informal Labor. At the same time, related sectors such as Labor - Invalids and Social Affairs and Finance should study and develop support programs to encourage citizens’ participation in voluntary social insurance. This includes assessing the participation capacity of workers in general and informal workers in particular to continue to improve the system of related policies to be more suitable and attractive to workers in participating in voluntary social insurance. Additionally, it is necessary to consider labor management through the use of a “Digital Labor Book,” integrated with the national population database and other related databases, in order to design supportive and incentive policies for both high-skill creative jobs (such as insurance, finance, YouTuber, blogger) and general jobs (such as delivery services, online sales, etc.).

*Fifth, strengthening international cooperation in fields related to labor utilization.*

It is important to enhance international cooperation, particularly with organizations such as the International Labor Organization (ILO), the United Nations Development Programme (UNDP), the World Bank

(WB), the Asian Development Bank (ADB), and international non-governmental organizations (NGOs) operating in Vietnam. Such cooperation would involve research, experience exchange, and technical support in training and conducting field surveys of the informal economy and the informal labor market, especially concerning new types of online platform-based economies and jobs (through technological applications) in Vietnam. These activities would serve as a basis for reaching a shared understanding and providing recommendations to the State for the supplementation and improvement of policies and laws to ensure social security for Labor working in this sector.

### Conclusion

The informal labor sector is currently under indirect pressure from the Fourth Industrial Revolution. Vietnam is entering a digital economy era with the explosive development of the Internet, digital technologies, smart devices, robotics, and etc.. These technologies are increasingly being widely applied across labor sectors to better serve and meet human demands. As a result, the digital age will transform the labor market: many traditional and manual occupations will be eliminated, leading to widespread job losses, including among informal Labor. On the other hand, it will also open opportunities for many new occupations that require fewer workers but demand higher-quality labor. However, a common issue is that not all Labor are included in the social protection system or hold jobs protected by labor laws. This situation results in low labor productivity and low income levels among these groups not only within the informal sector but also in parts of the formal sector. Therefore, to seize opportunities and overcome challenges, it is crucial to effectively implement the aforementioned solutions to further enhance the quality and adaptability of informal Labor in Vietnam in today’s digital era./.

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# RESEARCH ON THE RELATIONSHIP BETWEEN EDUCATION LEVEL AND SALARY OF AGRICULTURAL GRADUATES IN VIETNAM

Nguyen Thuy Anh\*

**Abstract:** *This study examines whether overeducation is associated with wage differentials among agricultural graduates in Vietnam. Using Vietnam Labour Force Survey data for 2018-2024, the analysis documents a significant wage penalty linked to overeducation. Doubly robust estimates indicate that graduates employed in jobs that do not require a university degree earn lower wages than those in positions requiring tertiary qualifications. The result remains robust across age, gender, regional, and job-sector subgroups. Gender, employment sector, and time effects also emerge as important correlates of education-job mismatch. Overall, the evidence points to a misalignment between higher education expansion and labor market demand in Vietnam's agricultural sector. Improving graduate-job matching is therefore crucial to ensure that skilled human capital is utilised effectively and contributes to productivity growth.*

• Keywords: overeducation, labour market, wage penalty, higher education

JEL codes: I23, J24, J31, J40

Date of receipt: 29<sup>th</sup> Jan., 2026

Date of delivery revision: 09<sup>th</sup> Mar., 2026

DOI:

Date of receipt revision: 13<sup>th</sup> Mar., 2026

Date of approval: 31<sup>th</sup> Mar., 2026

## 1. Introduction

Agricultural development increasingly depends on a well-trained workforce, including university graduates in agriculture (Tuyền, 2024). When graduates are employed in jobs that match both their field of study and qualification level, they can apply their knowledge and skills more effectively, which supports higher productivity and future earnings (Montt, 2017).

A substantial international literature shows that overeducation, working in a job that does not require a university degree, is associated with lower wages relative to well-matched employment (Elamin, 2023). In Vietnam, recent evidence using broad samples of university graduates also documents a wage penalty linked to overeducation (Tran et al., 2026). However, research has not yet examined overeducation specifically among agricultural graduates, although a limited number of studies have considered field-of-study mismatch for this group (Tuyền, 2024).

This paper fills that gap by providing the first systematic evidence on the incidence of overeducation and its wage implications among agricultural university graduates in Vietnam. Using individual-level data from the Vietnam Labour Force Survey, representative at provincial, regional, and national levels for 2018-2024, we show that overeducated agricultural graduates earn significantly lower average wages than appropriately matched peers. The wage penalty is robust across

subgroups by gender, age, region, and employment sector. We also find that gender, employment sector, and the COVID-19 period are important correlates of overeducation among agricultural graduates. The remainder of the paper is organised as follows. Section 2 reviews relevant theories and empirical findings on overeducation and wages. Section 3 describes the data and empirical strategy. Section 4 presents descriptive patterns and econometric results. Section 5 concludes and discusses policy implications.

## 2. Literature Review

Overeducation and undereducation are forms of vertical mismatch, describing misalignment between a worker's educational attainment and the education required by their job. Overeducation occurs when a worker's schooling exceeds job requirements, while undereducation arises when a job requires more schooling than the worker possesses (Montt, 2017). Several theoretical perspectives explain why overeducation may be linked to wage differentials (Tran et al., 2026). Human capital theory (Becker, 1964) views education as a form of investment that raises productivity, but it also recognises that schooling and training/experience can partially substitute for one another. In this view, overeducation may reflect deficits in practical skills or experience rather than pure overinvestment in schooling. Individuals with lower abilities or limited experience may acquire additional

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education to compensate, and they may accept lower reservation wages, which can contribute to observed wage penalties (Chuang & Liang, 2022).

Assignment theory (Sattinger, 1993) emphasises that wages depend on both individual human capital and job characteristics. Productivity is shaped by how well workers are allocated to jobs; when workers are mismatched, they cannot fully utilise their skills, reducing productivity and earnings relative to well-matched counterparts (Montt, 2017).

The career mobility model (Sicherman & Galor, 1990) offers a complementary interpretation: overeducation may be a transitional outcome, especially early in careers, as graduates accept lower-level jobs to gain experience and signal ability under information frictions. Overeducated workers may initially earn less but later move into better-matched jobs with higher earnings potential (Chuang & Liang, 2022).

Empirically, a large body of evidence documents a wage penalty associated with overeducation across diverse contexts. Studies report penalties for overeducated graduates in Argentina and other Latin American settings (Marioni, 2021), around 30% in China (Wu & Wang, 2018), and roughly 20% in Thailand (Paweenawat & Vechbanyongratana, 2015). In Vietnam, young overeducated graduates face a wage penalty of approximately 30% (Tran et al., 2026), while evidence from North Africa suggests losses ranging from about 12% to 50% (Elamin, 2023). Similar patterns appear in advanced economies, including the UK, Italy, and Taiwan, and across several other OECD countries (Chuang & Liang, 2022). Overall, the literature points to a persistent earnings disadvantage associated with overeducation (Tran et al., 2026).

### 3. Data and method

#### 3.1. Data

The data for this study are drawn from the Vietnam Labour Force Survey covering the period 2018-2024. The sample includes individuals whose highest qualification is a university degree in agriculture and whose main job is paid employment across different types of organizations. The dataset contains information on work experience, gender, marital status, household membership, employment sector, wages, and other socio-economic characteristics. The pooled sample across years comprises approximately 8,500 individuals.

This study adopts the job analysis method, commonly referred to as the normative approach, to identify overeducation, as this measure is generally considered to yield more consistent and less biased

estimates (Flisi et al., 2017). In line with the International Labour Organization (2018) framework and Appendix II of Vietnam's official occupational classification (Government of Vietnam, 2020), graduates are classified as overeducated, or vertically mismatched, when they work in occupations that formally require a qualification below the university level. Undereducation is not examined in this study because the number of university graduates employed in jobs requiring education beyond the university level is negligible.

#### 3.2. Method

To estimate the wage impact of overeducation, we apply a doubly robust estimation strategy, which identifies the causal effect of mismatch status on earnings by combining an outcome regression model with a propensity score (treatment) model (Tran et al., 2025). Either approach can deliver unbiased causal estimates when correctly specified. The key advantage of the doubly robust framework is that estimates remain consistent as long as at least one of the two models is correctly specified (Liu et al., 2019). Following prior studies (Somers, Cabus, Groot, & van den Brink, 2019; Tran et al., 2025), we control for gender, marital status, work experience, employment sector, field of study, household size, dependency ratio, and include year and regional fixed effects. In addition, we examine determinants of overeducation among agricultural graduates using a probit regression model. Consistent with the Vietnamese and international literature (Somers et al., 2019; Tran et al., 2025), covariates include gender, work experience, job sector, and regional and year dummy variables.

### 4. Results and discussion

#### 4.1. Descriptive statistics

Table 1 presents descriptive statistics for agricultural graduates over the period 2018-2024, disaggregated by job sector. It shows substantial wage differences across sectors. Graduates employed in FDI enterprises earn the highest average monthly wages, followed by private domestic firms and state-owned enterprises. In contrast, those working for households or individuals earn the lowest income. The overall average wage is 7,830, indicating that employment in more formal and capital-intensive sectors, particularly FDI firms, is associated with a wage premium. Table 1 also indicates that the incidence of overeducation varies considerably by sector. The highest proportion of overeducated workers is found among individuals working for households (87.4%) and FDI enterprises (66.5%), while the lowest rates appear in the public sector (21.2%) and



state-owned enterprises (32.1%). The overall rate of overeducation is 33.5%. This pattern suggests that job mismatch is particularly prevalent in less regulated or more flexible labor market segments, whereas public and state sectors may offer better alignment between qualifications and job requirements.

The data in Table 1 show that work experience differs substantially across sectors. Graduates in the public sector and state-owned enterprises exhibit the highest average years of experience (around 19.5 and 17.9 years, respectively), while those in FDI enterprises and households report lower levels. This may reflect greater employment stability and longer tenure in the public and state sectors.

Regarding job sector, Table 1 reveals that the majority of agricultural graduates in the sample are employed in the public sector (5,361 out of 8,500), followed by private domestic firms (1,762). This concentration highlights the continued importance of the public sector as a primary employer of agricultural graduates in Vietnam.

Overall, the descriptive statistics indicate clear sectoral segmentation in wages, experience, and the prevalence of overeducation. The coexistence of relatively high wages and high overeducation rates in some sectors, particularly FDI enterprises, suggests that mismatch does not necessarily preclude higher earnings but may reflect structural imbalances between educational expansion and labor demand.

**Table 1: Descriptive Statistics of Agricultural Graduates, 2018-2024**

| Jobsector        | Households, individuals |        | Private domestic firms |        | State Owned Enterprises |        | FDI Enterprises |        | Public sector |        | Other  |        | Total  |          |
|------------------|-------------------------|--------|------------------------|--------|-------------------------|--------|-----------------|--------|---------------|--------|--------|--------|--------|----------|
| Characteristics  | Mean                    | SD     | Mean                   | SD     | Mean                    | SD     | Mean            | SD     | Mean          | SD     | Mean   | SD     | Mean   | SD       |
| Monthly wages    | 6311                    | 2705   | 9181                   | 4463   | 8194                    | 3631   | 10006           | 5991   | 7372          | 2962   | 6843   | 3089   | 7830   | 3602.608 |
| Overeducation    | 0.874                   | 0.333  | 0.546                  | 0.498  | 0.321                   | 0.467  | 0.665           | 0.473  | 0.212         | 0.409  | 0.331  | 0.472  | 0.335  | 0.472    |
| Experience       | 10.992                  | 8.467  | 12.964                 | 8.810  | 17.873                  | 9.029  | 10.037          | 6.688  | 19.531        | 8.396  | 18.815 | 10.492 | 17.359 | 9.120    |
| Marital status   | 0.650                   | 0.478  | 0.730                  | 0.444  | 0.840                   | 0.367  | 0.746           | 0.436  | 0.924         | 0.264  | 0.901  | 0.300  | 0.860  | 0.347    |
| Household size   | 4.179                   | 1.616  | 4.212                  | 1.590  | 3.948                   | 1.231  | 4.301           | 1.758  | 4.052         | 1.417  | 3.854  | 1.288  | 4.088  | 1.465    |
| Dependency ratio | 34.909                  | 23.086 | 34.533                 | 22.878 | 36.521                  | 21.725 | 33.455          | 23.904 | 37.865        | 22.373 | 40.175 | 22.753 | 36.851 | 22.574   |
| Urban            | 0.624                   | 0.485  | 0.699                  | 0.459  | 0.625                   | 0.484  | 0.471           | 0.500  | 0.650         | 0.477  | 0.589  | 0.494  | 0.651  | 0.477    |
| Observations     | 380                     |        | 1762                   |        | 574                     |        | 272             |        | 5361          |        | 151    |        | 8500   |          |

**Figure 1. Trend of Overeducation among Agricultural Graduates in Vietnam, 2018-2024**

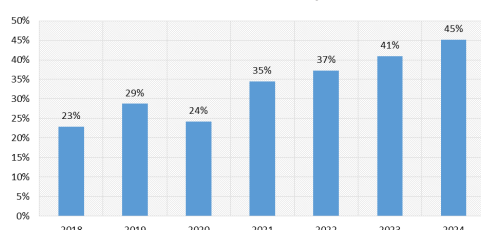


Figure 1 shows that the incidence of overeducation has increased consistently since 2020, rising from

approximately 24% to 45% in 2024. The sharp increase in 2021 may be explained by the impact of COVID-19. The upward trend thereafter may reflect a growing imbalance between labor supply and labor demand in the agricultural sector.

#### 4.2. Econometric results

Table 2 reports the estimated wage penalty associated with overeducation across different subgroups, using the doubly robust estimator. For the full sample, the estimated coefficient is -0.2208 and statistically significant at the 1% level. Since the dependent variable is measured in logarithmic form, this estimate implies that overeducated graduates earn approximately 20% lower wages than their matched counterparts. The wage penalty remains highly consistent across gender groups. The estimated coefficients for males (-0.2173) and females (-0.2199) are nearly identical in magnitude, suggesting that the negative wage effect of overeducation does not differ meaningfully by gender. However, substantial heterogeneity emerges across regions. The wage penalty is smaller in urban areas (-0.1814) compared to rural areas (-0.2668). This finding suggests that rural labor markets may provide fewer opportunities for skill reallocation or upward mobility, thereby amplifying the economic cost of mismatch.

**Table 2: Wage Differentials between Overeducated and Matched Graduates**

|                | Coefficient | SE     | P>z   |
|----------------|-------------|--------|-------|
| ALL            | -0.2208     | 0.0196 | 0.000 |
| Male           | -0.2173     | 0.0239 | 0.000 |
| Female         | -0.2199     | 0.0291 | 0.000 |
| Urban region   | -0.1814     | 0.0180 | 0.000 |
| Rural region   | -0.2668     | 0.0422 | 0.000 |
| Public sector  | -0.2188     | 0.0261 | 0.000 |
| Private sector | -0.1784     | 0.0196 | 0.000 |

Differences are also observed across employment sectors. The estimated penalty is slightly larger in the public sector (-0.2188) than in the private sector (-0.1784). This pattern may reflect more rigid wage-setting mechanisms in public employment, where compensation is often tied to formal job classifications rather than individual productivity or educational surplus.

Overall, the results indicate that overeducation is associated with a sizable and robust wage penalty, with particularly pronounced effects in rural regions and public employment settings. Our findings are partially consistent with Tran et al. (2026), who report that overeducation leads to an approximately 30% wage reduction among young graduates. However, our results differ in terms of regional heterogeneity. While Tran et al. (2026) do not document a stronger rural penalty,

our evidence suggests that graduates in rural areas face a substantially higher wage penalty than their urban counterparts. The stronger wage penalty observed in rural areas may reflect structural constraints in local labor markets, including limited job diversity, weaker competition among employers, and lower demand for high-skilled labor. In such settings, overeducation is more likely to persist and translate into sustained wage disadvantages.

**Table 3: Probit Estimates of Factors Associated with Overeducation**

| Explanatory variables                             | AME    | Robust Standard Errors | P-value |
|---------------------------------------------------|--------|------------------------|---------|
| Gender (1=male; 0=female)                         | 0.023  | 0.019                  | 0.233   |
| Household size (total household members)          | -0.007 | 0.006                  | 0.265   |
| Dependency ratio*                                 | 0.001  | 0.000                  | 0.027   |
| Workd experience (years)                          | -0.004 | 0.001                  | 0.003   |
| Marrital status (1=married; 0=others)             | -0.030 | 0.031                  | 0.341   |
| Job sector (public sector is the reference group) |        |                        |         |
| Households/individuals                            | 0.524  | 0.043                  | 0.000   |
| Private domestic firms                            | 0.268  | 0.020                  | 0.000   |
| Stated-owned enterprises                          | 0.124  | 0.035                  | 0.000   |
| FDI enterprises                                   | 0.351  | 0.041                  | 0.000   |
| Other organizations                               | 0.030  | 0.058                  | 0.612   |
| Regions (Red River Delta is the reference group)  |        |                        |         |
| North East Region                                 | -0.015 | 0.031                  | 0.632   |
| North West Region                                 | -0.085 | 0.030                  | 0.004   |
| North Central Region                              | -0.034 | 0.034                  | 0.312   |
| South Central Region                              | -0.131 | 0.036                  | 0.000   |
| Highland Region                                   | -0.055 | 0.036                  | 0.126   |
| South East Region                                 | -0.232 | 0.041                  | 0.000   |
| South West Region                                 | -0.003 | 0.029                  | 0.923   |
| Urban region (1=urban; 0=rural)                   | -0.041 | 0.018                  | 0.025   |
| Year dummies (2021 is the base year)              |        |                        |         |
| 2018                                              | 0.008  | 0.028                  | 0.776   |
| 2019                                              | 0.038  | 0.026                  | 0.147   |
| 2020                                              | 0.048  | 0.028                  | 0.084   |
| 2022                                              | 0.093  | 0.028                  | 0.001   |
| 2023                                              | 0.154  | 0.028                  | 0.000   |
| 2024                                              | 0.161  | 0.025                  | 0.000   |
| Prob > chi2 = 0.0000                              |        |                        |         |
| Pseudo R2 = 0.1727                                |        |                        |         |
| Observation: 8500                                 |        |                        |         |

Note: AME (average marginal effect). Estimates are accounted for sampling weights and clustered at the commune level. \* The dependency ratio is calculated as the number of household members aged below 16 and above 60 divided by the number of working-age members (16-60).

Table 3 presents probit estimates of factors associated with the probability of being overeducated, reported as average marginal effects (AME). The model is statistically significant (Prob > chi<sup>2</sup> = 0.0000) with a pseudo R<sup>2</sup> of 0.1727, indicating reasonable explanatory power for cross-sectional data. Gender does not significantly affect the likelihood of overeducation: the marginal effect for males is positive but statistically insignificant (p-value = 0.23), suggesting no meaningful difference between male and female graduates. Marital status and household size are also not statistically significant.

By contrast, work experience has a negative and statistically significant effect. Each additional year of experience reduces the probability of being overeducated by about 0.4 percentage points. This

supports the career mobility hypothesis, implying that overeducation may be partly transitory as mismatched graduates move into better-matched jobs over time. The dependency ratio has a small but positive and statistically significant effect: households with higher dependency burdens are slightly more likely to have members in mismatched employment, possibly reflecting financial pressure that leads graduates to accept jobs below their qualification level.

Substantial differences across job sectors are observed. Relative to public sector employment (the reference group), working for households/individuals, private domestic firms, state-owned enterprises, and FDI enterprises significantly increases the probability of overeducation. The largest marginal effect is among workers employed by households or individuals, where the probability of overeducation rises by 52.4 percentage points. Employment in FDI firms and private domestic firms is also associated with markedly higher mismatch probabilities, suggesting that sectors outside the public system may exhibit weaker alignment between job requirements and formal qualifications.

Regional variation is pronounced. Compared with the Red River Delta, several regions show significantly lower probabilities of overeducation, particularly the South Central and South East regions. The negative and significant marginal effect for the South East (-0.232) indicates a substantially lower likelihood of mismatch, potentially reflecting stronger labor demand or better industrial absorption capacity in economically dynamic areas. The urban dummy is negative and statistically significant, indicating that graduates in urban areas are about 4.1 percentage points less likely to be overeducated than those in rural areas, consistent with earlier wage results showing stronger penalties in rural labor markets.

Year dummies indicate that overeducation has increased over time, especially after 2021. The marginal effects for 2022-2024 are positive and highly significant, pointing to a rising mismatch probability. This may reflect structural imbalances between higher education expansion and labor market demand, lingering COVID-19 effects (disrupted recruitment, reduced demand, cohort congestion), and global economic uncertainty that constrained hiring. Similar findings are reported by Tran et al. (2025), showing that risks of vertical and horizontal mismatch increased significantly after 2021.

## 5. Conclusion and Policy Implications

### 5.1 Conclusion

This study is the first to examine the incidence

and wage consequences of overeducation among agricultural university graduates in Vietnam. Using nationally representative Vietnam Labour Force Survey data for 2018-2024, we find robust evidence of a substantial wage penalty associated with mismatch. Doubly robust estimates indicate that overeducated graduates earn about 20% less than well-matched peers. The penalty is observed across gender and employment sectors and is especially pronounced in rural areas, suggesting that local labor market conditions shape the economic costs of mismatch. Probit results imply that overeducation is driven more by structural and institutional factors than by individual demographics. Work experience significantly reduces mismatch risk, consistent with the career mobility hypothesis that overeducation can be partly transitional. By contrast, employment sector and regional location have large and statistically significant effects, highlighting the role of labor market structure. The likelihood of overeducation increases notably after 2021, which may reflect post-pandemic disruptions, cohort congestion, and wider global economic uncertainty. Overall, overeducation among agricultural graduates appears to be a structural issue, rooted in imperfect alignment between higher education expansion and labor market demand.

## 5.2. Policy Implications

The findings suggest several policy implications for Vietnam's agricultural sector and higher education system. First, agricultural training should be better aligned with labor market demand. Universities need regular curriculum updates in collaboration with employers, industry associations, and local authorities, with greater emphasis on agri-business, digital agriculture, and green transformation. Second, stronger labor market information systems are essential. More timely and transparent data on vacancies, sectoral trends, and regional opportunities would help students and graduates make informed education and job choices, reducing structural mismatch. Third, rural labor markets require targeted interventions. The higher mismatch risk and stronger wage penalty in rural areas indicate limited absorption of high-skill labor; policies that promote agro-processing, rural enterprise development, and agricultural modernization can expand demand for qualified graduates. Fourth, active labor market policies should support school-to-work transitions through internships, employer partnerships, career counseling, and job placement services. Because work experience reduces mismatch probability, accelerating early career experience accumulation is particularly important. Finally, given post-pandemic

uncertainty and global volatility, policymakers should monitor graduate outcomes and adopt countercyclical measures when needed. Temporary shocks can leave lasting scarring effects, so time-bound employment support and graduate hiring incentives may mitigate persistent mismatch.

## 5.3. Limitations and Future Research

This study has several limitations. First, overeducation is measured using the job analysis (normative) approach, which may not fully capture within-occupation heterogeneity in skill requirements. Second, the analysis relies on pooled cross-sectional data, preventing direct observation of individual mobility from mismatched to matched employment. Third, although the doubly robust estimator reduces bias from observable characteristics, unobserved factors, such as ability, motivation, or job search intensity, may still affect both mismatch and wages. Future research could strengthen causal identification by employing instrumental variable (IV) approaches to address potential endogeneity in overeducation status. If suitable instruments or longitudinal data become available, further studies could also examine mobility dynamics and the persistence of mismatch among agricultural graduates more explicitly.

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# THE IMPACT OF STATE OWNERSHIP TO THE COMPANIES' FINANCIAL PERFORMANCE: EMPIRICAL STUDY FROM LISTED FERTILIZER COMPANIES IN VIETNAM

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**Abstract:** *This paper examines how State ownership can affect financial performance of listed fertilizer companies in Vietnam. The empirical results show that state ownership can have substantial impact on financial performance of fertilizer companies. Specifically, the results show that government ownership have inverted U-shape non-linear relation to financial performance of business - measured by Return on assets (ROA). The authors find that state ownership will have the greatest impact on financial performance of listed fertilizer companies in Vietnam when state ownership is approximately 38.18% to total capital of the firm. We also specify that average sales growth rate (SAGR), liquidity ratio, assets turnover (TAT) affect positively to business performance, while the opposite is true for leverage (LEV).*

• Keywords: *state ownership, financial performance...*

Date of receipt: 30<sup>th</sup> Jan., 2026

Date of delivery revision: 12<sup>th</sup> Mar., 2026

DOI:

Date of receipt revision: 25<sup>th</sup> Mar., 2026

Date of approval: 31<sup>th</sup> Mar., 2026

## 1. Introduction

State capital investment in enterprises always plays a vital role in forming, maintaining, and developing business activities in key sectors and sectors with limited investment from economic components. This creates a driving force for the development of other industries and the entire economy as a whole. However, whether state capital investment in enterprises has been managed and utilized effectively to achieve the government's objectives remains a highly debated issue in many countries around the world (Yu, 2013; Kubo et al, 2019). Kubo et al (2019) conducted an empirical study with 1,236 observations, including 407 listed companies in Vietnam during the period from 2006 to 2010. The study showed that state-owned enterprises (SOEs) gain higher total asset turnover and return on assets compared to private enterprises. Additionally, the research indicated that the proportion of state ownership had a non-linear inverted U-shaped relationship with return on assets of the companies. A study conducted by Lin et al (2022) with samples of 63,083 observations collected from 6,950 enterprises in the agricultural sector in China during the period from 1998 to 2013, however, confirmed that government support policies for enterprises did not improve the labor productivity of SOEs.

In Vietnam, the restructuring of SOEs has implemented following the Resolution of the 3rd Conference of the Central Committee, 11th session, in 2011, with the main objective of establishing SOEs with a reasonable capital ownership structure. State capital is to be invested, managed, exploited, and utilized effectively to avoid waste, aiming to develop key economic sectors that serve as the backbone of the national economy, thereby enhancing competitiveness and ensuring macroeconomic stability. The restructuring process of SOEs in Vietnam is carried out in stages under close supervision of the Government. Throughout the process of restructuring SOEs, certain achievements have been made, such as the completion of the legal framework and legal documents to support the restructuring process of SOEs, as well as the development and approval of comprehensive plans for the arrangement and innovation of SOEs in line with the role of the SOE sector in the market economy and connected to the country's development orientation goals. However, alongside the achieved results, the process of restructuring state-owned enterprises still faces many limitations, such as the slow progress in the implementation of the equitization and divestment plans for SOEs, which mainly focuses on the number of enterprises being equitized rather than the amount of capital being equitized according to the Government's plan. Over 95% of enterprises

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have been equitized, however the total amount of state capital sold out reached only some 8%. Many SOEs are operating inefficiently, incurring losses, and mismanaging and wasting state resources, leading to losses, deficits, and a general impact on the national economic development situation. Therefore, studying the impact of state ownership on the financial performance of enterprises in Vietnam is an important topic that needs to be addressed to evaluate the effectiveness of the SOEs' restructuring process.

In addition, agriculture remains one of the key economic sectors of Vietnam, therefore the fertilizer industry plays a vital role in the development of the national economy. Currently, fertilizers contribute between 30% and 60% of the input value of agricultural materials and help increase crop yields by about 40% to 50%. Furthermore, with the current trend of sustainable development, the fertilizer industry is also under strong pressure from the demand for a shift towards green production and reducing greenhouse gas emissions. To address the aforementioned challenges, capital mobilization, investment activities and efficiency of capital utilization are critical issues for fertilizer companies. In addition, at the end of 2023, among total of 23 listed fertilizer companies in Vietnam, there are 17 state-owned enterprises. It can be seen that fertilizer industry receives a large amount of state-owned capital. Therefore, the authors decided to conduct research on the impact of state ownership on the financial performance of listed fertilizer companies in Vietnam.

Our paper consists of 5 sections. After the introduction in section 1, section 2 focuses on analyzing and clarifying the relevant theories and studies. Section 3 is the research methodology and database. Section 4 will discuss the research results, and finally, section 5 will present the conclusions and propose solutions.

## 2. Literature review and hypothesis development

State ownership and the financial performance of enterprises has been a hot topic that attracted many researchers. However, the research results have been varied on different research's scopes and subjects. Most studies, especially those conducted in the 1990s, provided evidence that government ownership negatively affected the financial performance of enterprises (Shleifer and Vishny, 1997). According to agency theory (Jensen and Meckling, 1976), managers and directors act as shareholder's agents when managing the company. Shareholder relies

on an agent to execute certain business or financial transactions on their behalf and to represent their interests without regard for self-interest. Furthermore, governments tend to protect and support SOEs during financial difficulties to avoid the risk of bankruptcy. As a result, managers in SOEs often face less pressure to strive for operational efficiency, allowing them to exploit opportunities and gaps in weak and loose corporate governance structures to maximize their own benefits (Laffont and Tirole, 1991). Porta, Lopez, and Shleifer (2002) conducted a cross-country study and showed that the financial performance of state-owned banks is lower than that of private banks, primarily because during this period, state-owned banks were used as tools to assist politicians in addressing their political issues, which in turn undermined the national economy.

The relationship between agents and principals - is also examined from the perspective of the relationship of interests between the State and minority shareholders. In certain specific business sectors, SOEs will set political and social goals such as reducing unemployment rates, preventing foreign investor penetration, and protecting the domestic industry as primary objectives. However, this can lead to conflicts of interest with the goal of maximizing profits for minority shareholders (Vickers and Yarrow, 1991).

In addition to agency theory, the Quiet Life theory explains the inefficiency of enterprises with state ownership. This theory suggests that when managers operate a business in a non-competitive environment, they will not face any pressure or risks from competitors, and therefore, lack of motivation to optimize results and business efficiency.

In contrary, many researchers support the view that SOEs will have higher profitability and value than that of private companies (Tan et al, 2015; Ang and Ding, 2006). According to the "Helping Hand" model, government need to make reasonable interventions to manage, guide, and adjust the national economy towards common goals. This model is particularly important for underdeveloped and developing countries, as state support in terms of resources will help businesses easily address issues related to capital shortages in their operations, as well as avoid the costs associated with the negative impacts of foreign enterprises. Yu (2013) conducted a study on the impact of government ownership on the business performance of enterprises based on a research sample that includes 10,639 observations

collected from listed companies in China during the period from 2003 to 2010. The research has shown that the structure of state ownership has a nonlinear U-shaped relationship with return on asset, return on equity, and the market value compared to the book value of the enterprise. An increase in state ownership will have the negative effect to financial performance of enterprises. However, once the state ownership ratio reaches a threshold that results in the lowest business efficiency for the enterprises, the higher the state ownership ratio, the more the business efficiency of the enterprises will improve. This is explained based on the context of companies in China during the period from 2003 to 2010, where investor protection mechanisms were weak, financial management laws were lax, and there were many loopholes. As a result, companies with diverse ownership structures often performed less effectively due to encountering “free-rider problems” which occur when individuals benefit from resources or public services without making a proportional contribution to their costs, leading to wasteful and excessive use of common resources. Meanwhile, enterprises with a high rate of state ownership often benefit from government support in terms of resources, incentives, potential investment opportunities, and political connections. Kubo et al., (2019) was conducted based on data that includes 1,236 observations collected from 407 listed companies on the Ho Chi Minh Stock Exchange and the Hanoi Stock Exchange during the period from 2006 to 2010. Research has shown that SOEs operate more efficiently than private enterprises due to more opened access to capital markets, credit sources, and obtaining operating licenses, among other advantages. SOEs also have the ability to access early and possess information about changes in policies, principles, and regulations from the government, leading to asymmetric information between SOEs and private enterprises. In addition, SOEs often have political motivations to encourage managers and employees within the company to strive for improved business results and labor productivity. The research also proved the inverse U-shaped nonlinear relationship between state ownership and the financial performance of enterprises. Research indicates that state ownership has the most positive impact on the business efficiency of enterprises at a rate of 30-55%. Other studies such as McConnell and Servaes (1990) and Wei (2007) also found an inverse U-shaped relationship between state ownership and business performance, with the optimal state ownership ratio

ranging from 35% to 50%.

Based on above literature review, authors propose the following research hypothesis:

*H0: State ownership and financial performance have an inverted U-shaped nonlinear relationship.*

### 3. Research methodology

#### 3.1. Data

To conduct an empirical study on the impact of state ownership structure on the financial performance of listed fertilizer companies in Vietnam, we have collected financial and non-financial data from 23 listed fertilizer companies over a 10-year financial period from 2014 to 2023. We collected data from the financial statements and annual reports of fertilizer companies listed on Vietnam Stock Exchanges, including UPCOM, HNX, and HOSE. The data for some companies in certain years is missing because the companies did not publish their financial statements and annual reports. Accordingly, the study sample includes a total of 224 observations.

#### 3.2. Empirical model

To test the hypothesis proposed in section 2, the authors suggest the following research model:

$$Y_{it} = \beta_0 + \beta_1 SOE_{i,t} + \beta_2 SOE_{i,t}^2 + \varphi \text{Control variables}_{i,t} + \varepsilon_{it}$$

Where: *i* is the fertilizer enterprise and *t* is the year of research.

The dependent variable of business performance (*Y*) in the equation is measured by the net return on assets ratio.

Previous studies (Huan, N.H et al., 2019; Yu, 2013) have clarified the characteristics of enterprises in relation to financial performance. Therefore, the authors included control variables in the model regarding the characteristics of the enterprises, including the size of the enterprise, revenue growth rate, liquidity ratio, fixed asset investment ratio, enterprise age, asset utilization efficiency, and debt ratio.

The variables in the research model are defined and explained in the summary table below:

**Table 1. Summary of variables in the research model**

| Item                        | Variable              | Definition                              | Measurement                                                    |
|-----------------------------|-----------------------|-----------------------------------------|----------------------------------------------------------------|
| <b>Dependent variable</b>   |                       |                                         |                                                                |
| ROA                         | Returns on assets     | Financial performance                   | Net profit/Average total assets                                |
| <b>Independent variable</b> |                       |                                         |                                                                |
| SOE                         | State ownership ratio | Level of State ownership in enterprises | Number of shares held by the State/<br>Number of shares issued |
| <b>Control variable</b>     |                       |                                         |                                                                |
| SIZE                        | Firm size             | Firm size                               | Natural logarithm of total assets                              |



|      |                    |                                     |                                                         |
|------|--------------------|-------------------------------------|---------------------------------------------------------|
| AGE  | Firm age           | Firm age                            | The number of operation years since establishment       |
| SAGR | Sale growth rate   | Sale growth rate                    | (Sales in year t - Sales in year t-1)/Sales in year t-1 |
| LIQ  | Liquidity ratio    | Liquidity of enterprises            | (Cash and cash equivalent + Cash at bank)/Total assets  |
| FIX  | Fixed assets ratio | Level of investment in fixed assets | Fixed assets/Total assets                               |
| DEBT | Gearing ratio      | Level of leverage                   | Liabilities/Total capital                               |
| TAT  | Asset turnover     | Asset turnover                      | Total income/Average total assets                       |

Source: The authors synthesized

### 3.3. Research methodology

We conducted a validation of the linear regression model using the Ordinary Least Squares method (OLS). Then, to ensure the accuracy and reliability of the test results, we conducted tests for model deficiencies, including using the VIF test to detect multicollinearity; the White test to identify heteroscedasticity; and the Wooldridge test to detect autocorrelation. To address the shortcomings of the model using the OLS method, as well as to identify the most suitable method for the model's data, we conducted model testing using both Fixed-effect regression model (FEM) and Random-effect regression model (REM). Then conduct the Breusch-Pagan test, Wald Test, and Hausman test to determine which model provides the most reliable results. Following that, we conduct Feasible Generalized Least Squares (FGLS) method to address the issue of autocorrelation and heteroscedasticity in the selected model.

## 4. Findings and discussions

### Descriptive statistics

Table 2. Descriptive statistics

| Variables | N   | Mean   | SD     | Min    | Max    | p25    | p95    |
|-----------|-----|--------|--------|--------|--------|--------|--------|
| ROA       | 225 | .057   | 0.064  | -.181  | .353   | .029   | .166   |
| SOE       | 225 | .501   | 0.310  | 0      | .977   | .241   | .756   |
| SAGR      | 225 | .032   | 0.261  | -.652  | 1.439  | -.095  | .569   |
| LIQ       | 225 | .206   | 0.198  | 0      | .949   | .047   | .606   |
| FIXED     | 225 | .176   | 0.191  | .004   | .91    | .061   | .665   |
| SIZE      | 225 | 11.977 | 0.636  | 11.033 | 13.248 | 11.435 | 13.053 |
| AGE       | 225 | 30.422 | 17.166 | 4      | 64     | 14     | 60     |
| TAT       | 225 | 2.69   | 3.131  | .104   | 12.841 | .973   | 10.154 |
| DEBT      | 225 | .433   | 0.248  | .027   | 1.246  | .248   | .993   |

Source: The table extracted from Stata 17

Table 3. Pairwise correlations

| Variables | (1)               | (2)               | (3)               | (4)               | (5)               | (6)               | (7)   | (8) |
|-----------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------|-----|
| (1) SOE   | 1.000             |                   |                   |                   |                   |                   |       |     |
| (2) SAGR  | 0.020<br>(0.761)  | 1.000             |                   |                   |                   |                   |       |     |
| (3) LIQ   | 0.287<br>(0.000)  | -0.012<br>(0.853) | 1.000             |                   |                   |                   |       |     |
| (4) FIXED | 0.317<br>(0.000)  | 0.036<br>(0.589)  | -0.194<br>(0.004) | 1.000             |                   |                   |       |     |
| (5) SIZE  | 0.136<br>(0.041)  | 0.144<br>(0.031)  | -0.228<br>(0.001) | 0.557<br>(0.000)  | 1.000             |                   |       |     |
| (6) AGE   | -0.017<br>(0.805) | 0.025<br>(0.706)  | -0.459<br>(0.000) | -0.073<br>(0.273) | 0.255<br>(0.000)  | 1.000             |       |     |
| (7) TAT   | 0.383<br>(0.000)  | 0.069<br>(0.306)  | 0.409<br>(0.000)  | -0.247<br>(0.000) | -0.497<br>(0.000) | -0.409<br>(0.000) | 1.000 |     |

| Variables | (1)               | (2)              | (3)               | (4)              | (5)              | (6)              | (7)               | (8)   |
|-----------|-------------------|------------------|-------------------|------------------|------------------|------------------|-------------------|-------|
| (8) DEBT  | -0.054<br>(0.421) | 0.048<br>(0.470) | -0.536<br>(0.000) | 0.432<br>(0.000) | 0.272<br>(0.000) | 0.230<br>(0.001) | -0.293<br>(0.000) | 1.000 |

Source: The table extracted from Stata 17

Table 4. VIF coefficients

| Variables | VIF   | 1/VIF |
|-----------|-------|-------|
| FIXED     | 2.382 | .42   |
| TAT       | 2.347 | .426  |
| SIZE      | 2.053 | .487  |
| SOE       | 1.975 | .506  |
| LIQ       | 1.967 | .508  |
| AGE       | 1.838 | .544  |
| DEBT      | 1.688 | .593  |
| SAGR      | 1.067 | .937  |
| Mean VIF  | 1.915 | .     |

Source: The table extracted from Stata 17

ROA of the fertilizer companies ranges from -0.181 to 0.353, with a mean value of 0.057 and a standard deviation of 0.064 which means on average, each unit of assets participating in business activities yields an average of 0.057 units of after-tax profit for the fertilizer companies listed on Stock exchange in Vietnam. Thus, it can be seen that the economic profitability of listed fertilizer companies in Vietnam over the past 10 years has been relatively low, and there are significant differences among the companies in different years. The average state ownership ratio of listed fertilizer companies in Vietnam during the period from 2014 to 2023 is 0.501 times (50.1%). At the same time, the 25th percentile of the variable is 0.241 (24.1%), indicating that 75% of the observations (equivalent to 168 observations) in the research sample have a state ownership ratio greater than 24.1%. This indicates that the state's investment ratio in enterprises in the fertilizer sector is relatively high. The state ownership ratio reaches a minimum value of 0 and a maximum value of 0.977 (97.7%), with a standard deviation of 0.31. The results indicate that the level of state ownership in the fertilizer companies within the study sample is relatively dispersed and shows significant differences. The scale of the fertilizer enterprise (SIZE) used in the study is determined by the natural logarithm of total assets at the end of the year. The scale of the enterprise, measured by the natural logarithm of total assets, reached a minimum value of 11.033 (corresponding to 107.84 billion VND) and a maximum value of 13.248 (corresponding to 17,698 billion VND). The average of the scale variable during the study period reached 11.977 with a standard deviation of 0.636, indicating that the scale of enterprises in the fertilizer sector in Vietnam shows a relatively large disparity. The average revenue growth rate is 0.032 times (3.2%) with values ranging from -0.652 times (-65.2%) to 1.439 times (143.9%), the standard deviation is 0.261,

and the median is -0.00149. Thus, more than 50% of the observed samples experienced a decline in total revenue, income, and the growth rate of revenue and income among businesses also showed a relatively clear differentiation. The liquidity ratio of the research enterprises reached 0.206 times (20.6%), indicating a very high level of cash, cash equivalents, and short-term bank deposits held by fertilizer companies. In addition, the rate of fixed asset investment is relatively low, averaging only 0.176 times (17.6%) throughout the study period. The standard deviation of the fixed asset investment ratio is 0.191 times, approximately at the average value, indicating that the general level of most fertilizer companies has a relatively low level of fixed asset investment. The average lifespan of businesses in the study sample is 30.422 years, with the youngest company, established in 2011, being Ca Mau Petrochemical Fertilizer Joint Stock Company, and the oldest company in this market is Ha Bac Fertilizer and Chemical Joint Stock Company, which has a history of 63 years of formation and development. The average asset utilization ratio of the companies in the study sample is 2.69 times, indicating that on average, for every one unit of assets, the companies studied generate 2.69 units of total revenue. The asset utilization performance reached a maximum value of 13.248 times and a minimum of 0.104 times, with a standard deviation of 3.131. This shows that the effectiveness of asset utilization among fertilizer companies is still relatively uneven. The average debt ratio of the study sample is 0.433 times (43.3%), with values ranging from 0.027 times (2.7%) to 1.246 times (124.6%), and a standard deviation of 0.248. Overall, the leverage ratio of the researched enterprises is relatively high. In particular, among them, two companies, Ha Bac Fertilizer and Chemicals Joint Stock Company (DHB) and General Materials Biochemistry Fertilizers Joint Stock Company (HSI), have negative equity, resulting in a debt ratio greater than 1. Therefore, to limit the shortcomings of the research model, we have eliminated the outlier values of the DEBT variable by performing a 5% winsorization.

The correlation coefficients between independent variables and control variables in the research model are relatively low, and the average VIF value is 1.915. Therefore, it can be concluded that the research model does not exhibit multicollinearity.

#### *Analyze the results of the model testing*

The authors conducted a regression model test using the ordinary least squares (OLS) method

and simultaneously performed tests for model deficiencies. The results indicate that the model does not exhibit multicollinearity; however, the White test points out the presence of heteroskedasticity at a significance level of 1%. The results of the Wald test and Hausman test indicate that the most effective method for the model is the FEM. However, the results of the Wooldridge test and the Breusch and Pagan Lagrangian test indicate that the model still exhibits heteroscedasticity. To address these shortcomings and enhance the accuracy of the model's results, we have applied the FGLS method to the model.

**Table 5. Regression analysis**

|              | (1)<br>OLS | (2)<br>OLS | (3)<br>FGLS |
|--------------|------------|------------|-------------|
|              | ROA        | ROA        | ROA         |
| SOE          | .027*      | .132***    | .139***     |
|              | (.015)     | (.048)     | (.042)      |
| SOE2         |            | -.157**    | -.182***    |
|              |            | (.069)     | (.06)       |
| SAGR         | .063***    | .065***    | .059***     |
|              | (.015)     | (.015)     | (.013)      |
| LIQ          | .064**     | .091***    | .063***     |
|              | (.025)     | (.028)     | (.021)      |
| FIXED        | -.098***   | -.047      | .002        |
|              | (.027)     | (.035)     | (.033)      |
| SIZE         | .02***     | .016**     | .008        |
|              | (.008)     | (.008)     | (.007)      |
| AGE          | -.000337   | .000037    | .000397     |
|              | (0)        | (0)        | (0)         |
| TAT          | .002       | .003*      | .005***     |
|              | (.002)     | (.002)     | (.001)      |
| DEBT         | -.034*     | -.025      | -.035**     |
|              | (.019)     | (.019)     | (.017)      |
| _cons        | -.143      | -.128      | -.027       |
|              | (.092)     | (.092)     | (.074)      |
| Observations | 225        | 224        | 224         |
| Fixed Year   | Yes        | Yes        | Yes         |

*Standard errors are in parentheses*

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$ .

*Source: The table extracted from Stata 17*

The results of the model testing without the squared state ownership variable using the OLS method (model 1) indicate that state ownership has a positive relationship with ROA. At significance level of 10%, a 1% increase in state ownership will lead to a 0.027% increase in ROA. The results of the model testing with the squared variable of state ownership using the FGLS method (model 3) show that the coefficients of the SOE variable and the squared SOE variable with respect to ROA are 0.139 and -0.182, respectively, with a significance level of 1%. Thus, the research results have confirmed that the proposed research hypothesis is accurate, showing that the state ownership ratio has a non-linear U-shaped relationship with ROA. The results of the model testing using the OLS method (model 2) once again support the research hypothesis. An increasing state ownership ratio will positively impact the ROA; however, when this ratio

reaches a certain threshold, the ROA of the enterprise will reach its maximum value. Beyond this threshold, as the state ownership ratio continues to increase, the ROA will begin to decline. This research result has once again confirmed the findings of McConnell and Servaes (1990); Wei (2017); Kubo et al (2019). Based on the results of the model testing using the FGLS method, the authors calculated that the threshold for the state ownership ratio for the company's ROA to reach its maximum value is 38.18%. In other words, state ownership will have the most positive impact on the net asset return rate of fertilizer companies in Vietnam when the state ownership ratio is at 38.18%. This optimal ratio threshold is relatively consistent with the proposed ratios in previous studies, such as 30-55% in the research by Kubo et al. (2019), 35% according to the study by McConnell and Servaes (1990), and 30-50% in Wei (2017).

Regarding control variables, the results also indicate that, sale growth rate has a positive impact on ROA with a coefficient of 0.059 at significance level of 1%. It shows that, under the condition that other factors remain unchanged, if the revenue growth rate of fertilizer companies increases by 1%, the ROA will increase by 0.059%. Accelerating sales growth is one of the important factors contributing to enhancing the business efficiency of companies in the fertilizer sector. In addition, the liquidity ratio has a positive relationship with ROA at significance level of 1%. The liquidity ratio reflects a company's ability to pay its debts, therefore, a high liquidity capability will contribute to maintaining continuous, safe, and effective business operations. In addition, asset utilization has a positive impact on ROA at a significance level of 1%, although the degree of impact is relatively small; a 1% increase in asset utilization results in only a 0.005% increase in ROA. In addition, the company's debt ratio has a negative impact on ROA at 5% significance level. A 1% increase in the debt ratio will cause the ROA to decrease by 0.035%. The increase in debt financing will raise financial costs and the cost of capital, thereby negatively impacting the financial performance of the company.

## 5. Conclusion

The state ownership structure shows certain positive impacts on the business efficiency of listed fertilizer companies in Vietnam. This result differs from the conclusions of several previous studies (Shleifer and Vishny, 1997; Laffont and Tirole, 1991; Porta, Lopez, and Shleifer, 2022) as the authors argue that state ownership leads to government intervention

in the profit objectives of enterprises, with the government using SOEs as tools for political goals, or due to conflicts of interest between representatives and owners. The positive impact of state ownership on the business performance of enterprises can be explained by the fact that in Vietnam, SOEs still receive advantages such as access to low-cost capital and support programs for trade promotion, market exploration, partnerships, and customers. These advantages provide a competitive edge and enhance the operational efficiency of state-owned enterprises. In addition, in Vietnam, in the context of a legal system that still lacks coherence and is not fully developed, the issue of information asymmetry regarding regulations and legal policies between SOEs and private enterprises is evident. SOEs may have an advantage in accessing unpublished internal information, allowing them to leverage this advantage to make more beneficial investment decisions for the company.

Research also highlights that the state ownership structure in listed fertilizer companies in Vietnam should be maintained at below 38.18% to ensure that the government's intervention and support for the operations of these companies is adequate and effective. If the state ownership ratio in enterprises is too high, it will lead to adverse effects on business performance due to the consequences of conflicts of interest or dependence on government power, which limits the motivation for innovation and creativity, diminishes the sense of responsibility among employees in managing, exploiting, and utilizing the company's resources, as well as reducing the competitiveness of the enterprise in the market.

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# STRENGTHENING SCIENCE AND TECHNOLOGY ACTIVITIES IN THE ANIMAL FEED INDUSTRY IN ALIGNMENT WITH RESOLUTION NO. 57-NQ/TW

PhD. Nguyen Duc Hai\*

**Abstract:** *Developing the livestock feed industry associated with science and technology (S&T) in the spirit of Resolution No. 57-NQ/TW dated December 22, 2024 of the Politburo on breakthrough development of science, technology, innovation and national digital transformation is shifting from extensive production to intensive production, increasing productivity, quality, added value, towards smart agriculture and high technology. The article outlines the current situation of developing the livestock feed industry associated with science and technology in the spirit of Resolution No. 57-NQ/TW, thereby proposing a number of related solutions.*

• Keywords: *animal feed industry, science and technology, resolution No. 57-NQ/TW.*

Date of receipt: 30<sup>th</sup> Jan., 2026

Date of delivery revision: 12<sup>th</sup> Mar., 2026

DOI:

Date of receipt revision: 25<sup>th</sup> Mar., 2026

Date of approval: 31<sup>th</sup> Mar., 2026

## Current status of the animal feed industry development

In 2025, Vietnam's livestock feed industry recorded positive growth in output in the context of declining and gradually stabilizing global raw material prices. The output of compound feed increased by nearly 3% compared to the previous year, while raw material import activities remained at a high level to meet domestic production demand. According to aggregated data from reports of the Department of Livestock Production and Veterinary Medicine (Ministry of Agriculture and Environment) shown in Table 1, in 2025, the country's compound feed output reached 22.12 million tons, an increase of 2.9% compared to 2024. The production structure continues to clearly reflect the demand of key livestock groups. Among them, compound feed for pigs reached 11.59 million tons, accounting for 52.3% of total compound feed output. This continues to be the product group with the largest share, consistent with the scale of the pig herd and the demand for recovery and production development after periods of market fluctuations. Compound feed for poultry reached 9.82 million tons, accounting for 44.4%, showing that the poultry sector still maintains an important role in the livestock structure and industrial feed consumption. Meanwhile, feed for cattle and other livestock reached 707 thousand tons, accounting for 3.3%, reflecting the stable but not yet breakthrough development trend of large livestock farming.

In general, the growth rate of compound feed output in 2025 shows that livestock feed production activities have maintained a stable pace, basically meeting the demand of the domestic livestock industry.

**Table 1: Animal Feed Production 2024-2025**

| Description                              | Year 2024 | Year 2025 |
|------------------------------------------|-----------|-----------|
| Total production (thousand tons)         | 21,500    | 22,120    |
| Compound pig feed (thousand tons)        | 11,202    | 11,597    |
| Compound poultry feed (thousand tons)    | 9,546     | 9,815     |
| Feed for cattle & others (thousand tons) | 753       | 707       |
| Pig feed (Percentage %)                  | 52.10     | 52.34     |
| Poultry feed (%)                         | 44.40     | 44.43     |
| Other feed (%)                           | 3.50      | 3.23      |

Source: Department of Livestock Production and Veterinary Medicine

**Table 2: Import of Animal Feed by Raw Material Group and Value in 2025**

| No. | Item Category           | Volume (Tons)       | Item Value (USD)       |
|-----|-------------------------|---------------------|------------------------|
| 1   | Soybeans                | 461,479.58          | 206,882,520.64         |
| 2   | Soybean meal            | 5,442,081.95        | 2,156,472,326.80       |
| 3   | Palm kernel meal        | 529,921.49          | 77,226,901.59          |
| 4   | Rapeseed meal           | 290,972.91          | 67,441,488.97          |
| 5   | Other oilseed meals     | 49,150.0            | 11,220,165.0           |
| 6   | Wheat                   | 2,371,064.1         | 597,619,641.8          |
| 7   | DDGS                    | 1,543,851.4         | 369,457,118.4          |
| 8   | Various wheat brans     | 621,204.1           | 107,653,373.2          |
| 9   | Corn (kernels)          | 10,911,598.5        | 2,720,852,456.8        |
| 10  | Supplementary feed      | 940,829.0           | 1,044,040,071.7        |
| 11  | Complete compound feed  | 30,030.5            | 46,336,962.2           |
| 12  | Hay                     | 65,531.9            | 24,020,476.6           |
| 13  | Animal-derived products | 826,241.5           | 516,090,537.4          |
| 14  | Other types             | 704,348.1           | 283,434,340.6          |
|     | <b>Total</b>            | <b>24,788,305.0</b> | <b>8,228,748,381.5</b> |

Source: Department of Livestock Production and Veterinary Medicine

Along with domestic production, the activity of importing livestock feed raw materials continues to play an important role. Table 2 shows that the total volume of livestock feed raw materials imported in 2025 reached 24.78 million tons, equivalent to 8.22 billion USD. Specifically, the high-protein feed group reached 9.43 million tons, worth about 3.38 billion USD, mainly soybean meal and equivalent products. High-energy feed reached 14.32 million tons, worth 3.6 billion USD, in which corn and wheat remained the main imported

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items. In addition, feed additives reached nearly 940.8 thousand tons, worth about 1.04 billion USD; complete compound feed reached 30 thousand tons and hay reached 65.53 thousand tons.

Also according to the Department of Livestock Production and Veterinary Medicine, regarding market developments, compared to 2023, most raw materials for livestock feed production in 2025 recorded strong price decreases. Notably, soybean meal decreased by 26.5%, DDGS decreased by 24.1%, and corn decreased by 11.6%. Compared to 2024, the overall raw material price level was more stable, in which corn increased slightly by 4.8%, while soybean meal continued to decrease sharply by 17.8% and DDGS decreased by 7.2%. The decrease in raw material prices has led to a decrease in the price of compound livestock feed compared to previous years. Specifically, the price of compound feed for meat pigs decreased by 2.5% compared to 2024 and decreased by 9.2% compared to 2023. Feed for colored-feather broilers remained stable compared to 2024 and decreased by 3.3% compared to 2023, while feed for white-feather broilers decreased by 3.5% compared to 2024 and decreased by 8.6% compared to 2023. The stable feed price level is evaluated as a favorable factor, contributing to reducing input costs and supporting farmers in maintaining and expanding production.

In 2025, the export of livestock feed and raw materials reached about 1.6 billion USD, an increase of 45% compared to 2024. In addition, Vietnam and China have upgraded the 2016 Memorandum of Understanding on rice bran export to a Protocol (signed on April 15, 2025), significantly expanding market access opportunities. Accordingly, in addition to the 8 enterprises that had been granted codes previously, 4 more new enterprises were approved by the Chinese side, bringing the total number to 12 qualified enterprises for export. The current rice bran export volume reaches about 100 thousand tons per month, estimated for the whole year of 2025 to reach 1.2 million tons, with a value of 400–500 million USD.

In the context of fluctuating global raw material prices, the Department of Livestock Production and Veterinary Medicine has advised the Ministry of Agriculture and Environment to propose that the Government issue financial support policies for livestock feed enterprises. Decree No. 73/2025/NĐ-CP on exemption and reduction of import tax on corn and soybean meal is considered an important solution to help reduce domestic livestock feed production costs. In addition, the implementation of Decree No. 106/2024/NĐ-CP on supporting the production, processing, preservation and consumption of domestic raw materials continues to be promoted, focusing on key crops and agricultural and industrial by-products such as rice bran, sugarcane bagasse, DDGS, as well as the production of feed additives.

#### **Promoting science and technology activities in the livestock feed industry**

In order to promote scientific and technological

activities in the livestock feed industry, the Prime Minister of the Government has signed and promulgated Decision No. 1742/QĐ-TTg dated December 30, 2023, approving the Priority Project “Promoting Science and Technology Activities in the Livestock Industry to 2030” (the Project). The general objective of the Project is to enhance the quality and efficiency of scientific and technological activities in the livestock industry to meet the requirements of industrialization, modernization and international integration. The Project sets specific objectives to apply science and technology in the following fields: High-tech breeding of key livestock to meet 95% of the demand for pig breeds, 85 - 90% of the demand for poultry breeds, 100% of the demand for waterfowl breeds, 70% of beef cattle breeds; Livestock feed nutrition: Transfer technology for producing types of high-protein feed raw materials, feed supplements, additives, meeting about 20-35% of demand; Effectively exploit by-products from industry - agriculture - fisheries, biological products, medicinal herbs, safe and environmentally friendly natural compounds; Barns and livestock waste management: Transfer technology for producing barn equipment to meet 80% of demand, ensuring disease safety towards sustainable livestock farming; Processing of livestock products such as meat, eggs, milk, honey and slaughter products: Transfer technology to ensure 50-55% of industrial-scale meat processing facilities and 90% of industrial-scale egg processing facilities reach advanced technology level by 2030, diversify products to serve domestic consumption and aim for export. One of the tasks and solutions that the Project sets out is to upgrade material facilities, strengthen research capacity for a number of research facilities and high-tech laboratories in the livestock sector in a specialized, modern and synchronous direction at the level of the region and the world. Research and create key livestock breeds using high technology to transfer to domestic livestock breed production facilities.

In particular, the Politburo has signed and promulgated Resolution No. 57-NQ/TW dated December 22, 2024 on breakthrough development of science, technology, innovation and national digital transformation. In the context that digital transformation has become an inevitable trend and the agricultural sector in general, and the livestock feed industry in particular, is facing many urgent challenges, Resolution 57-NQ/TW of the Politburo is considered the “compass” for science, technology and innovation to truly become the key driving force for the sustainable development of this field.

For the field of agriculture and environment, Resolution No. 57-NQ/TW carries strategic significance in the context where Vietnam is facing urgent challenges such as increasingly harsh climate change, rapidly depleting resources, and heavy pressure from requirements for green growth and emission reduction. Accordingly, traditional agricultural production models, which depend on manual labor and high consumption of inputs, are no

longer suitable for the current situation. Instead, advanced trends such as circular agriculture, multi-value agriculture, green transformation, and digital transformation are becoming extremely urgent. To change the landscape, improve productivity, quality, and the added value of products while protecting the living environment for current and future generations, we must innovate our thinking and approach, placing science, technology, and digital transformation as the foundation for development. In recent times, the agriculture and environment sectors have proactively implemented many efforts and initiatives to apply technology, from high-tech agricultural models and smart livestock farming to environmental monitoring using sensors, and the construction of digital maps and databases on land, forests, and meteorology.

Despite positive changes, to achieve “breakthrough and development” in the spirit of Resolution No. 57-NQ/TW, the agricultural and environmental science and technology sector still faces many major challenges. Accordingly, the animal feed production system is still unsynchronized, lacking sustainable linkages, and the production scale remains at a small and medium level, making it difficult to apply modern technology. Many current scientific research projects have not yet truly met the development needs of the country. The situation where research is completed but is difficult or impossible to commercialize and apply to practical life is a significant challenge. One of the main bottlenecks is the stagnation in institutional innovation, especially in the mechanism for attracting and utilizing talent. Another inadequacy lies in the irrational allocation of resources. While local budgets can allocate up to 2% of total expenditures to science and technology but lack the human resources for implementation, at the Central level, where many leading experts are concentrated, there is a lack of research funding. Notably, a large portion of science and technology funding (about 54%) is “retained” for the administrative apparatus, salaries, and bonuses, instead of being invested directly into research activities. This seriously weakens the ability to create scientific products with practical and commercial value. In particular, cumbersome and prolonged administrative procedures are also a major barrier. Many scientific projects take 5-6 years from proposal to implementation, rendering the research results obsolete. This slows down the process of technology transfer into production and causes a waste of resources. Reality shows that the potential of the industry is not small, but “old wine in new bottles” management thinking and the lack of substantive autonomy regarding finance, tasks, and personnel of science and technology organizations are hindering development. While enterprises can proactively borrow capital to invest in research, scientific organizations are “tied down” by administrative regulations.

#### Proposed solutions

Currently, the animal feed industry is facing many major challenges that require technological innovation: Global food security: The world population will reach

over 9.8 billion people by 2050, requiring increased food production compared to the present; Climate change and sustainability: The livestock industry contributes approximately 14.5% of human-induced greenhouse gas emissions, of which animal feed production is a significant part; High requirements for food safety and traceability: Consumers are increasingly concerned about food origins, requiring the livestock industry to be more transparent throughout the entire supply chain.

In general, the application of science and technology is one of the important solutions to improve productivity, quality, and competitiveness, promoting sustainable development for the animal feed industry. Accordingly, it is necessary to focus on research and development of breeds; quality management of animal feed through the management of micro-elements, energy, and protein. In particular, environmental issues in the livestock industry also require technologies and equipment to resolve.

Identify and focus investment on science and technology fields with great potential, such as biotechnology and gene technology, to improve product quality, save resources, and create added value for the animal feed industry. In addition, the system of public science and technology organizations will be rearranged towards being lean, efficient, competitive, and capable of spreading knowledge to the market. The mechanism for assigning scientific tasks will also shift to ordering and bidding, linking more closely with production reality and aiming for the commercialization of research results.

Furthermore, the development of high-quality human resources in the field of science, technology, and digital transformation is also specially emphasized, with a close link between training, research, and practical application. Mechanisms to attract domestic and foreign experts and scientists, especially from the private sector, to participate in important industry tasks need to be prioritized. Finally, promoting comprehensive digital transformation-from policy planning and management to production and consumption-is considered a key factor for digital data, digital technology, and the digital economy to truly become competitive advantages in the new stage of development.

In addition, attention should be paid to promoting: biotechnology in animal feed production; automation and robotics in animal feed production (automatic feed mixing and distribution systems; robots in packaging and quality control stages); the application of IoT and Big Data in animal feed management (IoT sensor systems for monitoring feed quality; big data analysis for optimizing dietary rations); alternative and sustainable raw materials in animal feed production; AI-based automatic ration calculation systems; regulations and certification in animal feed technology; and the future of technology in the animal feed industry.

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# FACTORS AFFECTING STOCK PRICES OF LISTED MANUFACTURING FIRMS ON THE VIETNAMESE STOCK MARKET

MSc. Nguyen Thi Hong\* - PhD. Pham Thu Huyen\*

**Abstract:** *This study investigates the factors affecting the stock prices of listed manufacturing firms on the HOSE and HNX stock exchanges during the period 2015-2024. The dependent variable is stock price, while the independent variables comprise eight factors: financial leverage (LEV), earnings per share (EPS), price-to-earnings ratio (P/E), price-to-book ratio (P/B), firm size (SIZE), firm age (AGE), state ownership ratio (STATE), and foreign ownership ratio (FRG). Using regression analysis implemented in Stata, the study finds that most of these factors have a significant impact on stock prices, except for P/E. Based on the findings, the authors provide a set of recommendations for key stakeholders, including regulatory authorities, firms, and investors, to facilitate well-informed economic and investment decisions.*

• Keywords: Keywords: stock market price, manufacturing firms, financial leverage (LEV), price-to-book ratio (P/B), price-to-earnings ratio (P/E)

JEL codes: M10, M40, M41

Date of receipt: 30<sup>th</sup> Jan., 2026

Date of delivery revision: 12<sup>th</sup> Mar., 2026

DOI:

Date of receipt revision: 25<sup>th</sup> Mar., 2026

Date of approval: 31<sup>th</sup> Mar., 2026

## 1. Introduction

In recent years, the Vietnamese stock market has experienced significant development, becoming an important channel for corporate capital mobilization and an attractive investment avenue for both domestic and international investors. Notably, FTSE Russell - an international market classification organization - announced in early October 2025 that the Vietnamese stock market has been upgraded from a Frontier Market to a Secondary Emerging Market, with the potential for official reclassification starting from September 21, 2026, provided that the relevant conditions are maintained and successfully assessed. This process requires market transparency, informational efficiency, and stability, with stock prices serving as a core indicator reflecting investor expectations and assessments of firms.

Within the structure of the Vietnamese stock market, manufacturing firms account for a substantial proportion, approximately 40% of all listed companies on the HOSE and HNX, playing a dominant role in overall market fluctuations. Examining the stock prices of this sector is not only representative but also provides a comprehensive picture of market behavior. Stock prices reflect the market value of firms and are influenced by profit expectations, capital structure risk, firm size, operational efficiency, and the quality of accounting information.

Numerous domestic and international studies have examined the effects of factors such as financial leverage (LEV), earnings per share (EPS), price-to-earnings ratio (P/E), price-to-book ratio (P/B), firm age, firm size, and ownership structure on stock prices; however,

the results remain inconsistent. Specifically, Kaizoji & Miyano (2017) analyzed data from approximately 8,000 companies worldwide during 2004-2013 and found that stock prices are influenced by dividends per share, cash flow per share, and book value. Studies in Vietnam, including Hoang Thi Viet Ha et al. (2018) and Dang Ngoc Hung et al. (2018), reported that EPS, book value, and firm size positively affect stock prices. Ma, Ausloos, Schinckus & Chong (2019) demonstrated in China that accounting indicators, particularly EPS and book value, significantly impact stock prices. Similarly, Do Thi My & Nguyen Thi Thu Hien (2021) confirmed that EPS and firm size have a positive effect, while the debt-to-asset ratio has a negative impact on stock prices.

In Bahrain, Doblaz, Lagaras & Enriquez (2021) emphasized the predictive role of P/E and P/B ratios for stock returns in the banking sector. Khan et al. (2022) in Indonesia found that P/B directly influences stock returns, while ROE exerts an indirect effect through P/E. In Vietnam, Tran Quoc Thinh et al. (2023), studying 144 listed companies, confirmed that EPS and book value per share remain critical valuation information. Conversely, Vo Thi Minh Thai (2024), focusing on listed mining companies, reported that EPS and the debt-to-equity ratio were statistically insignificant, whereas book value per share and ROA had a positive effect on stock prices.

The above findings indicate that the impact of financial factors and ownership structure on stock prices varies by industry, firm size, and market, highlighting the importance of studying the manufacturing sector in Vietnam—a sector that accounts for a large proportion

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of listed companies and serves as a pillar of the national economy. This study will examine the effects of financial leverage (LEV), earnings per share (EPS), price-to-earnings ratio (P/E), price-to-book ratio (P/B), firm size (SIZE), firm age (AGE), state ownership ratio (STATE), and foreign ownership ratio (FRG) on the stock prices of listed manufacturing firms in the Vietnamese stock market, thereby providing empirical evidence and policy-relevant recommendations for investors, firms, and regulatory authorities.

## 2. Literature Review

Stock prices reflect the market value of firms and are influenced by profit expectations, capital structure risk, firm size, and accounting information. Numerous studies both in Vietnam and internationally have examined the effects of factors such as financial leverage (LEV), earnings per share (EPS), price-to-earnings ratio (P/E), price-to-book ratio (P/B), firm age, firm size, and ownership structure on stock prices; however, the results remain inconsistent. The authors summarize below some representative studies.

Kaizoji & Miyano (2017) analyzed data from approximately 8,000 companies worldwide during 2004-2013, finding that stock prices are influenced by dividends per share, cash flow per share, and book value.

Hoang Thi Viet Ha et al. (2018) studied 416 listed companies on the Vietnamese stock market during 2012-2016 and reported that EPS and book value are positively associated with stock prices.

Dang Ngoc Hung et al. (2018) examined 273 listed companies in Vietnam and found that variables such as EPS, book value, and firm size positively affect stock prices.

Ma, Ausloos, Schinckus & Chong (2019) investigated 60 listed companies in China from 2011-2015 using 25 different indicators and demonstrated that accounting information, particularly book value and earnings, significantly impacts stock prices.

Do Thi My & Nguyen Thi Thu Hien (2021) analyzed 239 companies during 2015-2019, finding that EPS and firm size positively influence stock prices, whereas the debt-to-asset ratio has a negative effect.

Doblas, Lagaras & Enriquez (2021) in Bahrain highlighted that P/E and P/B ratios can predict stock returns in the banking sector, emphasizing the relevance of traditional valuation metrics even in the financial industry.

Khan et al. (2022) in Indonesia, focusing on real estate companies, reported that P/B directly affects stock returns, while ROE has an indirect effect through P/E.

Tran Quoc Thinh et al. (2023) studied a sample of 144 listed companies in Vietnam, confirming that earnings and book value per share remain important valuation information.

Conversely, Vo Thi Minh Thai (2024), analyzing

listed mining companies on HOSE and HNX during 2019-2022, found that book value per share and ROA positively affect stock prices, while EPS and the debt-to-equity ratio are statistically insignificant.

## 3. Research Methodology

### 3.1. Research Model and Hypotheses

#### Research Model

Following the methodological approaches employed in previous studies, particularly the research by Tran Quoc Thinh et al. (2023), a multivariate linear model is applied to examine the effects of various factors on the stock prices of listed manufacturing firms in the Vietnamese stock market.

Previous studies have indicated that EPS and book value per share positively influence stock prices (Hoang Thi Viet Ha et al., 2018; Dang Ngoc Hung et al., 2018; Vo Thi Minh Thai, 2024). At the same time, traditional valuation ratios such as P/E and P/B also play a significant role in predicting stock prices (Doblas, Lagaras & Enriquez, 2021; Khan et al., 2022).

Furthermore, several studies have shown that firm size (SIZE) positively affects stock prices (Hoang Thi Viet Ha et al., 2018; Dang Ngoc Hung et al., 2018), while firm age (AGE) may influence firm valuation and stock prices through reputation, managerial capability, and market experience (Coad et al., 2018).

Regarding ownership structure, the state ownership ratio (STATE) is considered a factor potentially affecting stock prices through its impact on financial policies, corporate governance, and strategic development (Nguyen Thi Minh Hue et al., 2017). Similarly, the foreign ownership ratio (FRG) may influence stock prices by enhancing corporate governance, increasing liquidity, and improving firm reputation in the market (Estrin et al., 2009).

$$SP_{it} = \beta_{0it} + \beta_1 LEV_{it} + \beta_2 EPS_{it} + \beta_3 PE_{it} + \beta_4 PB_{it} + \beta_5 SIZE_{it} + \beta_6 AGE_{it} + \beta_7 STATE_{it} + \beta_8 FRG_{it} + e_{it}$$

All measurements of the dependent and independent are summarized in Table 1.

**Table 1: Research Variables and Their Measurements**

| Variable Coding                              | Variables name          | Measurement                                                                                  |
|----------------------------------------------|-------------------------|----------------------------------------------------------------------------------------------|
| <b>Dependent Variable - Stock Price (SP)</b> |                         |                                                                                              |
| SP                                           | Stock Price             | The natural logarithm of the market price of the stock at the end of the fiscal year         |
| <b>Independent Variables</b>                 |                         |                                                                                              |
| LEV                                          | Financial Leverage      | Total borrowings and financial lease obligations / Total equity                              |
| EPS                                          | Earning per share       | Net income attributable to common shareholders / Average number of outstanding common shares |
| PE                                           | Price-to-Earnings Ratio | Market price of the stock / Earnings per share (EPS)                                         |
| PB                                           | Price-to-Book Ratio     | Market price of the stock / Book value per share                                             |
| SIZE                                         | Firm size               | Natural logarithm of Total Assets                                                            |
| AGE                                          | Firm Age                | Current year - Year of establishment                                                         |
| STATE                                        | State Ownership Ratio   | State-owned equity / Total firm capital                                                      |
| FRG                                          | Foreign Ownership Ratio | Foreign-owned equity / Total firm capital                                                    |

Source: Compiled by the authors.

#### Research Hypotheses

**Financial Leverage (LEV)** reflects the ratio of debt to equity. According to agency theory, high leverage increases conflicts between shareholders and creditors, which may negatively affect stock prices.

*H1: Financial leverage has a negative impact on the market price of stocks of listed manufacturing firms in Vietnam.*

**EPS** is an important indicator measuring profitability per share. According to signaling theory, a higher EPS signals better performance and profitability, thereby increasing investor confidence and stock price.

*H2: EPS has a positive impact on the market price of stocks of listed manufacturing firms in Vietnam.*

**Price-to-Earnings Ratio (P/E)** reflects the relationship between stock price and corporate earnings. According to asymmetric information theory, P/E reflects growth expectations and reduces information asymmetry, leading to a positive effect on stock price.

*H3: P/E has a positive impact on the market price of stocks of listed manufacturing firms in Vietnam.*

**Price-to-Book Ratio (P/B)** measures the stock price relative to the book value per share. According to signaling theory, a higher P/B indicates strong asset value and growth prospects, sending a positive signal to investors.

*H4: P/B has a positive impact on the market price of stocks of listed manufacturing firms in Vietnam.*

**Firm Size (SIZE)** reflects total assets or market capitalization. According to agency theory, larger firms tend to be more transparent and better governed, which enhances investor confidence.

*H5: Firm size has a positive impact on the market price of stocks of listed manufacturing firms in Vietnam.*

**Firm Age (AGE)** represents the duration of the firm's operation. According to signaling theory, older firms convey stability, credibility, and managerial experience, which positively influence investors.

*H6: Firm age has a positive impact on the market price of stocks of listed manufacturing firms in Vietnam.*

**State Ownership Ratio (STATE)** indicates the proportion of shares held by the government. According to agency theory, state ownership may enhance credibility but reduce financial flexibility, thereby affecting stock price.

*H7: State ownership ratio has a positive impact on the market price of stocks of listed manufacturing firms in Vietnam.*

**Foreign Ownership Ratio (FRG)** measures the proportion of shares held by foreign investors. According to asymmetric information theory, foreign investors improve transparency and corporate governance, strengthening market confidence.

*H8: Foreign ownership ratio has a positive impact on the market price of stocks of listed manufacturing firms in Vietnam.*

### 3.2. Research Data

According to the statistics of the State Securities Commission, by the end of 2024, there were a total of

1,646 listed firms on the three exchanges: HOSE, HNX, and UPCOM. The data used in this study include 252 listed manufacturing firms on the HOSE and HNX, comprising 2,339 observations over a 10-year period from 2015 to 2024. The composition of the research sample is presented in Table 2:

**Table 2: Research Sample Size**

| Year  | Freq. | Percent |
|-------|-------|---------|
| 2015  | 195   | 8.27    |
| 2016  | 205   | 8.69    |
| 2017  | 227   | 9.62    |
| 2018  | 236   | 10      |
| 2019  | 243   | 10.3    |
| 2020  | 246   | 10.43   |
| 2021  | 251   | 10.64   |
| 2022  | 252   | 10.68   |
| 2023  | 252   | 10.68   |
| 2024  | 252   | 10.68   |
| Total | 2,359 | 100     |

Source: Results generated from Stata 15.1

## 4. Results and Discussion

### 4.1. Descriptive Statistics of Stock Price (SP)

During the period 2015-2024, the average stock price of listed manufacturing firms on the Vietnam Stock Exchange exhibited fluctuations but generally showed an upward trend. The lowest prices occurred in 2018-2019, while the highest was recorded in 2021. In 2015, the average price was approximately VND 23,000, as the Vietnam stock market was still in a recovery phase following the 2014 crisis, with limited liquidity and investor confidence.

During 2016-2017, the average price increased from VND 24,500 to VND 26,500, driven by improved investor confidence, rising FDI inflows, the listing of new firms, and positive business performance. In 2018-2019, prices fell to around VND 22,000 due to global stock market adjustments, tightened domestic credit policies, and growing concerns about the impact of the COVID-19 pandemic.

**Figure 1: Average Stock Price during 2015-2024**



Source: Results generated from Stata 15.1

However, in 2020, the average price rose to approximately VND 24,500 as government economic support policies helped maintain liquidity and investor confidence. In 2021, the stock price peaked at nearly VND 35,000, representing the strongest growth in the period, fueled by substantial capital inflows, heightened enthusiasm from individual investors, and supportive economic policies, leading to record growth in the Vietnam stock market.

Nevertheless, in 2022, prices declined sharply to around VND 23,500 due to a market correction following



the previous boom, as well as the effects of global inflation and tighter monetary policies. During 2023-2024, prices recovered from VND 25,000 to VND 27,500, supported by gradual economic stabilization, the return of foreign capital, and positive prospects for listed firms.

#### 4.2. Correlation regression

Table 3 presents the correlation results among the variables, measured using Pearson's correlation coefficients.

**Table 3: Pearson Correlation Coefficients among Variables**

|       | SP      | LEV     | EPS    | PE      | PB     | SIZE   | AGE    | STATE   | FRG |
|-------|---------|---------|--------|---------|--------|--------|--------|---------|-----|
| SP    | 1       |         |        |         |        |        |        |         |     |
| LEV   | -0.0904 | 1       |        |         |        |        |        |         |     |
| EPS   | 0.5978  | -0.1142 | 1      |         |        |        |        |         |     |
| PE    | -0.0177 | -0.0005 | 0      | 1       |        |        |        |         |     |
| PB    | 0.6235  | 0.0215  | 0.2346 | -0.0669 | 1      |        |        |         |     |
| SIZE  | 0.2981  | 0.2095  | 0.174  | 0.0423  | 0.1651 | 1      |        |         |     |
| AGE   | 0.1948  | 0.0146  | 0.0947 | -0.0078 | 0.0128 | 0.0183 | 1      |         |     |
| STATE | 0.0945  | 0.0135  | 0.0342 | -0.0245 | 0.006  | -0.038 | 0.2095 | 1       |     |
| FRG   | 0.3014  | -0.0923 | 0.2125 | -0.0244 | 0.1496 | 0.2239 | 0.042  | -0.1105 | 1   |

Source: Results generated from Stata 15.1

Table 3 describes the correlations among the variables in the model, including the dependent variable, Market Price of Stock (SP), and the independent variables: Financial Leverage (LEV), Earnings per Share (EPS), P/E, P/B, Firm Size (SIZE), Firm Age (AGE), State Ownership Ratio (STATE), and Foreign Ownership Ratio (FRG). Based on the table, most variables are statistically significant and exhibit correlations. The correlation coefficients between any pair of variables in the model do not exceed 0.8, indicating a low likelihood of multicollinearity. Therefore, it can be concluded that the model does not suffer from severe multicollinearity.

#### 4.3. Linear regression

*Linear regression using FEM, REM, and FGLS models*

Table 4 reports the regression results of factors affecting stock prices using FEM, REM, and FGLS models. The F-test, Hausman test, and Breusch-Pagan Lagrange test were used to compare POLS-FEM, FEM-REM, and REM-POLS, respectively, identifying FEM as the most appropriate model.

Tests for heteroskedasticity and autocorrelation show  $\text{Prob} > \chi^2 = 0.0000$  ( $< 0.05$ ), indicating their presence. Therefore, FGLS was applied to correct these issues. The regression results of FEM, REM, and FGLS are presented in Table 4.

**Table 4: Regression Results**

|      | FEM                     | REM                     | GLS                    |
|------|-------------------------|-------------------------|------------------------|
| LEV  | -0.0314***<br>[-3.48]   | -0.0384***<br>[-4.38]   | -0.0659***<br>[-6.74]  |
| EPS  | 0.0000549***<br>[16.83] | 0.0000647***<br>[20.21] | 0.000118***<br>[32.44] |
| PE   | 0.0000367***<br>[2.71]  | 0.0000334**<br>[2.41]   | 0.0000245<br>[1.17]    |
| PB   | 0.253***<br>[38.89]     | 0.262***<br>[40.62]     | 0.297***<br>[39.05]    |
| SIZE | 0.0718***<br>[3.69]     | 0.0866***<br>[7.02]     | 0.0800***<br>[10.85]   |

|                      | FEM                      | REM                  | GLS                   |
|----------------------|--------------------------|----------------------|-----------------------|
| AGE                  | 0.00388<br>[1.33]        | 0.00702***<br>[5.35] | 0.00695***<br>[10.50] |
| STATE                | 0.157*<br>[1.67]         | 0.227***<br>[3.35]   | 0.227***<br>[5.49]    |
| FRG                  | 0.192*<br>[1.77]         | 0.412***<br>[4.29]   | 0.640***<br>[8.10]    |
| _cons                | 7.145***<br>[14.22]      | 6.583***<br>[19.57]  | 6.588***<br>[32.96]   |
| N                    | 2344                     | 2344                 | 2344                  |
| R-sq                 | 0.496                    |                      |                       |
| F-test               | Prob>F=0.0000            |                      |                       |
| Hausman test         | Prob > $\chi^2$ = 0.0000 |                      |                       |
| Breusch - pagan test | Prob> $\chi^2$ = 0.0000  |                      |                       |

Source: Results generated from Stata 15.1

*Financial Leverage (LEV):* The financial leverage coefficient is -0.0659, significant at the 1% level, indicating that financial leverage has a negative impact on stock prices, consistent with hypothesis H1. This result aligns with the findings of Do Thi My et al. (2021), reflecting that the Vietnam Stock Exchange perceives high financial risk from debt as a factor that reduces firm stock prices.

*Earnings Per Share (EPS):* The coefficient of EPS and stock price is 0.000118, statistically significant at the 1% level. This result shows that higher EPS leads to higher stock prices, supporting hypothesis H2. This finding is consistent with Hoang Thi Viet Ha et al. (2018), Dang Ngoc Hung (2018), and Tran Quoc Thinh (2023). However, it differs from Vo Thi Minh Thai (2024) in the mining sector. This implies that companies improving after-tax profits contribute to increasing stock prices, making EPS one of the most fundamental factors influencing investor expectations.

*Price-to-Earnings Ratio (P/E):* The coefficient of P/E and stock price is 0.0000245 and is not statistically significant. This indicates that P/E has no impact on stock prices, rejecting hypothesis H3 and contrasting with the results of Kaizoji & Miyano (2017), Doblas et al. (2021), and Khan et al. (2022). This suggests that Vietnamese investors may not consider P/E as a primary factor in stock valuation.

*Price-to-Book Ratio (P/B):* The coefficient of P/B and stock price is 0.297, significant at the 1% level. This shows that P/B has a positive and strong effect on stock prices, supporting hypothesis H4. This result aligns with previous studies such as Hoang Thi Viet Ha et al. (2018), Dang Ngoc Hung (2018), Ma et al. (2019), and Khan et al. (2023). It indicates that firms with higher net asset value or strong growth prospects tend to have higher stock prices, and P/B is a valued market indicator.

*Firm Size (SIZE):* The coefficient of SIZE and stock price is 0.0800, significant at the 1% level, indicating that larger firms tend to have higher stock prices, supporting hypothesis H5. This is consistent with the findings of Dang Ngoc Hung et al. (2018), Do Thi My et al. (2019), and Tran Quoc Thinh et al. (2023). Larger firms are generally more stable and attract capital more easily, resulting in higher stock prices.

**Firm Age (AGE):** The coefficient of AGE and stock price is 0.00695, significant at the 1% level, indicating a small but positive effect on stock prices, supporting hypothesis H6. This aligns with the findings of Edwin Wijaya & Sung Suk Kim (2023). Older firms typically have stronger reputation, stability, and operational capability, contributing to higher stock prices.

**State Ownership (STATE):** The coefficient of STATE and stock price is 0.227, significant at the 1% level, suggesting that firms with state ownership have higher stock prices, supporting hypothesis H7. This result is consistent with Kubo et al. (2019). The market tends to positively evaluate firms with state-owned shares, viewing them as stable, less risky, and likely to receive support in case of difficulties.

**Foreign Ownership (FRG):** The coefficient of FRG and stock price is 0.640, significant at the 1% level, indicating that higher foreign ownership leads to higher stock prices, supporting hypothesis H8. However, this contrasts with the findings of Vo Xuan Vinh (2015). The positive impact of foreign ownership on stock prices reflects investor confidence, improved governance, and the attractiveness of the firm, which boosts stock prices due to high demand.

#### 4.4. Discussion

This study aims to examine the impact of various factors on the stock prices of listed manufacturing firms on the HOSE and HNX during 2015-2024. Regression results indicate that most factors in the model significantly affect stock prices, except for P/E. Based on these findings, the authors propose the following recommendations for relevant stakeholders:

**For regulators:** Regulatory agencies should encourage firms to disclose transparent information regarding ownership structure, EPS, P/B, financial leverage, and firm age to help investors accurately assess stock value and reduce information asymmetry. Policies promoting foreign ownership participation in the stock market can enhance liquidity, increase investor confidence, and improve corporate governance standards. Additionally, developing guidelines for managing financial risk, particularly related to leverage, can help firms maintain safe debt levels, thereby minimizing negative impacts on stock prices and promoting market stability. Regulators can also support the development of analytical and stock valuation tools based on indicators such as P/B, EPS, firm size, and firm age to improve market information quality, enabling investors to make more effective and sustainable decisions.

**For firms:** Companies should focus on increasing after-tax profits and improving EPS to enhance stock value and attract investor attention. Maintaining a large firm size and a long-standing reputation also helps build market trust and reduces perceived risk. Another key recommendation is to attract foreign investors, which

not only increases capital but also improves governance, transparency, and corporate image in the capital market. Additionally, firms should consider maintaining a reasonable level of financial leverage, avoiding excessive debt that could depress stock prices and increase financial risk, especially during periods of market volatility. Effective management of these factors can optimize stock prices, enhance capital accessibility, and foster long-term investor confidence.

**For investors:** Investors should prioritize firms with high EPS, high P/B, large size, and long operational history, as these factors reflect stable business performance, strong net assets, and market credibility. The study shows that such firms typically have higher stock prices, reflecting positive market expectations. Moreover, investors need to consider a company's financial leverage (LEV) before investing, since firms with high debt levels are exposed to greater financial risk, which can lower stock prices. Ownership structure is also critical: firms with high state ownership (STATE) and foreign ownership (FRG) are generally evaluated positively by the market, as these indicate stability, good governance, and potential support during challenging situations. Therefore, taking these factors into account will help investors make more informed decisions and reduce risk when investing in the Vietnam Stock Exchange.

**Conclusion:** Through this study, it can be observed that the stock prices of listed manufacturing firms on the Vietnam Stock Exchange during 2015-2024 are influenced by financial characteristics, ownership structure, firm size, and firm age. Based on these findings, the authors provide several recommendations for regulators, firms, and investors. However, the study has certain limitations, such as not including all possible factors affecting stock prices and focusing only on manufacturing firms, without examining the entire market for broader comparison and more conclusive results. Therefore, further research is needed to generate more generalizable findings in the future.

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# FACTORS INFLUENCING THE MOBILIZATION OF FINANCIAL RESOURCES FOR THE CONSERVATION AND DEVELOPMENT OF CULTURAL HERITAGE IN HUẾ CITY

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**Abstract:** *As a heritage city and a major cultural and tourism center, Huế City has enacted numerous policies aimed at conserving and promoting cultural heritage values in alignment with sustainable urban development. In this process, financial resources play a pivotal role, determining the effectiveness of policy implementation and sustaining long-term conservation activities. The establishment of the Huế Heritage Conservation Fund is a commendable initiative; however, its nature remains experimental and has not yet been implemented on a larger scale. Meanwhile, specialised studies on financial resource mobilisation for the conservation and development of cultural heritage in Huế City remain limited. Against this backdrop, this study analyses the factors influencing the mobilisation of financial resources for the conservation and development of cultural heritage in Huế City and, on that basis, proposes recommendations to improve the effectiveness of mobilising financial resources for the conservation and development of the city's cultural heritage in the upcoming period.*

• Keywords: financial resources; conservation and development; cultural heritage; Huế City

Date of receipt: 30<sup>th</sup> Jan., 2026

Date of delivery revision: 12<sup>th</sup> Mar., 2026

DOI:

Date of receipt revision: 25<sup>th</sup> Mar., 2026

Date of approval: 31<sup>th</sup> Mar., 2026

## 1. Introduction

Thừa Thiên Huế was formerly the capital of the unified Vietnamese state for 143 years (1802-1945) and was among the country's most important political and cultural centers throughout history. Over many centuries, Huế City has conserved and retained a cultural heritage system of the largest scale, highest integrity, and greatest representativeness in Viet Nam, including numerous tangible and intangible cultural heritages recognised by UNESCO, together with nearly 1,000 historical monuments with distinctive value. With its status as a "heritage city" and "Vietnam's Festival City," Huế also plays a strategic role in the cultural-tourism development space of the region and the nation as a whole. In addition to its exceptional historical and cultural values, Huế was once expected, together with Hà Nội and Hồ Chí Minh City, to become one of the three major political, economic, and cultural-tourism centers of the North, Central, and South regions. In recent years, the local authorities have promulgated and implemented various guidelines and policies to conserve and promote cultural heritage values, aligned with the orientation toward sustainable development of a heritage-oriented city.

Among the success determinants of heritage conservation and development, financial resources play a decisive role because they are the direct

elements that ensures the capacity to implement policies, execute conservation-restoration projects, and maintain conservation activities over the long term. The recent establishment of the Huế Heritage Conservation Fund represents a notable step forward, demonstrating efforts to mobilise participation and contributions from the community and visitors. Nevertheless, this model remains experimental, its impact scope is still limited, and it has not been systematically replicated.

Given the above context, selecting and conducting research on the topic Factors Influencing the Mobilisation of Financial Resources for the Conservation and Development of Cultural Heritage in Huế City is necessary and meaningful in both theoretical and practical terms. This research not only contributes to strengthening the scientific basis for designing financial policies in the field of heritage conservation and cultural development, but also provides important evidence for the sustainable development orientation of the heritage city of Huế in the coming period.

## 2. Theoretical Foundations of Factors Influencing the Mobilisation of Financial Resources for the Conservation and Development of Cultural Heritage

At the international level, the concept of cultural heritage is primarily grounded in two UNESCO

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conventions: the 1972 Convention Concerning the Protection of the World Cultural and Natural Heritage and the 2003 Convention for the Safeguarding of the Intangible Cultural Heritage. Together, these conventions reflect a shift in heritage thinking from a static view centered on tangible assets to a broader and more dynamic understanding that also places communities and intangible values at the center. Vietnam's 2025 Law on Cultural Heritage follows this distinction between tangible and intangible heritage while also incorporating national cultural particularities. Accordingly, cultural heritage may be understood as the totality of tangible and intangible values created through history, recognized as having historical, cultural, scientific, aesthetic, and identity significance, and preserved and transmitted for present and future generations.

Financial resources play a decisive role in the conservation and development of cultural heritage because they determine the capacity to implement policies, finance restoration projects, and sustain conservation activities over time. In this study, financial resources for heritage conservation and development are understood as the monetary expression of social wealth that can be mobilised and used for this purpose. However, such resources exist only as potential unless appropriate mechanisms, policies, instruments, and actors are in place to transform them into effective financial funds. In this sense, the mobilisation of financial resources refers to the process of converting potential resources in society into actual financial means for conserving and promoting cultural heritage values (Phạm Quỳnh Mai & Lưu Huyền Trang, 2024).

In practice, heritage conservation is often financed primarily through public resources, while additional support may come from supplementary public spending, private participation, and community contributions (OpenHeritage, 2021). Previous studies show that the mobilisation of financial resources depends on several interrelated conditions. Fiscal reforms and sound budget governance strengthen the State's mobilisation capacity and long-term resilience (World Bank, 2024), whereas economic crises often reduce allocations for culture and heritage. Because public resources are usually limited, diversified financing—especially through private-sector participation—is essential for sustainability (Tạ Đình Long, 2016). At the same time, community support and stakeholder consensus are critical, since local participation strongly affects the success of heritage financing and management (Aas et al., 2005; Nasser,

2003). Cultural heritage also creates both economic and non-economic intergenerational benefits, thereby encouraging broader local engagement (Throsby, 2020). Overall, financial resource mobilisation is shaped by community perceptions, governance effectiveness, socio-economic and natural conditions, and the development of tourism and related services.

The mobilisation of external financial resources, particularly private and institutional investment, is further influenced by the broader legal, policy, and macroeconomic environment. A transparent legal framework, effective governance, and adequate public support help build investor confidence (OECD, 2025), whereas institutional, regulatory, and political risks may discourage long-term private capital mobilisation (Inderst, 2021). Economic fluctuations, inflation, and country risk also affect investors' willingness to participate in long-term projects, including heritage conservation and development (World Bank, 2023). In addition, a more developed and efficient financial system facilitates access to foreign capital and deeper international financial integration. International integration and cooperation also support technology transfer, managerial improvement, and external funding, including ODA and bilateral cooperation for heritage conservation (Phan Thanh Hải, 2013). Thus, the mobilisation of financial resources is closely linked not only to domestic institutional conditions but also to market development, international cooperation, and technological progress.

Building on previous international and domestic studies, and considering the specific characteristics of cultural heritage conservation and development, this study identifies two groups of influencing factors. The subjective factors include organizational implementation capacity, the quality of the management workforce, the application of science and technology, stakeholders' awareness of the role of finance in heritage conservation and development, and local policies promoting financial mobilisation. The objective factors include the socio-economic environment, natural conditions and climate change impacts, the legal environment, the development of tourism and heritage-related service markets, and trends in international integration and cooperation.

Based on the above analysis, the study proposes the following hypotheses:

(H1): The implementation-related factor has an effect on the mobilization of financial resources for the conservation and development of cultural heritage in Huế City;

(H2): The technological factor has an effect on the mobilization of financial resources for the conservation and development of cultural heritage in Huế City;

(H3): The awareness-related factor has an effect on the mobilization of financial resources for the conservation and development of cultural heritage in Huế City;

(H4): Local policy has an effect on the mobilization of financial resources for the conservation and development of cultural heritage in Huế City;

(H5): The socio-economic environmental factor has an effect on the mobilization of financial resources for the conservation and development of cultural heritage in Huế City;

(H6): The natural environmental factor has an effect on the mobilization of financial resources for the conservation and development of cultural heritage in Huế City;

(H7): The legal environment factor has an effect on the mobilization of financial resources for the conservation and development of cultural heritage in Huế City;

(H8): The tourism and heritage-related service market factor has an effect on the mobilization of financial resources for the conservation and development of cultural heritage in Huế City;

(H9): The international integration and cooperation factor has an effect on the mobilization of financial resources for the conservation and development of cultural heritage in Huế City.

### 3. Assessment of Factors Influencing the Mobilization of Financial Resources for the Conservation and Development of Cultural Heritage in Huế City

#### 3.1. Research Model

##### Data

The study is expected to use primary data collected through a questionnaire survey. However, socio-economic and environmental indicators used for policy analysis remain limited and inconsistent. In practice, the same indicator is often constructed by multiple agencies and organizations, leading to discrepancies across data sources. To ensure consistency, the dataset employed in this study is primarily compiled from the *Statistical Yearbook of Thừa Thiên Huế Province* and survey results. In addition, selected socio-economic and environmental data are obtained from reports issued by provincial departments, line agencies, and research institutes. Nevertheless, certain inputs

required for the economic modelling framework are estimated by the study itself.

This research adopts a dynamic computable general equilibrium (CGE) model built upon a Social Accounting Matrix (SAM). As an official SAM for Thừa Thiên Huế is not available, the study constructs an estimated SAM by applying technical coefficients derived from the 2017 input–output (I/O) table compiled by the General Statistics Office, combined with the province-specific socio-economic dataset assembled for this research. In cases where some cells of the SAM cannot be populated using official statistical data, estimates are derived through a quadratic programming approach, minimizing the aggregate deviation between observed and estimated values.

For data processing and analysis, the study employs quantitative methods. Survey data are processed using SPSS, while Structural Equation Modelling (SEM) is applied to analyze and assess financial resource needs, the capacity to mobilize financial resources, and the impact of such resources on the development of Thừa Thiên Huế into a centrally governed heritage city. Based on the estimated I/O table, a CGE model is subsequently developed to simulate economic growth scenarios for Thừa Thiên Huế up to 2030, with a long-term vision to 2050.

The data utilized in this study are primary data collected through a survey employing five-point Likert-scale questionnaires, ranging from 0 (“strongly disagree”) to 5 (“strongly agree”). A total of 350 valid responses were obtained, satisfying the minimum sample size requirements for exploratory factor analysis (EFA) as suggested by Hair et al. (2014).

#### Research Variables

*Dependent Variable:* The dependent variable is quantified as the mobilisation of financial resources (NTC).

*Independent Variables:* The independent variables include organizational implementation factors (TC), technology factors (CN), awareness factors (NT), local policies (CS), the socio-economic environment factor (KTXH), the natural environment factor (TN), the legal environment factor (PL), the tourism and heritage-related service market factor (TT), and the trend of international integration and cooperation factor (HN).

#### Proposed Research Model

$$Y(NTC) = \beta_0 + \beta_1*TC + \beta_2*CN + \beta_3*NT + \beta_4*CS + \beta_5*KTXH + \beta_6*TN + \beta_7*PL + \beta_8*TT + \beta_9*HN + \varepsilon$$

With:

Y: Dependent Variable

TC, CN, NT,... TN: independent variables

$\beta_0$ : Constant

$\beta_i$ : the intercept (constant term)  $X_i$

$\varepsilon$ : random error term

### 3.2. Empirical results:

#### Scale Reliability Test: Cronbach's Alpha

To ensure the reliability of the measurement scales before conducting exploratory factor analysis (EFA), the study uses Cronbach's Alpha coefficient to assess the internal consistency among observed variables within the same factor group. According to Nunnally and Bernstein (1994), a Cronbach's Alpha of at least 0.6 is considered acceptable for exploratory research, and at least 0.7 indicates good reliability. In addition, the corrected item-total correlation must exceed 0.3 for an observed variable to be retained in the scale.

Results of the Cronbach's Alpha reliability test shows that all scales have Cronbach's Alpha values of at least 0.76, indicating good overall reliability. In addition, all items have corrected item-total correlations above 0.3, showing that the observed variables are strongly associated with the overall scale. At the same time, removing any item does not materially increase the Cronbach's Alpha of its group; therefore, all observed variables are retained for the exploratory factor analysis (EFA) step. Notably, several groups exhibit very high reliability, such as NT (0.90), PL (0.88), and TC (0.87), which will constitute strong components in the validated model.

#### Exploratory Factor Analysis (EFA)

Exploratory factor analysis (EFA) is conducted to examine the convergent validity and discriminant validity of the observed variables in the model.

The test results show that the Kaiser-Meyer-Olkin (KMO) measure equals 0.755 ( $> 0.5$ ), indicating that the data are adequate for EFA. At the same time, Bartlett's Test of Sphericity yields Chi-Square = 5,441.873 with Sig. = 0.000 ( $< 0.05$ ), rejecting the null hypothesis that the correlation matrix is an identity matrix. This confirms that the observed variables are linearly correlated and suitable for extracting latent factors.

**Table 1. KMO and Bartlett's tests**

|                                                  |                    |          |
|--------------------------------------------------|--------------------|----------|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. |                    | 0,76     |
| Bartlett's Test of Sphericity                    | Approx. Chi-Square | 5441,873 |
|                                                  | df                 | 561      |
|                                                  | Sig.               | 0,000    |

Source: SPSS results.

EFA results show that nine factors are extracted with eigenvalues greater than 1, and the total variance explained reaches 69.812%, meaning that these nine factors explain 69.812% of the variation in the full set of observed variables. This satisfies the criterion of Hair et al. (2014), under which a total variance explained of  $\geq 50\%$  is considered appropriate in social science research. After Varimax rotation, the rotated factor matrix indicates that all observed variables have factor loadings of  $\geq 0.65$ , and no variable loads simultaneously on two or more factors, demonstrating good convergent and discriminant validity of the scales.

Accordingly, the EFA results confirm that the observed variables within each scale group are closely related, and that the initial theoretical model fits the empirical data. The factors extracted from EFA are then used in the multiple linear regression analysis step to test the influence of each factor on the dependent variable in the research model.

#### Multiple Linear Regression Analysis

The regression results presented in Table 3 show  $R = 0.645$ ,  $R^2 = 0.416$ , and adjusted  $R^2 = 0.400$ . This indicates that the linear regression model explains 40.0% of the variation in the dependent variable NTC through the independent variables TC, CN, NT, CS, KTXH, TN, PL, TT, and HN. The Durbin-Watson statistic = 1.937 and lies within the range 1.5-2.5, indicating no residual autocorrelation and supporting the reliability of the model.

**Table 2. Model summary**

| Model | R                 | R Square | Adjusted R Square | Std. Error of the Estimate | Durbin-Watson |
|-------|-------------------|----------|-------------------|----------------------------|---------------|
| 1     | .645 <sup>a</sup> | .416     | .400              | .53769                     | 1.937         |

a. Predictors: (Constant), HN, TC, TT, PL, CN, KTXH, CS, NT, TN

b. Dependent Variable: NTC

Source: SPSS results.

The ANOVA test yields  $F = 26.717$  with Sig. = 0.000 ( $< 0.05$ ), indicating that the multiple linear regression model is appropriate and statistically significant, meaning that the independent variables in the model have a significant effect on the dependent variable.

**Table 3. ANOVA test**

|   | Model      | Sum of Squares | df  | Mean Square | F      | Sig.  |
|---|------------|----------------|-----|-------------|--------|-------|
| 1 | Regression | 69,516         | 9   | 7,724       | 26,717 | .000b |
|   | Residual   | 97,718         | 338 | 0,29        |        |       |
|   | Total      | 167,234        | 347 |             |        |       |

Source: SPSS results.

The analysis of standardized regression coefficients (Beta) shows that all independent variables have Sig. values  $< 0.05$ , indicating that they all exert positive and statistically significant effects on NTC. Among



them, the natural environment factor (TN) has Beta = 0.371, making it the strongest influencing factor on NTC; next are the awareness factor (NT) with  $\beta = 0.244$ , the international integration and cooperation trend factor (HN) with  $\beta = 0.130$ , local policy (CS) with  $\beta = 0.140$ , and the socio-economic environment factor (KTXH) with  $\beta = 0.127$ . The remaining factors, including organizational implementation (TC), technology (CN), legal environment (PL), and the tourism and service market associated with heritage (TT), have smaller Beta coefficients but remain statistically significant in the model (Sig. < 0.05).

**Table 4. Regression coefficients and multicollinearity diagnostics**

| Model | Unstandardized Coefficients |            | Standardized Coefficients | t      | Sig. | Collinearity Statistics |      |
|-------|-----------------------------|------------|---------------------------|--------|------|-------------------------|------|
|       | B                           | Std. Error | Beta                      |        |      | Tolerance               | VIF  |
| 1     | (Constant)                  | (1,62)     |                           | (3,92) | 0,00 |                         |      |
|       | TC                          | 0,08       | 0,03                      | 0,12   | 2,82 | 0,01                    | 0,98 |
|       | CN                          | 0,09       | 0,04                      | 0,11   | 2,50 | 0,01                    | 0,89 |
|       | NT                          | 0,22       | 0,04                      | 0,24   | 5,67 | 0,00                    | 0,93 |
|       | CS                          | 0,16       | 0,05                      | 0,14   | 3,27 | 0,00                    | 0,95 |
|       | KTXH                        | 0,16       | 0,05                      | 0,13   | 3,01 | 0,00                    | 0,97 |
|       | TN                          | 0,41       | 0,05                      | 0,37   | 8,07 | 0,00                    | 0,82 |
|       | PL                          | 0,09       | 0,04                      | 0,09   | 2,17 | 0,03                    | 0,97 |
|       | TT                          | 0,09       | 0,04                      | 0,10   | 2,39 | 0,02                    | 1,00 |
|       | HN                          | 0,15       | 0,05                      | 0,13   | 2,97 | 0,00                    | 0,90 |

Source: SPSS results.

The standardized linear regression equation is determined as follows:

$$NTC = 0,112TC + 0,11CN + 0,244NT + 0,14CS + 0,13KTXH + 0,371TN + 0,092PL + 0,1TT + 0,13HN$$

The results of the multiple linear regression indicate that the model is statistically significant overall, while also providing clear evidence regarding both the magnitude and direction of the effects of the independent variables on the dependent variable.

First, with respect to the intercept (Constant), the estimated coefficient is  $B = -1.62$  and is statistically significant at the 1% level (Sig. = 0.00). This suggests that when all independent variables are equal to zero, the expected value of the dependent variable is negative. However, in empirical research, this coefficient is primarily of technical relevance rather than offering a direct economic interpretation.

Regarding the explanatory variables, all coefficients are positive ( $B > 0$ ) and statistically significant at the 5% level or better (Sig. < 0.05). This implies that TC, CN, NT, CS, KTXH, TN, PL, TT, and HN all exert a positive effect on the dependent variable; that is, an increase in these factors leads to an increase in the dependent variable. These findings are consistent with prior studies that have documented

positive relationships between the independent variables and the dependent variable.

In terms of relative influence, as reflected by the standardized Beta coefficients, TN exhibits the strongest effect (Beta = 0.37;  $t = 8.07$ ), indicating that it is the most important determinant in the model. It is followed by NT (Beta = 0.24), CS (Beta = 0.14), KTXH and HN (both approximately Beta = 0.13), TC (Beta = 0.12), CN (Beta = 0.11), TT (Beta = 0.10), and finally PL (Beta = 0.09). Thus, although all variables are statistically significant, their impacts are heterogeneous, with TN and NT emerging as the most influential factors.

With respect to the reliability of the estimates, the collinearity diagnostics suggest no serious multicollinearity issues in the model. Specifically, all Variance Inflation Factor (VIF) values are low (ranging from 1.005 to 1.220, well below the common thresholds of 5 or 10), and all Tolerance values exceed 0.1. This confirms the absence of strong linear correlations among the independent variables, thereby ensuring the stability and reliability of the estimated regression coefficients.

Overall, the regression results confirm that the constructed model is well suited to the research context, highly stable, and accurately reflects the relationships among factors influencing the mobilization of financial resources in the conservation and development of cultural heritage in Hué City.

#### 4. Conclusion and Policy Recommendations

The estimation results show that financial resource mobilization capacity is simultaneously influenced by multiple economic, social, institutional, and environmental factors, with differing degrees and mechanisms of influence that are mutually supportive. In particular, factors such as trust, awareness, and social consensus play a dominant role, determining stakeholders' willingness to participate in mobilizing and using financial resources for the conservation and development of cultural heritage in Hué City. Conversely, factors such as institutions, technology, and the legal framework have a lower direct impact but serve as foundational elements that establish the environment and necessary conditions for other factors to be effective. Therefore, these factors do not substitute for one another but instead complement and interact throughout the financial resource mobilization process.

Based on the regression results and the relative impacts of factors in the model, several policy recommendations can be proposed.

**First**, it is essential to refine the financial management mechanisms for developing a heritage city by establishing a tailored financial institutional framework that allows for greater flexibility compared to conventional urban settings. This approach provides strategic orientation for mobilizing and managing financial resources to support Huế's transformation into a heritage city. In parallel, priority should be given to protecting and enhancing the quality of the natural environment as a core foundation for strengthening the capacity to mobilize financial resources for heritage conservation and development. The close integration of heritage preservation with green and sustainable development orientations not only safeguards the long-term value of heritage assets but also enhances their attractiveness to investors and broader societal financial resources.

**Second**, efforts should be made to enhance the awareness of communities and enterprises, while strengthening social trust through intensified communication, improved financial transparency, and the establishment of mechanisms that encourage the socialization of resources. This constitutes a critical condition for expanding the participation of the private sector and the community in heritage conservation and development. Concurrently, it is necessary to develop a pool of interdisciplinary professionals capable of meeting the requirements of financial governance in the specific context of a heritage city, thereby ensuring effective integration across economic, technical, and cultural dimensions in project planning and implementation.

**Third**, international integration and cooperation should be promoted, with proactive engagement in accessing external financial resources, aid flows, and international public-private partnership models. Learning from international experiences and flexibly adopting appropriate cooperation models will contribute to diversifying funding sources and enhancing the investment efficiency of heritage projects.

**Fourth**, attention should be directed toward strengthening the implementation capacity of local authorities and improving the quality of the management workforce, while refining policies for financial resource mobilization in line with the distinctive characteristics of Huế as a heritage city. It is also necessary to enhance two-way feedback mechanisms between public authorities and investors/donors, creating regular platforms for dialogue to facilitate information exchange, promptly address

constraints, and ensure transparency in the use of funds.

**Fifth**, the deployment of digital technology solutions not only improves the efficiency of heritage financial governance but also contributes to positioning Huế as a pioneering model of a "Smart Heritage City," where heritage, technology, and community are interconnected within a sustainable development ecosystem. Several measures may be adopted, including the development of integrated heritage financial data platforms; the application of GIS, BIM, and e-PMIS in heritage project management; the digitalization of public-private partnership processes; the development of smart heritage applications; and the utilization of artificial intelligence (AI) and big data analytics.

**Finally**, it is necessary to establish a comprehensive monitoring and evaluation system to ensure the sustainability of financial resource mobilization for Huế as a heritage city. A multi-level monitoring and evaluation framework should be developed, involving state management agencies, social organizations, local communities, and international partners. This system plays a central role in measuring, controlling, and enhancing the effectiveness of heritage financial governance in accordance with international standards.

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# FACTORS AFFECTING FOREIGN DIRECT INVESTMENT IN A PROVINCIAL LEVEL IN VIETNAM: AN INTEGRATED THEORETICAL FRAMEWORK AND PROPOSED RESEARCH MODEL

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**Abstract:** *The article develops a theoretical framework and research model to analyze factors influencing provincial foreign direct investment (FDI) inflows in Vietnam based on a synthesis of three theories: Ownership Location internalization theory (OLI), New economic geography theory (NEG) and New institutional economic theory (NIE). Based on this framework, the study also proposes future empirical research directions in the context of increasingly fierce competition in attracting FDI.*

• Keywords: FDI, OLI theory, NEG theory, NIE theory, research framework, provincial level.

Date of receipt: 30<sup>th</sup> Jan., 2026

Date of receipt revision: 25<sup>th</sup> Mar., 2026

Date of delivery revision: 12<sup>th</sup> Mar., 2026

Date of approval: 31<sup>th</sup> Mar., 2026

DOI:

## 1. Introduction

In the context of globalization and deep international economic integration, foreign direct investment (FDI) plays a pivotal role in promoting industrialization, modernization and national competitiveness. For developing countries like Vietnam, FDI is not only a crucial supplementary source of capital but also a conduit for advanced technology transfer, managerial expertise and job creation.

Despite Vietnam's sustained efforts to attract FDI over the past three decades, the distribution of FDI across provinces remains uneven. While some provinces have emerged as "FDI hubs" with substantial inflows, many others continue to face challenges in attracting foreign investors. This disparity underscores the significant influence of endogenous factors such as institutions, infrastructure, geographic location and labor quality.

Research into the determinants of FDI attraction provides empirical and scientific justification for formulating targeted strategies and policy solutions aimed at strengthening FDI inflows. This is critical for achieving the broader socioeconomic development goals of both national and sub-national governments. In this regard, the development of a robust theoretical framework is a prerequisite it forms the theoretical backbone of the study.

Although the OLI (Ownership Location Internalization), NEG (New Economic Geography) and NIE (New Institutional Economics) theories have been

widely applied in the literature on FDI, there remains a lack of studies that systematically integrate all three pillars into a unified research framework with internally consistent logic and testable hypotheses, particularly at the provincial level in Vietnam. This paper seeks to fill this gap by proposing an integrated framework accompanied by specific hypotheses and empirically testable propositions, thereby providing a foundation for subsequent multidimensional studies of FDI at the sub-national level.

The study employs a qualitative research approach based primarily on secondary data. The author synthesizes existing theories, models, and relevant concepts to construct a comprehensive and theoretically grounded research framework.

## 2. Theoretical foundations and Literature review

In Vietnam, numerous studies have examined FDI attraction from various analytical angles. However, most have employed unidimensional approaches that focus exclusively on one category of determinants and have yet to establish a comprehensive and theoretically integrated framework at the provincial level.

### *Research on Economic-Material factors (OLI)*

The OLI paradigm, introduced by Dunning in 1976 and expanded in 1980, is a foundational theory in explaining the behavior of multinational enterprises. It posits that a firm will engage in FDI only when it possesses three simultaneous advantages: ownership (O), location (L) and internalization (I).

Most domestic studies have adopted the OLI

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framework, particularly emphasizing location-specific advantages (L), such as market size (measured by GRDP and population), labor costs, and public utilities and logistics infrastructure. For example, Nguyen Van Bon and Nguyen Minh Tien (2014) and Nguyen Duc Nhuan (2017) empirically validated the roles of these variables in northern and central provinces, respectively. They found that provinces with better physical infrastructure, large populations and competitive labor costs tend to attract more FDI. However, these studies often have overlooked the roles of institutional quality and interregional economic structures, limiting their ability to explain FDI disparities among provinces with otherwise similar conditions.

### ***Research on Spatial effects and Investment agglomeration (NEG)***

New economic geography (NEG), initiated by Krugman (1991), introduces models that emphasize increasing returns to scale and declining transportation costs. According to NEG, firms tend to cluster in regions with high market demand and dense industrial ecosystems. Forward and backward linkages lower transaction and transportation costs, while firm agglomeration promotes knowledge diffusion and access to specialized labor markets.

In Vietnam, this perspective has led to research on spatial spillover effects and geoeconomic positioning. Studies such as those by Tran Hoa et al. (2021) utilized spatial regression models to show that provinces near growth poles (e.g., Hanoi, Ho Chi Minh City) exhibit higher FDI attraction, driven by spillover effects and supply chain linkages. However, spatial factors in these studies are often considered as mere control variables or isolated influences, with limited integration into institutional or economic analyses.

### ***Research on institutional quality and investment environment (NIE)***

New institutional economics (NIE), with key contributions from North (1990), identifies institutions as the central determinants of transaction costs. In the context of FDI, variables including property rights protection, administrative transparency and effectiveness, and regulatory stability directly shape investment risk and influence investors' location choices.

Institutional quality - particularly governance capacity, procedural transparency, and informal costs - has increasingly been recognized as a key determinant of FDI inflows. A robust, transparent, and stable institutional environment reduces uncertainty, mitigates legal risks, and enhances location attractiveness. Bui Kieu Anh & Le Minh Son (2021) found that provinces with higher Provincial competitiveness Index (PCI)

scores tend to attract more FDI. Similarly, Nguyen Thi Mai Huong (2021) established a positive relationship between administrative reforms and FDI absorptive capacity.

In general, most prior research has concentrated on economic input factors while downplaying the roles of institutions or spatial interlinkages. Theoretical studies with high generalizability remain limited, which constrains efforts to design quantitative models and conduct interregional comparisons. More importantly, existing studies often follow unidimensional theoretical paths and fail to capture the interaction between economic, institutional and spatial determinants at the provincial level. This paper addresses this gap by proposing an integrated theoretical framework based on OLI-NEG-NIE and a corresponding empirical model, contributing novel insights and academic value to Vietnam's FDI literature.

## **3. Developing a theoretical framework for factors influencing provincial-level FDI attraction**

### ***3.1. Rationale for an integrated framework***

The formulation of an integrated research framework is underpinned by three key theoretical and practical rationales:

*First*, to study the determinants of FDI at the provincial level, three foundational theoretical pillars are essential:

(i) Ownership location internalization (OLI): The OLI theory emphasizes sub-national locationspecific advantages, including market size, labor costs, physical infrastructure as core elements at the sub-national level, directly influencing investment costs and productivity.

(ii) New economic geography (NEG): focuses on spatial clustering, where FDI tends to concentrate in localities with high enterprise density, robust industrial support systems, and strong regional connectivity, thereby generating spillover effects.

(iii) New institutional economics (NIE): underscores the importance of institutional quality in creating a predictable and transparent investment environment, thereby reducing transaction costs.

*Second*, the integration of OLI, NEG and NIE frameworks is substantiated by both empirical findings and theoretical reasoning. Vietnamese studies (e.g., Bui Kieu Anh & Le Minh Son, 2021) show that enhancing FDI attraction requires simultaneous improvements in economic-material conditions, institutional quality and spatial capabilities.

*Third*, a comprehensive integration of OLI-NEG-NIE at the provincial level remains absent in Vietnamese FDI research. While these theories have been individually applied at the national, regional, or

sectoral levels, no published work in Vietnam has yet established a unified framework encompassing all three with clear theoretical logic and empirical testing design. This paper addresses this void by proposing a tri-pillar model wherein:

- i) OLI represents tangible local economic factors (e.g., market potential, labor, infrastructure),
- ii) NEG captures spatial dynamics and regional linkages, and
- iii) NIE incorporates institutional quality and governance.

### 3.2. Applying theoretical perspectives to framework construction

#### Applying the OLI theory

The OLI framework provides a robust basis for explaining the motivations behind FDI decisions. Among its components, location advantages (L) are particularly salient at the provincial level, as ownership (O) and internalization (I) are generally assumed to be firm-specific and exogenous in sub-national studies. Therefore, provinces compete to attract FDI by optimizing input structures, expanding market accessibility and enhancing public service quality.

Empirical models using the OLI framework typically include indicators such as market size and potential, labor cost and quality and physical infrastructure conditions. However, limitations of the OLI approach include:

- (i) A tendency toward enumeration of factors rather than dynamic interaction modeling;
- (ii) An implicit assumption of static, exogenous location advantages, ignoring their potential endogeneity; and
- (iii) A lack of consideration for interregional spatial effects or competitive dynamics.

#### Applying the NEG theory

NEG theory helps explain why FDI projects tend to concentrate in a few developed provinces, forming economic clusters. Common indicators include local returns to scale, enterprise density and spatial variables.

Nonetheless, standard NEG models have notable limitations:

- (i) Unrealistic assumptions, such as perfect labor mobility and uniformly decreasing transport costs rare in developing economies;
- (ii) Limited attention to institutional factors, despite their proven influence on firm location decisions in diverse governance contexts.

#### Applying the NIE theory

In empirical research, institutional quality is often measured through indicators such as the Provincial

Competitiveness Index (PCI), business environment indices, startup and operational costs, and perceived corruption levels.

Despite its insights, NIE also presents certain limitations:

- (i) Many institutional dimensions especially informal ones are difficult to quantify;
- (ii) The relationship between FDI and institutions may be bidirectional, where FDI can improve institutions and vice versa, necessitating advanced econometric techniques to address endogeneity.

In response, the proposed framework is structured around a “*Material Spatia Institutional*” matrix. These three theoretical axes are mutually reinforcing and collectively define a province’s FDI attractiveness, while also allowing for two-way interactions and feedback effects.

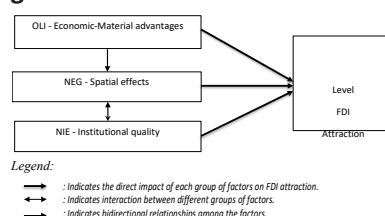
**Table 1. Theoretical research framework based on the three pillars: “Material \* Spatial \* Institutional”**

| Framework axis                     | Core content                                                                 | Role in FDI attraction                                                               |
|------------------------------------|------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| OLI - economic-material advantages | Economic-material conditions (market, labor, infrastructure, costs)          | Provide “tangible benefits” for firms to optimize production-distribution activities |
| NEG - spatial effects              | Industrial agglomeration, knowledge spillovers, reduced transportation costs | Explain spatial dynamics and the emergence of “growth poles”                         |
| NIE - institutional quality        | Property rights, transparency, procedural and informal costs                 | Define the risk and certainty of the business environment                            |

Source: Author’s synthesis and construction

The proposed framework visually illustrates the determinants of provincial FDI attraction, summarized as follows:

**Diagram 1 - Theoretical research framework**



This framework is not merely a listing model but reflects the dynamic and multidimensional nature of FDI decision-making:

- Strong institutions (NIE) amplify agglomeration effects (NEG) as firms feel secure in expanding their value chains.

- High-quality labor (OLI) enhances technological spillovers within a region.

- Enterprise clustering (NEG) may create feedback pressure on local governments to upgrade institutional quality to meet new FDI requirements.

- This highlights the complexity of FDI attraction, which depends not only on a province’s internal attributes but also significantly on spatial environment and institutional quality.

#### 4. Research model and Hypotheses testing

##### 4.1. Research hypotheses

Based on the theoretical framework, the following hypotheses are constructed to test the influence of the three theoretical pillars OLI (economic material), NEG (spatial effects) and NIE (institutional quality) on FDI attraction at the provincial level. Recent studies have also begun to examine interactions among these factors. To reflect the multidimensional nature of FDI influenced not only by linear impacts but also by interdependencies among the pillars, the following hypotheses are proposed:

**Table 2. Research hypotheses**

| Hypothesis | Content                                                                             | Source                                                                          |
|------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|
| H1         | Economic-material factors (OLI) positively influence FDI attraction                 | Dunning (1980); Nguyen Van Bon & Nguyen Minh Tien (2024); Anwar & Nguyen (2020) |
| H2         | Spatial effects (NEG) positively influence FDI attraction                           | Phuong Hoa Tran et al. (2021)                                                   |
| H3         | Institutional quality (NIE) positively influences FDI attraction                    | Bui Kieu Anh & Le Minh Son (2021); Bissoon (2021)                               |
| H4         | Stable macroeconomic factors positively influence FDI attraction                    | Azam (2019); Khachoo & Khan (2018)                                              |
| H5         | Multidimensional interactions among factors either strengthen or weaken FDI impacts | Bui Kieu Anh & Le Minh Son (2021); OLI-NEG-NIE Integrated theory                |

Source: Author's research results

##### 4.2. Model construction

Unlike unidimensional studies, this model adopts a multidimensional and integrative approach, reflecting not only the internal economic conditions of provinces but also the institutional and spatial environments. In addition, the model incorporates control variables for macroeconomic conditions such as national GDP growth, inflation, and exchange rates to ensure robustness and reduce noise from external factors.

Proposed model for assessing provincial-level FDI attraction:

$$FDI = \beta_0 + \beta_1 OLI + \beta_2 NEG + \beta_3 NIE + \beta_4 MACRO + \mu$$

The linear regression specification based on theoretical constructs:

Dependent variable: FDI - Level of FDI attraction in a given province

(i) Independent variables: OLI (economic-material advantages), NEG (spatial effects), NIE (institutional quality)

(ii) Control variable: MACRO - macroeconomic environment

(iii) Coefficients and parameters: Intercept ( $\beta_0$ ), regression coefficients ( $\beta_i$ , where  $i = 1, 2, \dots$ ), and error term ( $\mu$ )

##### 4.3. Variables in the research model

###### Dependent variable:

*FDI attraction*: Reflects the realized inflows of FDI at the provincial level (e.g., volume, disbursement progress, investor satisfaction) and investors' future

intentions regarding reinvestment or referrals.

###### Independent variables:

*OLI - Economic-Material advantages*: According to Dunning (1980), location advantage is the primary determinant of FDI. Key factors include:

- Market size and potential: Measured via GRDP, economic growth rate, and population (Nguyen Van Bon & Nguyen Minh Tien, 2024).

- Labor cost and quality: Low wages and high-skilled labor have opposing effects on FDI decisions (Anwar & Nguyen, 2020).

- Physical infrastructure: Includes transportation, electricity, water, telecommunications, and logistics identified as critical factors in both Vietnamese and international studies (Meyer & Nguyen, 2023; Nguyen Duc Nhuan, 2022).

###### NEG - Spatial effects

This dimension emphasizes returns to scale and spatial spillovers, explaining FDI concentration in economic hubs:

- Density of existing FDI firms: Indicates industrial cluster development and technological spillover (Krugman, 1991; Tran Hoa et al., 2021).

- Accessibility to neighboring markets: Measured by adjacent GRDP or proximity to regional centers.

- Supply chain and supporting industry linkages: Enhance investment appeal by reducing transaction costs (Nguyen Thi Mai Huong, 2021).

###### NIE - Institutional quality

Identified by North (2017) as central to transaction costs and investment behavior:

- PCI index: A composite measure of local governance and transparency.

- Informal costs: Reflect perceived corruption levels, with strong impact on investor decisions

- Administrative reform effectiveness and policy stability: Crucial for FDI disbursement and sustainability.

###### Control variable:

*MACRO - Macroeconomic environment*, including:

- National GDP growth: Signals profitability and purchasing power (Azam, 2019).

- Inflation and exchange rate: If well-managed, reduce input risks and currency exposure (Khachoo & Khan, 2018).

- International integration: Agreements such as FTA, WTO, CPTPP enhance investor confidence (Thu Thi Hoang, 2017).

The role of this control variable is to ensure overall stability and minimize estimation bias when evaluating the impact of provincial-level variables.



## 5. Conclusion and Recommendations

### 5.1. Conclusion

The proposed research framework is based on the matrix of “Material \* Spatial \* Institutional” dimensions, integrating the three pillars OLI, NEG, and NIE to explain how multinational firms make FDI location decisions at the provincial level.

The OLI model provides a foundational explanation of FDI motivation, with a focus on location-specific advantages (L), such as market size, labor quality and cost, and infrastructure. However, it tends to be enumerative, assumes static and independent location factors and often omits spatial influences.

NEG theory contributes a spatial dimension to FDI analysis by explaining why FDI concentrates in specific growth poles. It highlights regional market potential, industrial density and spillover effects. Yet, its assumptions like perfect labor mobility and uniform transport cost reductions are often unrealistic in transitional economies and it pays limited attention to institutional factors.

NIE theory argues that institutions both formal and informal are central to determining transaction costs, directly influencing operational risks and location decisions. While it supports evaluating governance indicators and corruption perceptions, it faces challenges in quantifying informal institutions and addressing endogeneity in FDI-institution interactions.

This integrated framework assumes that investment decisions result from complex interactions among tangible advantages, spatial dynamics, and institutional quality. Combining OLI, NEG and NIE offers a solid empirical foundation, enriching the analytical capacity while addressing the limitations of each theory in isolation.

Moreover, the framework anticipates two-way effects: for instance, strong institutions can amplify agglomeration benefits; a high-quality labor force can transform market size into productivity gains; and digital infrastructure can extend FDI spillovers to neighboring provinces. It also clearly separates material from social (institutional) advantages and models spatial externalities and institutional thresholds, thereby reducing omitted variable bias and enhancing the reliability of empirical findings.

In theory, this framework improves upon traditional OLI by incorporating spatial (NEG) and institutional (NIE) dimensions. In practice, it enables provincial governments to simultaneously develop public utilities and logistics infrastructure, institutional capacity and regional linkages to foster sustainable FDI attraction.

### 5.2. Recommendations

To implement the research effectively and

scientifically, the following considerations are proposed:

#### *Regarding variable measurement:*

Use specific, reliable indicators for each factor group. For example: GRDP and growth rate for market size; trained labor ratio for workforce quality; internet subscriptions for public utilities and logistics infrastructure; and PCI for institutional quality.

Consider interaction terms among factor groups to uncover complex relationships and sufficient conditions for impacts.

#### *Regarding empirical methodology:*

Prioritize panel data econometrics and spatial econometric models such as the Spatial Durbin Model (SDM) to simultaneously test agglomeration effects and institutional quality, as well as capture FDI spillovers from neighboring provinces.

Address potential endogeneity especially between FDI and institutional quality using advanced techniques such as Difference GMM or System GMM.

#### *Regarding data:*

Collect complete and timeconsistent data from official and credible sources.

Focus on newly registered FDI data for analyzing location decisions or implemented FDI for assessing actual investment effectiveness.

#### *Regarding policy implications:*

Research findings should be interpreted to offer specific, feasible policy recommendations to improve provincial FDI environments.

Emphasize the importance of balanced development across all factor groups rather than focusing solely on one, due to the interactive and complementary nature of these determinants.

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# TRANSFORMATIONAL LEADERSHIP, INSTITUTIONAL PRESSURES, ORGANIZATIONAL LEARNING AND PUBLIC VALUES IN THE CONTEXT OF PUBLIC SECTOR REFORM

PhD. Tu Thanh Hoai\* - PhD. Huynh Phuoc Nghia\*\*

**Abstract:** *Grounded on the institutional theory and transformational leadership theory, this paper proposes the effect of institutional pressures on public values, concentrating on the mediating role of organizational learning. Besides, the study suggests the moderating role of transformational leadership on the relationship between institutional pressures and organizational learning in the context of the public sector. Rooted in the context of the Vietnamese public sector, the study implicates that the institutional pressures promote organizational learning, which next fosters public values. It also connotes that transformational leadership moderates the relationship between institutional pressures and organizational learning. These perspectives add to the literature on public management and offer insightful viewpoints into how transformational leadership be able to navigate the positive influence of the institutional pressures on organizational learning, thereby enhancing public values.*

• Keywords: *institutional pressures, organizational learning, public values, transformational leadership, Vietnam.*

Date of receipt: 30<sup>th</sup> Jan., 2026

Date of delivery revision: 12<sup>th</sup> Mar., 2026

DOI:

Date of receipt revision: 25<sup>th</sup> Mar., 2026

Date of approval: 29<sup>th</sup> Mar., 2026

## 1. Introduction

Public sector organizations increasingly operate under intense institutional pressures arising from legal reforms, administrative modernization, accountability demands, and societal expectations for improved public value creation (Tu et al., 2022). Nevertheless, institutional pressure alone does not automatically transform into enhanced public value. Rather, the way public organizations learn, interpret, respond to, and internalize these pressures is critical, particularly in contexts characterized by resource constraints and complex governance structures, such as Vietnam. More specifically, through the essential mediating role of organizational learning, institutional pressures become a significant factor for public sector organizations to enhance values.

From a public value perspective and new public management (Barzelay, 2019), institutional pressures can serve as external stimuli that push public sector organizations to realign their objectives, processes, and outcomes with societal needs. Yet, these pressures often require organizations to engage in internal change processes, including the acquisition, dissemination, and utilization of knowledge (Castro & Aquino, 2021). It also explains how organizations

transform external demands into internal capabilities. It means that thanks to organizational learning (OL), public sector organizations have more chances to translate pressures that were considered as barriers into values. In a basic way of this study, institutional pressures do not directly generate public values; instead, they influence public values indirectly by inciting learning mechanisms that enable organizational change. In this regard, OL functions as a mediating mechanism through which institutional demands are transformed into improved service quality, accountability, innovation, and policy effectiveness. This mediating role is particularly relevant in public sectors where reforms are essential, but implementation capacity is uneven.

Perceiving the development of research on the public sector, it can be seen that transformational leadership (TL) shapes how institutional pressures are perceived and acted upon within organizations. By articulating a compelling vision, fostering commitment to change, and encouraging learning behaviors, transformational leaders can amplify the positive impacts of institutional pressures on OL and public value creation. Rather than passively

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complying with institutional demands, such leaders enable proactive and strategic responses to reform pressures (Tu et al., 2022), consistent with the perspectives of strategic responses to institutions (Oliver, 1992) and institutional work (Lawrence & Suddaby, 2006).

In the Vietnamese public sector context, this dynamic is particularly more prominent. Institutional reforms often originate from top-down policy mandates, creating strong coercive pressures. Nevertheless, variation in reform outcomes suggests that TL matters significantly (Tu et al., 2022). A key research gap related to understanding whether TL primarily assists public sector organizations in coping with and reducing the negative effects of institutional pressure, or whether institutional pressures themselves foster the emergence of TL and learning capabilities. This question is especially relevant for Vietnam, where public sector reform is ongoing, and innovation capacity remains uneven across organizations.

Building on this concern, a conceptual model integrating TL, institutional pressures, and OL provides an expectancy pathway for explaining public sector performance and values. In this proposal model, institutional pressures act as external drivers of change, OL serves as the internal mechanism for adaptation, and TL moderates the strength and effectiveness of this process. Ultimately, public value which reflected in improved outcomes, innovation capability, and policy effectiveness that is shaped by the dynamic interaction among these elements rather than by any single factor alone.

## 2. Literature review

In contemporary public sector reform, which was characterized by digitalization, new public management, and participatory governance, TL plays a crucial role in enabling organizations to respond to institutional pressures, foster organizational learning, and achieve superior performance outcomes. The following content presents a comprehensive review of the literature on “TL in reform: institutional pressures, organizational learning, and public values” in the most thorough manner.

### 2.1. Early stage (1980s-1990s): Foundations of TL and organizational change

The origins of TL lie in the 1980s, with foundational work by Burns (1978) and Bass (1985). These early works largely emerged from

studies of private-sector and political leadership, emphasizing TL’s potential to motivate followers toward collective goals.

By the 1990s, New Public Management (NPM) reform had swept across government systems worldwide, emphasizing efficiency, performance measurement, decentralization, and customer orientation. Leadership studies increasingly turned to the public sector, responding to calls for managerial capacity to drive change in bureaucratic systems. TL resonated with reform goals: its focus on vision, innovation, and motivation appeared ideal for steering rigid public organizations toward adaptability. However, early applications were mostly conceptual, with limited empirical grounding in public-sector realities.

Simultaneously, organizational learning theory advanced, driven by scholars such as Argyris & Schön (1996), Huber (1991), and Nonaka (1994). OL was framed as the essential engine of institutional adaptation, distinguishing single-loop learning (incremental adjustment) from double-loop learning (big structural change). These concepts aligned tightly with reform narratives demanding that public organizations build learning capacities to keep pace with technological, social, and regulatory complexities.

Thus, by the late 1990s, a conceptual convergence had emerged: TL held promise as a behavioral catalyst for learning-oriented reform, while OL provided a process framework through which leadership could translate vision into performance results.

### 2.2. Early 2000s: Institutional pressures and public sector leadership

The early 2000s introduced a new dimension into public-sector studies: institutional theory, particularly the work of DiMaggio & Powell (1983) on coercive, normative, and mimetic pressures. As governments faced global pressures - international benchmarking, donor expectations, anti-corruption norms, and evidence-based policymaking - scholars argued that leadership could no longer be studied independently of institutional context.

Public managers were increasingly expected to navigate conflicting demands: uphold bureaucratic rules, satisfy political oversight, and respond to changing citizen expectations. Under these conditions, TL was seen as a potential buffer, enabling organizations to adapt while maintaining



legitimacy.

Institutional pressures also encouraged greater emphasis on learning organizations, knowledge management, and innovation as strategic responses to complexity. However, early empirical studies struggled to pinpoint how exactly TL translated institutional demands into enhanced performance.

### ***2.3. Period from 2010 to 2015: Empirical foundations linking TL, OL, and performance***

During the early 2010s, researchers began empirically testing the relationships hinted at in earlier conceptual work. A decisive shift occurred toward understanding how TL influences performance indirectly, often through mediators such as learning culture, innovation, motivation, and knowledge processes.

In a specific research, García-Morales et al. (2008) have concentrated on the chain of relationships between TL-OL-innovation performance. This study investigates how TL affects organizational innovation and organizational performance in pharmaceutical firms, and demonstrates that TL positively influences organizational innovation and organizational performance, and that organizational innovation further enhances organizational performance. Crucially, these effects are significantly stronger in organizations with high levels of learning. The findings highlight OL as a strategic capability that amplifies the value of TL and innovation in technological environments.

García-Morales et al. (2012) examine how TL affects organizational performance through two dynamic capabilities: OL and organizational innovation and confirms that TL enhances both learning and innovation, which in turn significantly improve organizational performance.

### ***2.4. Period from 2016 to 2020: The rise of learning-based reform and knowledge capabilities***

As public organizations confronted digital transformation, service integration, and citizen co-production, scholars emphasized learning, knowledge sharing, and innovation as essential reform tools. TL was increasingly positioned as a knowledge enabler.

Salas-Vallina et al. (2017) tested how TL influences happiness at work through the mediating role of OL capability. The results confirm that the new happiness at work scale is reliable and that OL capability significantly mediates the relationship

between TL and employee happiness. The findings highlight the importance of leadership and learning conditions in fostering well-being among healthcare professionals.

### ***2.5. Period from 2020 to present: Emerging evidence***

Aslam et al. (2016) developed and empirically tested a comprehensive model explaining how TL enhances OL. Based on data from employees in private sector banks in Pakistan, the study identifies significant direct, mediating, and moderating effects among TL, OL, knowledge management process capability, and knowledge-intensive culture. The findings highlight the importance of transformational leaders, strong knowledge processes, and supportive knowledge cultures in shaping learning-oriented organizations.

Udin (2024) examines the relationship between TL, intrinsic work motivation, and OL culture within Indonesian community health centers and demonstrates that TL significantly enhances both intrinsic motivation and OL culture. Intrinsic motivation also directly strengthens learning culture while fully mediating and moderating the leadership-learning culture relationship.

Wang et al. (2025) compares the influence of vertical TL and horizontal workplace social capital on two key performance outcomes - organizational citizenship behavior and professional discretion - among public-sector social workers in China (n = 815). Findings show that although both TL and workplace social capital positively affect performance, team-based supportive relationships exert a stronger influence than leadership. Additionally, OL moderates the relationship between workplace social capital and professional discretion, underscoring the importance of learning-oriented environments in strengthening performance outcomes.

Sharma et al. (2025) test the comparative influence of TL and workplace social capital on key performance outcomes among social workers, specifically organizational citizenship behavior and professional discretion. Using survey data from 815 Chinese public-sector social workers, the study also tests whether OL moderates the relationship between workplace relationships and performance outcomes. Findings confirm that both TL and workplace social capital significantly improve organizational citizenship behavior and

professional discretion. Additionally, OL moderates the relationship between workplace social capital and professional discretion.

**Figure 1: Literature review on transformational leadership in the public sector reform**



Source: Synthesized by the author

### 3. Contemporary theories

#### 3.1. Institutional theory

Institutional theory explains how institutional pressures shape and regulate the behaviors, structures, and strategic choices of organizations operating within a specific field (Fernando & Lawrence, 2014). From this perspective, organizations are not solely driven by efficiency considerations but are also influenced by external institutional forces, such as laws, regulations, professional norms, and societal expectations. Consequently, organizations tend to align their activities with the dominant rules and norms of the institutional environment in which they operate. Compliance with institutional pressures enables organizations to gain legitimacy, access critical resources, and enhance their capacity for long-term survival (Fernando & Lawrence, 2014).

Drawing on Deegan (2009), institutional theory provides a theoretical foundation for linking organizational activities, particularly those related to social responsibility and public-sector values, to broader institutional norms and expectations. In the public sector context, this linkage highlights the importance of legitimacy as a central organizational objective. Public sector organizations are therefore compelled to establish and maintain legitimacy by conforming to legal requirements, normative expectations, and societal values embedded within the institutional framework. Under such coercive

and normative pressures, these organizations are encouraged to engage in activities that enhance public value and accountability.

#### 3.2. Transformational leadership theory

TL has long been recognized as a critical driver of organizational change, particularly in the public sector, where institutional complexity, political accountability, and resource constraints pose unique challenges. Since Burns (1978) first conceptualized TL as a process whereby leaders elevate followers to higher levels of motivation and morality, scholars have expanded and refined this theory to examine how TL shapes organizational adaptation and performance. Later developments (e.g., Bass, 1985; Bass, 1990; Bass & Avolio, 1994...) extended the model into measurable components such as idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration. As a result, the constant growth of society makes it applicable not only to the private sector but also suitable for contemporary public administration contexts.

Overall, TL theory posits that leadership fosters learning and fundamental change in public sector organizations by articulating a compelling vision, inspiring commitment, shaping beliefs and values, and enhancing the organization's intrinsic capabilities, rather than relying primarily on transactional exchanges of rewards and incentives.

### 4. Transformational leadership in the public sector reform

Despite several global studies on TL, OL, and public-sector performance, significant gaps remain, particularly when applying these concepts to the Vietnamese public management context. In reality, Vietnam's public sector is characterized by unique institutional features, including strong political centralization, an administrative hierarchy, and ongoing reform efforts under the Public Administration Reform and Digital Government agendas (Tu et al., 2022; Tu & Nguyen, 2023). Although international studies highlight the role of TL in driving learning and adaptation in complex bureaucracies, existing literature reveals that there is enormous potential for conducting research in the Vietnamese public sector.

To begin with, there is limited empirical evidence on how TL and institutional pressures shape OL behaviors in Vietnam's public sector. While institutional theory recognizes coercive, normative, and mimetic pressures as major forces influencing

OL, most Vietnamese studies treat TL as an internal managerial style rather than a leadership response to institutional demands such as political directives, administrative reforms, digital transformation policies, or anti-corruption norms (Tu et al., 2022). The extent to which Vietnamese leaders adopt TL, along with the support of institutional pressures to meet Party-state expectations or comply with the Public Administration Reform agenda, remains poorly understood. This creates a critical demand in understanding how TL and institutional pressures activate OL or constrain it in politically embedded governance systems.

Furthermore, the relationship between institutional pressures and OL is understudied in Vietnamese public organizations. International scholarship has increasingly highlighted institutional pressures as the primary mechanism through which public sector organizations influence performance (Munir & Baird, 2016), innovation (De Vries et al., 2018), and employee well-being (Hassan et al., 2022). However, empirical research in Vietnam often focuses on leadership as a direct driver of performance, overlooking the mediating role of learning processes such as knowledge sharing, reflective dialogue, experimentation, and collective problem-solving. Given Vietnam's transition toward digital public services, limited OL capacity represents a critical bottleneck, and the extent to which organizations can strengthen learning-oriented cultures is an interesting invitation.

Prior research on TL in Vietnam seldom incorporates contemporary insights emphasizing the role of institutional pressures and OL as independent or mediating mechanisms. Recent global studies (e.g., Aslam 2016; Udin 2024; Wang et al. 2025) show that TL's influence is often indirect, dependent on contextual factors like intrinsic motivation, team relationships, and knowledge-intensive culture. Vietnam's collectivist culture and hierarchical administrative structure suggest that relational dynamics (e.g., harmony norms, informal networks, teamwork) may play a stronger role than vertical leadership, yet this possibility needs to be formally studied.

Cannot go beyond expectations, Vietnamese studies tend to conceptualize performance narrowly. Most assess performance at an organizational level (service delivery indicators, administrative efficiency) (Tu et al., 2022) without examining behavioral outcomes such as innovation behavior,

professional discretion, organizational citizenship behavior, and employee well-being. Global literature increasingly shows that TL enhances these micro-level outcomes, yet their relevance for Vietnamese civil servants is not yet confirmed by in-depth studies.

Notably, TL moderates the relationship between institutional pressures and OL in Vietnam's public sector is a novel contribution. It can be seen that TL can spread the coercive pressures from reform mandates can strengthen influence on learning, while excessive control may restrict experimentation. While normative pressures support TL-driven learning when professionalism is valued, but hinder it when conformity dominates. Nonetheless, mimetic pressures encourage innovation adoption but risk superficial learning. Hence, when reinforced by TL, institutional pressures are more likely to foster OL in a favorable and upward trajectory. One major advantage is that TL aligns well with Vietnam's ongoing public administration reform and Digital Government agendas, which require visionary direction, innovation, and adaptive capacity. TL's emphasis on articulating a clear vision and motivating employees supports the government's push toward modernization, citizen-centric services, and digital transformation. This leadership style can help public servants overcome inertia and embrace change in traditionally rule-bound systems.

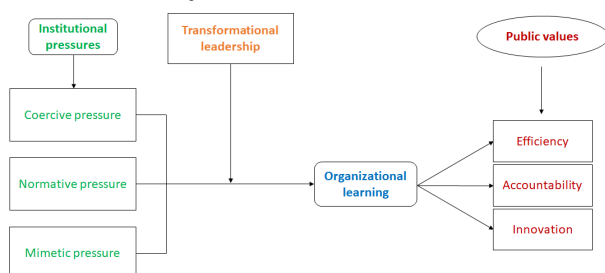
Culturally, TL benefits from Vietnam's collectivist orientation, where group harmony, shared purpose, and relational leadership are highly valued. TL's focus on inspirational motivation and individualized consideration resonates with Vietnamese norms emphasizing respect, empathy, and moral leadership (Tu et al., 2022). Additionally, Vietnam's younger, reform-minded civil service increasingly expects empowerment and professional development, needs that TL directly addresses through intellectual stimulation and learning support. As a result, TL strengthens OL, which is crucial in Vietnam's transition toward more knowledge-driven, integrated public services. By promoting reflection, collaboration, and knowledge sharing, transformational leaders can help public organizations adapt to complex institutional pressures, regulatory reforms, and rapidly evolving technological demands.

Besides these benefits, TL faces several obstacles in Vietnam's administrative context. The highly hierarchical, centrally controlled governance



system can constrain leaders' ability to exercise autonomy or promote bottom-up innovation. Transformational behaviors may conflict with rigid procedural norms, political sensitivities, or strict compliance requirements. Moreover, TL's reliance on empowerment and participatory decision-making may clash with cultural legacies of top-down authority and risk aversion (Tu et al., 2022). Subordinates may hesitate to experiment or challenge established norms, limiting the effectiveness of intellectual stimulation. Institutionally, performance evaluation systems remain compliance-oriented rather than innovation-oriented, reducing incentives for TL-supported learning and creativity. Resource constraints, heavy workloads, and bureaucratic fragmentation also hinder advanced leadership initiatives (Tu & Nguyen, 2023). In the last, overreliance on TL may neglect the importance of workplace social capital - peer support, trust, and informal network, which research shows can exert even stronger performance effects in collectivist contexts like Vietnam.

**Figure 2: Transformational leadership in the public sector reform**



Source: Proposed by the authors

## 5. Conclusion

This study proposes several important theoretical contributions by addressing critical gaps in the existing literature on TL, institutional pressures, and OL within the public sector, particularly in the Vietnamese administrative context.

**Firstly**, by integrating institutional theory with transformational leadership research, this study advances understanding of how TL emerges and operates under strong political and regulatory pressures characteristic of Vietnam's governance system. This research conceptualizes TL as a leadership response related to coercive, normative, and mimetic pressures. This contributes theoretically by embedding leadership within the broader institutional environment, offering a more holistic and contextually grounded explanation

of why TL, beyond the barriers of institutions, manifests and grows in OL of politically controlled public agencies.

**Secondly**, the study enriches the theoretical background by illustrating OL's central mediating role between institutional pressures and public values in Vietnam's public organizations. This research positions OL as a dynamic capability through which public sector organizations translate institutional demands into practical reforms, knowledge sharing, and adaptive behaviors, thereby promoting their values.

**Lastly**, the study of performance and values in public management are expected shall extend analysis beyond organizational metrics to include micro-level outcomes such as innovation behavior, professional discretion, and citizenship behaviors. This contributes to a more multidimensional and behaviorally informed framework for understanding public-sector performance.

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# CAUSAL AND EXPLAINABLE MACHINE LEARNING INSIGHTS INTO ROA'S IMPACT ON BANK STABILITY AMID LIQUIDITY AND PANDEMIC SHOCKS

PhD. Pham Thuy Tu\*

**Abstract:** Amid growing systemic vulnerabilities in emerging financial markets, this study examines the causal impact of bank profitability, proxied by Return on Assets (ROA), on institutional stability, measured by the Z-score, under liquidity stress and pandemic-induced shocks. Using data from 63 commercial banks across six ASEAN countries (2010–2023), we develop a hybrid framework integrating causal inference, machine learning, and model interpretability. Regularized regressions (Lasso, Ridge, Elastic Net) enhance feature selection, while Double Machine Learning (DML) estimates both average and conditional treatment effects. Optimized via Particle Swarm Optimization (PSO), CatBoost and XGBoost models achieve  $R^2$  above 0.93. SHAP-based analysis reveals nonlinear interactions between ROA, liquidity gaps (FGAP), and COVID-19, indicating that profitability's stabilizing role weakens under high liquidity stress. By bridging explainable AI and causal reasoning, this study offers a novel, interpretable framework for early-warning systems and prudential supervision in volatile and capacity-constrained financial environments.

• Keywords: bank stability; return on assets; liquidity gap; double machine learning; SHAP.

JEL codes: G01, G21, G32, C53, C55

Date of receipt: 31<sup>st</sup> Jan., 2026

Date of delivery revision: 11<sup>th</sup> Mar., 2026

DOI:

Date of receipt revision: 20<sup>th</sup> Mar., 2026

Date of approval: 28<sup>th</sup> Mar., 2026

## 1. Introduction

Banking system stability underpins effective financial intermediation, market confidence, and macroeconomic resilience. In emerging economies, particularly within ASEAN, banks play a vital role in channeling capital but remain vulnerable to external shocks due to limited capitalization, thin liquidity buffers, and strong regional interconnectedness. Return on Assets (ROA), representing profitability per unit of assets, serves as a key indicator of operational efficiency and the capacity to accumulate buffers against systemic risk.

Recent disruptions, including the COVID-19 pandemic and global liquidity tightening, have reshaped regional financial risk structures. Evidence from MENASA and ASEAN economies indicates sharp declines in ROA and ROE, heightening insolvency risk and earnings volatility (Muntaqiah & Akhmadi, 2024). This raises a critical question: does ROA causally enhance bank stability, measured by the Z-score, and how does this relationship vary across different risk conditions?

Existing research predominantly employs linear models (e.g., OLS, GMM), which inadequately capture nonlinear, high-dimensional interactions and provide limited interpretability regarding how profitability transmits to stability under systemic stress. In contrast, emerging methodologies integrating Machine Learning (ML), Causal Inference, and Explainable AI (XAI), such as SHAP (Lundberg & Lee, 2017), enable precise causal estimation and interpretability of when and why ROA strengthens or weakens financial resilience.

This study introduces a hybrid analytical framework combining causal inference, ML, and explainability to examine the ROA–stability nexus, emphasizing liquidity risk (FGAP) and pandemic-induced shocks. Feature selection is performed using penalized regressions (Lasso, Ridge, Elastic Net) to address multicollinearity and overfitting. Among these, Ridge regression demonstrates superior robustness and predictive accuracy in noisy, correlated financial data typical of emerging markets (Sun et al., 2024; Tu et al., 2025).

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Using a balanced panel of 63 commercial banks across six ASEAN economies (2010–2023), the study integrates (i) penalized feature selection, (ii) causal estimation via DML, (iii) predictive modeling with eight ML algorithms optimized through PSO, and (iv) interpretability using SHAP analysis. By linking profitability, liquidity stress, and systemic shocks within a unified causal–ML framework, the study enhances predictive precision and offers actionable insights for deploying ROA as an early-warning indicator in volatile, capacity-constrained financial systems.

## 2. Theoretical Framework and Literature Review

### 2.1. Profitability and Bank Stability

Traditional financial theory posits that profitability is a key determinant of bank stability through mechanisms such as internal capital accumulation and risk buffer formation (Berger & Bouwman, 2013). Specifically, Return on Assets (ROA) reflects a bank's ability to generate returns from its assets, thus indicating its inherent capacity to sustain operations and meet liquidity obligations.

However, empirical evidence suggests that this relationship is not always linear. In periods of economic turbulence, ROA may also reflect heightened risk-taking behaviors, as banks pursue short-term returns through aggressive asset allocation. Fu et al. (2014) found that under conditions of rising macroeconomic uncertainty, the link between profitability and stability becomes nonlinear and sensitive to capital structure and risk management strategies.

### 2.2. Liquidity Risk and Pandemic Shocks

Liquidity maintenance is vital for bank survival, particularly during times of systemic crisis. The liquidity gap (FGAP) - the mismatch between short-term liquid assets and liabilities - serves as a key indicator of liquidity pressure (Vodová, 2011). During the COVID-19 pandemic, study by Demirgüç-Kunt et al. (2021) emphasized that this shock not only eroded profitability but also substantially heightened liquidity risk and systemic contagion.

Liquidity fragility remains a central source of systemic vulnerability among banks in emerging ASEAN economies, where heavy reliance on short-term funding and limited access to interbank markets heighten exposure to liquidity shocks.

Empirical evidence by Huong et al. (2021) demonstrates that liquidity risk substantially weakens bank performance and amplifies the transmission of macro-financial shocks, underscoring the importance of adaptive liquidity management and context-sensitive regulatory frameworks to safeguard financial stability.

Moreover, Kumar & Prasanna (2019) revealed that liquidity risk tends to be procyclical during global financial disruptions, especially for banks with short-term funding profiles. These patterns - first observed during the 2008 global financial crisis - were amplified during the COVID-19 pandemic, raising the need to re-examine the interactions between ROA, FGAP, and external shocks.

### 2.3. Causal and Machine Learning Frameworks in Finance

The relationship between ROA, liquidity, and bank stability is inherently complex and often influenced by unobserved confounders. Conventional methods such as linear regression and GMM may fall short in accurately identifying causal effects in such settings (Chernozhukov et al., 2018). DML combines modern causal inference with ML, allows for robust control of confounding variables and unbiased estimation of average and conditional treatment effects (ATE and CATE).

Meanwhile, there is growing demand for model transparency in financial ML applications. SHAP have emerged as a powerful tool for interpreting model predictions through cooperative game theory, quantifying the marginal contribution of each input variable (Lundberg & Lee, 2017). XAI enhances transparency and fulfills ethical and compliance requirements in complex financial systems (Černevičienė & Kabašinskas, 2024). The integration of causal inference and interpretable modeling thus represents an emerging paradigm in financial risk management.

### 2.4. Research Gap and Contributions

While previous studies have addressed the individual effects of ROA, FGAP, and COVID-19 on bank stability, few have proposed a unified framework that integrates these elements under a modern, explainable causal learning approach. Specifically, to the best of our knowledge, no existing work simultaneously combines three core elements of next-generation financial AI: (i) ML



for predictive accuracy, (ii) global optimization via PSO, and (iii) explainability via SHAP for transparent, logic-traceable outputs.

In addition, this research makes a notable contribution in the preprocessing and variable engineering phase - often overlooked in ML-based financial studies. By systematically applying Lasso, Ridge, and Elastic Net regressions, we not only improve variable selection but also identify latent predictors with nonlinear interactions. The inclusion of interaction terms and nonlinear transformations among ROA, FGAP, and COVID-19 enhances the model's ability to uncover hidden causal patterns.

What sets this study apart is its multi-layered integration of DML (for causal identification and CATE estimation), PSO (for predictive model optimization), and SHAP (for interpretability). This approach enables us to answer not just whether ROA affects bank stability, but also how, under what conditions, and for which types of banks the effect occurs. By adopting this comprehensive analytical structure, the study not only delivers more robust empirical insights, but also constructs an explainable causal map - one that regulators, supervisors, and bank managers can utilize to support strategic decision-making in increasingly volatile financial environments.

### 3. Methodology

#### 3.1 Data Description and Preprocessing

This study utilizes a balanced panel dataset comprising 63 commercial banks across six ASEAN economies - Indonesia, Malaysia, Philippines, Singapore, Thailand, and Vietnam - from 2010 to 2023. The dataset includes micro-level financial indicators (e.g., ROA, Z-score, FGAP, ETA, SIZE), macroeconomic variables (GDP, inflation), and a COVID-19 dummy to represent pandemic-induced shocks. Outlier treatment is performed using IQR and Z-score methods. Min - Max normalization is applied to rescale input variables, followed by the generation of nonlinear and interaction terms (e.g., ROA<sup>2</sup>, FGAP<sup>2</sup>, ROA×COVID, ROA×FGAP, FGAP×COVID).

Feature expansion through nonlinear transformation and interaction terms enables machine learning and causal inference models to uncover latent relationships that traditional linear frameworks often miss.

#### 3.2. Dependent Variable: Bank Stability

The Z-score, a widely accepted proxy for bank insolvency risk, is employed as the primary dependent variable:

$$Z_{score\ it} = \frac{ETA_{it} + ROA_{it}}{\sigma_{ROA\ i}} \quad (1)$$

Where ETA is the equity-to-assets ratio, and  $\sigma(ROA)$  is the standard deviation of ROA. A higher Z-score indicates greater bank stability and a lower probability of default (Berger & Bouwman, 2013; Tu et al., 2025).

#### 3.3. Feature Selection via Regularized Regression

To address multicollinearity and reduce dimensionality in high-noise environments, we apply three penalized regression techniques: Lasso, Ridge, and Elastic Net. These methods are effective in controlling overfitting and variable selection in financial datasets with highly correlated features (Tibshirani, 1996). Among the three, Ridge regression outperforms in terms of stability and predictive power, especially in emerging markets (Sun et al., 2024; Tu et al., 2025). Model performance is assessed using R<sup>2</sup>, Root Mean Squared Error (RMSE), and 5-fold cross-validation (CV).

#### 3.4. Causal Estimation Using Double Machine Learning

To estimate the causal effect of ROA on Z-score while accounting for numerous confounding factors, this study employs the Double Machine Learning (DML) framework proposed by Chernozhukov et al. (2018). DML is particularly suited to financial applications involving nonlinearities and high-dimensional data, as it produces unbiased treatment estimates even when predictive models are imperfect.

The central innovation of DML lies in its orthogonalization strategy, which mitigates bias from overfitting and model misspecification. This is achieved by first using machine learning algorithms (e.g., Random Forest, XGBoost) to predict both the treatment variable (ROA) and the outcome variable (Z-score) from the full set of covariates. The residuals from these predictions are then regressed against one another to estimate the causal effect of ROA on stability. This residual-on-residual approach ensures the causal parameter is orthogonal to nuisance components, yielding consistent inference under flexible model specifications.

Beyond estimating the average treatment effect, the framework is extended to capture treatment heterogeneity by interacting residualized ROA with key moderators, specifically, the liquidity gap (FGAP) and a COVID-19 crisis dummy. This allows for the estimation of conditional average treatment effects (CATE), revealing how the profitability–stability relationship varies across liquidity and crisis conditions. Leveraging the flexibility of ensemble learners such as Random Forest and XGBoost, DML isolates context-dependent causal patterns that traditional linear models (e.g., OLS or GMM) cannot uncover, enabling a deeper understanding of when and for whom profitability enhances stability.

### 3.5. Training and Optimization of Machine Learning Models

To maximize predictive accuracy and prevent overfitting in complex financial data, the study applies Particle Swarm Optimization (PSO) as a global metaheuristic algorithm for hyperparameter tuning. Inspired by collective behavior in nature (Kennedy & Eberhart, 1995), PSO optimizes model parameters by iteratively searching for global minima in non-convex, multidimensional loss surfaces.

Eight supervised learning algorithms are trained, include CatBoost, XGBoost, LightGBM, Gradient Boosting, Random Forest, Support Vector Regression, K-Nearest Neighbors, and Decision Tree. PSO enhances performance by dynamically adjusting key parameters (e.g., learning rate, depth, estimators) based on cross-validated RMSE, improving computational efficiency and convergence stability. The optimized models achieve substantial gains in predictive precision, with CatBoost and XGBoost yielding post-optimization  $R^2$  values exceeding 93%, confirming PSO's effectiveness in calibrating nonlinear learners in volatile financial settings.

### 3.6. Explainable AI via SHAP

While predictive accuracy is essential, interpretability is equally critical in banking applications, where regulatory transparency and accountability are required. To this end, SHAP, a cooperative game theory–based framework, is employed to interpret the predictions of the best-performing model (CatBoost). SHAP quantifies each feature's marginal contribution to model output, decomposing complex predictions into additive, intuitive components.

At the global level, SHAP summary plots rank variables by their average impact on bank stability, identifying ROA, FGAP, and their interaction terms as dominant determinants. At the local level, dependence and force plots reveal how variations in individual features affect predicted stability, exposing nonlinear thresholds and context-dependent interactions. Together, these insights transform opaque machine learning models into interpretable tools for financial supervision, allowing policymakers and managers to understand not only what drives stability, but why and under what conditions profitability translates into resilience.

To ensure generalizability and reliability of the findings, we conduct a comprehensive robustness validation process, such as: K-fold cross validation, bootstrap resampling, subgroup analysis by bank size, country, and capital structure, comparison across pre- and post-COVID periods. These checks ensure that the estimated causal effects are not only sample-specific but also hold practical significance for policy and managerial applications.

## 4. Empirical Results

### 4.1. Regularization Performance: Lasso, Ridge, and Elastic Net

To select the optimal predictors while minimizing multicollinearity and overfitting, three penalized regression methods were employed. Among them, Ridge regression exhibited the highest performance:

Ridge Regression:  $R^2 = 0.6676$ ; RMSE = 0.3017

Lasso:  $R^2 = 0.6216$ ; RMSE = 0.3219

Elastic Net:  $R^2 = 0.6171$ ; RMSE = 0.3238

These findings reaffirm the robustness of Ridge regression in financial datasets with highly correlated features, consistent with recent empirical validations in high-dimensional macro-finance applications (Sun et al., 2024).

This result compellingly highlights the superior stability and robustness of Ridge regression across a wide range of regularization strengths. While Lasso and Elastic Net exhibit a sharp degradation in performance ( $R^2$ ) and a steep rise in error (MSE) as the penalty increases, Ridge maintains consistently high explanatory power, underscoring its effectiveness for high-dimensional, correlated

financial datasets - especially in emerging market contexts where variable multicollinearity is prevalent.

#### 4.2. Causal Effects Estimation via Double Machine Learning

To estimate the causal impact of profitability on bank stability, we employ the DML framework, which allows for robust treatment effect estimation in the presence of high-dimensional, nonlinear confounders (Chernozhukov et al., 2018). Specifically, we estimate both the ATE and the CATE of ROA on Z-score, while accounting for potential heterogeneity across liquidity conditions and crisis periods.

To control for unobserved heterogeneity, we incorporate bank-level fixed effects in the residualization stage of DML. Covariate functions for both treatment (ROA) and outcome (Z-score) are estimated using Random Forest and XGBoost learners under a 5-fold cross-fitting scheme. Statistical inference is conducted using 500 bootstrap replications, allowing us to construct 95% confidence intervals and assess p-values.

The estimated ATE of the COVID-19 pandemic (dummy = 1) on Z-score is  $-578.97$ , which is statistically significant at the 1% level ( $p < 0.01$ , 95% CI:  $[-694.2, -462.3]$ ). This confirms a strong average destabilizing effect of systemic shocks on bank stability. To explore treatment heterogeneity, we estimate CATEs across combinations of FGAP levels (high/low) and time periods (pre-/during COVID). Results are summarized in Table 1.

**Table 1. COVID-19 CATE Estimates by FGAP and Time**

| Group                    | CATE     | 95% CI                 |          |
|--------------------------|----------|------------------------|----------|
| High FGAP - During COVID | -854,233 | $[-962,108; -741,947]$ | $<0,001$ |
| High FGAP - Pre-COVID    | -574,372 | $[-691,002; -455,885]$ | $<0,001$ |
| Low FGAP - During COVID  | -205,811 | $[-328,994; -91,670]$  | $<0,005$ |
| Low FGAP - Pre-COVID     | 42,753   | $[-79,219; +163,802]$  | 0,421    |

Source: Author's own work

These results confirm substantial treatment effect heterogeneity. The most severe destabilizing effects are observed in banks with high liquidity gaps during crisis periods, while the effect is negligible or statistically insignificant for low-FGAP banks in stable conditions. These findings suggest that the destabilizing effect of COVID-19 is significantly amplified among banks with higher liquidity gaps. This complements prior evidence in global contexts (Mashamba, 2022), while also

extending causal inference with richer interaction structures. The destabilizing effect is significantly stronger for banks with high FGAP during the COVID-19 period.

#### 4.3. Predictive Performance of Machine Learning Models

Eight machine learning algorithms were trained and evaluated before and after hyperparameter optimization using PSO. Post-optimization results show marked improvement, especially in CatBoost and XGBoost.

**Table 2. Predictive performance of ML models before and after PSO-based optimization**

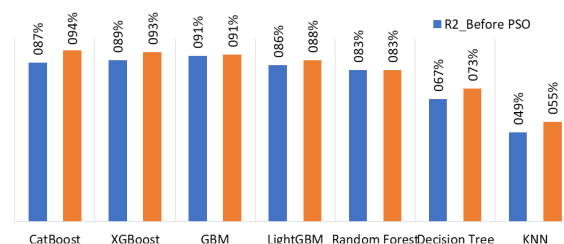
| Models        | RMSE_Before PSO | R2_Before PSO | RMSE_After PSO | R2_After PSO |
|---------------|-----------------|---------------|----------------|--------------|
| CatBoost      | 0,2036          | 86,97%        | 0,1388         | 93,95%       |
| XGBoost       | 0,1909          | 88,54%        | 0,1499         | 92,94%       |
| GBM           | 0,1706          | 90,85%        | 0,1649         | 91,45%       |
| LightGBM      | 0,2122          | 85,85%        | 0,1925         | 88,36%       |
| Random Forest | 0,2327          | 82,98%        | 0,2383         | 82,15%       |
| Decision Tree | 0,3236          | 67,09%        | 0,2939         | 72,85%       |
| KNN           | 0,4027          | 49,03%        | 0,3795         | 54,72%       |
| SVR           | 0,4088          | 0,4748        | 0,3857         | 0,5324       |

Source: Authors' own work

Table 2 provides a detailed presentation of the training results obtained from machine learning algorithms, both before and after the application of PSO. This table reports RMSE and  $R^2$  metrics for eight machine learning algorithms, evaluated before and after hyperparameter tuning via PSO. Post-optimization results demonstrate significant improvements in CatBoost, XGBoost, and GBM, highlighting the effectiveness of PSO in enhancing model accuracy.

Traditional models such as OLS and GMM underperformed ( $R^2 < 0.55$ ), underscoring the value of nonparametric machine learning, especially in nonlinear, noisy datasets. Figure 1 displays the comparative  $R^2$  before and after PSO optimization.

**Figure 1. Model performance comparison before and after hyperparameter optimization via PSO ( $R^2$  Scores)**



Source: Author's own work



The bar chart presents the  $R^2$  for various machine learning models before and after applying PSO. Overall, PSO consistently improved model accuracy, with CatBoost, XGBoost, and GBM achieving the highest post-optimization performance.

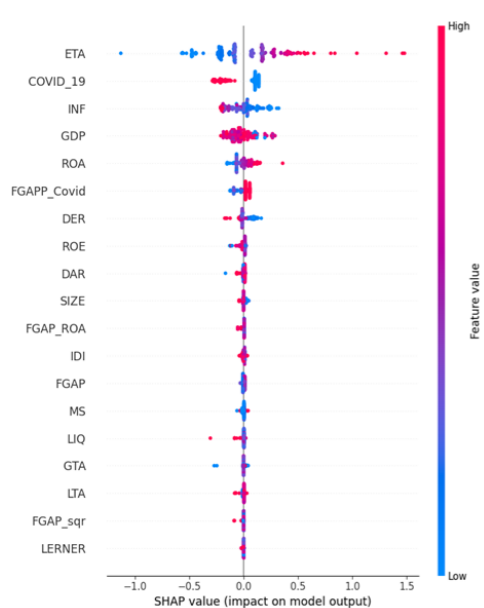
#### 4.4. SHAP-Based Explainability

To enhance interpretability and uncover the mechanisms behind the model's predictive structure, SHAP analysis was applied to the best-performing CatBoost model ( $R^2 = 93.95\%$ , RMSE = 0.1388). SHAP enables both global and local interpretability by quantifying each feature's marginal contribution to the predicted Z-score, transforming the model from a "black box" into a transparent "glass box."

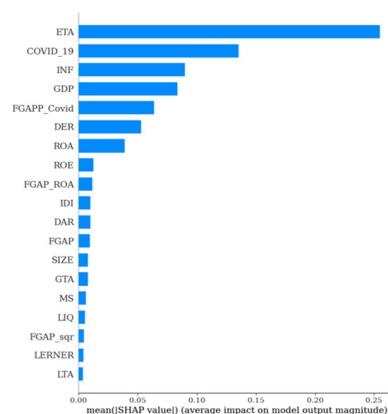
At Figure 2, Panel (a) ranks all input variables by their mean absolute SHAP values, showing that capital strength (ETA) and systemic shocks (COVID-19) are the most influential determinants of bank stability, followed by macroeconomic variables (INF, GDP) and interaction terms such as  $FGAP \times COVID$ . ROA demonstrates moderate standalone importance but interacts strongly with liquidity and systemic factors, confirming the conditional profitability–stability hypothesis.

**Figure 2. SHAP Summary Plot**

*Panel (a). Feature contributions to predicted Z-score*



*Panel (a). Global feature importance in predicting Z-score*



*Source: Author's own work*

Panel (b) visualizes SHAP value distributions across all observations, revealing both the direction and intensity of each feature's effect on the Z-score. ETA and COVID-19 exhibit the most consistent contributions, while ROA displays asymmetric behavior, its stabilizing influence increases under moderate conditions but weakens markedly with higher FGAP or during pandemic stress. The color gradient highlights nonlinear dependencies and cross-feature interactions that traditional linear regressions cannot capture.

SHAP-based diagnostics confirm that ROA is a critical but conditional driver of bank resilience. The combination of high liquidity stress ( $FGAP > 0.15$ ) and low profitability ( $ROA < 0.5\%$ ) can even reverse its stabilizing effect. These insights validate the theory of conditional profitability–stability transmission and demonstrate the value of explainable AI for supervisory practice. By revealing when and why ROA influences financial stability, SHAP enhances transparency and enables data-driven, context-aware early-warning systems, advancing the shift toward interpretable AI in prudential regulation (Černevičienė & Kabašinskas, 2024).

The SHAP-based analysis further reveals that the stabilizing impact of profitability on bank stability is inherently nonlinear and contingent upon contextual stressors such as liquidity pressure and systemic crises. Specifically, the effect of ROA on Z-score strengthens when liquidity gaps are low but weakens markedly as FGAP exceeds 0.15 or during pandemic periods, indicating that profitability's resilience-enhancing role diminishes under adverse liquidity and crisis conditions. This pattern underscores a threshold dynamic, wherein ROA above approximately 1.2% yields disproportionately stronger stabilizing

effects, primarily through internal capital accumulation and improved equity buffers, while below this level, profitability loses its protective capacity. Moreover, the interaction between ROA, FGAP, and COVID-19 demonstrates a second-order moderation effect: systemic shocks not only directly erode stability but also attenuate the marginal utility of earnings as a buffer mechanism.

These findings confirm that profitability alone cannot ensure resilience without adequate liquidity management. By integrating DML and SHAP, this study uncovers these conditional, nonlinear mechanisms, shifting the interpretation of ROA's influence from a static indicator to a dynamic, context-sensitive determinant of financial stability in volatile banking environments.

### 5. Conclusion and Policy Implications

This study develops a comprehensive analytical framework integrating causal inference through DML, predictive optimization using ML with PSO, and model interpretability via SHAP to examine the causal effect of bank profitability ROA on institutional stability, proxied by the Z-score, under liquidity stress and systemic shocks. Using data from 63 commercial banks across six ASEAN economies (2010–2023), the findings reveal that profitability enhances stability; however, this relationship is nonlinear, context-dependent, and shaped by macro-financial conditions. The stabilizing effect of ROA is stronger when liquidity gaps are low but diminishes markedly during crises such as COVID-19. SHAP interaction plots expose hidden mechanisms and nonlinear thresholds often invisible to conventional econometric models, offering interpretable and policy-relevant insights into banking resilience in emerging markets.

The results carry important policy and managerial implications. For central banks and financial supervisors, ROA should be integrated as a forward-looking indicator in systemic early-warning systems, complemented by liquidity risk measures such as FGAP. The SHAP evidence highlights that profitability's stabilizing role weakens under liquidity stress, underscoring the need for dynamic, context-aware supervisory models. Basel prudential frameworks should incorporate countercyclical capital buffer guidelines that adjust based on profitability–liquidity interactions. Embedding DML–SHAP analytics into supervisory

pipelines allows real-time causal detection and transparent interpretability, enhancing regulatory responsiveness and trust.

For bank management, profitability should be viewed not only as a performance metric but also as a strategic stability buffer. Banks achieving high ROA during normal periods should proactively reinforce capital reserves, anticipating the erosion of profitability's stabilizing power during downturns. The identified threshold of approximately 1.2% ROA can guide decisions on capital retention and dividend policy.

For investors and rating agencies, incorporating SHAP-based interpretability into credit risk models enables dynamic, event-contingent risk pricing and portfolio management.

Future research could extend this causal–explainable AI framework to other financial systems, integrate time-varying causal structures, and employ unstructured data (e.g., news sentiment or disclosures) via NLP techniques to enhance predictive precision. Embedding this hybrid model into real-time macroprudential stress testing could further strengthen regulatory and supervisory capacity in volatile financial environments.

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# ENHANCING SUSTAINABILITY IN THE DEVELOPMENT OF VIETNAM'S TOURISM ECONOMY

MSc. Vo Dinh Thuat\*

**Abstract:** *In recent years, Vietnam's tourism industry has become one of the key economic sectors, contributing significantly to GDP growth, job creation and the promotion of the national image. However, its rapid development has also posed numerous challenges related to the environment, culture and tourism resource management. This paper focuses on analyzing the current state of sustainable tourism development in Vietnam, assessing the limitations of the current growth model and proposing solutions to enhance the sustainability of the tourism economy. The research results aim to provide policy and practical implications for developing Vietnam's tourism industry in a way that is both economically efficient and harmoniously aligned with environmental protection and cultural preservation.*

• Keywords: sustainability, development, economy, tourism, Vietnam

Date of receipt: 17<sup>th</sup> Jan., 2026

Date of delivery revision: 06<sup>th</sup> Mar., 2026

DOI:

Date of receipt revision: 18<sup>th</sup> Mar., 2026

Date of approval: 26<sup>th</sup> Mar., 2026

## 1. Introduction

Tourism today is not simply an activity for leisure or recreation but has become a comprehensive economic sector with strong spillover effects on various fields such as trade, services, transportation, culture and agriculture. In Vietnam, tourism has been identified as one of the key economic sectors, playing an important role in the country's socio-economic development strategy. Recognizing the potential and strategic significance of tourism for national development, the Politburo issued Resolution No. 08-NQ/TW on January 16, 2017, on developing tourism into a spearhead economic sector (Central Committee, 2017). This resolution created a strong driving force that encouraged localities, enterprises and communities to actively participate in tourism activities, thereby contributing significantly to economic growth, job creation and the promotion of Vietnam's image worldwide.

According to the Vietnam National Authority of Tourism, the number of international visitors to Vietnam in the first 11 months of 2025 reached over 19 million, an increase of 20.9% compared with the same period in 2024. This figure marks a record high, surpassing the 18 million visitors in 2019, before the outbreak of the COVID-19 pandemic. This growth has generated substantial revenue for the state budget and strongly stimulated the development of the service sector. However, along

with these achievements, the rapid and sometimes uncontrolled expansion of certain tourist destinations has given rise to several problems such as environmental pollution, overexploitation of natural resources, commercialization of local culture and ecological imbalance. These challenges highlight the urgent need to shift toward sustainable tourism development that ensures harmony between economic growth, conservation of natural resources and preservation of cultural and social values. In the context of Vietnam's efforts to promote a green growth model and implement its international commitments to the Sustainable Development Goals (SDGs), improving sustainability in the development of the tourism economy has become a strategic mission.

## 2. The Current Situation of Vietnam's Tourism Economy Development

### 2.1. Achievements

In recent years, Vietnam's tourism industry has made remarkable progress, becoming one of the key pillars of the national economy. Thanks to the attention and guidance of the Party and the State, especially after the Politburo issued Resolution No. 08-NQ/TW on January 16, 2017, on developing tourism into a spearhead economic sector, Vietnam's tourism industry has achieved positive transformations in scale, quality and professionalism. Subsequently, the Prime Minister issued Decision No. 147/QĐ-TTg on

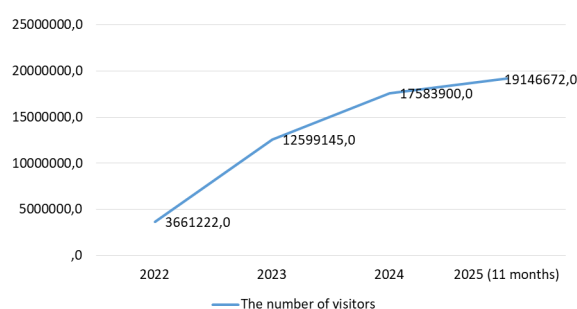
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January 22, 2020, approving the Vietnam Tourism Development Strategy to 2030. This strategy clearly sets out the goal of making Vietnam an attractive destination, ranking among the leading countries in Southeast Asia in terms of tourism development and developing the industry in a professional, high-quality, sustainable and branded manner (The Prime Minister, 2020). The promulgation of these important strategic policies has provided a solid foundation and clear orientation for Vietnam's tourism development in the new period. Sustainable tourism development is a major and consistent policy of the Party and the State, aiming not only at economic growth but also at comprehensive and balanced development (Do Van Quan & Nguyen Thi Ung, 2025).

Statistical data show that the period from 2022 to 2025 marks a strong recovery and breakthrough for Vietnam's tourism after the COVID-19 pandemic. Specifically, the number of international visitors to Vietnam in 2022 reached 3,661,222 arrivals, signaling a significant comeback of the tourism market after nearly two years of stagnation. This figure reflects the positive impact of the comprehensive reopening policy implemented in March 2022, along with the restoration of international flight routes and the relaxation of entry regulations for foreign tourists.

**Chart 1. Number of International Visitors to Vietnam, 2022-2025**



Source: Vietnam National Authority of Tourism, 2025

In 2023, the number of international visitors increased sharply to 12,599,145 arrivals, more than 3.4 times higher than in 2022. By 2024, Vietnam welcomed approximately 17,583,900 international visitors, an increase of nearly 40% compared to 2023, surpassing industry expectations and approaching the pre-pandemic level of over 18 million visitors in 2019. In the first 11 months of 2025, the number of international visitors to Vietnam reached 19,146,672 arrivals.

This indicates that Vietnam's tourism industry is entering a phase of stable and sustainable growth, moving toward the goal of welcoming over 20 million international visitors in 2025 as set out in the Vietnam Tourism Development Strategy to 2030. The rapid recovery and surpassing of pre-pandemic levels demonstrate the strong appeal of Vietnam as a destination while also reflecting the effectiveness of tourism management, administration and promotion at both national and local levels. Along with the robust rebound in visitor numbers, total tourism revenue in recent years has also recorded impressive growth, clearly showing the economic efficiency of the tourism sector in the post-pandemic period.

**Table 1. Total Tourism Revenue, 2022-2024**

| Year | Total Tourism Revenue (trillion VND) | Growth Rate (%) |
|------|--------------------------------------|-----------------|
| 2022 | 495                                  | 175             |
| 2023 | 678,3                                | 37              |
| 2024 | 840                                  | 23,9            |

Source: Vietnam National Authority of Tourism, 2025

According to statistical data, in 2022, total tourism revenue reached 495 trillion VND, increasing by 175% compared with 2021, marking the highest growth rate in the history of Vietnam's tourism industry. In 2023, total revenue from tourists continued to rise strongly, reaching 678.3 trillion VND, equivalent to a growth rate of 37% over the previous year. This impressive increase reflects positive changes in both domestic and international visitor segments. Vietnam's tourism not only regained traditional markets such as South Korea, China and Japan but also expanded to potential markets like India, Australia and Europe. At the same time, the diversification of tourism products, especially resort tourism, eco-tourism and cultural tourism, helped increase the average spending per visitor and enhance the overall economic value of the industry.

By 2024, total tourism revenue was estimated at 840 trillion VND, up 23.9% compared with 2023. Although the growth rate slowed compared with the previous period, the scale of revenue continued to expand, showing a shift toward deeper and more sustainable development. During this period, the travel consumption trend among domestic tourists changed significantly: instead of choosing low-cost tours, travelers preferred high-end resorts, quality services and environmentally friendly destinations. Major tourism centers such as Hanoi, Ho Chi Minh City, Da Nang, Nha

Trang and Phu Quoc remained the main drivers of revenue growth. In 2025, Vietnam is expected to welcome 21.5 million international visitors and 135.5 million domestic tourists, with total tourism revenue exceeding 1 quadrillion VND (Vietnam Tourism Information Center, 2025).

State management, institutions and tourism policies have been improved through important documents such as the Implementation Plan for the National Tourism System Planning for the 2021-2030 period, the Prime Minister's Directive No. 34 on promoting tourism growth and several resolutions on tourism stimulation and visa exemptions for many countries. These efforts have created favorable conditions for enterprises and localities to develop. Tourism promotion and marketing activities have been carried out more professionally, spreading Vietnam's image through major international fairs and the communication campaign "Vietnam - Timeless Charm," which has helped strengthen the position of the national tourism brand.

Tourism products have become increasingly diverse, focusing on green, smart and high-value development. Typical forms include community-based tourism, night tourism, wellness tourism and culinary tourism. Digital transformation in tourism has been strongly promoted, contributing to innovation in management, marketing and visitor experiences. Vietnam has also continued to receive international recognition from UN Tourism and the World Travel Awards in many categories, affirming the country's position and reputation on the global tourism map (Vietnam Tourism Information Center, 2025).

The continuous increase in total tourism revenue in recent years shows that Vietnam's tourism industry is recovering firmly, gradually regaining its pre-pandemic growth momentum and confirming its important role in the national service economy. The high growth rate during this period results not only from the rise in visitor numbers but also from improved service quality, product innovation and the advancement of digital transformation in tourism activities.

## 2.2. Challenges and Limitations

Alongside the remarkable achievements gained in recent years, Vietnam's tourism industry continues to face a number of persistent challenges and limitations that must be recognized

and addressed to ensure long-term, sustainable development. These challenges relate not only to infrastructure and service quality but also to environmental management, institutional coordination, human resources and the country's capacity to adapt to global changes.

*First, tourism infrastructure and transport connectivity remain inconsistent.*

Infrastructure plays a crucial role in supporting tourism development, yet Vietnam still faces many bottlenecks in this area. Although many localities have actively invested in upgrading facilities, the transport network linking major tourism centers with satellite destinations remains underdeveloped. In particular, mountainous, remote and island areas often suffer from poor road conditions and limited access to public transportation, restricting tourism potential and visitor mobility.

The uneven quality of infrastructure can be seen not only in transportation but also in the supporting facilities that serve tourism activities. Accommodation systems, shopping areas, entertainment venues and facilities for hosting international events, such as cultural festivals, sports tournaments and conferences, are still lacking or have not met international standards. The absence of large-scale integrated complexes reduces Vietnam's capacity to attract MICE (Meetings, Incentives, Conferences and Exhibitions) and high-spending tourist segments. Moreover, infrastructure development remains fragmented across regions, with limited coordination between provinces, leading to inefficiencies and weakening the competitiveness of the overall tourism network (Government, 2023).

*Second, the quality and uniqueness of tourism products and services are not yet consistent.*

Despite progress in diversifying tourism products, many offerings remain repetitive and undifferentiated. Similar tourism models, such as beach resorts or sightseeing tours, are often replicated across regions without distinctive cultural or experiential elements. As a result, many destinations fail to leave a strong impression on visitors or encourage repeat travel. Some areas have developed tourism projects spontaneously, without alignment to overall regional or national tourism planning.

In addition, service quality still varies widely between destinations. While some major cities

and established tourist hubs provide professional services, smaller or newly developed areas often lack qualified personnel and standardized service processes. This inconsistency affects visitor satisfaction and limits Vietnam's ability to attract international travelers with higher spending capacity. Green tourism and smart tourism development, though frequently mentioned in strategic documents, are still in their infancy, with insufficient investment and weak linkages between stakeholders. The absence of comprehensive, sustainable value chains that integrate production, services and community participation remains a major barrier (Doan Manh Cuong, 2025).

*Third, tourism promotion, marketing and technological application remain limited.*

Promotion and marketing activities have improved but are still not commensurate with Vietnam's tourism potential. The country's image as a travel destination is not consistently or strategically projected in international markets. Financial resources for marketing campaigns remain limited, making it difficult to maintain long-term visibility and brand recognition. While neighboring countries such as Thailand, Malaysia and Singapore have built powerful and continuous marketing identities, Vietnam's tourism communication still lacks continuity, creativity and emotional appeal.

The application of digital technologies in promotion and destination management remains fragmented. Although some provinces and enterprises have developed tourism websites, mobile apps, or virtual reality tours, these initiatives are often uncoordinated and fail to form a unified digital ecosystem. Data on visitor behavior, spending and satisfaction are not systematically collected or shared across regions, which limits evidence-based planning and forecasting. This lack of integration hampers the effectiveness of Vietnam's tourism digital transformation agenda and reduces the country's competitiveness in the global tourism market.

*Fourth, awareness and practice of environmental protection and sustainable development are not yet consistent.*

Environmental degradation is becoming one of the most pressing issues in Vietnam's tourism industry. In many destinations, rapid and unregulated tourism development has led to

pollution, waste accumulation, overexploitation of natural resources and destruction of local landscapes. Popular tourist spots often face challenges related to solid waste management, untreated wastewater and uncontrolled construction, which diminish the natural beauty and ecological balance of the sites.

Moreover, the principle of "responsible tourism" has not yet been widely adopted. Some tourism businesses prioritize short-term profit over long-term sustainability, while local authorities sometimes allow excessive exploitation of resources to achieve short-term economic gains. The lack of strict monitoring and enforcement mechanisms further exacerbates environmental pressures. Without stronger policies and public awareness campaigns, these practices threaten to undermine Vietnam's tourism brand as a clean, green and attractive destination for future generations.

*Fifth, external factors and climate change exert significant impacts.*

Vietnam's tourism industry operates in an increasingly complex global environment shaped by economic volatility, geopolitical conflicts and climate change. Fluctuations in the global economy, rising fuel prices and changes in travel behavior after the COVID-19 pandemic have made international tourism markets more unpredictable. In addition, regional tensions and natural disasters disrupt travel flows, affecting the stability of the industry.

Climate change, in particular, poses long-term threats to tourism sustainability. Many coastal destinations, including Da Nang, Nha Trang and Phu Quoc, face rising sea levels, coastal erosion, coral bleaching and more frequent storms. These impacts not only damage infrastructure but also alter local ecosystems, diminishing the attractiveness of natural landscapes. In mountainous areas, landslides and flash floods have caused serious damage to tourist sites and communities. These challenges highlight the urgent need for Vietnam's tourism industry to strengthen its resilience, diversify products and markets and integrate climate adaptation measures into tourism planning and management.

In short, the challenges and limitations outlined above reveal that Vietnam's tourism development still relies heavily on extensive



growth, emphasizing quantity over quality. To achieve sustainable progress, the industry must shift toward intensive growth based on innovation, efficiency and sustainability. Recognizing these issues accurately and designing appropriate, forward-looking solutions will enable Vietnam's tourism sector not only to recover strongly but also to achieve long-term stability, competitiveness and greater contributions to the national economy.

### **3. Solutions to Enhance Sustainability in the Development of Vietnam's Tourism Economy**

In order to overcome existing limitations and move toward sustainable tourism development, Vietnam's tourism industry needs to adopt a comprehensive approach that integrates policy reform, infrastructure modernization, product innovation, digital transformation, human resource development and environmental protection. These efforts should be implemented in a systematic and coordinated manner, ensuring alignment between national and local strategies as well as close cooperation among the State, enterprises and communities.

*First, improve infrastructure and strengthen regional linkages in tourism development.*

Infrastructure is a key foundation for sustainable tourism growth. The government should continue prioritizing public investment in major transportation projects that connect national tourism hubs such as Hanoi, Ho Chi Minh City, Da Nang and Quang Ninh with surrounding satellite destinations. Developing a multimodal transport system that integrates road, air, rail and waterway networks will facilitate visitor mobility, reduce travel time and help distribute tourist flows more evenly to avoid overloading at popular sites.

In addition, it is necessary to invest in synchronized infrastructure systems such as modern accommodation facilities, shopping centers, international convention halls and large-scale cultural and sports complexes. These projects will provide the conditions for Vietnam to develop into a regional center for MICE (Meetings, Incentives, Conferences and Exhibitions) and luxury tourism. Localities should also promote inter-provincial cooperation and regional tourism corridors, especially in key economic regions, to create linked and competitive destinations that share infrastructure, services and marketing resources.

*Second, enhance the quality and distinctiveness of tourism products.*

Tourism products should reflect Vietnam's rich cultural diversity and natural heritage. Each locality should develop tourism products that highlight its unique cultural identity, traditional craft villages, festivals and cuisine while integrating modern creative elements to meet new consumer demands. The goal is to offer authentic, memorable experiences rather than homogeneous products that reduce the value of the destination.

Special attention should be given to the development of green, community-based, agricultural and wellness tourism, as these forms align with the global trend toward sustainable consumption and responsible travel. Encouraging cooperation among enterprises, local authorities and residents will help build sustainable value chains that ensure equitable benefits. This approach not only supports the economy but also preserves traditional livelihoods, cultural heritage and the environment. Furthermore, innovation in product design should integrate digital storytelling, smart tour guidance and personalized experiences to enhance visitor satisfaction and competitiveness.

*Third, innovate tourism promotion and strengthen the application of digital technology.*

Tourism marketing plays a decisive role in shaping national image and attracting visitors. Vietnam should develop a coherent national tourism brand strategy emphasizing its identity as a "safe, friendly, unique and attractive" destination. Collaboration with international media agencies, global tourism organizations and online travel platforms should be intensified to enhance the country's presence in key and emerging markets.

Digital transformation must become a central pillar of tourism promotion and management. Applying technology in destination management, data collection and visitor analytics will improve decision-making and enhance visitor experience. Building a unified smart tourism platform that integrates central and local data systems can help monitor tourist flows, manage capacity and optimize marketing efforts. Moreover, encouraging private sector participation and start-up innovation in digital tourism (such as virtual tours, AI-based recommendation systems or digital ticketing) can boost efficiency and competitiveness.

*Fourth, strengthen training and develop a high-quality tourism workforce.*

Human resources are the cornerstone of sustainable tourism. Training institutions and enterprises should establish partnerships to design curricula that combine theoretical knowledge with practical training. Programs should emphasize professional competencies, foreign languages, intercultural communication, customer service and technological proficiency.

Policies should also be introduced to attract, reward and retain skilled professionals, especially those with international expertise. Building a professional network of tour guides, destination managers and community-based tourism workers is crucial for maintaining service quality. For rural and mountainous areas, vocational training programs tailored to local contexts can help residents participate directly in tourism activities, improving their livelihoods while preserving local traditions and ecosystems.

*Fifth, enhance environmental protection and promote responsible tourism.*

Sustainability must be embedded in every aspect of tourism development. Local governments should rigorously enforce environmental impact assessment requirements in tourism planning and operations. Monitoring systems for waste management, wastewater treatment and ecosystem conservation need to be strengthened at all tourism sites.

At the same time, businesses and tourists should be encouraged to participate in green initiatives such as “Zero-Waste Tourism” or “Green Destination Certification.” Integrating natural and cultural heritage conservation goals into tourism projects will create a balance between economic benefits and ecological preservation. Awareness campaigns on responsible tourism should be widely implemented to promote environmentally conscious behavior among both service providers and travelers.

*Sixth, improve resilience to climate change and global fluctuations.*

Climate change and global crises pose significant risks to tourism sustainability. The tourism sector should actively develop risk management and disaster response plans tailored to different regions, especially coastal and mountainous areas that are more vulnerable to natural hazards. Investments in resilient, eco-friendly infrastructure such as flood-resistant

resorts and renewable energy systems will enhance long-term sustainability.

#### 4. Conclusion

In recent years, Vietnam’s tourism industry has confirmed its role as one of the key sectors of the national economy, contributing significantly to GDP growth, job creation and international integration. The period from 2022 to 2025 marks a strong recovery and comprehensive progress of the industry after the COVID-19 pandemic, reflected in record growth in visitor numbers, revenue and Vietnam’s rising position on the world tourism map. However, along with these achievements, Vietnam’s tourism still faces a number of structural challenges such as incomplete infrastructure, unstable product quality and limited attention to environmental protection and sustainable development. To achieve the goals set out in the Vietnam Tourism Development Strategy to 2030, the industry needs to continue transforming its growth model from extensive to intensive, focusing on quality, identity and sustainability as the main pillars. Efforts to improve infrastructure, diversify products, promote digital transformation, train a high-quality workforce and protect the environment should be implemented in a coordinated way through cooperation among the government, enterprises, communities and citizens. With the right orientation, consistent policies and joint determination of the whole society, Vietnam’s tourism can become a truly leading economic sector, making major contributions not only to economic growth but also to cultural exchange and the promotion of a dynamic, friendly and culturally rich national image on the international stage, moving toward sustainable and inclusive development.

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# INNOVATING ACCOUNTING TEACHING METHODS IN THE CONTEXT OF DIGITAL TRANSFORMATION TO MEET IFRS APPROACH REQUIREMENTS ACCORDING TO CIRCULAR 99/2025/TT-BTC

PhD. Do Thi Thu Hang\*

**Abstract:** *This paper assesses the current state of teaching methods at the Accounting Department - University of Economics and Business Administration. Based on this, it proposes solutions to innovate accounting teaching methods in the context of digital transformation to meet IFRS approach requirements according to Circular 99/2025/TT-BTC, aiming to enhance students' professional competence and IFRS adaptability, and to meet the requirements for training high-quality accounting human resources in the digital age.*

• Keywords: *digital transformation; accounting teaching; IFRS; Circular 99/2025/TT-BTC; professional competence*

Date of receipt: 17<sup>th</sup> Jan., 2026

Date of delivery revision: 06<sup>th</sup> Mar., 2026

DOI:

Date of receipt revision: 18<sup>th</sup> Mar., 2026

Date of approval: 28<sup>th</sup> Mar., 2026

## 1. Introduction

In recent years, the digital transformation process has been strong in the business sector, especially in the accounting field, profoundly changing the role, function, and competency requirements for accounting professionals. The widespread use of ERP systems, integrated accounting software, electronic invoices, big data, cloud computing, along with the trend of automation and digitization of accounting processes, has rendered the traditional accounting model, heavily reliant on manual record-keeping, unsuitable. This creates an urgent need for higher education institutions to adjust the content and methods of accounting teaching towards a modern approach, closely linked to technology and business practices.

Besides the impact of technology, the rapid changes in the legal and accounting environment also create significant pressure on training activities. The Ministry of Finance's issuance of Circular 99/2025/TT-BTC, replacing Circular 200/2014/TT-BTC, effective from January 1, 2026, is considered a crucial turning point in Vietnam's corporate accounting system. The new circular not only adjusts accounting techniques, chart of accounts, and financial reporting but also clearly demonstrates an innovative mindset towards flexibility, transparency, and digitalization,

aligning with International Financial Reporting Standards (IFRS). This change requires future accountants to not only master accounting principles but also possess analytical skills, systemic thinking, and the ability to operate accounting in a digital environment.

However, in reality, accounting training at many higher education institutions still lags behind the demands of the labor market and the new legal context. Teaching methods in some courses do not adequately focus on developing professional skills, digital thinking, and the ability to adapt to changes in accounting regulations and technology. This leads to graduates facing difficulties in accessing business practices, especially in work environments using ERP systems and digital accounting processes.

Stemming from these requirements, research into innovating accounting teaching methods in universities training in the field of accounting in general and the University of Economics and Business Administration in particular, in the context of digital transformation and updating new regulations of the corporate accounting system is extremely necessary and significant both theoretically and practically. The research not only contributes to clarifying the scientific basis for innovating accounting teaching methods but also provides practical arguments to help

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training institutions in general and the University of Economics and Business Administration in particular, adjust their programs, content, and training methods towards a modern direction, meeting the requirements for developing high-quality accounting human resources in the digital age.

## 2. Theoretical foundation of teaching methods

### 2.1. Concept of Teaching Methods

In a broad sense, teaching methods at the university level are a synthesis of forms, measures, and organized activities between lecturers and learners to achieve the set training objectives. Teaching methods not only include the way knowledge is transmitted but also the interaction between the two subjects, the teacher and the learner, in the process of acquiring knowledge, forming skills, and developing creative thinking abilities.

In a narrow sense, teaching methods are a system of specific ways and techniques used by lecturers and learners to perform learning tasks, in accordance with the objectives, content, and specific teaching conditions.

### 2.2. Teaching Methods

Currently, teaching methods mainly fall into two groups: traditional teaching methods and active learning methods. Traditional teaching methods are lecturer-centered, with content delivered in a logical, systematic, and highly academic sequence. However, this method makes learners passively receive knowledge, lessons tend to be monotonous, and there is little emphasis on developing practical skills. Active learning methods are a system of teaching methods oriented towards promoting self-awareness, creativity and cooperation between learners and teachers. In the higher education environment of the digital economy, this method often includes the following forms:

*Online learning (E-learning):* Utilizing platforms such as Zoom, Google Classroom, Moodle and Coursera to deliver teaching content, allowing learners to access lectures anytime, anywhere, saving costs and optimizing self-study.

*Blended learning:* Combining in-person teaching and online learning; learners independently research digital materials before participating in discussions and practical exercises in class, thereby enhancing their proactiveness and ability to apply knowledge.

*Problem-Based Learning:* Instructors create real-world scenarios, requiring learners to analyze them, propose solutions, and derive new knowledge,

thereby developing critical thinking and problem-solving skills.

*Think-Pair-Share Method:* Learners work in pairs to discuss a topic for a set period before sharing with the class, helping to increase confidence and understanding.

*Group discussion method:* Classes are divided into groups of 5–7 people to complete learning tasks and provide feedback to each other, thereby developing collaboration and critical thinking skills.

*Project-based learning method:* Teaching is organized through practical projects, in which learners participate in designing and solving problems, thereby fostering creativity and teamwork.

*Case study:* Using professional scenarios for learners to analyze and make decisions under limited conditions, helping to improve their ability to apply knowledge to practice.

*Role-playing Method:* The role-playing method is an active learning method in which learners are assigned specific roles in a hypothetical or simulated real-life situation to recreate professional, social, or managerial contexts, thereby practicing problem-solving and decision-making. Role-playing places learners in the position of active participants, requiring them to apply their knowledge, skills, and attitudes to handle the situation according to their assigned role.

## 3. Research methodology

### Secondary Data Collection

To collect secondary data, the author collected documents on the detailed syllabi of all 24 courses and course project modules, graduation internships, and graduation theses of the Accounting and Accounting-Auditing training programs to gather information on the current state of application of teaching methods in these courses. Based on the above secondary data, a research database will be compiled.

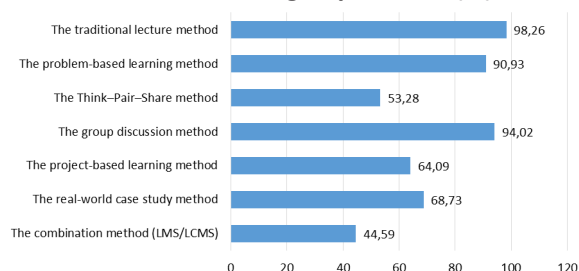
### Primary Data Collection

The author used primary data collection methods through surveys, interviews, and investigations. The interview subjects were lecturers from the Accounting Department. The total sample consisted of 30 lecturers. The purpose was to further clarify the implementation, deployment, and current state of application of information technology in teaching methods. The survey subjects were students from cohorts 19 to 22. The purpose was to evaluate the current teaching methods of the lecturers. A total of 518 quantitative samples were collected.

#### 4. Research results

To reflect the current teaching methods of the Accounting Department, through the course outlines and a survey of students regarding the teaching methods used by lecturers in training accounting students, the survey results on lecturers' teaching methods are shown in the following table:

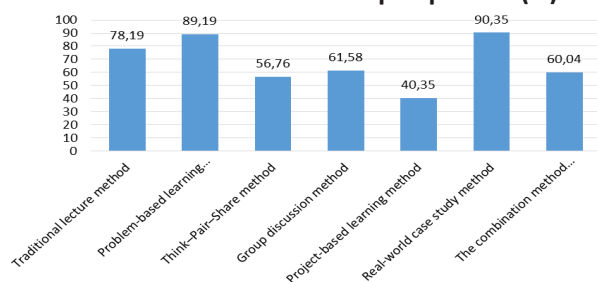
**Table 1: Current status of using teaching methods in the Accounting Department (%)**



Source: Compilation of survey results by the Author

At the same time, the author conducted a survey to gather feedback on the effectiveness of teaching methods from students. The evaluation results are shown in the following table:

**Table 2: Evaluation of the effectiveness of teaching methods from the learners' perspective (%)**



Source: Compilation of survey results by the Author

From the survey results in Table 01 and Table 02, there is a difference between the level of application and effectiveness of teaching methods in the Accounting Department. The traditional lecture method is used most often (98.26%) but its effectiveness only reaches 78.19%, showing that although it ensures the systematic nature and progress of the program, this method is limited in terms of interaction and promoting the learners' initiative, and needs to be combined with more active methods.

The group discussion method was applied in 94.02% of classes, but its effectiveness was only 61.58%. The main reasons were large class sizes, ineffective organization and management of discussions, and some group discussion activities being merely formalistic.

The case study method was applied at a rate of 68.73%, but its effectiveness was very high at 90.35%. This result reflects the students' interest and effective learning through the analysis of specific professional situations, linking theory with practice. Lecturers often use examples, accounting data, and financial reports from businesses to make lectures more lively and practical. However, a major limitation of this method is the limited availability of real-world data and the fact that the school has not yet implemented the creation of a virtual accounting department, thus limiting its application.

Project-based learning was used at an average rate of 64.09%, with learners rating its effectiveness at 40.35%. This is the lowest rate among the methods surveyed. Although this method has the potential to develop comprehensive skills, creative thinking, and teamwork management abilities, its effectiveness is not high because learners lack experience in planning, assigning tasks, and evaluating progress. Some instructors do not have sample project frameworks and specific evaluation criteria when implementing them for learners.

The Think-Pair-Share method has an adoption rate of 53.28% and an effectiveness rate of 56.76%. This is a highly interactive method that helps learners develop critical thinking and presentation skills. However, in large class sizes and with limited time, its implementation is challenging. Learners are hesitant and reluctant to share. The blended learning method has the lowest adoption rate at 44.59%, while achieving a relatively high effectiveness rate of 60.04%. Learners rated the blended learning method as effective, but noted limitations in infrastructure and technological skills. This method was considered effective, flexible in terms of learning time and space, and offered easy access to digital resources.

#### 5. Proposals for innovating accounting teaching methods in the context of digital transformation to meet ifrs approach requirements according to Circular 99/2025/TT-BTC

##### 5.1. For the School

##### Firstly, regarding physical infrastructure

The school plays a fundamental role in building a digital learning environment and ensuring the information technology infrastructure to support the innovation of accounting teaching methods in the era of digital transformation. Therefore, the school needs to invest in upgrading high-speed internet connections, a wireless network covering the entire

school campus; and building sufficiently powerful servers to operate the learning management system (LMS/LCMS) and the digital accounting database.

Invest in a virtual accounting simulator room equipped with powerful computers, specialized software (MISA, 1C), and high-quality video and audio recording equipment to support online and in-person teaching. The classroom system needs to be standardized to support interactive teaching that simulates real-world accounting practices.

Building a team of dedicated technical staff to manage, maintain, and upgrade the system periodically; having a plan to allocate stable, long-term funding to ensure information security, data confidentiality, and the stable operation of the system.

*Secondly, changes in accounting training methods*

To adapt to the requirements of the Fourth Industrial Revolution, the accounting training methods at the School need to be comprehensively and fundamentally reformed. In particular, applying the "Virtual Accounting Department" model to teaching is a practical solution to connect theory with practice, helping learners develop practical professional skills to meet the increasingly high demands of businesses and the labor market.

Currently, with the automation of accounting software, electronic documents, digital signatures and financial information flow and recording processes, schools need to shift to a digitalized training method, focusing on simulation, experience, and practical application to help learners apply their knowledge to specific professional situations.

Along with this, it is necessary to build and operate a simulation model of the entire business accounting process, from creating, checking and processing electronic documents to data aggregation and financial reporting. This model should integrate modern technologies such as cloud-based accounting software, ERP systems, electronic invoices and digital signatures, allowing learners to directly experience the digital accounting process in a simulated real-world work environment, thereby improving the quality of training and the professional competence of learners.

*Thirdly, improving the quality of lecturers and training support staffs*

Organize dissemination and training on the use of teaching and learning methods suitable for the blended learning approach for lecturers.

The school needs to have policies to support and encourage lecturers to improve their information technology skills, software usage skills, network systems and modern teaching tools. Emphasis should be placed on simulation research and human-computer interaction research.

Expand international cooperation with reputable professional organizations such as ACCA, CPA Australia and ICAEW so that lecturers can stay updated on global accounting training trends and access international teaching standards.

**5.2. For Departments and Faculties**

Firstly, departments and Faculties need to regularly review, evaluate, and update training programs in a modern direction, integrating internationally and aligning with the requirements of the digital economy.

Update professional content on International Financial Reporting Standards (IFRS), the Code of Ethics for Accountants and Auditors (IESBA Code) and new technologies such as data analytics, artificial intelligence, digital accounting, and blockchain in management and auditing. Courses such as Principles of Accounting, Financial Accounting 1 and 2, International Accounting, and Basic Auditing need to be updated to align with the ACCA, CPA Australia and AICPA programs.

Review the credit structure to increase the time allocated to practical training and applied modules, especially in subjects such as Business Accounting Practice, Secondary and Industrial Accounting Practice, IT Applications in Accounting, Accounting Information Systems and Financial Statement Auditing Practice. Practical sessions should be linked to real accounting software (MISA, 1C, Fast, etc.) to help learners access a real-world work environment.

Secondly, the Faculty and Departments need to strengthen links with businesses, professional organizations and management agencies to provide students with earlier access to professional practice, thereby consolidating knowledge, skills and clear career orientation.

Organize practical professional programs, in coordination with businesses, banks, and auditing firms, so that students can visit, intern and experience real-world accounting and auditing work.

Organize seminars, workshops, and professional forums, inviting accounting experts, auditors, financial directors, etc., to share experiences, professional case studies, and development trends in the digital age.



Connect with technology companies and international professional organizations: Strengthen cooperation with companies developing accounting software and accounting data mining (MISA, 1C) and international professional organizations such as ACCA, CPA Australia, and ICAEW. From there, the departments developed realistic learning outcomes, expanding opportunities for students to obtain international professional certifications.

### 5.3. For Lecturers

*Firstly*, lecturers need to diversify teaching methods, combining traditional methods with modern, active teaching methods, suitable to the specifics of each course. These methods include thinking-pair-sharing method, thinking-pair-sharing method, role-playing method, case study, project-based learning.

*Secondly*, instructors need to enhance multi-directional interaction with learners through LMS/LCMS systems, online discussion forums, or collaborative learning applications. Regularly provide feedback on learning outcomes, assignments and guidance to learners on correcting professional errors, especially in practical accounting and auditing courses. Encourage learners to provide feedback on teaching methods, so that instructors can promptly adjust content, approaches and assessment methods to be more appropriate.

*Thirdly*, applying modern technology in teaching: Lecturers need to effectively use accounting and auditing software (MISA, 1C, FAST, ERP, Power BI), interactive tools, and LMS/LCMS systems. Participating in professional and pedagogical development: Lecturers should regularly attend scientific seminars and workshops on innovative accounting teaching methods in the digital age and participate in training courses on active teaching methods and international training standards (IFRS, ACCA). Developing applied research capabilities: Combining scientific research with teaching to build case studies, open educational resources and practical simulation exercises suitable for each course module.

### 5.3. For Learners

*Firstly*, learners need to develop a habit of purposeful self-learning, proactively seeking and processing information from various sources.

For foundational courses, learners should proactively read materials, textbooks, legal documents and Vietnamese and international accounting standards in advance, then compare them to identify differences.

For specialized courses, learners should independently find real-world accounting case studies from corporate financial reports or professional articles to practice applying theory to practice.

For technology-based courses, learners should use accounting software (MISA, 1C) and data analysis tools (advanced Excel, Power BI).

Outside of class, students should participate in small study groups or collaborate with instructors on research activities to broaden their understanding and hone their skills in researching and analyzing practical accounting information.

*Secondly*, learners need to be proactive and engaged in both in-class and online learning

In active learning classes, students not only listen to lectures but also participate in discussions, debates, and presentations of their learning outcomes.

In discussion and analysis modules such as Management Accounting, Financial Accounting, and Financial Statement Preparation and Analysis, students need to prepare thoroughly, participate in discussions and share their personal opinions and hone their critical thinking and logical reasoning skills.

When learning through projects in courses like Business Accounting Practice or Accounting Information Systems, students must proactively assign tasks, coordinate in groups and ensure project completion on schedule.

On the LMS/LCMS system, students should proactively access it regularly to update materials, participate in discussions, complete assignments and provide timely feedback to instructors on any difficulties encountered during the learning process.

In addition, students need to maintain academic discipline, adhere to instructor requirements regarding assignment deadlines, fully participate in group activities and be ready to support and share experiences with their classmates.

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# THE INTERPLAY OF REGRET, BENEFIT PERCEPTIONS AND FINANCIAL WELL-BEING IN ONLINE SHOPPING CART ABANDONMENT

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**Abstract:** *This study applies Prospect theory to explain how regret and subjective evaluations of loss avoidance shape online shopping cart abandonment (OSCA). Based on qualitative interviews and a survey of 630 consumers, the model shows that regret predicts abandonment directly and indirectly through perceived benefits of not purchasing. PLS-SEM results confirm that regret strengthens all three benefit perceptions of OSCA. Financial well-being reduces OSCA and moderates personal finance benefits. The findings clarify the emotional-cognitive mechanisms driving OSCA and position regret as a central trigger.*

• Keywords: online shopping cart abandonment, regret, prospect theory, perceived financial well-being, perceived benefits.

Date of receipt: 21<sup>th</sup> Jan., 2026

Date of delivery revision: 15<sup>th</sup> Mar., 2026

DOI:

Date of receipt revision: 21<sup>th</sup> Mar., 2026

Date of approval: 28<sup>th</sup> Mar., 2026

## 1. Introduction

E-commerce continues to grow rapidly in both user base and revenue, yet this expansion is accompanied by persistently high levels of online shopping cart abandonment (OSCA). OSCA refers to the behavior in which consumers place items into their virtual carts but do not complete the purchase during the same session (Kukar-Kinney & Close, 2010). In Vietnam's fast-growing digital market, OSCA has emerged as a significant challenge for retailers. The national abandonment rate in 2024 ranged from 79.0% to 79.5%, meaning that only one in five carts resulted in a transaction (ECDB, 2024). This substantial loss of potential sales places added pressure on firms already competing in a crowded marketplace.

Prior studies have examined OSCA from situational, psychological, and behavioral perspectives. Recent findings highlight the impact of online shopping experiences, showing that complex payment procedures, information overload, strict return policies, and limited delivery options all increase abandonment (Sundjaja et al., 2024). Behavioral theories such as the Theory of Planned Behavior and Expectancy Disconfirmation Theory have further explained the roles of intention, perceived risk, and evaluation of alternatives in OSCA (Sharma & Srivastava, 2025). Nevertheless,

several gaps remain in the literature.

**First**, existing research tends to focus on platform, technological, or service-related factors, while paying limited attention to how consumers process and evaluate outcomes of suboptimal past purchases, particularly regret. Regret is an emotional state that meaningfully affects decision-making, yet its mechanism leading to OSCA behavior has not been thoroughly examined. Evidence from (Cho et al., 2006) indicates that “negative past experience” and “avoid regret/uncertain needs” are key triggers of shopping cart abandonment.

**Second**, the role of perceived financial well-being has not been explored in OSCA research, even though prior evidence (Netemeyer et al., 2018) shows that subjective financial conditions strongly shape consumers' risk-avoidance tendencies. Building on this insight, perceived financial well-being may influence how consumers evaluate the consequences of abandoning versus completing a purchase. When individuals feel financially secure, they tend to experience lower sensitivity to potential financial losses and may therefore treat abandonment as a low-risk, easily reversible decision.

To address these gaps, this study employs mixed methods and draws on Prospect theory (Kahneman & Tversky, 1979; Tversky & Kahneman, 1992). We argue that regret shifts consumers toward loss-

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avoidance thinking, increasing the perceived benefits of abandoning the cart, including (i) benefit related to product performance (seeking a better option), (ii) benefit related to purchasing at lower prices (waiting for discounts or comparing prices), and (iii) benefit related to personal finance (maintaining spending discipline). These three dimensions are expected to mediate the effect of regret on OSCA. In addition, perceived financial well-being is proposed as a moderator of these relationships.

## 2. Theoretical framework and hypothesis development

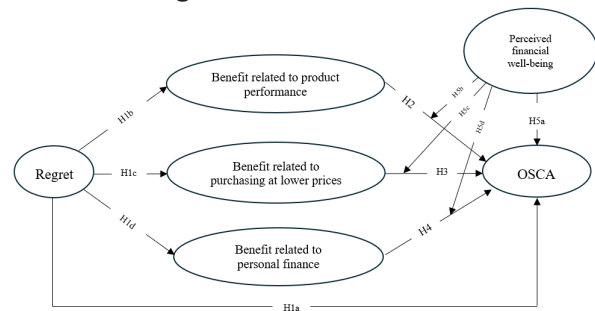
### 2.1. Prospect theory

Prospect theory (Kahneman & Tversky, 1979; Tversky & Kahneman, 1992) argues that individuals evaluate decisions in terms of perceived gains and losses rather than objective expected value. Because losses are psychologically more impactful than equivalent gains, people become loss-averse and prefer choices that minimize the chance of loss, even when such decisions delay or reduce potential benefits. In online shopping, each item placed in a cart represents potential losses, such as choosing an unsuitable product, overpaying, missing a better price, buying something unnecessary, or straining personal finances. When earlier purchases fall short of expectations, consumers may experience regret, a negative emotion triggered by comparisons with better imagined alternatives (Landman & Manis, 1992; Tsiros & Mittal, 2000). Prospect theory suggests that such past losses heighten future risk sensitivity, increasing the preference for inaction or maintaining the status quo (Kahneman & Miller, 1986). In the e-commerce environment, online shopping cart abandonment (OSCA) - placing items in the cart without completing the checkout process (Kukar-Kinney & Close, 2010) can therefore be viewed as a strategic form of loss avoidance achieved by preserving the status quo.

Building on this perspective, we propose that regret serves as a key antecedent of OSCA, functioning as a protective response intended to prevent repeated mistakes. Regret also reshapes how consumers interpret the benefits of abandonment, reframing them as “loss-prevention gains” rather than missed opportunities. Prior work by Cho et al. (2006) notes that negative past experiences increase abandonment but does not explain the underlying mechanism. Our model addresses this gap by proposing that regret influences OSCA both

directly and indirectly through three perceived benefit dimensions: product-performance benefits, price-related benefits, and personal-finance benefits. Furthermore, perceived financial well-being is introduced as a moderator that shapes the strength of these relationships. This study proposes the research model shown in Figure.

Figure 1. Research model



The following section on hypothesis development will incorporate propositions from prospect theory, the literature on online shopping cart abandonment, and findings from the interview research to propose hypotheses for this study.

### 2.2. Hypotheses development

#### 2.2.1. Regret and online shopping cart abandonment

Regret is one of the key negative emotions that individuals seek to avoid when making decisions (Inman et al., 1997; Loomes & Sugden, 1982). When regret arises, consumers become more cautious and tend to maintain the current state to minimize the risk of another loss (Kahneman & Miller, 1986; Tsiros & Mittal, 2000). In the context of online shopping, failing to complete the transaction and leaving the items in the shopping cart serves as a way for consumers to postpone the decision and avoid emotional discomfort.

*H1a: Regret positively affects OSCA behaviour*

#### 2.2.2. Perceived benefits of OSCA and OSCA behavior

Perceived benefits play an important role in shaping loss avoidance behavior. When consumers recognize that abandoning the shopping cart helps them avoid the risks of choosing the wrong product, overpaying, or experiencing financial strain, they are more inclined to adopt OSCA. In line with Prospect theory, the three dimensions of OSCA benefits have the potential to direct consumers toward abandoning their online shopping carts.



First, in-depth interviews reveal that consumers often abandon carts when they believe a better product is available, expect higher quality elsewhere, or wish to avoid unnecessary purchases by using what they already own. Consumer choice theory suggests that individuals seek to maximize utility within budget and preference constraints (Nicholson & Snyder, 2010; Varian, 2014). Much cart abandonment occurs during exploration and comparison, as consumers research options before committing (Xu & Huang, 2015). This comparative process helps them select better products and avoid premature, dissatisfying purchases. Thus, more substantial perceived product-performance benefits are likely to increase the pull toward online shopping cart abandonment.

*H2: Benefit related to product performance positively affects OSCA behaviour*

Secondly, more than half of the interviewees reported abandoning their carts to obtain better prices. Cart abandonment enables consumers to wait for discounts or seek lower prices on other platforms. Prior research shows that many abandon online carts but later buy the same item offline to avoid delivery (Wang, Cheah, et al., 2022). In Vietnam, in-store purchases may also be exempt from certain taxes. Studies consistently identify waiting for discounts as a key driver of OSCA (Kukar-Kinney & Close, 2010; Wang, Ye, et al., 2022). Thus, the perceived benefit of securing a lower price is likely to increase the pull toward abandonment.

*H3: Benefit related to purchasing at lower prices positively affects OSCA behaviour*

Thirdly, the interviewees explained that they abandon carts to control budgets, avoid unnecessary spending, and prevent credit strain. This aligns with evidence that financially literate consumers regulate expenditures more effectively, whereas those with lower financial knowledge are more prone to impulsive online purchases (Suyanto et al., 2025). In-depth interviews show that OSCA serves as a self-regulation strategy to limit overspending, save money, and avoid debt. Therefore, stronger perceptions of financial-related benefits are likely to increase the likelihood of online shopping cart abandonment.

*H4: Benefit related to personal finance positively affects OSCA behaviour*

#### 2.2.3 The mediating role of perceived benefits of OSCA

Prospect theory suggests that past poor purchases heighten regret, increasing consumers' sensitivity to potential losses in later decisions. This makes them more cautious about product fit, quality, and price, leading them to view cart abandonment as a safe delay while seeking better options. Regret over overpaying or overspending also amplifies attention to price and budget protection, making abandonment a strategy to wait for discounts or avoid unnecessary expense. Overall, regret strengthens loss-avoidance motives and enhances perceived benefits of abandoning the cart.

*H1b: Regret positively affects perceived benefits related to product performance.*

*H1c: Regret positively affects perceived benefits related to purchasing at lower prices.*

*H1d: Regret positively affects perceived benefits related to personal finance*

#### 2.2.4 The moderate role of Perceived financial well-being

Perceived financial well-being (Brüggen et al., 2017) reflects individuals' sense of security and control over their finances and is known to shape spending behavior (Hojman et al., 2016; Serido et al., 2013) and online shopping tendencies (Hampson et al., 2018; Tanoto & Evelyn, 2019). Those experiencing financial strain often prioritize saving and cutting non-essential expenses, making OSCA more likely. Interviewees similarly reported buying more readily when financially comfortable and delaying purchases when budgets felt tight. Beyond its direct influence, perceived financial well-being also moderates the extent to which perceived benefits translate into OSCA: saving money, avoiding waste, and delaying unnecessary purchases, which strengthens the influence of these benefits on OSCA, whereas financial security weakens them.

*H5a: Perceived financial well-being negatively affects OSCA behaviour*

*H5b: Perceived financial well-being moderates the relationship between benefit related to product performance and*

*H5c: Perceived financial well-being moderates the relationship between benefits related to purchasing at lower prices and OSCA*

*H5d: Perceived financial well-being moderates the relationship between benefit related to personal finance and OSCA*

### 3. Research methodology

#### Phase 1. Qualitative study

This study builds on the authors' prior research project examining psychological and behavioral drivers of online shopping cart abandonment. To align with the current Prospect theory framework, the original qualitative dataset was revisited and reanalyzed. The in-depth interviews with 30 Vietnamese online shoppers revealed that all five key factors proposed in the research model were consistent with Prospect theory. Together, these factors help explain why consumers choose to abandon their carts.

#### Phase 2. Quantitative study

**Table 1. Measurement items**

| Factors                                                                                                                                                                         | Sources                                                                                                                      |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| Regret (REG)                                                                                                                                                                    |                                                                                                                              |
| REG_1: Many times, I misjudged the product when I purchased it online.                                                                                                          | (David Clarke & Mortimer, 2013)                                                                                              |
| REG_2: Many times, I chose the wrong product while shopping online.                                                                                                             |                                                                                                                              |
| REG_3: Many times I thought that I should have bought a different product.                                                                                                      |                                                                                                                              |
| REG_4: I have often regretted some of my choices when shopping online.                                                                                                          |                                                                                                                              |
| REG_5: I have often felt that I spent beyond my means when shopping online.                                                                                                     |                                                                                                                              |
| Benefit related to purchasing at lower prices (BLP)                                                                                                                             |                                                                                                                              |
| BLP_1: Abandoning the online shopping cart may provide an opportunity to purchase the products at a later time with better promotions.                                          | Benefit related to purchasing at lower prices (BLP)<br>(Kukar-Kinney & Close, 2010)                                          |
| BLP_2: Abandoning the online shopping cart may lead to buying the products from another online store or platform with more attractive offers.                                   |                                                                                                                              |
| BLP_3: Abandoning the online shopping cart may result in purchasing the products from a physical (offline) store with better promotions.                                        |                                                                                                                              |
| BLP_4: Abandoning the online shopping cart may allow for purchasing the products elsewhere at lower or free shipping costs.                                                     |                                                                                                                              |
| BLP_5: Abandoning the online shopping cart may help buy the products from another place without being subject to taxes.                                                         |                                                                                                                              |
| Benefit related to product performance (BPP)                                                                                                                                    |                                                                                                                              |
| BPP_1: Abandoning the online shopping cart can lead to purchasing the products with better quality afterward.                                                                   | Benefit related to product performance (BPP)<br>Newly developed                                                              |
| BPP_2: Abandoning online shopping cart can lead to buying the products elsewhere with better after-sales service.                                                               |                                                                                                                              |
| BPP_3: Abandoning online shopping cart provides an opportunity to choose more satisfying products by shopping at physical stores (due to hands-on experience with the product). |                                                                                                                              |
| BPP_4: Abandoning online shopping cart helps optimize the use of existing products at home.                                                                                     |                                                                                                                              |
| BPP_5: Abandoning online shopping cart can lead to purchasing products that better suits actual usage needs.                                                                    |                                                                                                                              |
| Benefit related to personal finance (BPF)                                                                                                                                       |                                                                                                                              |
| BPF_1: Abandoning online shopping cart helps avoid unnecessary spending.                                                                                                        | Benefit related to personal finance (BPF)<br>Newly developed                                                                 |
| BPF_2: Abandoning online shopping cart helps save money for long-term goals                                                                                                     |                                                                                                                              |
| BPF_3: Abandoning online shopping cart helps avoid accumulating debt from credit cards                                                                                          |                                                                                                                              |
| BPF_4: Abandoning online shopping cart helps prevent overspending beyond one's financial means.                                                                                 |                                                                                                                              |
| Perceived financial well-being (FWE)                                                                                                                                            |                                                                                                                              |
| FWE_1: How do you feel about your current financial situation?                                                                                                                  | Perceived financial well-being (FWE)<br>(Gerrans et al., 2014; Hoang et al., 2023; Losada-Otálora & Alkire (Née Nasr), 2019) |
| FWE_2: How frequently do you find yourself just getting by financially and living from pay slip to pay slip?                                                                    |                                                                                                                              |
| FWE_3: How confident are you that you could find the money to pay for a financial emergency that costs more than your monthly income?                                           |                                                                                                                              |
| FWE_4: How often do you worry about being able to meet normal monthly living expenses?                                                                                          |                                                                                                                              |
| FWE_5: How satisfied are you with your present financial situation?                                                                                                             |                                                                                                                              |
| Online shopping cart abandonment behavior (OSCA)                                                                                                                                |                                                                                                                              |

| Factors                                                                                                                 | Sources                                                                       |
|-------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|
| OSCA_1: How often do you leave items in your online shopping cart without buying them?                                  | Online shopping cart abandonment behavior (OSCA) (Kukar-Kinney & Close, 2010) |
| OSCA_2: How often do you place an item in the online shopping cart, but do not buy it during the same Internet session? |                                                                               |
| OSCA_3: How often do you exit the page or close the app before completing your purchase?                                |                                                                               |
| OSCA_4: How often do you abandon your online shopping cart?                                                             |                                                                               |
| OSCA_5: How often do you review your online shopping cart and remove items before proceeding to checkout?               |                                                                               |
| Source(s): Authors' own work                                                                                            |                                                                               |

A quantitative survey was conducted to validate the measurement scales and test the proposed model, building on insights from the qualitative phase (See Table 1). All constructs were measured with five-point Likert scales, and a pilot test with 20 respondents ensured clarity. The main cross-sectional survey took place from December 2024 to February 2025 across five major Vietnamese cities (Hanoi, Ho Chi Minh, Danang, Hue, Bien Hoa). Using convenience sampling, eligible participants were required to have at least six months of online shopping experience and a history of cart abandonment. Trained assistants recruited respondents in public areas and administered both paper-based and online questionnaires, checking submissions to reduce missing data. Of the 676 collected surveys, 630 valid cases were retained. The demographic profile reflects Vietnam's online consumer population, with most respondents living in Hanoi and Ho Chi Minh City, high levels of tertiary education, and varied income levels. More than 60% reported over five years of online shopping experience, indicating a well-informed sample suitable for analyzing OSCA behavior.

### 4. Empirical results

#### 4.1. Assessment of the measurement scales

The measurement model was evaluated following the guidelines of (Hair & Alamer (2022)). Results show that most indicator loadings exceeded 0.70, demonstrating adequate indicator reliability. Loadings ranged from 0.712 to 0.871 for the predictor constructs and from 0.697 to 0.817 for OSCA, indicating stable item contributions. Construct reliability was supported, with Cronbach's alphas ranging from 0.810 to 0.854 and composite reliabilities ranging from 0.868 to 0.902, confirming strong internal consistency. Convergent validity was achieved, as all AVE values exceeded 0.50, ranging from 0.570 to 0.696.

Discriminant validity was established using both the Fornell-Larcker criterion and HTMT ratios. The square roots of the AVEs were greater than the inter-construct correlations, and all HTMT

values remained below 0.85, which is appropriate for theory-driven studies. Collectively, these results confirm that the measurement model demonstrates satisfactory reliability and validity, allowing progression to the structural model assessment.

#### 4.2. Structural model evaluation

The structural model was assessed using PLS-SEM. Multicollinearity was not a concern, as all VIF values ranged from 1.028 to 2.252, well below the threshold of 5. Path analysis results (Table 2) show that regret had a significant direct effect on online shopping cart abandonment (OSCA) ( $\beta = 0.416$ ,  $p < 0.001$ ), confirming its role as a primary driver of abandonment behavior. Regret also exerted significant positive effects on all three perceived benefit dimensions: benefits related to personal finance ( $\beta = 0.296$ ,  $p < 0.001$ ), benefits related to purchasing at lower prices ( $\beta = 0.303$ ,  $p < 0.001$ ), and benefits related to product performance ( $\beta = 0.297$ ,  $p < 0.001$ ). These results support hypotheses H1b to H1d.

All three perceived benefit dimensions were significant predictors of OSCA. Benefits related to product performance ( $\beta = 0.129$ ,  $p = 0.008$ ), lower prices ( $\beta = 0.155$ ,  $p = 0.001$ ), and personal finance ( $\beta = 0.128$ ,  $p = 0.002$ ) each showed positive effects, supporting hypotheses H2 through H4.

Perceived financial well-being (FWE) had a meaningful direct effect on OSCA ( $\beta = -0.113$ ,  $p = 0.001$ ), indicating that individuals who feel more financially secure are less likely to abandon their carts, consistent with hypothesis H5a. However, its moderating influence was only partially supported. FWE did not significantly moderate the relationships between lower-price benefits and OSCA ( $\beta = 0.046$ ,  $p = 0.324$ ) or between product-performance benefits and OSCA ( $\beta = -0.023$ ,  $p = 0.675$ ). In contrast, FWE significantly moderated the effect of personal-finance benefits on OSCA ( $\beta = -0.079$ ,  $p = 0.038$ ), supporting hypothesis H5d. Thus, financial well-being shapes only selected benefit-behavior links rather than exerting a uniform moderating effect.

The model accounted for 29.4 percent of the variance in OSCA ( $R^2 = 0.294$ ), an acceptable level given the complexity of consumer decision making. Overall, the structural model provides robust empirical support for the central role of regret and perceived benefits in explaining OSCA, alongside the direct influence of financial well-being.

**Table 2: Results of partial least squares - structural equation modeling**

| Path           | VIF   | Path coefficients | p value | R <sup>2</sup> | Hypothesis | Decision      |
|----------------|-------|-------------------|---------|----------------|------------|---------------|
| FWE → OSCA     | 1.028 | -0.113            | 0.001   | 0.294          | H5a        | Supported     |
| FWE*BLP → OSCA | 2.159 | 0.046             | 0.324   |                | H5c        | Not supported |
| FWE*BPF → OSCA | 1.425 | -0.079            | 0.038   |                | H5d        | Supported     |
| FWE*BPP → OSCA | 2.252 | -0.023            | 0.675   |                | H5b        | Not supported |
| BLP → OSCA     | 1.803 | 0.155             | 0.001   |                | H3         | Supported     |
| BPF → OSCA     | 1.352 | 0.128             | 0.002   |                | H4         | Supported     |
| BPP → OSCA     | 1.795 | 0.129             | 0.008   |                | H2         | Supported     |
| REG → BLP      | 1     | 0.303             | 0.000   |                | H1c        | Supported     |
| REG → OSCA     | 1.158 | 0.416             | 0.000   |                | H1a        | Supported     |
| REG → BPF      | 1     | 0.296             | 0.000   |                | H1d        | Supported     |
| REG → BPP      | 1     | 0.297             | 0.000   |                | H1b        | Supported     |

Note: BLP: Benefit related to purchasing at lower prices; BPP: Benefit related to product performance; BPF: Benefit related to personal finance; FWE: Perceived financial well-being; REG: Regret; OSCA: Online shopping cart abandonment behavior.

Source(s): Authors' own work

The model's predictive performance was assessed using PLS-Predict following Hair & Alamer (2022) followed by a discussion of situations in which PLS-SEM should be the method of choice for structural equation modeling. It is argued that PLS-SEM is appropriate when complex models are analyzed, when prediction is the focus of the research – particularly out-of-sample prediction to support external validity, when data do not meet normal distribution assumptions, when formative constructs are included, and when higher-order constructs facilitate better understanding of theoretical models. The most up-to-date guidelines for applying PLS-SEM are provided, and step-by-step guidance is offered on how to apply the method using an R statistical package (i.e., SEMinR). All OSCA indicators showed positive  $Q^2$  values (0.076-0.129), demonstrating that the PLS model outperformed the linear benchmark. PLS RMSE values were equal to or lower than those of the LM model, indicating stable predictive accuracy. Blindfolding yielded an overall  $Q^2$  of 0.16, surpassing the recommended threshold for behavioral research. These results confirm that the model demonstrates satisfactory predictive validity.

## 5. Conclusion

### 5.1. Discussion

This study extends the consumer behavior perspective in the context of online shopping cart abandonment by applying Prospect theory to explain the role of regret and how this emotion shapes consumers' perceptions of the benefits of abandoning the shopping cart. Regret also emerged as a positive driver, suggesting that negative prior purchase experiences heighten hesitation and avoidance (Cho et al., 2006). The quantitative results reinforce the



theoretical argument by showing that regret not only exerts a direct effect on OSCA but also strengthens three dimensions of perceived benefits, including product performance, lower prices, and personal finance. These benefit dimensions, therefore, serve as important mechanisms that translate regret into a preference for maintaining the status quo rather than completing the purchase.

The findings also reveal that lower perceived financial well-being was associated with higher abandonment, aligning with evidence that financial constraints prompt consumers to prioritise essential purchases and defer discretionary spending (Durante & Laran, 2016; Serido et al., 2013). However, the moderating effect of perceived financial well-being appeared only for the personal finance benefit dimension, suggesting that consumers with weaker financial conditions are more sensitive to the risk of overspending and thus place greater emphasis on the benefit of not buying as a way to preserve short-term financial security.

Overall, these findings help clarify the decision-making mechanism of consumers in online shopping cart contexts, a process shaped by emotions, subjective risk assessments, and self-protective motivations.

### 5.2. Academic and practical implications

This study advances OSCA research in three ways. It integrates regret into Prospect theory to clarify how emotional and cognitive loss-avoidance mechanisms operate in online shopping. It also validates three perceived benefits of cart abandonment as mediators, offering a broader explanatory structure beyond risk or cost-based models. Finally, it highlights the dual role of perceived financial well-being as both a direct predictor and a moderator in shaping digital purchase decisions. Practically, the findings suggest improving post-purchase experiences, enhancing price and product transparency, and offering supportive financial features to reduce regret-driven loss avoidance and lower cart abandonment.

### 5.3. Limitations and future research direction

This study has several limitations. The sample, collected from five major Vietnamese cities, may not capture regional differences, indicating the value of comparisons with rural areas or other countries. The cross-sectional design also restricts understanding of how regret or financial well-being evolves over time, and studies using longitudinal or experimental methods could strengthen causal interpretations.

Although the model demonstrates acceptable predictive power, the modest  $R^2$  for OSCA suggests that other factors, such as social influence, shopping habits, or perceived risks, may also play an important role in shaping abandonment behavior.

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# THE IMPACT OF DIGITAL TRANSFORMATION LEADERSHIP ON FACULTY DEVELOPMENT AT UNIVERSITIES IN HANOI

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**Abstract:** *This study aims to assess the impact of digital transformation leadership on faculty development at universities in Hanoi. Drawing on transformational leadership theory and digital competency frameworks in higher education, the study proposes a research model in which digital transformation leadership is the independent variable, faculty development is the dependent variable, and organizational culture and technological readiness serve as mediating variables. Data are expected to be collected through a structured questionnaire survey of lecturers using a 5-point Likert scale. SEM/PLS-SEM is proposed as the analytical technique to examine causal relationships among the variables. The study is expected to provide empirical evidence clarifying the central role of digital transformation leadership in lecturers' professional competence, teaching innovation, and career effectiveness, and to inform appropriate governance policies for higher education institutions in Hanoi.*

• Keywords: digital transformation leadership; faculty development; higher education; Hanoi; human resources; SEM.

JEL codes: A22, I25, O33

Date of receipt: 21<sup>th</sup> Jan., 2026

Date of delivery revision: 15<sup>th</sup> Mar., 2026

DOI:

Date of receipt revision: 19<sup>th</sup> Mar., 2026

Date of approval: 28<sup>th</sup> Mar., 2026

## 1. Theoretical and Practical Background

### 1.1. Digital transformation in higher education and the need for digital leadership

In the digital era, higher education institutions face pressures from emerging technologies, changing teaching-learning models, demands for agile governance, and the need to enhance faculty capabilities. Digital transformation in higher education is not merely the adoption of technology; rather, it is a comprehensive restructuring of teaching, learning, and governance models to meet the demands of the digital age (Tien, 2023).

Accordingly, digital leadership emerges as a decisive factor - leaders must possess a strategic digital vision while being able to lead change, develop human capacity, and build appropriate infrastructure to ensure successful digital transformation.

### 1.2. The concept of digital leadership in higher education

In universities, the terms "technology leadership" or "digital leadership" are commonly used to refer to the leadership capacity of academic managers and leaders to promote ICT use, pedagogical innovation, faculty support, and a digital academic environment. Zhang, Adams, and Lee (2022) show that university leaders' technology leadership directly influences lecturers' ICT competency - lecturers' technological

capability improves when leaders perform their technology-leadership roles effectively. Zhang et al. (2022) conceptualize digital leadership across dimensions such as technological support, strategic vision, communication, change management, and encouragement for technology adoption. Their study of 298 lecturers at a Chinese university finds that all dimensions of digital leadership have statistically significant positive effects on lecturers' ICT competencies.

These findings confirm that digital leadership is not merely about purchasing software or hardware; it is fundamentally about leading people - supporting, guiding, and training - so that technology is used effectively.

### 1.3. Faculty competency development in the digital era

Faculty development in the digital era spans multiple dimensions: pedagogical competence, technological competence, instructional innovation, digital content design, and the application of ICT in teaching and research. A recent review in Vietnam identifies the development of digital competencies for university lecturers as an urgent requirement for sustainable digital transformation (Tran Trung & Trinh Thi Phuong Dung, 2025).

These competency frameworks often reference

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international standards such as the EU's DigCompEdu, including the use of technology for teaching, digital learning design, online assessment, and digital learner support (Tran Trung & Trinh Thi Phuong Dung, 2025). Consequently, without adequate support for developing digital competencies even with advanced technologies in place digital transformation is unlikely to be sustainable.

#### **1.4. Organizational culture and technological readiness as mediators**

##### **1.4.1. Organizational culture and support for innovation**

Many studies show that organizational culture especially cultures that promote innovation, continuous learning, and openness to change strongly influences successful technology adoption and pedagogical innovation. When organizations encourage sharing, experimentation, and digital learning, lecturers are more willing to learn, adopt technology, and innovate in teaching (Tien, 2023). Organizational culture also shapes attitudes toward change; unsupportive environments tend to foster resistance.

##### **1.4.2. Technological readiness**

Technological readiness including ICT infrastructure, technical systems, technical support, policies, and training is a necessary material condition for digital transformation. Zhang et al. (2022) demonstrate that digital leadership improves technological readiness, which in turn enhances lecturers' ICT competencies. Without adequate infrastructure and technical support, digital initiatives are constrained lecturers lack tools and assistance resulting in limited application of technology in teaching, learning materials, and research.

#### **1.5. International empirical evidence on the effects of digital leadership on teaching effectiveness and faculty development**

Recent empirical studies illustrate the link between digital leadership and faculty development/teaching effectiveness:

Kong & Gat-eb (2025) at a Chinese university find that digital leadership positively affects teaching effectiveness as perceived by lecturers, despite existing policy, training, and infrastructure barriers.

Zhang et al. (2022) show that university technology leadership positively affects lecturers' ICT competency, manifested in technology use and integration in teaching.

Tien (2023) in Vietnam emphasizes digital

competency development as a strategic pillar for sustainable transformation and identifies influencing factors such as organizational support, individual motivation, policy, and infrastructure.

In addition, cross-national and experimental evidence shows that when teachers/lecturers possess digital competencies, receive leadership support, and operate within innovative cultures with strong infrastructure, the adoption of technology in teaching, digital learning, research collaboration, and pedagogical innovation increases markedly.

## **2. Research Model and Hypotheses**

### **2.1. Basis for Developing the Research Model**

Recent studies indicate that digital leadership (technology leadership) is a foundational driver of digital transformation in educational institutions, influencing lecturers' innovative behavior, technological competence, and performance (Ghamrawi, 2023; Obied, 2025; Zhang et al., 2022). From the perspective of transformational leadership, leadership extends beyond administration to encompass vision building, leading change, and cultivating human capabilities in the digital context (Bass & Riggio, 2006).

In addition, organizational culture functions as a key mediating mechanism that translates leadership orientation into lecturers' actual innovative behaviors, because a learning-innovation culture strongly shapes attitudes, motivation, and readiness for change (Denison & Mishra, 1995). In parallel, technological readiness provides the material and technical foundation and organizational capability that enables leaders' digital policies to be implemented effectively (Parasuraman, 2000).

Empirical evidence confirms that digital leadership enhances lecturers' ICT competence and technology integration behaviors (Zhang et al., 2022), improves teaching effectiveness through digital innovation (Muslim et al., 2024), and promotes knowledge sharing and innovation within academic organizations (Pu et al., 2024). Studies in Vietnam and the ASEAN region further show that digital leadership affects lecturers' performance and organizational citizenship behavior (Maheshwari, 2023; Malik et al., 2025).

Building on these insights, this study integrates four theoretical streams (i) transformational leadership, (ii) organizational culture, (iii) technological readiness, and (iv) faculty development to develop a model that simultaneously tests the direct and indirect (mediated) effects of digital leadership on faculty development in universities in Hanoi.



## 2.2. Hypothesis Development

### 2.2.1. Digital transformation leadership and faculty development

Empirical studies show that digital leadership significantly influences lecturers' innovative behavior, technology integration, and job performance (A'Mar & Eleyan, 2022; Karakose et al., 2021; Zhang et al., 2022). Effective digital leadership is typically associated with a technology vision, training support, encouragement of experimentation, and resource provision, thereby enhancing lecturers' digital-pedagogical competence and professional performance (Obied, 2025).

*Hypothesis 1: Digital transformation leadership positively affects faculty development.*

### 2.2.2. Digital transformation leadership and organizational culture

Leadership is a primary architect of culture. In the digital context, leaders shape norms of innovation, continuous learning, and collaboration, thereby fostering a culture that embraces technology and pedagogical innovation (Denison & Mishra, 1995; Ghamrawi, 2023). Empirical evidence shows that digital leadership improves knowledge-sharing culture and the innovation climate in universities (Anwar & Saraih, 2024; Pu et al., 2024).

*Hypothesis 2: Digital transformation leadership positively affects organizational culture.*

### 2.2.3. Organizational culture and faculty development

A learning-innovation culture enhances intrinsic motivation, knowledge sharing, and readiness for change among lecturers, thereby improving professional competence and teaching-research outcomes (Denison & Mishra, 1995; Rasdiana & Nurhadi, 2024).

*Hypothesis 3: Organizational culture positively affects faculty development.*

### 2.2.4. Digital transformation leadership and technological readiness

Digital transformation leadership directly affects infrastructure investment, IT policies, and digital skills training the core components of technological readiness (Parasuraman, 2000). Evidence at the university level shows that technology leadership increases lecturers' ICT competence and technology use (Zhang et al., 2022).

*Hypothesis 4: Digital transformation leadership positively affects technological readiness.*

### 2.2.5. Technological readiness and faculty development

Technological readiness enables digital teaching-learning, data utilization, and assessment innovation, thereby enhancing lecturers' professional effectiveness and student learning value (Sun & Yoon, 2025).

*Hypothesis 5: Technological readiness positively affects faculty development.*

### 2.2.6. The mediating roles of organizational culture and technological readiness

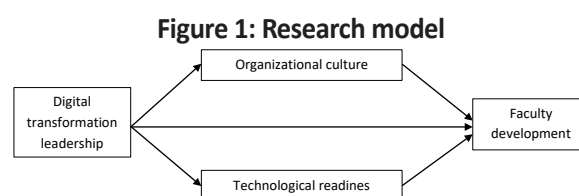
Recent studies emphasize digital transformation leadership as a "system lever" that shapes professional outcomes through cultural and infrastructural mechanisms (Pu et al., 2024; Muslim et al., 2024). This suggests that an innovation-oriented organizational culture and technological readiness serve as mediating channels through which leadership vision is translated into faculty capabilities and behaviors.

*Hypothesis 6: Organizational culture mediates the relationship between digital transformation leadership and faculty development.*

*Hypothesis 7: Technological readiness mediates the relationship between digital transformation leadership and faculty development.*

## 2.3. Research Model

Based on the theoretical foundations and hypotheses, the proposed research model is presented below.



Source: Compiled and proposed by the author

## 3. Research Methodology

This study employs a quantitative approach with a cross-sectional survey design to examine the relationships between digital transformation leadership and faculty development, as well as the mediating roles of organizational culture and technological readiness. This approach is appropriate for simultaneously testing the measurement model and the structural model using SEM/PLS-SEM procedures (Hair et al., 2019).

The target population comprises university lecturers in Hanoi from both public and private institutions. A sample of approximately  $n \approx 350$  is selected using controlled convenience sampling (by type of institution, age group, and academic field). The

sample size meets SEM/PLS-SEM recommendations for estimation stability (Hair et al., 2019). After data collection, the dataset is cleaned and analyzed using specialized software (SPSS) for statistical analysis.

#### 4. Research Results

##### 4.1. Descriptive Statistics of the Sample

The sample includes 350 lecturers currently working at universities in Hanoi. The sample profile is as follows:

Gender: approximately 55% female and 45% male.

Age groups: those aged 30-39 and 40-49 constitute the largest shares (over 60% of the sample).

Teaching experience: an average of about 12 years, indicating a relatively stable and experienced faculty cohort.

Institution type: about 70% work at public universities, with the remainder at private institutions.

Academic fields: economics and social sciences account for the largest proportion, followed by engineering/technology and other fields.

This sample structure reasonably reflects the profile of university faculty in Hanoi.

##### 4.2. Reliability Testing of Measurement Scales

Scale reliability is assessed using Cronbach's Alpha coefficients and Corrected Item-Total Correlations.

**Table 1. Cronbach's Alpha Results**

| Scales                      | Observed variables | Cronbach's Alpha | Corrected Item-Total Correlation | Conclusions |
|-----------------------------|--------------------|------------------|----------------------------------|-------------|
| Lãnh đạo chuyển đổi số (DL) | DL1-DL5            | 0.89             | 0.62-0.78                        | Đạt         |
| Văn hóa tổ chức (OC)        | OC1-OC4            | 0.86             | 0.58-0.74                        | Đạt         |
| Sẵn sàng công nghệ (TR)     | TR1-TR4            | 0.83             | 0.55-0.71                        | Đạt         |
| Phát triển giảng viên (FD)  | FD1-FD5            | 0.88             | 0.60-0.77                        | Đạt         |

Source: Results of data analysis using SPSS 26

All scales meet the reliability criteria ( $\alpha > 0.7$ ). The item-total correlation coefficients of all observed variables are greater than 0.3; therefore, no variables were removed from the model.

##### 4.3. Exploratory Factor Analysis (EFA)

EFA was conducted on 18 observed variables.

**Table 2: KMO and Bartlett's Test**

|                                                  |         |
|--------------------------------------------------|---------|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | ,91     |
| Bartlett's Test of Sphericity                    | 2,436.5 |
| Approx. Chi-Square                               | 903     |
| df                                               | ,000    |
| Sig.                                             |         |

Source: Results of data analysis using SPSS 26

**Table 3. Total Variance Explained**

| Nhân tố | Eigenvalue | % variance | cumulative % |
|---------|------------|------------|--------------|
| 1       | 5.84       | 32.4%      | 32.4%        |
| 2       | 3.12       | 17.3%      | 49.7%        |
| 3       | 2.10       | 11.7%      | 61.4%        |
| 4       | 1.27       | 7.0%       | 68.4%        |

Source: Results of data analysis using SPSS 26

The results indicate that: KMO = 0.91 ( $> 0.5$ ), confirming that the data are suitable for factor analysis. Bartlett's Test is significant with Sig.  $< 0.001$ , indicating that the variables are sufficiently correlated. EFA extracts four factors corresponding to the four theoretical constructs, with a total variance explained of 68.4% ( $> 50\%$ ). All factor loadings are greater than 0.6. These results confirm that the measurement structure fits well with the proposed theoretical model.

##### 4.4. Confirmatory Factor Analysis (CFA)

CFA is employed to validate the measurement model. Model fit indices:

**Table 4. Rotated Component Matrix (Varimax)**

| Observed variables | Factors 1 (DL) | Factors 2 (OC) | Factors 3 (TR) | Factors 4 (FD) |
|--------------------|----------------|----------------|----------------|----------------|
| DL1                | 0.81           |                |                |                |
| DL2                | 0.78           |                |                |                |
| DL3                | 0.75           |                |                |                |
| DL4                | 0.80           |                |                |                |
| DL5                | 0.77           |                |                |                |
| OC1                |                | 0.76           |                |                |
| OC2                |                | 0.73           |                |                |
| OC3                |                | 0.79           |                |                |
| OC4                |                | 0.71           |                |                |
| TR1                |                |                | 0.74           |                |
| TR2                |                |                | 0.77           |                |
| TR3                |                |                | 0.72           |                |
| TR4                |                |                | 0.70           |                |
| FD1                |                |                |                | 0.78           |
| FD2                |                |                |                | 0.75           |
| FD3                |                |                |                | 0.80           |
| FD4                |                |                |                | 0.77           |
| FD5                |                |                |                | 0.74           |

Source: Results of data analysis using SPSS 26

All fit indices meet acceptable thresholds, indicating that the measurement model fits the data well. The tests of convergent and discriminant validity show that AVE for all constructs is greater than 0.5 and CR exceeds 0.7. The Fornell-Larcker criterion indicates that the square roots of AVE are greater than the inter-construct correlation coefficients. Accordingly, the scales demonstrate good convergent and discriminant validity.

##### 4.5. Structural Equation Modeling (SEM) Results

**Table 5. SEM Model Fit Indices**

| Index       | Value | Threshold   | Assessment |
|-------------|-------|-------------|------------|
| CFI         | 0.93  | $\geq 0.90$ | Tốt        |
| TLI         | 0.92  | $\geq 0.90$ | Tốt        |
| RMSEA       | 0.061 | $\leq 0.08$ | Đạt        |
| $\chi^2/df$ | 2.31  | $\leq 3$    | Đạt        |

Source: Results of data analysis using SPSS 26

The SEM results indicate that the model fits the data well. The tested relationships are presented as follows:

**Table 6. Hypothesis Testing Results**

| Hypothesis | Path                | Standardized Coefficient ( $\beta$ ) | p-value   | Result    |
|------------|---------------------|--------------------------------------|-----------|-----------|
| H1         | DL $\rightarrow$ FD | 0.31                                 | $< 0.001$ | Chấp nhận |
| H2         | DL $\rightarrow$ OC | 0.58                                 | $< 0.001$ | Chấp nhận |
| H3         | OC $\rightarrow$ FD | 0.29                                 | $< 0.001$ | Chấp nhận |
| H4         | DL $\rightarrow$ TR | 0.52                                 | $< 0.001$ | Chấp nhận |
| H5         | TR $\rightarrow$ FD | 0.26                                 | $< 0.01$  | Chấp nhận |

Source: Results of data analysis using SPSS 26

**Table 7. Coefficients of Determination ( $R^2$ )**

| Dependent variables | $R^2$ |
|---------------------|-------|
| OC                  | 0.34  |
| TR                  | 0.27  |
| FD                  | 0.48  |

Source: Results of data analysis using SPSS 26

From Tables 6 and 7, it can be observed that  $R^2$  for OC = 0.34;  $R^2$  for TR = 0.27; and  $R^2$  for FD = 0.48. This indicates that the model explains nearly 48% of the variance in faculty development.

#### 4.6. Mediation Testing

A bootstrap procedure with 5,000 resamples was used to test the mediating effects:

**Table 7. Mediation Test Results**

| Mediating relationship               | Mediating relationship | p-value | Conclusion            |
|--------------------------------------|------------------------|---------|-----------------------|
| DL $\rightarrow$ OC $\rightarrow$ FD | 0.17                   | < 0.01  | Trung gian có ý nghĩa |
| DL $\rightarrow$ TR $\rightarrow$ FD | 0.14                   | < 0.05  | Trung gian có ý nghĩa |

Source: Results of data analysis using SPSS 26

### 5. Discussion

#### 5.1. Digital Transformation Leadership and Faculty Development

The results show that digital transformation leadership has a significant direct impact on faculty development ( $\beta = 0.31$ ;  $p < 0.001$ ), confirming the central role of leadership in the digital transformation of universities in Hanoi.

This finding is consistent with the theoretical literature on digital leadership in higher education, which emphasizes that leaders are not only technology policymakers, but also architects of digital vision, drivers of pedagogical innovation, and motivators enabling faculty to adapt to digital environments (Onan, 2024; Zeike et al., 2019).

In the Vietnamese context, where technology investment is sometimes “symbolic,” this result implies that effective faculty development does not arise from technology alone, but from leadership capacity to organize, lead, and strategically implement digital transformation.

#### 5.2. The Role of Organizational Culture in Faculty Development

The analysis indicates that organizational culture is both strongly influenced by digital transformation leadership ( $\beta = 0.58$ ;  $p < 0.001$ ) and exerts a significant direct effect on faculty development ( $\beta = 0.29$ ;  $p < 0.001$ ), underscoring its pivotal mediating role.

This finding aligns with Denison and Mishra (1995), who regard organizational culture as an “invisible foundation” shaping members’ behaviors, attitudes, and readiness for innovation.

When organizational culture encourages continuous learning, embraces innovation and experimentation, and fosters collaboration in teaching and research, faculty members become more proactive in enhancing professional competencies, adopting technology, and improving teaching methods.

In Hanoi’s higher education context characterized by wide variation in institutional types and ICT investment levels differences in organizational culture may explain uneven levels of faculty development across universities.

#### 5.3. Technological Readiness and Faculty Development

The study also shows that technological readiness positively affects faculty development ( $\beta = 0.26$ ;  $p < 0.01$ ), while digital transformation leadership significantly enhances technological readiness ( $\beta = 0.52$ ;  $p < 0.001$ ).

This suggests that when universities provide adequate ICT infrastructure, technical support, and digital skills training, faculty members are better positioned to innovate teaching and improve professional outcomes.

These findings are consistent with prior studies on organizational readiness for change and technological readiness in education, which argue that readiness is necessary but not sufficient: without strategic leadership and an innovation-oriented culture, technology cannot realize its full potential (Parasuraman, 2000; Onan, 2024).

#### 5.4. The Mediating Roles of Organizational Culture and Technological Readiness

Bootstrap results confirm that both organizational culture and technological readiness significantly mediate the relationship between digital transformation leadership and faculty development. Organizational culture exerts the stronger mediating effect, while technological readiness plays a complementary role.

Digital transformation leadership does not influence outcomes in a “mechanical” manner; rather, it operates by building an innovation-friendly environment, shaping learning practices, and establishing academic digital infrastructure. These findings contribute to the literature by positioning digital leadership as a form of system leadership that concurrently shapes organizational structures, people, and technology.

### 6. Managerial Implications

Based on the results of the structural model and international empirical evidence on digital leadership



in education, several specific managerial implications for universities in Hanoi can be proposed as follows.

*Develop digital leadership as a strategic pillar:* The findings show that digital transformation leadership has significant direct and indirect effects on faculty development. This suggests that universities need to consider digital academic leadership as a core pillar of organizational development strategy rather than merely as a “supporting skill” for academic managers. Recent studies indicate that digital leadership of university leaders strongly influences faculty digital competence, technology use behaviors, and digital transformation effectiveness at the institutional level (Zhu et al., 2024; Jing, 2025). Accordingly, universities should design structured digital leadership development programs for rectorate boards and deans/department heads, focusing on digital strategic thinking, data governance, evidence-based decision making, change management, and digital communication. Digital leadership competence should be incorporated into criteria for appointment, performance evaluation, and leadership succession planning, for example, requiring evidence of implementing digital initiatives and organizing digital professional development activities for faculty members. Universities should encourage middle-level leaders (deans and department chairs) to become “change agents” in coordinating digital transformation activities at the unit level, consistent with research on e-leadership in building professional learning organizations (Sterrett, 2020).

*Build an innovation-oriented and digitally enabled organizational culture:* The model results show that organizational culture is both strongly influenced by digital leadership and a critical mediating variable in the relationship with faculty development. This implies that managerial interventions should not stop at the level of “technology projects” but must aim to restructure organizational culture toward encouraging experimentation with digital pedagogy and accepting managed risk-taking, promoting the sharing of experiences and digital resources within and across faculties, and recognizing and rewarding innovations in digital teaching and learning. Universities may establish professional learning communities around the theme of digital transformation, where faculty collaboratively design, pilot, and reflect on digital teaching models, as studies indicate that such communities are important channels through which digital leadership is translated into classroom-level change (Sterrett, 2020; Rasdiana & Nurhadi, 2024). Universities should design recognition and reward

mechanisms directly linked to digital innovation outputs such as digital learning materials, online courses, blended learning models, and OER, rather than relying primarily on traditional workload indicators or academic publications. Universities should embed the values of lifelong learning, knowledge sharing, cross-department collaboration, and readiness for innovation into institutional regulations, policies, and routine practices, as research shows that these values are core components of a culture that supports digital transformation (Onan, 2024).

*Strengthen technological readiness aligned with faculty development:* The mediating effect of technological readiness shows that ICT infrastructure and the digital ecosystem are necessary conditions for digital transformation to support faculty development. However, numerous studies warn that investment in technology alone without accompanying capacity building and supportive policies leads to “underutilized technology” (AlAjmi, 2022; Obied, 2025). At the strategic level, universities should develop a digital competency framework for faculty members based on international standards such as DigCompEdu, and then design digital career development pathways tailored to different groups of lecturers. Universities should ensure consistency between institutional ICT strategy and faculty development orientation, for example, implementation of an LMS or e-assessment system must be accompanied by requirements for developing faculty competence in digital learning design. At the operational level, universities should establish learning innovation centers or edtech units responsible for providing digital pedagogy consultation, technical support, and co-design of digital courses with faculty. Professional development programs should be redesigned in a scaffolded manner, shifting from technology-heavy training courses to contextualized programs with one-to-one consultation, mentoring, and long-term monitoring of faculty progress.

*Link digital leadership development with performance evaluation and faculty development:* Universities should integrate digital transformation-related indicators into the performance evaluation system for administrators, such as faculty participation in digital training programs, the number of technology-enhanced courses, and levels of LMS and OER utilization. At the same time, universities should avoid “coercive digitalization” metrics that count only logins or file uploads, but instead focus on substantive changes in teaching and learning, such as meaningful online interaction, active learning design, and the use of

learning analytics to improve instruction. Universities may develop a system of digital faculty development indicators that directly link leadership efforts (policies, support, and training) with outputs such as digital teaching competence, pedagogical innovation, and student learning effectiveness.

*Implications for state agencies and system-level policy:* Beyond the institutional level, the findings also suggest policy implications at the national level. Regulatory bodies such as the Ministry of Education and Training and related ministries should treat digital leadership in higher education as a priority axis in the national digital transformation strategy rather than focusing solely on infrastructure. International reports such as OECD Digital Education Outlook 2023 emphasize the role of leadership and workforce digital capacity in building effective digital education ecosystems. A national program for developing digital leadership among university leaders should be established, similar to existing educational management training programs but with a focus on digital governance, data management, AI in education, and building digital learning organizations. Financial mechanisms and incentive policies should be strengthened to encourage universities to establish digital innovation centers, teaching support units, and digital learning laboratories, accompanied by requirements for outcome-based reporting on their impacts on faculty development. Support should also be provided for research and pilot projects on digital leadership and faculty development in digital transformation, especially in local university clusters, to generate evidence for policy refinement.

## Conclusion

This study aims to examine the impact of digital transformation leadership on faculty development in the context of universities in Hanoi. Based on a structural equation modeling analysis with a sample of 350 lecturers, the study provides empirical evidence showing that:

*First*, digital transformation leadership has a direct and positive effect on faculty development.

*Second*, digital transformation leadership strongly influences the formation of an innovative organizational culture and enhances the level of technological readiness.

*Third*, organizational culture and technological readiness play important mediating roles, transmitting the effects of leadership to faculty development outcomes.

These results indicate that digital transformation in higher education cannot be effective if it focuses solely on technology investment; instead, it requires a comprehensive strategy integrating leadership, organizational culture, and human resource development.

Despite its contributions, the study has several limitations. The research scope is limited to Hanoi; the cross-sectional survey design does not capture changes over time; and the self-reported data may be subject to subjective bias.

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# FACTORS AFFECTING THE QUALITY OF MANAGEMENT ACCOUNTING INFORMATION SYSTEMS IN COMMERCIAL ENTERPRISES IN THAI NGUYEN PROVINCE

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**Abstract:** *This study aims to identify and measure the factors affecting the quality of Management Accounting Information Systems (MAIS) in commercial enterprises in Thai Nguyen province. Data were collected from 407 enterprises through a survey. The research results indicate that seven factors have a positive and statistically significant impact on the quality of MAIS. Among them, system integration, digital technology, and the qualifications of accounting staff are the most influential factors. This study contributes to the existing literature by providing empirical evidence on the determinants of MAIS quality in commercial enterprises, while also offering a scientific basis for proposing managerial implications to enhance system effectiveness in the future.*

• Keywords: management accounting information system; quality; commercial enterprises; digital technology; Thai Nguyen.

Date of receipt: 20<sup>th</sup> Jan., 2026

Date of delivery revision: 14<sup>th</sup> Mar., 2026

DOI:

Date of receipt revision: 18<sup>th</sup> Mar., 2026

Date of approval: 30<sup>th</sup> Mar., 2026

## 1. Introduction

In the context of globalization and rapid digital transformation, enterprises are increasingly facing intense competitive pressure and the need for timely and accurate decision-making. In such an environment, Management Accounting Information Systems (MAIS) have become an essential tool for collecting, processing, and providing information to support managerial and operational activities. The quality of MAIS directly affects decision-making effectiveness, thereby influencing firms' competitiveness and sustainable development.

In Vietnam, particularly in commercial enterprises, the application of MAIS remains limited. Many firms, especially small and medium-sized enterprises, still primarily focus on financial accounting and have not fully exploited the role of management accounting. In addition, the lack of synchronized technological development, the quality of accounting human resources, as well as limitations in processes and data, have hindered the effective operation of these systems. In practice, commercial enterprises in Thai Nguyen province are in the process of transformation and adaptation to the new business environment. However, the quality of MAIS has not yet met the requirements of modern management. Therefore, examining the factors affecting the quality of

MAIS is necessary to identify key determinants and propose appropriate solutions. Based on this context, this study aims to analyze and evaluate the impact of various factors on the quality of MAIS in commercial enterprises in Thai Nguyen province, thereby providing a scientific basis for improving the system and enhancing managerial effectiveness within enterprises.

## 2. Literature Review

In recent years, factors affecting the quality of Accounting Information Systems (AIS) and MAIS have attracted significant attention from scholars. This interest stems from the increasingly important role of accounting information in supporting decision-making, especially in the context of digital transformation.

Early international studies focused on measuring system quality through user satisfaction and the effectiveness of information provision. Ives, Olson, and Baroudi (1983) emphasized user satisfaction, while Raymond (1990) and Gatian (1994) highlighted the role of information systems in improving organizational performance. Later studies expanded to incorporate technological, organizational, and human factors, such as Nicolaou (2000), Rom and Rohde (2007), Salehi et al. (2010), and Grande et al. (2011). Notably, the model developed by DeLone and McLean (2016) is

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considered a foundational framework for evaluating information system quality.

In Vietnam, empirical studies have also identified various factors influencing AIS quality. Nguyen Thi Duc Hieu (2021) found that managerial involvement, organizational structure, accounting staff, and information technology all have positive impacts, with managerial involvement being the most significant. Nguyen Van Hai et al. (2024) identified factors such as managerial knowledge, employee competence, user participation, and organizational culture as key determinants of system quality. Meanwhile, Duong Thi Luyen (2024), in the context of digital transformation, emphasized the importance of human resource capability, technological infrastructure, process automation, and internal control.

However, most domestic studies focus on AIS in general, without in-depth analysis of MAIS and its role in supporting internal managerial decision-making. Moreover, there is a lack of integrated models that simultaneously examine multiple factors within a unified theoretical framework, particularly in the context of commercial enterprises. Therefore, this study builds upon previous research and develops an appropriate model to analyze the factors affecting MAIS quality in commercial enterprises in Thai Nguyen province.

### 3. Quality of Management Accounting Information Systems in Enterprises

The quality of Management Accounting Information Systems (MAIS) is a critical aspect that reflects the extent to which the system meets the information needs of decision-makers, thereby directly affecting operational efficiency and firms' competitiveness. The perceived usefulness of the information generated by the system is a key determinant of this quality (Sajady et al., 2008).

In the literature, the concept of MAIS quality has been approached from different perspectives. DeLone and McLean (2016) associate quality with the overall success of information systems, while Stair and Reynolds (2018) emphasize user satisfaction. More recent studies, such as Prasertianingrum and Sonjaya (2024), argue that system quality is reflected in the level of integration among components, including technology, human resources, data, and processes.

Overall, these perspectives indicate that MAIS quality is a multidimensional concept, evaluated

based on system effectiveness, the degree of integration among components, and the ability to meet users' information needs, thereby supporting accurate and timely managerial decision-making.

## 4. Research Model and Hypotheses

### 4.1. Proposed Research Model

Based on the theoretical foundation and prior studies, the quality of Management Accounting Information Systems (MAIS) is identified as the dependent variable, reflecting the extent to which the system meets managerial information requirements within enterprises. The influencing factors are categorized into three main groups: (i) human factors, (ii) technological factors, and (iii) organizational factors.

Specifically, the proposed research model includes seven independent variables: (1) managerial involvement, (2) accounting staff qualifications, (3) digital technology, (4) system interaction, (5) data quality, (6) procedures and guidelines, and (7) accounting software. These variables are expected to have a direct and positive impact on the quality of MAIS.

The relationships among variables are expressed through the following multiple linear regression model:

$$QLHT = \beta_0 + \beta_1 NQL + \beta_2 TDNV + \beta_3 CNS + \beta_4 STT + \beta_5 CLDL + \beta_6 TTQT + \beta_7 PMKT + \varepsilon$$

Where:

QLHT: Quality of MAIS

$\beta_0$ : Intercept

$\beta_i$ : Regression coefficients of independent variables

$\varepsilon$ : Error term

### 4.2. Research Hypotheses

Based on theoretical arguments and prior empirical studies, the following hypotheses are proposed:

H1: Managerial involvement positively affects the quality of MAIS.

H2: Accounting staff qualifications positively affect the quality of MAIS.

H3: Digital technology positively affects the quality of MAIS.

H4: System interaction positively affects the quality of MAIS.

H5: Data quality positively affects the quality of MAIS.

H6: Procedures and guidelines positively affect the quality of MAIS.

H7: Accounting software positively affects the quality of MAIS.

### 5. Sampling Method

According to Nguyen Dinh Tho (2014), the minimum sample size required for a study should be determined based on the number of questionnaire items, typically estimated at five times the total number of questions. Accordingly, with 33 measurement items in the survey, the minimum sample size is 165 observations. However, considering the broad geographical scope of Thai Nguyen province and to ensure objectivity as well as the author's survey capacity, a total of 450 observations were selected. The data collection period was conducted from October 2024 to April 2025. A total of 450 questionnaires were collected. After data screening, 43 responses were excluded due to incomplete answers or selecting a single response option throughout. As a result, the final sample size used for analysis was 407 valid observations, which still satisfies the minimum sample requirement.

## 6. Research Results

### 6.1. Regression Model Estimation Results

To determine the magnitude and direction of the effects of factors identified from the EFA analysis on the quality of Management Accounting Information Systems (MAIS) in commercial enterprises in Thai Nguyen province, multiple regression analysis was conducted. This process also aimed to test the proposed research hypotheses. The general form of the multiple regression model is presented as follows:

**Table 1. Regression Coefficients**

|          | Unstandardized Coefficients |            | Standardized Coefficients | t      | Sig.  | Collinearity Statistics |       |
|----------|-----------------------------|------------|---------------------------|--------|-------|-------------------------|-------|
|          | Coefficient                 | Std. Error |                           |        |       | Tolerance               | VIF   |
| Constant | -0.995                      | 0.188      |                           | -5.306 | 0.000 |                         |       |
| NQL      | 0.179                       | 0.028      | 0.233                     | 6.490  | 0.000 | 0.746                   | 1.341 |
| TDNV     | 0.204                       | 0.024      | 0.284                     | 8.488  | 0.000 | 0.856                   | 1.169 |
| CNS      | 0.213                       | 0.041      | 0.183                     | 5.135  | 0.000 | 0.752                   | 1.330 |
| TTQT     | 0.228                       | 0.036      | 0.218                     | 6.309  | 0.000 | 0.805                   | 1.242 |
| CLDL     | 0.158                       | 0.036      | 0.144                     | 4.405  | 0.000 | 0.899                   | 1.113 |
| STT      | 0.104                       | 0.029      | 0.134                     | 3.596  | 0.000 | 0.691                   | 1.447 |
| PMKT     | 0.150                       | 0.037      | 0.140                     | 4.003  | 0.000 | 0.781                   | 1.281 |

Source: SPSS output

The regression model illustrating the relationship between the dependent and independent variables is as follows:

$$CLHT = 0.233 \times NQL + 0.284 \times TDNV + 0.183 \times CNS + 0.218 \times TTQT + 0.144 \times CLDL + 0.134 \times STT + 0.140 \times PMKT$$

The results indicate that all regression coefficients are positive, suggesting that the factors including managerial involvement (NQL), accounting staff qualifications (TDNV), digital technology (CNS), procedures and guidelines (TTQT), data quality (CLDL), system interaction (STT), and accounting software (PMKT) all have positive effects on the quality of MAIS (CLHT).

In other words, improvements in these factors lead to enhancements in MAIS quality. Moreover, the significance values (p-values) for all coefficients are 0.000, which are lower than the 5% significance level. This confirms that the positive relationships are statistically significant and not due to random variation, thereby ensuring the reliability of the findings.

### 6.2. Model Fit Assessment

**Table 2. Model Summary**

| Model | R      | R <sup>2</sup> | Adjusted R <sup>2</sup> | Durbin-Watson (d) |
|-------|--------|----------------|-------------------------|-------------------|
| 1     | 0.786a | 0.618          | 0.611                   | 1.938             |

Source: SPSS output

The coefficient of determination (R<sup>2</sup>) of the regression model is 0.618. This indicates that the independent variables, including NQL, TDNV, CNS, TTQT, CLDL, STT, and PMKT, explain 61.8% of the variation in the dependent variable, CLHT.

The adjusted R<sup>2</sup> value is 0.611, which falls within the acceptable range of 0.5 to 1, indicating that the model has relatively good explanatory power and is well-fitted to the dataset. This result demonstrates that the selected factors capture a substantial portion of the determinants of CLHT, providing a reliable basis for subsequent conclusions and managerial implications.

**Table 3. Analysis of Variance (ANOVA)**

| Sum of Squares | Degrees of Freedom | Mean Square | F      | Sig.   |
|----------------|--------------------|-------------|--------|--------|
| 140.471        | 7                  | 20.067      | 92.114 | 0.000b |

Source: SPSS output

Based on the analysis results, the significance value (Sig.) is 0.000, which is lower than the 5% significance level, with an F-statistic of 92.114. This indicates that the proposed model is well-fitted to the empirical data. In other words, the independent variables have a statistically significant linear relationship with the dependent variable at the 99% confidence level.

### 6.3. Diagnostic Tests

#### Multicollinearity Test

Multicollinearity was examined using the Variance Inflation Factor (VIF). The results indicate that all independent variables (NQL, TDNV, CNS, TTQT, CLDL, STT, PMKT) have VIF values below 2 (ranging from 1.113 to 1.447), which are well below the threshold of 5. Therefore, no multicollinearity issue is detected, and the regression estimates are considered reliable.

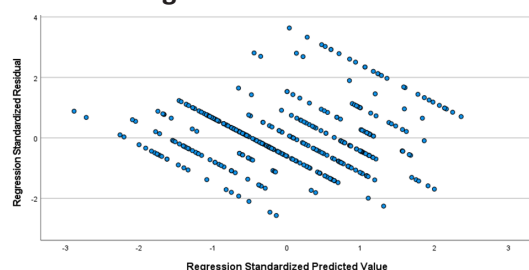
#### Autocorrelation Test

Autocorrelation was tested using the Durbin-Watson statistic. The result shows a value of 1.938, which falls within the acceptable range ( $1 < DW < 3$ ). Hence, it can be concluded that there is no autocorrelation, satisfying the assumption of independent residuals.

#### Heteroscedasticity Test

To test for heteroscedasticity, the following hypotheses were formulated:  $H_0$  assumes that the regression model does not exhibit heteroscedasticity, while  $H_1$  assumes that heteroscedasticity is present. The test is conducted based on the results of the Scatter Plot distribution as figure 1:

Figure 1. Scatter Plot



Source: SPSS output

Since the distribution density of the Scatter Plot falls within the range of -2.5 to 2.5, the model does not violate the heteroscedasticity assumption. Therefore, the null hypothesis ( $H_0$ ) is accepted.

### 6.4. Hypothesis Testing Results

After testing for model violations, no issues were detected. Therefore, based on the regression coefficients and p-values, the research hypotheses are evaluated as presented in Table 4:

Table 4. Results of Hypothesis Testing

| Hypotheses                                                                                                                   | Regression Coefficient | p-value | Conclusion |
|------------------------------------------------------------------------------------------------------------------------------|------------------------|---------|------------|
| H1: Managerial involvement positively affects the quality of MAIS in commercial enterprises in Thai Nguyen province.         | 0.179                  | 0.000   | Supported  |
| H2: Accounting staff qualifications positively affect the quality of MAIS in commercial enterprises in Thai Nguyen province. | 0.204                  | 0.000   | Supported  |

| Hypotheses                                                                                                             | Regression Coefficient | p-value | Conclusion |
|------------------------------------------------------------------------------------------------------------------------|------------------------|---------|------------|
| H3: Digital technology positively affects the quality of MAIS in commercial enterprises in Thai Nguyen province.       | 0.213                  | 0.000   | Supported  |
| H4: System interaction positively affects the quality of MAIS in commercial enterprises in Thai Nguyen province.       | 0.228                  | 0.000   | Supported  |
| H5: Data quality positively affects the quality of MAIS in commercial enterprises in Thai Nguyen province.             | 0.158                  | 0.000   | Supported  |
| H6: Procedures and guidelines positively affect the quality of MAIS in commercial enterprises in Thai Nguyen province. | 0.104                  | 0.000   | Supported  |
| H7: Accounting software positively affects the quality of MAIS in commercial enterprises in Thai Nguyen province.      | 0.150                  | 0.000   | Supported  |

Source: Compiled by the authors

## 7. Discussion of Research Findings

The regression results indicate that all seven factors in the model have positive and statistically significant effects on the quality of Management Accounting Information Systems (MAIS). However, the magnitude of their impacts varies, reflecting the uneven roles of each factor in business practice.

### Managerial Involvement

The results show that managerial involvement has a positive effect on MAIS quality ( $\beta = 0.179$ ;  $p < 0.001$ ), confirming its role in system orientation and supervision. However, strategic capabilities remain limited and need to be enhanced to meet digital transformation requirements.

### Accounting Staff Qualifications

This factor has a strong impact ( $\beta = 0.204$ ;  $p < 0.001$ ), highlighting the critical role of accounting personnel in ensuring information quality. Despite strong professional competence, limitations in innovative thinking and organizational skills suggest the need for further training.

### Digital Technology

Digital technology has a significant impact ( $\beta = 0.213$ ;  $p < 0.001$ ), improving information processing efficiency. However, limitations in system integration and data security indicate the absence of a comprehensive digital strategy.

### System Interaction

This is the most influential factor ( $\beta = 0.228$ ;  $p < 0.001$ ), emphasizing the importance of system integration and data sharing in enhancing system quality.

### Data Quality

Data quality has a positive impact ( $\beta = 0.158$ ;  $p < 0.001$ ) but remains a weak point due to issues related to accuracy and timeliness, requiring improvements in processes and control mechanisms.



### Procedures and Guidelines

This factor has a relatively smaller impact ( $\beta = 0.104$ ;  $p < 0.001$ ) but plays a foundational role in ensuring system stability and compliance.

### Accounting Software

Accounting software positively affects MAIS quality ( $\beta = 0.150$ ;  $p < 0.001$ ) by supporting automation and improving information processing efficiency. However, greater integration with other systems is necessary.

## 8. Managerial Implications

Based on the research findings, in order to enhance the quality of Management Accounting Information Systems (MAIS), commercial enterprises in Thai Nguyen province should consider the following managerial implications:

**First**, strengthen the role of managers in directing and developing MAIS. Top management should enhance their awareness of the system's importance while improving strategic management capabilities and the ability to apply technology in operations.

**Second**, develop accounting human resources with both strong professional expertise and technological skills, as well as innovative thinking. Enterprises should regularly provide training to improve analytical, managerial, and innovation capabilities of accounting staff.

**Third**, promote the synchronized adoption of digital technologies. Firms should not only invest in infrastructure but also develop comprehensive digital transformation strategies, with a focus on system integration and data security.

**Fourth**, enhance integration and interaction among information systems within the enterprise. Connecting MAIS with systems such as sales, inventory, and finance will improve the consistency and timeliness of information.

**Fifth**, improve accounting data quality by standardizing data entry processes, strengthening internal controls, and applying technology to minimize errors.

**Sixth**, refine accounting procedures and guidelines to ensure clarity, consistency, and regular updates, thereby maintaining system compliance and stability.

**Seventh**, select and upgrade appropriate accounting software that ensures flexibility, integration capability, and alignment with managerial

needs. At the same time, enterprises should fully exploit software features to enhance efficiency.

## Conclusion

This study identified and examined the factors affecting the quality of MAIS in commercial enterprises in Thai Nguyen province. The findings reveal that all seven factors, including managerial involvement, accounting staff qualifications, digital technology, system interaction, data quality, procedures and guidelines, and accounting software, have positive and statistically significant impacts on MAIS quality. Among these factors, system interaction, digital technology, and accounting staff qualifications exert the strongest influence. This highlights the critical importance of system integration, human resource capabilities, and technological application in the context of digital transformation. Meanwhile, data quality and procedures remain relatively weaker aspects, indicating areas that require further improvement. The study contributes to the existing literature by providing both theoretical and empirical evidence on MAIS in commercial enterprises in Vietnam. It also offers practical managerial implications to enhance system quality. However, the research is limited by its focus on a single geographical area and the exclusion of external factors. Future studies are encouraged to expand the research scope and incorporate additional variables to improve generalizability.

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# THE GLOBAL MINIMUM TAX FRAMEWORK: IMPLICATIONS FOR INTERNATIONAL INVESTMENT AND VIETNAM'S STRATEGIC POLICY RESPONSE

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**Abstract:** *This study examines the implementation and implications of the Global Minimum Tax (GMT), specifically the Pillar Two framework designed to establish a 15% minimum effective tax rate for multinational enterprises with annual revenues exceeding EUR 750 million. For decades, the global "race to the bottom" in corporate taxation and aggressive profit shifting to tax havens have cost governments between USD 500-600 billion annually in lost revenue. The GMT framework employs a coordinated system of mechanisms, including the Qualified Domestic Minimum Top-up Tax, the Income Inclusion Rule, and the Undertaxed Payments Rule, to ensure that under-taxed profits are captured either by the host country or the parent jurisdiction. By analyzing the shift toward substance-based investment and the erosion of tax haven advantages, this study highlights how the policy encourages real economic activity over artificial profit allocation. Furthermore, the study explores the case of Vietnam, which implemented the GMT in 2024 and is now transitioning its investment strategy from traditional tax incentives toward non-tax support measures, such as infrastructure and R&D subsidies, to maintain its competitiveness in a standardized global tax environment.*

• Keywords: global minimum tax, pillar two, tax havens, foreign direct investment, Vietnam.

Date of receipt: 20<sup>th</sup> Jan., 2026

Date of delivery revision: 14<sup>th</sup> Mar., 2026

DOI:

Date of receipt revision: 18<sup>th</sup> Mar., 2026

Date of approval: 31<sup>th</sup> Mar., 2026

## 1. Introduction

For decades, multinational enterprises (MNEs) have exploited differences in tax rates across countries to shift profits to jurisdictions with very low or zero tax rates, commonly referred to as "tax havens." As a result, substantial tax revenues have been lost; tax havens are estimated to cost governments worldwide around USD 500-600 billion annually in corporate tax revenues. Low-income economies suffer particularly severe losses, about USD 200 billion, a figure that even exceeds the total amount of global official development assistance each year (Shaxson, 2019).

This "race to the bottom" in corporate tax rates, driven by countries competing to attract investment, has created an uneven playing field in which large multinational corporations with hundreds of foreign subsidiaries can pay significantly less tax than domestic firms. In response to this situation, the international community reached a historic agreement to establish a global floor for corporate income taxation.

In 2021, 137 countries agreed on the Two-Pillar global tax reform (Gaspar, Hebous & Mauro, 2022). Pillar Two - the Global Minimum Tax requires large multinational enterprises to face a minimum effective tax rate of 15% on income in every jurisdiction where

they operate. The objective of this policy is to set a floor for tax competition and reduce incentives for profit shifting to low-tax jurisdictions, thereby preventing the global race to the bottom in corporate taxation.

Earlier estimates by the OECD suggested that implementing a 15% global minimum tax could generate around USD 150 billion in additional tax revenue annually worldwide. More recent estimates in 2023 raised this figure to approximately USD 220 billion per year, equivalent to 9% of total global corporate income tax revenue (OECD, 2023). Furthermore, ending aggressive tax competition is expected to increase tax revenues by about 8%, as firms would no longer have strong incentives to avoid taxes.

## 2. Mechanism of the global minimum tax

The Global Minimum Tax is designed to ensure that large multinational enterprises pay at least 15% tax on income in every country where they operate. Specifically, the rules under Pillar Two, also known as the Global Anti-Base Erosion (GloBE) rules, require multinational groups within the scope of the regime (those with global consolidated revenues of at least EUR 750 million) to calculate their income and taxes paid on a jurisdiction-by-jurisdiction basis.

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The group then determines the effective tax rate (ETR) in each jurisdiction. If the effective tax rate in any jurisdiction is below 15%, the multinational enterprise must pay a top-up tax to bring the tax level up to the minimum threshold (OECD, 2024).

The income subject to this calculation is adjusted to exclude a portion known as the “substance-based income exclusion,” which corresponds to a certain percentage of tangible assets and payroll located in that jurisdiction. This provision aims to exclude profits linked to genuine economic activity from additional taxation, thereby allowing countries to retain some flexibility in competing to attract real investment (Azémar & Giroud, 2023).

The global minimum tax established under the OECD Inclusive Framework’s Pillar Two operates through three interrelated mechanisms that determine how top-up tax is allocated across jurisdictions. These mechanisms are applied in a specific order to ensure that MNEs are subject to a minimum effective tax rate of 15% on their global profits.

### **2.1. Qualified Domestic Minimum Top-up Tax (QDMTT)**

The Qualified Domestic Minimum Top-up Tax (QDMTT) grants the jurisdiction in which low-taxed income arises the primary right to collect the additional tax necessary to reach the 15% minimum rate. Under this mechanism, if a country adopts a QDMTT, subsidiaries of multinational enterprises operating within that jurisdiction must pay any required top-up tax locally. This design allows the source country to retain the associated tax revenue rather than allowing other jurisdictions to collect it under the international rules.

### **2.2. Income Inclusion Rule (IIR)**

If the jurisdiction where the income arises does not implement a QDMTT, the Income Inclusion Rule (IIR) applies. Under the IIR, the jurisdiction in which the ultimate parent entity is located obtains the right to impose a top-up tax on low-taxed income earned by its foreign subsidiaries. Where the ultimate parent jurisdiction has not adopted the IIR, the taxing right moves down the ownership chain to the next intermediate parent entity located in a jurisdiction that applies the rule. Through this mechanism, the headquarters country can ensure that profits earned abroad through low-tax regimes are subject to the global minimum rate.

### **2.3. Undertaxed Profits Rule (UTPR)**

The Undertaxed Profits Rule (UTPR) functions as a backstop mechanism to ensure that low-taxed income is ultimately subject to the minimum tax. If the income has not been taxed under the QDMTT in the source

jurisdiction and is not captured by the IIR because the parent jurisdiction has not implemented the rule, other jurisdictions within the multinational group that have adopted the UTPR may collect the remaining top-up tax. In practice, this is typically achieved through adjustments such as the denial of deductions or other mechanisms that increase the tax liability of entities within the group operating in those jurisdictions.

Together, these three mechanisms, QDMTT, IIR, and UTPR, create a coordinated framework that ensures multinational enterprises cannot avoid the 15% global minimum tax by shifting profits to low-tax jurisdictions. By allocating taxing rights across multiple jurisdictions in a hierarchical order, the Pillar Two rules aim to limit base erosion and profit shifting while strengthening the stability and fairness of the international corporate tax system.

## **3. Global impacts of the global minimum Tax**

### **3.1. Effects on tax havens and low-tax jurisdictions**

One of the most visible impacts of the global minimum tax is the erosion of the advantages previously enjoyed by tax havens, which are jurisdictions that impose extremely low corporate tax rates to attract profits shifted from elsewhere.

Previously, multinational enterprises frequently shifted large portions of their accounting profits to offshore financial centers such as Bermuda, the Cayman Islands, and the British Virgin Islands in order to minimize tax liabilities. As a result, these jurisdictions received substantial volumes of foreign investment in the form of booked financial flows rather than real economic activity.

With the introduction of a 15% minimum tax floor, these incentives largely disappear because profits located in tax havens will automatically be subject to top-up taxes elsewhere if the tax haven itself does not impose sufficient taxation (United Nations Committee of Experts on International Cooperation in Tax Matters, 2025). In practical terms, multinational corporations no longer gain a tax advantage from shifting profits to jurisdictions with tax rates below 15%, since they will ultimately have to pay the difference to some government.

Low-tax countries have begun adjusting their policies in response. For example, Ireland, long known for its 12.5% corporate tax rate, has agreed to raise the rate to 15% for large multinational firms while maintaining the lower rate for smaller companies (Dillon, de Bruijn & Smyth, 2024). Financial hubs such as Singapore and Hong Kong, with corporate tax rates around 17%, are also designing domestic minimum taxes to ensure that



any top-up taxes are collected locally rather than by foreign governments (Huld, 2026).

Pure tax havens with 0% corporate tax rates, such as Bermuda or the Cayman Islands, generally have not joined the agreement. However, most large multinational enterprises have parent or subsidiary companies in countries that have adopted the new rules. Consequently, the zero-tax advantage of these jurisdictions will largely be neutralized, as other countries will collect the top-up tax.

According to UNCTAD, tax havens and low-tax jurisdictions will therefore become significantly less attractive destinations for multinational capital flows. The structure of international investment may shift fundamentally as artificial profit flows leave jurisdictions that rely primarily on tax advantages. UNCTAD predicts that implementing the global minimum tax will lead to a reallocation of investment, allowing traditionally high-tax countries to attract more foreign direct investment (FDI) because the tax gap between them and tax havens has narrowed (Azémar & Giroud, 2023).

At the same time, offshore financial centers may lose their unique advantage, resulting in declines in “headquarter-type” investment flows. UNCTAD estimates that Africa and Asia could benefit the most, with FDI increasing by 2.4% and 1.7% respectively compared with a scenario without the global minimum tax.

### **3.2. Effects on investment flows and profit shifting**

Overall, the Global Minimum Tax affects both the scale and direction of international investment flows.

First, regarding the overall level of global investment, higher tax obligations may slightly reduce the after-tax profitability of multinational enterprises, which could marginally affect investment decisions. UNCTAD estimates that the total tax burden of multinational firms worldwide could increase by around 14% due to the global minimum tax. This increase includes both the direct effect of the 15% top-up tax and the indirect effect of reduced tax competition, as countries raise their tax rates closer to the minimum threshold.

Considering only the direct effect of the minimum tax, UNCTAD predicts that global FDI flows could decline by approximately 2% compared to a scenario without the reform. However, this reduction is considered relatively modest (UNCTAD, 2022). Moreover, the report suggests that greater tax certainty and transparency under the new system may partially offset this decline, as a more stable and predictable global tax environment can strengthen long-term investor confidence (Azémar & Giroud, 2023).

Second, in terms of the direction and allocation of foreign direct investment, the global minimum tax is expected to reshape multinational investment strategies. Previously, companies could locate production assets in one country with relatively high taxes while shifting profits on paper to another jurisdiction with very low taxes in order to minimize their tax burden.

Under the new system, since the tax advantage of low-tax jurisdictions is greatly reduced, companies have stronger incentives to locate real economic activities where value is created. Firms may also seek to benefit from the substance-based income exclusion, which encourages them to increase tangible assets and employment in strategic locations in order to reduce their exposure to top-up taxes.

This shift discourages the use of “shell entities” or purely paper-based structures designed for profit shifting and instead promotes genuine productive investment. As emphasized by the OECD, a central objective of Pillar Two is to reduce incentives for cross-border profit shifting and encourage investment decisions based on real economic considerations rather than tax differentials (OECD, 2020).

### **4. Case study of technology multinationals: Alphabet**

The case of large technology multinationals illustrates the significant implications of the Global Minimum Tax framework. One prominent example is Alphabet Inc., which historically relied on sophisticated international tax planning strategies to minimize its global tax liabilities. Prior to 2015, Alphabet employed the “Double Irish with Dutch Sandwich” structure, enabling the company to shift substantial portions of its global profits through Ireland and Bermuda. This arrangement allowed the firm to achieve an effective foreign tax rate of approximately 2.4%, resulting in billions of dollars in tax savings (Bateman, 2023). Between 2007 and 2009 alone, Alphabet is estimated to have saved approximately USD 3.1 billion through these mechanisms.

Following the phase-out of the Double Irish structure in 2015, the company adjusted its tax strategy by utilizing Ireland’s patent box regime and intangible capital allowances, which allowed income derived from intellectual property (IP) to be taxed at rates as low as 10% or even lower (EY, 2023). Similar strategies were employed by other major U.S. technology firms, including Meta Platforms and Apple Inc.. Reports indicate that such practices enabled companies like Google and Apple to shift roughly USD 20 billion in profits out of higher-tax jurisdictions in 2015 alone.

The implementation of Pillar Two under the OECD/G20 Inclusive Framework significantly alters the effectiveness of these arrangements. The introduction of a 15% global minimum effective tax rate reduces the incentive to channel profits into low-tax jurisdictions. For example, if an Irish subsidiary is taxed at 10%, the rules require a 5% top-up tax. If Ireland adopts a QDMTT, it would collect this additional tax domestically; otherwise, the tax would be collected by the parent jurisdiction or another relevant jurisdiction under the Income Inclusion Rule.

Consequently, the overall effective tax burden on foreign profits for companies such as Alphabet is expected to increase from previously low single-digit levels toward the 15% global minimum. This shift may require multinational enterprises to reconsider aspects of their international tax planning strategies, including the location of intellectual property, profit allocation structures, and the geographic distribution of economic activities. While certain preferential regimes remain legally available, their advantages are substantially reduced for firms subject to Pillar Two rules (EY, 2023).

### 5. Vietnam's legal framework and impact

Vietnam represents a notable example of a developing country that must adjust its investment attraction policies in the era of the global minimum tax. With a development strategy heavily reliant on attracting FDI, Vietnam has long used corporate income tax (CIT) incentives as a key instrument to attract large multinational corporations. The statutory CIT rate in Vietnam is currently 20%; however, many large-scale FDI projects, particularly those located in high-tech zones and special economic zones, have historically benefited from preferential tax rates of 0%, 5%, or 10% during their first 5-15 years of operation. These incentives have contributed significantly to Vietnam's ability to rank among the world's top 20 FDI destinations in 2020, with annual disbursed FDI reaching approximately USD 30 billion during the 2020-2022 period (Thanh Hoa, 2023). Nevertheless, the emergence of the global minimum tax has fundamentally altered the policy environment for Vietnam.

In June 2021, Vietnam joined all other members of the OECD Inclusive Framework in endorsing the global minimum tax agreement. Subsequently, the government began actively studying ways to incorporate the rules into domestic legislation. During the 6th session of the 15th National Assembly on 29 November 2023, Vietnam's National Assembly approved Resolution No. 107/2023/QH15 on the implementation of the global minimum tax effective from 1 January 2024, with more than 93.5% of representatives voting in favor (Kim Chi, 2023).

Under this resolution, Vietnam will implement a top-up corporate income tax in accordance with the global anti-base erosion rules, applying a minimum effective tax rate of 15% to multinational enterprise groups with consolidated revenue exceeding EUR 750 million in at least two of the four preceding fiscal years. The regulation excludes certain entities such as government bodies, non-profit organizations, and pension funds, in line with the OECD's exclusion mechanisms (National Assembly of the Socialist Republic of Vietnam, 2023).

According to Vietnamese tax authorities, approximately 619 MNEs, comprising 1,017 subsidiaries operating in Vietnam, reported consolidated revenues exceeding €750 million in 2021. Among these, it is estimated that around 112 groups will be subject to additional top-up tax obligations under the new global minimum tax rules (Vietnam News, 2023). The remaining firms either already maintain an effective tax rate of at least 15% or do not meet other qualifying conditions under the Pillar Two framework. Many of the entities affected by the reform are large foreign-invested enterprises that previously benefited from preferential tax incentives. Major multinational corporations such as Samsung Electronics, Intel, and LG Electronics have historically received preferential corporate income tax rates for their large-scale manufacturing projects in Vietnam, in some cases resulting in effective tax rates as low as approximately 12.3% (Vietnam News, 2023). Under the Pillar Two framework, however, the effective tax rate applied to these enterprises will increase to the 15% global minimum threshold. This change is expected to raise their overall tax liabilities while simultaneously increasing Vietnam's state tax revenues.

Vietnamese policymakers view the reform as an important step toward aligning the country's tax system with international standards and strengthening the domestic tax base. According to PwC Vietnam (2025), the implementation of the global minimum tax is also expected to contribute to a more level competitive environment between domestic firms, typically subject to the standard 20% corporate income tax rate, and foreign investors that have historically benefited from significantly lower effective tax rates.

The implementation of the global minimum tax will inevitably lead to significant changes in Vietnam's investment attraction policies. First, traditional CIT incentives will lose much of their effectiveness for companies subject to the EUR 750 million threshold (OECD, 2022). FDI projects that previously benefited from tax holidays will now effectively face the 15% minimum tax rate, with the difference collected by the Vietnamese government rather than remaining with the

investor. This shift directly affects the benefits enjoyed by foreign investors during the incentive period and could influence the overall investment climate. Many large investors chose Vietnam partly because its tax incentive packages significantly reduced operating costs. If those incentives become ineffective, firms may reconsider expansion decisions or request alternative forms of government support (Hoi et al., 2024). Representatives of Samsung in Vietnam have previously expressed concern that, without appropriate policy responses, the global minimum tax could create additional challenges for FDI enterprises and have urged the government to implement support measures to maintain investment competitiveness.

Recognizing these challenges, the Vietnamese government has begun exploring new incentive policies that comply with the global minimum tax framework while maintaining the country's attractiveness to major investors. The Ministry of Finance has noted that many countries have already introduced policy responses to preserve competitiveness under the new regime. Thailand, for example, is reportedly developing a policy package that combines domestic tax measures with additional financial support such as subsidies for infrastructure development and electricity cost support for businesses. India, meanwhile, has introduced a Production-Linked Incentive program that provides direct financial rewards, thereby offering subsidies rather than tax reductions (RSM India, 2025). These developments illustrate a broader shift toward non-tax incentives as countries continue competing for global investment within the new tax framework.

For Vietnam, policy discussions have similarly focused on providing direct or indirect financial support to businesses without violating global minimum tax rules, while ensuring compliance with international standards and maintaining transparency. Deputy Director General of the General Department of Taxation Dang Ngoc Minh has suggested that the government could consider supporting FDI enterprises through measures such as infrastructure investment support, assistance with fixed asset investment, funding for environmental protection projects, support for worker housing, subsidies for social insurance and healthcare contributions, and incentives for research and development and technological innovation (Vietnam News, 2023). These measures aim to improve the real investment environment without relying on reductions in statutory tax rates. Naturally, implementing such support programs will require corresponding financial resources from the state budget or development funds; however, they could help sustain Vietnam's investment attractiveness while improving

the overall quality of incoming FDI projects. The Vietnamese government has therefore tasked relevant ministries with conducting a comprehensive review of the current system of investment incentives, both tax and non-tax, to propose suitable adjustments in light of the new global tax environment.

### Conclusion

The implementation of the Global Minimum Tax represents a historic shift in international taxation, effectively neutralizing the core advantages of tax havens and ending the decades-long "race to the bottom". By mandating a 15% floor, the GloBE rules significantly reduce the incentives for MNEs to utilize "shell entities" or paper-based structures, instead promoting investment decisions based on genuine economic substance and value creation. As demonstrated by the case of Alphabet, technology giants that once achieved single-digit effective tax rates must now prepare for increased tax liabilities approaching the 15% threshold.

For developing economies like Vietnam, the reform marks a critical turning point where traditional corporate income tax incentives are no longer sufficient to attract foreign direct investment. To remain a top investment destination, nations must now focus on improving the real investment environment through non-tax measures, including infrastructure development, labor support, and technological innovation incentives. Ultimately, while the GMT may cause a modest short-term decline in global FDI flows, it is expected to generate approximately USD 220 billion in additional annual revenue and foster a more transparent, stable, and equitable global financial landscape.

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# THE IMPACT OF TECHNOLOGY AND ARTIFICIAL INTELLIGENCE INVESTMENTS ON ECONOMIC GROWTH IN SEVERAL COUNTRIES AROUND THE WORLD: RECOMMENDATIONS FOR VIETNAM

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**Abstract:** *The trends of development, competition, and efficiency, technology and artificial intelligence (AI) plays an enormous role for many countries around the world. In this development process, investment in AI and technology exports are strong moves that many countries are taking to guide their development. So, how does investment in AI and technology impact economic growth? To provide an empirical basis for this research, we use data from 10 representative countries across continents from 2012 to 2024. The research aims to examine how investment in AI (VCI) and technology (Tech) impacts long-term economic growth. Additionally, we use control variables such as government efficiency (GE), foreign direct investment (FDI), and the workforce (La) to examine the impacts more clearly. As a result, all variables in the model are statistically significant, and investment in artificial intelligence and technology has a significantly positive impact on the economic growth of countries, but the role of government management cannot be ignored in the model.*

• Keywords: artificial intelligence (AI), technology, governance efficiency, economic growth.

Date of receipt: 20<sup>th</sup> Jan., 2026

Date of delivery revision: 14<sup>th</sup> Mar., 2026

DOI:

Date of receipt revision: 26<sup>th</sup> Mar., 2026

Date of approval: 31<sup>th</sup> Mar., 2026

## 1. Introduction

With the advancement of science and technology, every field is constantly developing, such as education, economics, healthcare, etc. Furthermore, the prosperity and rapid economic development have spurred the vigorous development of econometrics, statistics, and other economic-related fields, which have expanded significantly, making it difficult for authorities to manage the economic system. Economic management and organization play a crucial role in economic progress, influencing the orderly operation of the economic development process (Maksanova et al., 2021). Therefore, the combination of economic growth and Artificial Intelligence (AI) promotes the advancement of economic control and management technologies. In addition, it stimulates technological approaches in economic policy planning, affirming the prominent role of AI in promoting economic development. Artificial intelligence also facilitates the processing of massive financial data, verifies accuracy, and provides concise analysis of

economic data, supporting the development and implementation of effective economic policies. AI technology can improve the efficiency of economic systems by making them more technologically advanced, which can benefit national economic development and also contribute to achieving sustainable economic growth (Wang & Li, 2023). The intersection of technology, energy transition, and economic sectors is increasingly attracting attention (Vu & Hartley, 2021). Among technological advancements, artificial intelligence (AI) plays a key role, bringing new insights and higher operational efficiency to many industries, including tourism (H. M. W. Rasheed et al., 2024). Artificial intelligence (AI), as a disruptive technology, plays a crucial role in integrating with broader economic and environmental transformations to impact sustainable tourism growth. The synergistic effect between AI applications and key economic indicators shows how they enhance efficiency, resilience, and economic development (Siddik et al., 2025). AI can play a significant role in boosting production.

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As a broad field of advanced technology, studying the complex aspects of machine intelligence and the development of intelligent machines (Sarker, 2022), AI can be defined as “systems that exhibit intellectual capacity through careful consideration of their surroundings and take subsequent actions, with a certain degree of autonomy, to accomplish predetermined goals.” It has the potential to make a significant contribution to achieving future goals related to renewable energy (Hannan et al., 2021). AI can efficiently manage the components of hybrid systems to ensure energy demand is met cost-effectively (Zahraee, 2016). Artificial intelligence (AI), with its rapid advancements in recent years, has the potential to transform industries, society, and the economy. AI encompasses a range of technologies and applications that mimic human intelligence and perform tasks automatically. Its potential benefits in areas such as automation, data analytics, and decision-making make it a powerful tool for enhancing productivity, efficiency, innovation, and human well-being (Saba & Pretorius, 2024). Technology has brought many opportunities for economic development, promoting the modernization of the world economy and Vietnam (Long, 2023). One of the solutions is innovation and the application of technology, which has increased our labor productivity by an average of 5.88% (Thang, 2025). Moving towards a new stage of economic development, Vietnam needs to focus on investing in technology and artificial intelligence to achieve its economic goals. The development of science and technology and innovation is a trend and a crucial element in the modern economic growth model. In reality, many difficulties and challenges still exist in the development and application of science and technology in many countries, especially in developing countries like Vietnam (Vo Thanh Danh, 2022). Therefore, it is necessary to consider the impact of investing capital in science and technology and artificial intelligence on economic growth and, from there, make recommendations for Vietnam.

## 2. Research Overview

The asymmetric impact of artificial intelligence shows an upward trend for the positive component and a downward trend for the negative component. Additionally, interest rates and inflation have been found to have a negative impact on economic

growth in both the short and long term. Trade openness and government spending show adverse short-term but positive long-term impacts (Wang & Li, 2023).

As a key driver of the Fourth Industrial Revolution, artificial intelligence (AI) is now widely used in many economic and social sectors. AI has progressively evolved into a new engine for green technological progress, opening new avenues for green economic growth. The core AI industry witnessed phenomenal growth in 2021, exceeding the 2019 figure by more than six times. Simultaneously, global venture capital investment in AI surged from under 5% in 2013 to approximately 20% in 2021, solidifying its position as the second-largest investment sector globally (Lee et al., 2024).

The integration of artificial intelligence (AI) into the fundamental structure of society is creating a transformative process with the potential to profoundly impact many aspects of human life, including environmental quality. Country-specific studies have shown that Austria, Germany, and New Zealand are examples of countries where both positive and negative AI changes significantly improve the clean energy structure in the short term. Natural resources, information and communication technology, and economic growth also drive renewable energy production. Ultimately, policies are geared towards increasing renewable energy production (MQ Rasheed et al., 2024).

The impact of AI investment on employment and economic growth from 2012 to 2022 is significant, taking into account the regulatory role of overall governance as well as specific governance indicators such as political governance, institutional governance, and economic governance. Prioritizing and enhancing the integration of artificial intelligence (AI) into their governance systems is crucial to promoting employment and stimulating growth in both the short and long term (Saba & Ngepah, 2024).

Traditional factors of production such as physical capital and labor may no longer be the primary drivers of growth. The prevailing belief is that AI will play a key role in future employment and growth, and unlike conventional machines that replace human and animal labor

for specific tasks, AI input has the potential to fundamentally transform the nature of work. Artificial intelligence (AI) is widely regarded as a key factor for future growth (Lu, 2021). Research and development plays a vital role in economic growth. The potential of AI to replace workers to some extent could contribute to future growth (Fernald & Jones, 2014).

### 3. Data and research methods

#### 3.1 Research Data

The research model collected data from 2012-2024 from 10 countries and economic regions representing the continent that have made significant investments in technology and artificial intelligence: the US, China, the EU, the UK, Germany, India, Canada, Israel, Sweden, and South Korea.

**Table 1: Data description**

| Content | Index                                                 | Unit of measurement | Source                                                        |
|---------|-------------------------------------------------------|---------------------|---------------------------------------------------------------|
| lnGDP   | GDP per capita (calculated at 2015 prices)            | USD/person          | WDI - World Development Indicators                            |
| lnVCI   | Venture capital investment in artificial intelligence | Million USD         | OECD - Organization for Economic Co-operation and Development |
| lnGE    | The effectiveness of government administration        |                     | OECD - Organization for Economic Co-operation and Development |
| lnFDI   | Foreign direct investment                             | Million USD         | OECD - Organization for Economic Co-operation and Development |
| lnTech  | Exporting high-tech products                          | Million USD         | WDI - World Development Indicators                            |
| lnLa    | workforce                                             | Millions of people  | WDI - World Development Indicators                            |

#### *Proposed research model:*

Proceed to describe the observed variables as follows:

**Table 2: Descriptive statistics of variables**

| Planet | Obs | Mean     | Std.     | dev.      | Min      |
|--------|-----|----------|----------|-----------|----------|
| lnGDP  | 130 | 10.18704 | 1.027722 | 7.19526   | 11.1077  |
| lnVCI  | 130 | 7.386704 | 2.247975 | -.3566749 | 11.67289 |
| lnGE   | 126 | .0245156 | .7581483 | -4.175483 | .6476453 |
| lnFDI  | 126 | 4.042561 | 1.377022 | .3972667  | 6.745386 |
| lnTech | 130 | 4.521353 | 1.396477 | 2.44809   | 6.842037 |
| lnLa   | 130 | 4.015828 | 1.710693 | 1.310972  | 6.660816 |

#### 3.2. Research Results

Table 3 shows that the correlation coefficients between the independent variables are below 0.7. Therefore, there is no serious multicollinearity problem and the model's estimation results are not significantly affected.

**Table 3: Correlation coefficient matrix between independent variables**

|       | lnVCI   | lnGE    | lnFDI  | lnTech | lnLa |
|-------|---------|---------|--------|--------|------|
| lnVCI | 1.0000  |         |        |        |      |
| lnGE  | -0.0501 | 1.0000  |        |        |      |
| lnFDI | 0.6091  | -0.1433 | 1.0000 |        |      |

|        | lnVCI  | lnGE    | lnFDI  | lnTech | lnLa   |
|--------|--------|---------|--------|--------|--------|
| lnTech | 0.4301 | -0.0935 | 0.6183 | 1.0000 |        |
| lnLa   | 0.4884 | -0.6101 | 0.6412 | 0.6682 | 1.0000 |

Table 4 presents the results regarding multicollinearity. We can see that lnVCI has a VIF coefficient of 5.46, the highest among the variables, indicating a moderate degree of multicollinearity. Meanwhile, TC1 has the lowest VIF coefficient of 1.73, indicating negligible multicollinearity. The average VIF coefficient across all variables is 2.95, indicating that, on average, the variables exhibit low to moderate levels of multicollinearity. If the VIF value is less than 10, multicollinearity is considered acceptable. Therefore, there are no serious multicollinearity issues in the model.

**Table 4: Multicollinearity**

| Planet   | VIF  | 1/VIF    |
|----------|------|----------|
| lnVCI    | 5.46 | 0.183232 |
| lnGE     | 2.61 | 0.383762 |
| lnFDI    | 2.57 | 0.388840 |
| lnTech   | 2.39 | 0.418782 |
| lnLa     | 1.73 | 0.578027 |
| Mean VIF | 2.95 |          |

**Table 5: Testing for differences between FEM and REM**

|        | (b) fixed | (B) random | (bB) Difference | sqrt(diag(V_b-V_B)) Std. err. |
|--------|-----------|------------|-----------------|-------------------------------|
| lnVCI  | .0213089  | .0289633   | -.0076544       | .0097036                      |
| lnGE   | .0676691  | .1506817   | -.0830126       | .0223844                      |
| lnFDI  | -.0148374 | .068355    | -.0831924       | .0108264                      |
| lnTech | .1659803  | .4150106   | -.2490303       | .1378329                      |
| lnLa   | .1083908  | -.5961705  | .7045613        | .7017908                      |

b = Consistent under H0 and Ha; obtained from xtreg.

B = Inconsistent under Ha, efficient under H0; obtained from xtreg.

Test of H0: Difference in coefficients not systematic

$$\chi^2(5) = (bB)'[(V_b - V_B)^{-1}](bB) = 107.14$$

$$\text{Prob} > \chi^2 = 0.0000$$

Since the p-value > 0.05, we conclude that there is no statistically significant difference between FEM and REM. This result also shows that the uit errors are not correlated with the independent variables in the model, and using a random effects model would be more effective.

Testing for heteroskedasticity across entities in REM (Lagrange multiplier test)



Breusch and Pagan Lagrangian multiplier test for random effects

$$\ln \text{GDP}[\text{COU}, t] = Xb + u[\text{COU}] + e[\text{COU}, t]$$

Estimated results:

$$| \text{Var SD} = \text{sqrt}(\text{Var})$$

-----+-----

$$\ln \text{GDP} | .8830502 .9397075$$

$$e | .0026191 .0511776$$

$$u | .0012653 .0355713$$

$$\text{Test: Var}(u) = 0$$

$$\text{chibar2}(01) = 157.63$$

$$\text{Prob} > \text{chibar2} = 0.0000$$

Conclusion: p-value < 0.05 → choosing Ho, meaning there is heteroskedasticity across entities.

Testing for heteroskedasticity across entities in FEM (Wald test).

Modified Wald test for groupwise heteroskedasticity in fixed effect regression model

$$H_0: \sigma_{\mu i}^2 = \sigma_{\mu}^2 \text{ for all } i$$

$$\chi^2(10) = 515.09$$

$$\text{Prob} > \chi^2 = 0.0000$$

The p-value < 0.05, therefore rejecting Ho means there is heteroskedasticity in the FEM model.

Using the Robust Standard Errors and GLS estimation. To address heteroskedasticity (the condition of constantly changing error variance), the following estimation results were obtained:

**Table 6: OLS, FEM, and REM Estimates**

|                                | OLS                  | FEM                 | REM                  |
|--------------------------------|----------------------|---------------------|----------------------|
| lnVCI                          | 0.041**<br>(0.018)   | 0.021***<br>(0.004) | 0.029***<br>(0.011)  |
| lnGE                           | 0.484***<br>(0.064)  | 0.068***<br>(0.013) | 0.151***<br>(0.042)  |
| lnFDI                          | 0.191***<br>(0.034)  | 0.015**<br>(0.007)  | 0.068***<br>(0.023)  |
| lnTech                         | 0.282***<br>(0.036)  | 0.166***<br>(0.041) | 0.415***<br>(0.042)  |
| lnLa                           | -0.494***<br>(0.043) | 0.108<br>(0.199)    | -0.596***<br>(0.040) |
| _cons                          | 9.835***<br>(0.125)  | 8.966***<br>(0.667) | 10.225***<br>(0.149) |
| N                              | 122                  | 122                 | 122                  |
| adj. R-sq                      | 0.871                | 0.652               |                      |
| Breusch and Pagan Lagrangian   |                      |                     | 0.000                |
| Hausman test                   |                      | 0.000               |                      |
| Wald test                      |                      | 0.000               |                      |
| Standard errors in parentheses |                      |                     |                      |

\* p<0.1 \*\* p<0.05 \*\*\* p<0.01

The Hausman test selects FEM and Rem. Since the result  $\text{Prob} > \chi^2 = 0.000 < \alpha = 0.05$ , we reject  $H_0$  and conclude that the model chosen in this study is the FEM model. Economic growth in the studied countries is related to venture capital investment in artificial intelligence, government governance efficiency, foreign direct investment, high-tech exports, and the workforce. All variables have a positive impact on economic growth. In particular, the two variables studied, technology investment and investment in artificial intelligence, both have a significant positive impact on economic growth (Lee et al., 2024). (Kalai et al., 2024). In particular, technology exports are having the strongest positive impact on major economies around the world. Venture capital investment in AI is in its early stages but has already had a very significant impact on their economic growth.

#### 4. Conclusion and some recommendations

The role of technology, digitalization, and AI in the economies of countries around the world has been proven in many nations. Especially after the Covid-19 pandemic, economies are shifting towards digitizing many aspects of management and production processes, leading to increased productivity and a significant reduction in manual labor. The results from the regression model show that technology and investment in AI have a positive impact and make a major contribution to economic growth in a country. Based on these research findings, the authors suggest the following recommendations:

**Firstly,** Resolution 57-NQ/TW on breakthroughs in national science, technology, innovation, and digital transformation needs to be further promoted in all areas, from the economy and society to the environment. The government, businesses, and schools should take the lead in investing in and applying technology in their daily operations. Investment in technology could include: purchasing application licenses, implementing courses on digital skills and digital transformation for employees to participate in.

The government continues to remove institutional, mechanism, and policy bottlenecks to ensure the science and technology market develops synchronously, efficiently, modernly, and integratedly. As a result, businesses continue to trust and implement policy decisions.

Developing a synchronized national technology infrastructure will serve as a basis for connecting provinces, localities, businesses, and schools across the country.

Establish national technology exchange platforms in major cities or economic regions to both connect the domestic technology network and expand into global technology connectivity.

**Secondly**, besides investing in technology, other resources such as government governance efficiency also need attention. Currently, government governance efficiency is a key factor in ranking and evaluating government capabilities and attracting investment. However, government governance efficiency is also reflected in investment in digital technology. The terms “digital government” and “digital administration” highlight the strong role of technology in promoting government governance efficiency.

**Third**, promote international cooperation and attract investment: Vietnam should proactively seek opportunities for cooperation with leading AI centers worldwide to learn, transfer technology, and attract investment capital. Create a favorable policy and mechanism environment for AI startups, especially in areas that attract global AI investment.

Ultimately, the workforce, in any circumstance or stage, always has a significant impact on the economic growth of nations. In the era of globalization and the new era of national development, the quality of the workforce must be improved. With the population growth rate slowing and the country entering a period of population aging, the abundant labor force of previous decades is no longer an advantage in this current phase. Entrepreneurship and innovation among workers need to be strongly encouraged. The workforce needs to enhance its digital capabilities and social responsibility. The continuous growth of global AI scientific publications demonstrates the importance of research and training. Vietnam needs to invest in education, training, and attracting AI talent to meet the demands of this technology's development. Therefore, investing in technology can also be considered an investment in the digital capabilities of the workforce, enhancing their digital thinking and operational skills in work and life.

Science and technology are decisive factors in the development of nations; they are prerequisites

and the best opportunities for our country to develop and prosper. Investing in technology requires a significant amount of capital, but its effectiveness has been proven. Therefore, institutions should pave the way for science and technology and innovation. When the legal framework is streamlined, ministries, sectors, and localities will have the basis to rapidly implement science and technology in the coming period.

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# UNVEILING THE IMPACT OF CHINESE MANUFACTURING SMES' INTERNATIONALIZATION ON PERFORMANCE

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• Keywords: *internationalization; export intensity; SME performance; working capital constraints; inverted-U relationship; Chinese manufacturing; emerging markets.*

Date of receipt: 27<sup>th</sup> Jan., 2026

Date of delivery revision: 15<sup>th</sup> Mar., 2026

DOI:

Date of receipt revision: 26<sup>th</sup> Mar., 2026

Date of approval: 28<sup>th</sup> Mar., 2026

## 1. Introduction

Internationalization represents a primary growth strategy for small and medium-sized enterprises (SMEs) in emerging economies such as China. Although entry into global markets offers substantial opportunities for efficiency improvements, the performance outcomes associated with such expansion remain contested within academic literature (Lu & Beamish, 2001; Tallman & Li, 1996). Traditional trade theories, including the Melitz (2003) model, typically propose a linear progression in which more productive firms self-select into exporting. In contrast, recent empirical studies indicate a more complex, non-linear relationship, frequently described as an inverted U-shaped pattern (Hitt et al., 1997; Qian et al., 2013).

By integrating Working Capital Management theory with the Resource-Based View (RBV), this study posits that the observed performance downturn is driven by a “liquidity-performance trade-off.” Initial internationalization enables firms to benefit from scale economies and learning-by-exporting effects. However, excessive export intensity extends the cash conversion cycle a prolonging foreign receivables (Manova, 2013). For SMEs operating in imperfect credit markets, this dynamic creates a structural mismatch in which production outflows exceed foreign inflows, ultimately leading to a “Working Capital Trap.”

## 2. Theoretical framework and hypotheses

### 2.1. The Resource-Based View and Internationalization Gains

The Resource-Based View (RBV) suggests that firms possess unique, valuable, and inimitable

resources that drive competitive advantage (Barney, 1991). In the context of SMEs, internationalization serves as a mechanism to exploit underutilized resources and achieve economies of scale (Lu & Beamish, 2001). Early-stage internationalization enables firms to benefit from “learning by exporting,” as exposure to foreign markets enhances technological capabilities and operational efficiency. However, as firms move beyond a moderate level of export intensity, the complexity of managing disparate markets begins to strain these internal resources, leading to diminishing marginal returns.

### 2.2. The Working Capital Mechanism: Explaining the Downturn

While traditional International Business (IB) literature attributes the downturn of the I-P curve to coordination costs (Hitt et al., 1997), we propose that, for manufacturing SMEs, the primary driver is financial, specifically related to Working Capital Management (WCM). Exporting inherently involves longer Cash Conversion Cycles (CCCs) than domestic operations. Manufacturing SMEs must finance the production, packaging, and shipping of goods long before foreign receivables are collected.

In emerging economies such as China, institutional voids and imperfect credit markets limit an SME’s ability to bridge its liquidity gap (Manova, 2013). As export intensity increases, the volume of accounts receivable tied up in international trade grows proportionally. When this intensity surpasses a critical threshold, the firm enters a “Working Capital Trap”. In this state, the liquidity mismatch between immediate production outflows and delayed foreign inflows becomes

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structural. The firm is forced to divert resources from productivity-enhancing investments to cover short-term financing needs or, worse, face insolvency risks due to overtrading. Therefore, the financial strain of managing high-intensity exports eventually offsets the efficiency gains from scale.

### 2.3. The Inverted U-shaped Relationship

Based on the integration of RBV and WCM perspectives, we argue that the internationalization-performance relationship is non-linear. At low to moderate levels, the benefits of market diversification and knowledge spillover dominate. However, as intensity approaches the identified optimal point of 47.8%, the marginal cost of financing the extended cash cycle begins to escalate. Beyond this point, the performance curve enters a downward slope as liquidity constraints become the dominant boundary condition.

Proceeding from the theoretical contentions previously advanced, internationalization tends to exhibit diminishing marginal returns because the resultant financial burdens supersede the advantages conferred by operational efficiencies. To formally substantiate this non-linear association, we hereby submit the subsequent hypotheses:

*Hypothesis 1a (The Upward Phase): At moderate echelons of commitment to export engagement, the intensity of internationalization demonstrates a positive association with firm performance, attributable to the realization of economies of scale and the advantages derived from learning by exporting mechanisms.*

*Hypothesis 1b (The Downward Phase): Exceeding a certain pivotal threshold, subsequent augmentations in the intensity of internationalization engender a diminution in firm performance, since limitations regarding liquidity and the overextension of working capital become definitively constraining.*

*Hypothesis 1 (Composite): A relationship characterized by an inverted-U exists between the intensity of internationalization and the performance metrics of Chinese manufacturing SMEs.*

## 3. Research methodology

### 3.1. Data Source and Sample Construction

This study uses firm-level data from the World Bank Enterprise Survey (WBES) for China,

specifically the 2012 and 2024 waves. The use of WBES data is advantageous as it provides standardized, high-quality metrics on SME operations in emerging markets, allowing for a robust cross-sectional analysis across different economic cycles. After filtering for manufacturing firms (ISIC codes 15-37) and removing observations with missing critical values, the final sample consists of 4,290 firm-year observations. This large-scale dataset ensures sufficient statistical power to test the non-linear relationship and the stability of the identified threshold.

### 3.2. Variable Measurement

#### 3.3. Econometric Specification

$$Productivity_i = \beta_0 + \beta_1(ExportIntensity_i) + \beta_2(ExportIntensity_i^2) + \gamma X_i + \theta_j + \tau_t + \varepsilon_i$$

where  $Productivity_i$  signifies the labour productivity measure for firm  $i$ ;  $ExportIntensity_i$  represents the proportion of total sales that are exported;  $ExportIntensity_i^2$  constitutes the squared term;  $X_i$  designates the vector comprising firm-specific control variables;  $\theta_j$  accounts for the industry fixed effects;  $\tau_t$  captures the temporal indicator variable for the year; and  $\varepsilon_i$  represents the inherent error term. Standard errors are formally clustered in accordance with the 2-digit ISIC industry classification code. A significant positive  $\beta_1$  and a significant negative  $\beta_2$  would provide empirical support for the inverted U-shaped hypothesis. The optimal threshold is subsequently calculated by setting the first derivative of the equation with respect to intensity to zero:  $ExportIntensity^* = -\beta_1 / (2\beta_2)$ .

## 4. Results and discussion

### 4.1. Descriptive Statistics

Table 1 presents the descriptive statistics for the sample of 4,290 firm-year observations. The average labour productivity is 437.6 thousand RMB per employee, showing significant heterogeneity across the Chinese manufacturing sector. The mean export intensity stands at 23.7% (SD = 28.4%), indicating that while the majority of SMEs focus on the domestic market, a significant subset is deeply integrated into global value chains. Notably, 18% of the sampled firms register an export intensity exceeding 50%. This distribution provides an ideal empirical base to test for non-linear effects, as it covers the full spectrum from purely domestic to export-oriented operations.

**Table 1: The regression results - interted-u hypothesis**

| Variable                         | Mean  | SD    | Min  | Max    |
|----------------------------------|-------|-------|------|--------|
| Labour Productivity (000 RMB)    | 437.6 | 389.2 | 12.4 | 2847.5 |
| Export Intensity (FSTS) %        | 23.7  | 28.4  | 0    | 100    |
| Firm Size (employees)            | 284.5 | 512.8 | 5    | 5823   |
| Firm Age (years)                 | 15.3  | 11.2  | 1    | 67     |
| Manager Experience (years)       | 18.5  | 10.5  | 0    | 45     |
| Digital Capabilities (Index 0-1) | 0.673 | 0.469 | 0    | 1      |
| Access to Credit (Dummy)         | 0.615 | 0.487 | 0    | 1      |

Source: World Bank Enterprise Surveys, China (2012, 2024). [www.enterprisesurveys.org](http://www.enterprisesurveys.org)

#### 4.2. Regression Analysis and the Optimal Threshold

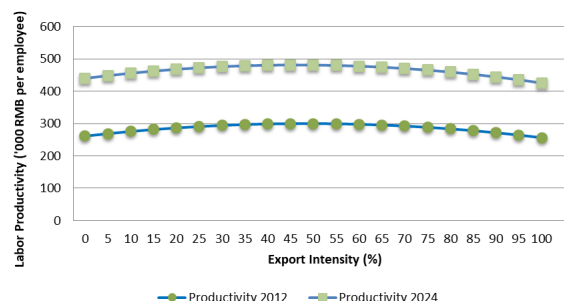
The results of the quadratic regression analysis (Table 2) provide robust empirical support for Hypothesis 1. In the quadratic specification (Model 2), the linear term for export intensity is positive and highly significant ( $\beta_1 = 1.704, p < 0.001$ ), while the squared term is negative and significant ( $\beta_2 = -1.781, p < 0.001$ ). This confirmation of a negative quadratic term formally establishes the inverted U-shaped relationship between internationalization and SME performance. Using the coefficients from Model 2, the definitive optimal export threshold is calculated at 47.8% (95% CI: 40.9%-54.1%). This finding suggests that productivity reaches its zenith when export revenue accounts for approximately half of the total sales. Beyond this 47.8% tipping point, the costs associated with excessive internationalization which we attribute to the “Working Capital Trap” - begin to outweigh the benefits of scale and learning. Specifically, the model indicates a “Safe Operating Zone” between 30% and 60% intensity, where firms achieve near-optimal efficiency without triggering severe liquidity constraints.

**Table 2: Principal regression results-an examination of the inverted-u hypothesis**

| Variable                                           | Model 1<br>(Linear) | Model 2<br>(Quadratic) | Model 3<br>(Full Controls) |
|----------------------------------------------------|---------------------|------------------------|----------------------------|
| Export Intensity (FSTS)                            | 0.952(0.325)        | 1.704(0.412)           | 1.682(0.418)               |
| Export Intensity <sup>2</sup> (FSTS <sup>2</sup> ) | -                   | -1.781 (0.336)         | -1.776 (0.339)             |
| Digital Capabilities                               | 0.386(0.078)        | 0.384(0.077)           | 0.381(0.078)               |
| Manager Experience                                 | 0.015 (0.005)       | 0.015 (0.005)          | 0.015(0.005)               |
| Firm Size (ln)                                     | 0.108(0.018)        | 0.112 (0.018)          | 0.113(0.018)               |
| Observations                                       | 4,290               | 4,290                  | 4,290                      |
| R-squared                                          | 0.062               | 0.079                  | 0.081                      |
| Turning Point                                      | -                   | 47.8%                  | 47.4%                      |

Note: \*\*\*  $p < 0.001$ ; \*\*  $p < 0.01$ ; \*  $p < 0.05$ . Standard errors clustered by industry.

Source: World Bank Enterprise Surveys, China (2012, 2024). [www.enterprisesurveys.org](http://www.enterprisesurveys.org)

**Figure 1: The Inverse U-Shaped Relationship between Internationalisation and Organisational Performance**

Source: World Bank Enterprise Surveys, China (2012, 2024). [www.enterprisesurveys.org](http://www.enterprisesurveys.org)

#### 4.3. Digitalization, Gender, and Temporal Stability

Our analysis further reveals that digital capabilities and managerial gender act as “level-shifters” rather than “slope-modifiers”. Digital capabilities (Model 3) uniformly augment productivity but do not induce significant modifications in the curvature or the 47.8% threshold. This implies that while digital tools enhance operational efficiency, they do not fundamentally resolve the structural credit-lag issues inherent in high-intensity exporting.

Regarding gender, the coefficient for female financial managers is statistically non-significant ( $\beta = -0.070, p > 0.10$ ), indicating gender parity in the I-P trajectory. Furthermore, Figure 1 illustrates a significant upward shift in the productivity curve from 2012 to 2024 (+68.3%). Crucially, the inverted-U formation and the optimal threshold remain remarkably stable across both periods (2012: 48.6%; 2024: 46.3%). This temporal consistency rigorously reinforces the argument that the 47.8% threshold is a structural feature of the SME financial environment in China, rather than a transitory market phenomenon.

**Table 3: Findings of the moderation analysis**

| Variable                    | Main Effects | With Interactions           |
|-----------------------------|--------------|-----------------------------|
| FSTS                        | 1.704        | 1.682                       |
| FSTS <sup>2</sup>           | -1.781       | -1.776                      |
| Digital Capabilities (DDCI) | 0.384        | 0.381                       |
| FSTS × DDCI                 | -            | 0.021 (0.064) <sup>ns</sup> |
| FSTS × Manager Exp          | -            | 0.003 (0.006) <sup>ns</sup> |
| R-squared                   | 0.079        | 0.080                       |
| F-test for Interactions     | -            | 0.34 (p=0.89)               |

Source: World Bank Enterprise Surveys, China (2012, 2024). [www.enterprisesurveys.org](http://www.enterprisesurveys.org)

#### 4.4. Examination of Robustness: Employing Alternative Metrics of Performance

Table 4 incontrovertibly demonstrates consistency when utilizing disparate performance measures. Specifically, employing Return on Assets (ROA) yields an optimal threshold of 44.2% (95% CI: 37.8%-50.6%). Furthermore, the implementation of Sales Growth yields an optimal threshold of 50.1% (95% CI: 43.5%-56.8%). The congruity evidenced across these three separate metrics specifically labour productivity, organizational profitability, and sales growth serves to consolidate confidence that the findings encapsulate fundamental relationships, rather than constituting mere measurement artefacts. The determination of the optimal threshold consistently remains within the bracket of 44% to 50%, thus endorsing the 30-60% “safe zone” as a form of robust strategic direction.

**Table 4: Temporal constancy (2012 versus 2024)**

| Variable                      | 2012 Subsample | 2012 Subsample | Digital (p-value) |
|-------------------------------|----------------|----------------|-------------------|
| FSTS Coefficient              | 1.598 (0.458)  | 1.789 (0.472)  | 0.412 (ns)        |
| FSTS <sup>2</sup> Coefficient | -1.647 (0.381) | -1.933 (0.395) | 0.346 (ns)        |
| Optimal Threshold             | 48.6%          | 46.3%          | 0.327 (Stable)    |
| Mean Productivity             | 261.3          | 439.8          | <0.001            |
| Observations                  | 2,136          | 2,154          | -                 |

Source: World Bank Enterprise Surveys, China (2012, 2024). [www.enterprisesurveys.org](http://www.enterprisesurveys.org)

**Table 5: Alternative performance metrics**

| Variable              | Labor Productivity | Return on Assets | Sales Growth   |
|-----------------------|--------------------|------------------|----------------|
| Turning Point         | 47.8%              | 44.2%            | 50.1%          |
| 95% Conf. Interval    | [40.9%, 54.1%]     | [37.8%, 50.6%]   | [43.5%, 56.8%] |
| Inverted-U Confirmed? | YES                | YES              | YES            |

Source: World Bank Enterprise Surveys, China (2012, 2024). [www.enterprisesurveys.org](http://www.enterprisesurveys.org)

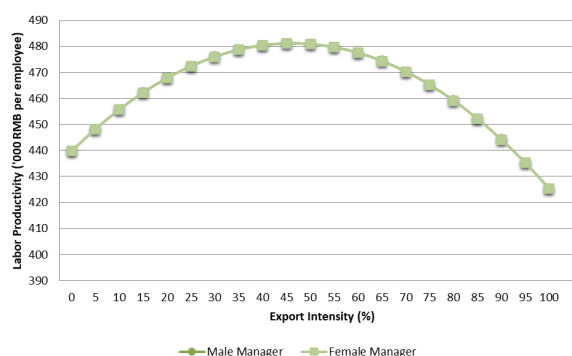
#### 4.5. The Attainment of Gender Parity within Internationalisation Outcomes

Figure 2 critically examines a question of significant theoretical import: Do managers identified as male and those identified as female navigate distinct trajectories in the relationship between internationalization and performance? Preceding scholarly literature posited that female entrepreneurs customarily confront escalated impediments to internationalization attributable to factors such as limitations in professional networking, discriminatory practices in credit issuance, and biases rooted in stereotypes (Brush et al., 2009; Orser et al., 2010). Should this premise hold true, our anticipation would be that firms under female management would exhibit pronounced declines in performance

when operating at elevated export intensities, or alternatively, register demonstrably lower optimal thresholds.

It is highly striking that Figure 2 discloses a convergence characterized by virtually complete overlap between the curves representing male and female managers. The mean differential in productivity is measured at -0.07 thousand RMB (constituting a variation of less than 0.02%), a quantum statistically indistinguishable from a value of zero ( $p > 0.10$ ). Both resultant curves demonstrate comparable curvature, reach their culmination at approximately 47% to 48% export intensity, and proceed to decline at analogous velocities when the intensity exceeds 60%. A rigorous formal regression analysis (not presented herein) conclusively verifies that the interaction term, defined as ExportIntensity multiplied by FemaleManager, remains statistically insignificant ( $\beta = 0.003$ ,  $p = 0.892$ ).

**Figure 2: Gender Parity in Export Intensity-Performance Relationship**



Source: World Bank Enterprise Surveys, China (2012, 2024). [www.enterprisesurveys.org](http://www.enterprisesurveys.org)

## 5. Conclusion and implications

### 5.1. The Working Capital Trap and Balanced Internationalization Strategy

Our findings identify a “golden zone” of internationalization between 30% and 60% export intensity, where SMEs maximize productivity. This zone represents the optimal balance between economies of scale and manageable liquidity demands. Operating below 30% leaves benefits unrealized, while exceeding 60% triggers severe working capital constraints that erode productivity gains.

The working capital mechanism explains this inverted-U pattern. Cross-border transactions extend cash conversion cycles from 30-45 days



to 75-90 days. At intensities beyond 60%, internal cash flow becomes insufficient to bridge these liquidity gaps. Constrained by credit rationing, firms often resort to productivity-damaging strategies, such as delaying supplier payments or foregoing critical investments, leading to the observed performance downturn.

**For SME Managers:** Pursue “balanced internationalization” strategies, targeting a 40-50% export intensity as a performance-maximizing level rather than maximizing export concentration. Prioritize working capital management, establish favourable payment terms with export buyers, develop relationships with trade finance providers (letters of credit, receivables factoring), and leverage digital technologies to reduce operational inefficiencies.

**For Policymakers:** Export promotion policies should emphasize financial infrastructure support for trade finance facilities, receivables factoring marketplaces, and supply chain finance platforms, rather than focusing solely on market access. Policies should particularly target highly internationalized firms (>60% export intensity) where working capital constraints bind most severely. Digital infrastructure investment may enhance productivity uniformly, but it cannot fundamentally address working capital constraints inherent in cross-border transactions.

## 5.2. Limitations and Future Research Directions

Several limitations merit acknowledgement. First, our cross-sectional design prevents us from fully addressing endogeneity concerns. More productive firms may self-select into higher export intensities, potentially confounding causal interpretation. Future research using panel data with firm fixed effects, instrumental variable strategies (e.g., exchange rate shocks, trade policy changes), or quasi-experimental designs would strengthen causal inference. Second, our sample focuses on manufacturing SMEs in one country, limiting generalizability. Service sector firms, larger enterprises, and firms in other institutional contexts may exhibit different patterns. Comparative studies across countries with varying levels of financial development would clarify the boundary conditions. Third, we measure only direct exports, thereby understating firms’ total international exposure when they engage

in indirect exporting through intermediaries. Fourth, our working capital mechanism remains somewhat indirect—we observe the inverted-U pattern and infer working capital constraints, but lack direct measures of cash conversion cycles or credit constraints at the firm level.

**Acknowledgments.** We thank the Enterprise Analysis Unit of the Development Economics Global Indicators Group of the World Bank for the data. The findings, interpretations, and conclusions expressed in this paper are entirely those of the authors and do not necessarily represent the views of the World Bank, its Board of Executive Directors, or the governments they represent.

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# FOREIGN DIRECT INVESTMENT, TRADE OPENNESS, GOVERNANCE AND GROWTH IN 25 ASIA-PACIFIC COUNTRIES: EVIDENCE FROM FIXED-EFFECTS AND PANEL ARDL MODELS

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**Abstract:** *This study investigates the joint impact of Foreign Direct Investment (FDI), trade openness, political stability, and control of corruption on economic growth in 25 Asia-Pacific economies over the period 1996-2019. The analysis addresses a critical gap regarding how governance conditions shape the growth benefits derived from external integration within this diverse region. Utilizing an unbalanced panel dataset, the research employs both static two-way fixed-effects models and dynamic Panel Autoregressive Distributed Lag (ARDL) models with a Pooled Mean Group (PMG) estimator to differentiate between short-run and long-run relationships. Empirical results consistently demonstrate that FDI inflows, measured as a share of GDP, are a robust and statistically significant positive correlate of real GDP growth across all specifications, serving as a meaningful long-run growth driver. Conversely, the direct effects of trade openness (trade-to-GDP ratio) and the selected governance indicators (political stability and control of corruption) are found to be weaker and highly sensitive to model specification. The findings underscore the strategic importance of policies focused on attracting and retaining productive FDI, supported by a stable domestic environment.*

• Keywords: Asian-pacific; FDI; governance; growth; trade openness.

Date of receipt: 27<sup>th</sup> Jan., 2026

Date of delivery revision: 15<sup>th</sup> Mar., 2026

DOI:

Date of receipt revision: 26<sup>th</sup> Mar., 2026

Date of approval: 28<sup>th</sup> Mar., 2026

## Introduction

Foreign direct investment (FDI) is widely viewed as an important engine of growth for developing and emerging economies. It can bring new technologies, management skills and access to global value chains that may be difficult to build domestically. Early cross-country studies such as Borensztein et al. (1998) and Alfaro et al. (2004) find that FDI can raise long-run growth, especially where human capital and financial systems are sufficiently developed. More recent work shows that the impact of FDI on growth is not uniform: it varies across regions and depends on local absorptive capacity and macroeconomic conditions (Iamsiraroj & Ulubaşoğlu, 2015; Mahembe, 2014).

Trade openness is another key channel through which countries integrate into the world economy. The classic contribution by Frankel and Romer (1999) documents that higher trade shares are associated with higher income per capita, suggesting that openness can support growth by allowing countries to exploit comparative advantage and scale effects. For Asia-Pacific developing economies, Dinh and Bui (2015) report that both FDI and trade openness contribute positively to income growth, but the size of the effect depends on domestic conditions such as

macroeconomic stability and infrastructure. These findings support the idea that external openness can be growth-enhancing, but only when combined with supportive domestic policies.

The institutional economics literature stresses that the quality of governance can shape both the volume of external flows and their impact on growth. Acemoglu et al. (2001) argue that persistent differences in political and economic institutions explain much of the cross-country variation in income levels. The Worldwide Governance Indicators (WGI) developed by Kaufmann et al. (2010) allow researchers to measure dimensions such as political stability and control of corruption in a consistent way across countries and over time. Empirical work shows that better institutional quality and lower political risk tend to attract more FDI (Busse & Hefeker, 2007; Kurul & Yalta, 2017; Sabir et al., 2019). Yet there is still limited evidence on how these governance dimensions jointly influence economic growth in Asia-Pacific economies once FDI and trade openness are taken into account.

Existing empirical studies on Asia-Pacific can be grouped into two broad strands. The first focuses on the growth effects of FDI and trade openness, often using panel data methods. For example, Dinh and Bui (2015)

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and Su et al. (2019) show that openness and capital inflows support growth in developing Asian economies, with results that depend on the choice of indicators and model specification. More recent work by Nguyen and Pham (2025) employs a Pooled Mean Group (PMG) panel autoregressive distributed lag (ARDL) model for ASEAN-5 countries and finds that FDI and trade openness have positive long-run effects on growth, with heterogeneous short-run dynamics. The second strand explains FDI inflows using political stability, governance and trade variables; for example, Rashid et al. (2017) and Le (2023) analyse how political stability and openness influence FDI in Asia-Pacific economies.

The study makes three main contributions to the literature. First, it provides updated evidence on the joint effects of FDI, trade openness and governance on economic growth in a large group of Asia-Pacific economies, using recent panel data that cover several crisis episodes and the run-up to major regional integration initiatives. Second, by including both political stability and control of corruption as core explanatory variables, the analysis explicitly examines how governance conditions shape the growth pay-off from external openness, bridging the FDI-growth and institutions-growth literatures. Third, the combination of static two-way fixed-effects models and dynamic PMG-ARDL estimates allows us to distinguish short-run from long-run effects and to check the robustness of the results to alternative specifications, addressing concerns about persistence, omitted variables and reverse causality. Empirically, the results show that FDI is a robust positive correlate of growth, whereas the direct effects of trade openness and the governance indicators are weaker and more sensitive to model specification once country and time effects and dynamic adjustment are taken into account.

### Literature review and hypotheses

Research on foreign direct investment (FDI) and growth generally finds that FDI can support long-run economic performance by transferring technology, management skills and access to international markets. Early cross-country studies such as Borensztein et al. (1998) and Alfaro et al. (2004) show that the growth effect of FDI is stronger when human capital and financial systems are more developed. More recent panel evidence, including Mahembe (2014) and Iamsiraroj and Ulubaşoğlu (2015), confirms that FDI is often growth-enhancing but stresses that the impact is heterogeneous across regions and income groups, and can be weak or negative when FDI crowds out domestic investment or is intermediated through weak institutions and unstable macroeconomic conditions. Overall, this literature supports a conditional FDI-growth nexus, which is consistent with our empirical

finding that FDI is the most robust positive correlate of growth in Asia-Pacific once country and time effects are controlled for.

Trade openness has also been widely examined as a driver of income and growth. Frankel and Romer (1999) argue that countries with higher trade shares tend to have higher income per capita because openness allows specialisation, scale economies and technology diffusion. Many panel studies for developing and emerging economies report positive openness-growth links, particularly for economies that liberalize trade and integrate into global value chains. However, later work shows that these results are sensitive to how openness is measured, the controls used and the treatment of crisis periods. For Asian economies, studies such as Dinh and Bui (2015) and Su et al. (2019) find that export expansion, trade liberalization and FDI inflows can support growth, but that poor infrastructure and macroeconomic volatility reduce the gains. This mixed evidence aligns with our results: once FDI, fixed effects and dynamics are taken into account, trade openness (measured by the trade-to-GDP ratio) has at best a weak and sometimes negative conditional association with growth, suggesting that openness alone is not a reliable proximate driver of annual growth in the region.

Institutional quality and governance now feature prominently in both growth and FDI research. Acemoglu et al. (2001) emphasise that differences in political and economic institutions explain much of the variation in income levels, while Kaufmann et al. (2010) provide the Worldwide Governance Indicators used to measure political stability, control of corruption and related dimensions. Empirical studies typically find that weaker institutions and higher political risk reduce FDI inflows (Busse & Hefeker, 2007; Kurul & Yalta, 2017; Sabir et al., 2019), and that corruption and instability can hinder investment and distort resource allocation. At the same time, governance indicators are highly persistent and strongly correlated with income, which complicates identification of their independent effect on growth in panel regressions with fixed effects.

Within the Asia-Pacific region, the interaction between external integration and governance is especially relevant. The region combines large emerging markets and small very open economies, with wide variation in institutional quality. Rashid et al. (2017) show that FDI into competitive Asia-Pacific economies responds to both macro fundamentals and political risk, while Le (2023) finds that trade openness can moderate the effect of political stability on FDI inflows in 25 Asia-Pacific countries. These and related studies mainly treat FDI as the dependent variable and devote less attention to how FDI, trade openness and governance jointly shape economic growth itself.



The dynamic nature of growth adjustment has led to wider use of error-correction and panel autoregressive distributed lag (ARDL) models. The Pooled Mean Group (PMG) estimator of Pesaran et al. (1999) allows heterogeneous short-run dynamics and speeds of adjustment across countries while imposing common long-run coefficients. Recent applications for emerging economies (e.g. Appiah et al., 2019; Wehncke et al., 2022) show that FDI, trade and financial development often have positive long-run links to growth, with weaker and more volatile short-run effects. Our dynamic panel ARDL results for Asia-Pacific are broadly consistent with this pattern for FDI but less so for trade and governance: we find a strong and stable long-run FDI-growth relationship and a fast error-correction process, while the long-run coefficients on trade openness and governance indicators are small and statistically fragile.

Taken together, the literature suggests that FDI and trade openness can support growth in favorable domestic environments and that governance shapes both external flows and long-run development paths.

Based on this literature, we formulate the following hypotheses for our empirical analysis:

- H1: Higher FDI inflows, measured as a share of GDP, are associated with higher economic growth in Asia-Pacific countries.
- H2: Trade openness, measured by the trade share of GDP, has a statistically significant association with economic growth in Asia-Pacific countries after controlling for FDI and country and time effects.
- H3: Political stability has a statistically significant association with economic growth in Asia-Pacific countries after controlling for FDI, trade openness and unobserved heterogeneity.
- H4: Control of corruption has a statistically significant association with economic growth in Asia-Pacific countries after controlling for FDI, trade openness and unobserved heterogeneity.

#### Data and methodology

This study uses an unbalanced panel dataset for 25 Asia-Pacific countries over the period 1996-2019. The sample includes both large emerging economies and smaller, highly open economies in the region. Country coverage is determined by the joint availability of data for real GDP growth, foreign direct investment, trade openness and governance indicators. Annual observations are taken from standard international sources: mainly the World Development Indicators (WDI) and the Worldwide Governance Indicators (WGI) compiled by the World Bank (Kaufmann et al., 2010). These databases provide internationally comparable series over a long period, which is

suitable for panel analysis. After merging all series and checking basic consistency, the final dataset contains 463 usable country-year observations for 25 Asia-Pacific economies. The full country list is reported in an online appendix.

The dependent variable is real GDP growth (GDP\_GROWTH), measured as the annual percentage change in real gross domestic product. This indicator captures year-to-year changes in economic activity and is widely used in empirical growth studies. The main explanatory variable of interest is foreign direct investment (FDI), defined as net FDI inflows as a percentage of GDP, using the WDI series BX.KLT.DINV.WD.GD.ZS. This ratio reflects the scale of external capital inflows relative to the size of the host economy. Trade openness (TO) is measured as the sum of exports and imports of goods and services as a percentage of GDP, using NE.TRD.GNFS.ZS, and is used to capture the degree of integration into international trade.

To represent governance and institutional quality, we use two indicators from the WGI. The political stability and absence of violence/terrorism index (POL) measures perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, with higher values indicating greater stability. The control of corruption index (COC) reflects perceptions of the extent to which public power is exercised for private gain, with higher values indicating stronger control of corruption (Kaufmann et al., 2010). Both indices are standardized around zero and typically range from approximately -2.5 to +2.5. All governance indicators are treated as continuous variables in levels. A consumer price index series is also available and is used to construct an inflation measure in robustness checks, but the core empirical specifications focus on GDP\_GROWTH, FDI, TO, POL and COC.

The empirical strategy combines a static two-way fixed-effects model with a dynamic panel autoregressive distributed lag (ARDL) approach. As a baseline, we estimate a fixed-effects model of economic growth on FDI, trade openness and governance indicators with both country and year effects:

$$GDP_{Growth\ it} = \alpha + \beta_1 FDI_{it} + \beta_2 TO_{it} + \beta_3 POL_{it} + \beta_4 COC_{it} + \mu_i + \lambda_t + \varepsilon_{it}$$

where  $i$  indexes countries and  $t$  indexes years. The term  $\mu_i$  captures unobserved, time-invariant country-specific factors such as geography, culture and deep institutional traits, while  $\lambda_t$  captures common time shocks that affect all countries in a given year, such as global crises or broad changes in the external environment. The error term  $\varepsilon_{it}$  is allowed to be heteroskedastic and to differ across countries. The model

is estimated using the within-group transformation with country and year dummy variables, and robust standard errors based on a White cross-section covariance matrix. This covariance estimator adjusts for heteroskedasticity and contemporaneous correlation across countries, and is consistent with standard panel data practice (Baltagi, 2008). The two-way fixed-effects framework helps control for omitted variables that are constant within countries and for shocks that are common across all countries in a particular year.

Economic growth is likely to exhibit persistence, and FDI, trade openness and governance may be jointly determined with growth. To address these issues and to distinguish between short-run and long-run relationships, we also estimate a panel ARDL model. In this framework, GDP growth is allowed to depend on its own past values and on current and lagged values of FDI, trade openness, political stability and control of corruption. A convenient way to express the panel ARDL model is in error-correction form:

$$\begin{aligned} \Delta GDP_{Growth\ it} = & \theta_1(GDP_{Growth\ it-1} - \theta_1 FDI_{it-1} - \theta_2 TO_{it-1} - \theta_3 POL_{it-1} - \theta_4 COC_{it-1}) \\ & + \sum_j \psi_{1ij} \Delta GDP_{Growth\ it-j} + \sum_j \psi_{2ij} \Delta FDI_{it-j} + \sum_j \psi_{3ij} \Delta TO_{it-j} \\ & + \sum_j \psi_{4ij} \Delta POL_{it-j} + \sum_j \psi_{5ij} \Delta COC_{it-j} + \mu_i + \lambda_t + \varepsilon_{it} \end{aligned}$$

where  $\Delta$  denotes first differences,  $\theta_1$  to  $\theta_4$  are the long-run coefficients linking GDP growth to FDI, trade openness and governance,  $\phi_i$  is the country-specific error-correction coefficient, and the  $\psi$  coefficients describe short-run dynamics. A negative and statistically significant  $\phi_i$  indicates that GDP growth adjusts back towards a long-run equilibrium relationship with FDI, trade openness and governance after a shock.

The panel ARDL model is estimated using the Pooled Mean Group (PMG) estimator proposed by Pesaran et al. (1999). This estimator allows the long-run coefficients ( $\theta_1$  to  $\theta_4$ ) to be common across countries, while permitting the short-run coefficients, error-correction speeds and intercepts to differ across countries. This structure is appropriate for a group of Asia-Pacific economies that share some regional characteristics but may adjust at different speeds. The ARDL-PMG framework is suitable for panels where variables are a mixture of stationary and non-stationary series, provided there is evidence of cointegration among them, and has been widely used in recent work on FDI and growth (Appiah et al., 2019; Pesaran et al., 1999; Wehncke et al., 2022).

Before implementing the ARDL-PMG approach, we apply panel unit root tests to assess the order of integration of each variable and panel cointegration tests to check for the existence of a stable long-run relationship. The lag length for each variable in the ARDL specification is selected using standard information criteria, taking into

account the time dimension of the panel and the need to avoid over-parameterization (Baltagi, 2008). In cases where the main variables appear stationary, the ARDL specification can still be interpreted as a flexible dynamic model of growth with lagged levels and differences. The panel ARDL estimates distinguish long-run elasticities from short-run responses and provide an explicit error-correction term that summarizes the speed at which growth returns to its long-run path after disturbances. Together, these methods help address concerns about unobserved heterogeneity, dynamic adjustment and potential endogeneity, and offer a more reliable basis for discussing the roles of FDI, trade openness and governance in shaping economic growth in Asia-Pacific economies (Appiah et al., 2019; Wehncke et al., 2022).

## Empirical results

### Descriptive statistics and correlations

Table 1 shows average real GDP growth in the full sample is 4.40% per year, with a median of 4.46% and a standard deviation of 3.33 percentage points. The minimum growth rate is about -2.05% and the maximum about 10.68%, indicating substantial variation in annual growth across countries and over time.

**Table 1. Descriptive statistics (1996-2019, 25 Asia-Pacific countries, 463 observations)**

|              | GDP_GROWTH | TO       | FDI      | POL       | COC       |
|--------------|------------|----------|----------|-----------|-----------|
| Mean         | 4.398521   | 105.9835 | 4.940453 | 0.308172  | 0.198544  |
| Median       | 4.461609   | 86.00175 | 2.920942 | 0.477436  | -0.125844 |
| Maximum      | 10.67680   | 359.6492 | 22.79922 | 1.350247  | 2.207466  |
| Minimum      | -2.053518  | 0.460368 | 0.054606 | -1.244970 | -1.133364 |
| Std. Dev.    | 3.330728   | 85.51455 | 5.925125 | 0.810395  | 1.024986  |
| Skewness     | -0.050175  | 1.781564 | 1.974524 | -0.529644 | 0.714446  |
| Kurtosis     | 2.435875   | 5.839885 | 6.020917 | 2.020793  | 2.292178  |
| Jarque-Bera  | 6.333586   | 400.5110 | 476.9077 | 40.14476  | 49.05373  |
| Probability  | 0.042139   | 0.000000 | 0.000000 | 0.000000  | 0.000000  |
| Sum          | 2036.515   | 49070.38 | 2287.430 | 142.6836  | 91.92574  |
| Sum Sq. Dev. | 5125.311   | 3378485. | 16219.49 | 303.4139  | 485.3754  |
| Observations | 463        | 463      | 463      | 463       | 463       |

Net FDI inflows average 4.94% of GDP, with a median of 2.92% and a standard deviation of 5.93 percentage points. The distribution is strongly right-skewed (skewness  $\approx 1.97$ ), reflecting episodes of very large inflows in some economies (maximum around 22.80% of GDP). Trade openness is high on average, with a mean of about 106% of GDP and a median of 86%. The standard deviation is 85.51 and the maximum is almost 360% of GDP, which is typical for a region that includes both relatively closed economies and very small, extremely open economies.

The governance indicators also display meaningful variation. Political stability (POL) has a mean of 0.31 and a median of 0.48, with values ranging from about -1.24 to 1.35 and a standard deviation of 0.81. Control of corruption (COC) has a mean of 0.20, a median slightly below zero (-0.13) and a standard deviation of about 1.02, with values spanning roughly from -1.13 to 2.21. Jarque-Bera statistics indicate that the null of

normality is rejected at the 5% level for all variables; this is common in macroeconomic and institutional panel data and does not prevent consistent estimation with robust methods.

**Table 2. Correlation matrix**

|            | GDP_GROWTH | TO     | FDI   | POL    | COC    |
|------------|------------|--------|-------|--------|--------|
| GDP_GROWTH | 1.000      | -0.005 | 0.169 | -0.266 | -0.277 |
| TO         | -0.005     | 1.000  | 0.748 | 0.324  | 0.449  |
| FDI        | 0.169      | 0.748  | 1.000 | 0.277  | 0.327  |
| POL        | -0.266     | 0.324  | 0.277 | 1.000  | 0.719  |
| COC        | -0.277     | 0.449  | 0.327 | 0.719  | 1.000  |

Table 2 presents the correlation matrix. GDP growth is positively correlated with FDI (about 0.17) and essentially uncorrelated with trade openness (-0.005). By contrast, growth is negatively correlated with both political stability (-0.27) and control of corruption (-0.28). This pattern likely reflects level differences: countries with very strong institutions tend to be richer and grow more slowly, whereas several fast-growing economies in the region still have weaker governance scores.

Among the explanatory variables, the correlations are much stronger. Trade openness and FDI are highly correlated (around 0.75), and both are positively correlated with the governance indicators. Political stability and control of corruption are strongly correlated with each other (about 0.72), indicating that they capture related aspects of institutional quality. These strong correlations suggest that multicollinearity may inflate standard errors for some coefficients, and they underline the value of using panel regressions with fixed effects to separate the roles of FDI, trade and governance.

#### **Robustness: Cross-section weighted GLS**

As a robustness check to the baseline fixed-effects specification, we estimate an alternative model using panel EGLS with cross-section weights and White cross-section robust standard errors. This approach allows for country-specific heteroskedasticity and reweights the observations accordingly, while still controlling for unobserved, time-invariant country characteristics through cross-section fixed effects (shown in Table 3).

**Table 3. Panel EGLS**

| Variable                              | Coefficient | Std. Error         | t-Statistic | Prob.    |
|---------------------------------------|-------------|--------------------|-------------|----------|
| C                                     | 4.092106    | 0.564105           | 7.254160    | 0.0000   |
| FDI                                   | 0.155891    | 0.035487           | 4.392903    | 0.0000   |
| TO                                    | -0.003349   | 0.004025           | -0.832086   | 0.4058   |
| POL                                   | 0.598372    | 0.610990           | 0.979348    | 0.3280   |
| COC                                   | -1.476916   | 0.422628           | -3.494598   | 0.0005   |
| Effects Specification                 |             |                    |             |          |
| Cross-section fixed (dummy variables) |             |                    |             |          |
| Weighted Statistics                   |             |                    |             |          |
| R-squared                             | 0.637362    | Mean dependent var |             | 6.522388 |
| Adjusted R-squared                    | 0.613966    | S.D. dependent var |             | 6.645672 |
| S.E. of regression                    | 2.631397    | Sum squared resid  |             | 3005.124 |
| F-statistic                           | 27.24237    | Durbin-Watson stat |             | 1.660094 |
| Prob(F-statistic)                     | 0.000000    |                    |             |          |
| Unweighted Statistics                 |             |                    |             |          |
| R-squared                             | 0.408533    | Mean dependent var |             | 4.398521 |
| Sum squared resid                     | 3031.452    | Durbin-Watson stat |             | 1.692646 |

In Table 3, the dependent variable remains real GDP growth, and the regressors are FDI, trade openness,

political stability and control of corruption. The weighted R-squared is 0.64 and the adjusted weighted R-squared is 0.61, indicating a reasonably good fit for annual growth data. The F-statistic (27.24 with p-value 0.0000) confirms that the regressors and country effects are jointly significant. The Durbin-Watson statistic of 1.66 suggests moderate residual persistence but no severe serial correlation.

FDI continues to have a positive and statistically significant association with economic growth. The coefficient on FDI is 0.1559 with a standard error of 0.0355 and a t-statistic of 4.39 ( $p < 0.01$ ). This estimate is very close to the fixed-effects result and reinforces the conclusion that higher FDI inflows are linked to faster growth in Asia-Pacific economies, even when the model allows for heteroskedasticity and cross-sectional weighting.

The coefficient on trade openness is negative but statistically insignificant in this robustness specification. The estimate is -0.0033 with a standard error of 0.0040 and a t-statistic of -0.83 ( $p \approx 0.41$ ). This suggests that, once the model is reweighted and only country fixed effects are included, trade openness does not show a clear conditional relationship with growth.

The governance variables show mixed results. Political stability remains positive but statistically insignificant (coefficient 0.5984,  $p \approx 0.33$ ), indicating that short-run changes in political stability do not have a clearly identifiable direct effect on annual growth in this specification. By contrast, the coefficient on control of corruption is negative and statistically significant (-1.4769 with a standard error of 0.4226 and a t-statistic of -3.49,  $p < 0.01$ ). This sign is counter-intuitive and most likely reflects sample composition and multicollinearity rather than a genuine negative effect of controlling corruption on growth.

#### **Dynamic panel ARDL results**

This subsection reports estimates from a dynamic panel ARDL(1,0,0,0) model with country and year fixed effects. Real GDP growth depends on its own lag, contemporaneous FDI, trade openness, political stability and control of corruption, plus country and year dummies. Because of the lagged dependent variable, the usable sample is 438 observations for 25 countries over 1997-2019. The model explains about 59% of the variation in annual growth (R-squared  $\approx 0.59$ ), which is slightly higher than in the static fixed-effects specification.

#### **Long-run coefficients**

Long-run coefficients are obtained by dividing each short-run slope by one minus the coefficient on lagged GDP growth. Table 4 summarizes the implied long-run relationships between growth and the explanatory variables.



**Table 4. Dynamic panel ARDL long-run coefficients (ARDL(1,0) with country and year fixed effects)**

| Variable                    | Coefficient | Std. error | t-statistic | p-value |
|-----------------------------|-------------|------------|-------------|---------|
| FDI (% of GDP)              | 0.192       | 0.049      | 3.90        | 0.0001  |
| Trade openness (TO)         | -0.015      | 0.007      | -2.03       | 0.0427  |
| Political stability (POL)   | 0.563       | 0.756      | 0.74        | 0.4567  |
| Control of corruption (COC) | 0.021       | 0.763      | 0.03        | 0.9778  |

The dynamic long-run estimates confirm the central role of FDI. The coefficient on FDI is positive and statistically significant at the 1% level. It implies that, in the long run, an increase in net FDI inflows by 1 percentage point of GDP is associated with roughly 0.19 percentage points higher annual real GDP growth, holding other factors constant. This result is consistent with Hypothesis H1 and with the static fixed-effects estimates.

Trade openness has a small negative long-run coefficient, which is statistically significant at the 5% level. Conditional on FDI and governance, higher trade shares are associated with slightly lower long-run growth. This suggests that, in this sample, the direct contribution of openness to growth is limited once FDI and fixed effects are taken into account, and that the openness-growth relationship may be driven by indirect channels or by differences in country income levels and vulnerability to external shocks.

The long-run coefficients on political stability and control of corruption are small and not statistically different from zero. This indicates that, in the dynamic specification, governance indicators do not show an independent long-run effect on annual growth once FDI, trade openness, country heterogeneity and common time shocks are controlled for. These results provide only weak direct support for Hypotheses H3 and H4, although governance may still matter indirectly through its impact on FDI and trade patterns.

### Conclusion

This paper examined how foreign direct investment, trade openness and governance relate to economic growth in 25 Asia-Pacific countries over 1996-2019, using two-way fixed-effects regressions, cross-section weighted GLS and a dynamic panel ARDL model with country and year effects. Across all specifications, FDI inflows emerge as a robust and economically meaningful driver of real GDP growth, in both the short run and the long run. This supports H1 and is consistent with the view that FDI transmits technology, management skills and access to global production networks when host economies have sufficient absorptive capacity.

By contrast, the evidence for H2-H4 is weak. Trade openness, measured by the trade-to-GDP ratio, shows a small negative or statistically insignificant conditional association with growth once FDI and fixed effects are controlled for. Political stability and control of corruption do not display strong independent effects on annual growth in the main models. These results

suggest that, in this regional panel, openness and governance operate mainly as background conditions and determinants of the level and quality of FDI and structural development, rather than as strong direct regressors in year-to-year growth equations. The dynamic ARDL estimates confirm a stable long-run relationship between growth, FDI, openness and governance, with a fast speed of adjustment back to equilibrium, but they underline that FDI is the most reliable predictor within this system.

The study contributes by providing updated panel evidence for a broad group of Asia-Pacific economies, placing growth (rather than FDI inflows) at the center of the analysis, and combining static fixed-effects and dynamic ARDL approaches to separate short-run and long-run effects. At the same time, the results are subject to limitations: the use of aggregate annual data and a limited set of regressors, the perception-based and persistent nature of the governance indicators, and the use of common slope coefficients in the dynamic model. Future work could extend the analysis by including additional structural variables, examining different types and sectors of FDI, and exploring possible non-linear or threshold effects of trade and governance. With these caveats, the evidence points to a clear policy message: strategies that focus on attracting and embedding productive FDI, supported by sound domestic conditions, are more likely to deliver durable growth gains than strategies based mainly on raising trade volumes.

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# ESG PERFORMANCE AND FIRM VALUE: EVIDENCE FROM THE CHINESE STOCK MARKET

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**Abstract:** *This paper examines the impact of Environmental, Social, and Governance (ESG) performance on firm value in the Chinese stock market using a panel dataset of listed firms. Firm value is measured by Tobin's Q to capture market-based valuation effects. Fixed-effects OLS estimations are employed to assess the baseline relationship between ESG performance and firm value, while two-step system GMM estimations are used to address potential endogeneity and valuation persistence. The results show that overall ESG performance is positively and significantly associated with firm value. Decomposition analyses indicate that this effect is primarily driven by the environmental and social pillars, whereas the governance pillar does not exhibit a significant valuation impact. These findings remain robust under dynamic specifications, highlighting the heterogeneous valuation relevance of ESG dimensions in an emerging-market context. The study contributes to the ESG literature by providing evidence from China and offers implications for firms and policymakers in transition economies.*

• Keywords: environmental, social, and governance (ESG); firm value; tobin's Q; ESG pillars; emerging markets; China.

Date of receipt: 27<sup>th</sup> Feb., 2026

Date of delivery revision: 10<sup>th</sup> Mar., 2026

DOI:

Date of receipt revision: 23<sup>th</sup> Mar., 2026

Date of approval: 30<sup>th</sup> Mar., 2026

## 1. Introduction

Environmental, Social, and Governance (ESG) considerations have become increasingly central to corporate strategy and investment decision-making in the context of the global transition toward sustainable development. ESG captures firms' approaches to managing environmental, social, and governance-related risks and to aligning corporate activities with stakeholder expectations. A growing body of research suggests that ESG engagement can create economic value by improving risk management, reducing information asymmetry, and strengthening investor confidence, thereby supporting firm valuation (Friede et al., 2015; Eccles et al., 2014).

At the institutional level, ESG principles have been progressively embedded in international policy frameworks such as the Paris Agreement, the United Nations' 2030 Agenda, and the European Green Deal. These initiatives have translated sustainability objectives into concrete expectations for corporate behavior, shifting the evaluation of corporate performance toward long-term value creation rather than short-term financial outcomes alone. Consistent with this trend, ESG adoption and disclosure have expanded rapidly across both developed and emerging markets, where firms increasingly use ESG performance

as a signaling mechanism to convey transparency and long-term strategic orientation to investors (Wong et al., 2021; Yuan et al., 2022).

Despite this global momentum, empirical evidence on the ESG–firm value relationship remains mixed, particularly in emerging economies. While some studies document positive valuation effects associated with ESG engagement (Ni et al., 2024; Duan et al., 2023), others report weak or context-dependent relationships (Tan et al., 2024; Xiao et al., 2025). These inconsistencies suggest that the economic consequences of ESG depend on institutional conditions, industry characteristics, and the relative importance of specific ESG dimensions. In emerging markets, ESG practices may be driven more by regulatory compliance or reputational considerations than by deeply embedded value-enhancing strategies, potentially weakening their valuation effects.

China provides a particularly relevant setting to examine these issues. As the world's second-largest economy, China has experienced rapid economic growth alongside significant environmental and social challenges. ESG adoption in Chinese capital markets has accelerated in recent years due to regulatory initiatives, closer alignment with international sustainability standards, and increasing scrutiny from global investors. At

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the same time, persistent concerns regarding transparency and governance quality raise questions about whether ESG engagement is effectively reflected in firm valuation.

Recent evidence indicates that the ESG–firm value relationship in China is characterized by substantial heterogeneity. ESG does not operate as a uniform value driver across firms and industries, and valuation effects are often driven by specific ESG dimensions rather than aggregate scores. In particular, environmental and social performance appear to play more prominent roles in reducing risk exposure, improving financing conditions, and enhancing firm value (Duan et al., 2023; Fang et al., 2025;).

Motivated by these considerations, this study examines the impact of ESG performance on firm value in the Chinese stock market using firm-level panel data. Beyond the aggregate ESG score, ESG is decomposed into environmental, social, and governance pillars to assess heterogeneous valuation effects across dimensions. By employing both static and dynamic estimation techniques, this study provides evidence from a major emerging market undergoing rapid institutional transformation and offers insights relevant for other emerging economies facing similar sustainability and governance challenges.

## 2. Literature Review and Hypotheses Development

### 2.1. Theoretical Foundation

This study examines the relationship between Environmental, Social, and Governance (ESG) performance and firm value through the lens of Stakeholder Theory (Freeman, 1984). Stakeholder Theory posits that firms operate within a network of relationships with multiple stakeholder groups whose continued support is essential for long-term value creation.

Within this framework, ESG engagement represents a strategic response to stakeholder expectations regarding environmental responsibility, social conduct, and governance quality. Rather than reflecting purely philanthropic motives, ESG activities can reduce stakeholder-related conflicts, enhance organizational legitimacy, and facilitate access to critical resources such as capital, labor, and regulatory support. These mechanisms can strengthen operational stability and ultimately enhance firm

value.

Conversely, weak ESG performance may trigger adverse stakeholder reactions, including reputational damage, regulatory pressure, and restricted access to capital, thereby impairing firms' competitive position. Accordingly, Stakeholder Theory provides a coherent foundation for explaining why ESG performance may be systematically associated with firm value, particularly in emerging markets characterized by information asymmetry and evolving institutional frameworks.

### 2.2. ESG Performance

The Environmental, Social, and Governance (ESG) framework is widely used to assess firms' sustainability performance and exposure to non-financial risks. ESG ratings consolidate firm-level information on environmental management, social responsibility, and governance practices into a standardized indicator that allows investors to evaluate long-term risks and opportunities beyond traditional financial measures.

Prior empirical evidence generally indicates that ESG engagement is associated with favorable economic outcomes. Cross-country studies document a positive relationship between ESG practices and market-based performance, while findings from emerging markets suggest that ESG engagement can improve firm profitability and innovation-related outcomes (Soschinski et al., 2024; Tan & Zhu, 2022).

However, the economic effects of ESG are not uniform across institutional contexts. The magnitude and transmission channels through which ESG performance influences firm outcomes vary across markets and firm characteristics, underscoring the importance of market-specific analysis and motivating further examination of how ESG performance is translated into firm value.

### 2.3. Firm value

Firm value reflects investors' expectations regarding a firm's future performance, growth prospects, and risk profile. Valuation theories emphasize that market-based measures incorporate forward-looking assessments of future cash flows and uncertainty rather than solely realized accounting outcomes (Grossman & Stiglitz, 1977).

Accordingly, market-based indicators such as



Tobin's Q are particularly suitable for capturing the value relevance of non-financial information, including ESG performance. Tobin's Q reflects the extent to which the market values a firm beyond its recorded assets, incorporating expectations of future profitability, growth opportunities, and risk mitigation.

Consistent with this perspective, recent evidence shows that improvements in ESG quality are positively associated with firm value among Chinese listed firms, suggesting that ESG-related information is incorporated into market valuation (Wei & Yang, 2024). These considerations support the use of Tobin's Q as an appropriate proxy for firm value in examining the ESG–valuation relationship.

## 2.4. Hypotheses Development

### 2.4.1. ESG performance and firm value

Drawing on Stakeholder Theory, firms that actively engage in ESG practices signal their commitment to balancing economic objectives with stakeholder interests. Enhanced ESG disclosure reduces information asymmetry, strengthens stakeholder relationships, and facilitates access to long-term capital, thereby improving competitive positioning and firm value (Freeman, 1984).

Empirical evidence largely supports a positive ESG–firm value relationship. Pu (2023) documents a nonlinear association between ESG engagement and corporate efficiency among Chinese firms, while Zhang et al. (2024) shows that higher ESG disclosure improves firm value by enhancing financing structures and reducing information asymmetry. Accordingly, the first hypothesis is proposed:

H1: ESG performance has a positive effect on firm value.

### 2.4.2. Environmental performance and firm value

From a stakeholder perspective, environmental performance is closely linked to firms' relationships with regulators, communities, and environmentally conscious investors. Proactive environmental practices reduce regulatory and environmental risks and improve resource efficiency, which may enhance firm value.

Empirical studies support this argument. Qureshi et al. (2021) find that stronger environmental performance is positively associated with market-

based valuation in U.S. firms, while Jo et al. (2015) show that environmental initiatives contribute to higher firm value through long-term cost reduction and performance improvement. Accordingly:

H2: Environmental performance has a positive effect on firm value.

### 2.4.3. Social performance and firm value

Stakeholder Theory emphasizes firms' responsibilities toward employees, customers, suppliers, and local communities. Strong social performance enhances trust and loyalty among stakeholders, reduces agency conflicts, and supports operational stability.

Prior evidence indicates that social engagement contributes positively to firm value. Waddock and Graves (1997) document a positive association between corporate social performance and financial outcomes, while Barko et al. (2022) find that the social dimension of ESG plays a key role in driving long-term firm value measured by Tobin's Q. Thus:

H3: Social performance has a positive effect on firm value.

### 2.4.4. Governance performance and firm value

Effective governance mechanisms mitigate agency conflicts, enhance transparency, and improve resource allocation, thereby supporting firm value. Evidence from China suggests that governance-related ESG disclosure can reduce financing mismatches and improve access to long-term capital (Zhang et al., 2024), while stronger governance structures are associated with higher ESG ratings and financial performance.

However, the valuation impact of governance practices may depend on institutional context and ownership structure. In environments where governance standards are highly regulated or relatively homogeneous, governance-related ESG indicators may provide limited incremental information to investors, weakening their direct association with firm value (Pu, 2023). Based on these considerations, the final hypothesis is stated as follows:

H4: Governance performance has a positive effect on firm value.

## 3. Research methodology

### 3.1. Model Specification and Variables

#### 3.1.1. The regression model

This study examines the relationship between ESG performance and firm value using panel-data regressions with year and industry fixed effects. The baseline specification is as follows:

$$TobinQ_{w,i,t} = \beta_0 + \beta_1 ESG_{i,t} + X_{i,t}\beta + \gamma_t + \delta_{industry} + \varepsilon_{i,t},$$

where  $TobinQ_{w,i,t}$  denotes firm value,  $ESG_{i,t}$  represents ESG performance,  $X_{i,t}$  is a vector of control variables,  $\gamma_t$  are year fixed effects, and  $\delta_{industry}$  are TRBC industry fixed effects.

To examine pillar-level effects, the aggregate ESG score is replaced by the Environmental, Social, and Governance pillar scores in separate specifications:

$$TobinQ_{w,i,t} = \beta_0 + \beta_1 Pillar_{i,t} + X'_{i,t}\beta + \gamma_t + \delta_{industry} + \varepsilon_{i,t},$$

where  $Pillar_{i,t} \in \{\text{Environmental, Social, Governance}\}$ .

### 3.1.2. Independent variables

The main independent variable is the aggregate ESG score obtained from Refinitiv. To capture heterogeneity across sustainability dimensions, three pillar-level variables Environmental, Social, and Governance are also employed. All ESG measures are standardized scores provided by Refinitiv and are widely used in empirical ESG research.

### 3.1.3. Dependent variables

Firm value is measured by Tobin's Q, computed as:

$$TobinQ = \frac{\text{Total Debt} + \text{Market Capitalization}}{\text{Total Assets}}$$

All financial variables, including Tobin's Q, are winsorized at the 1st and 99th percentiles to mitigate the influence of outliers.

### 3.1.4. Control variables

Consistent with the ESG–firm value literature, the regressions include the following control variables: audit quality (*AQ*), measured as a Big 4 auditor indicator; financial leverage (*LEV*); firm size (*SIZ*), proxied by the logarithm of total assets; growth opportunities (*GRO*); capital expenditure intensity (*CAP*); and listing age (*AGE*), capturing firm maturity. All models further include year and TRBC industry fixed effects to control for time-specific shocks and sectoral heterogeneity.

## 3.2. Sample and Methodology

The final sample comprises 1,148 firm-year observations of non-financial firms listed on the Shanghai and Shenzhen Stock Exchanges. Firms are included only when ESG performance data are available to ensure consistency across observations. ESG data are obtained from Refinitiv, while financial and market variables are collected from firms' financial statements and stock market data.

Baseline estimations are conducted using ordinary least squares (OLS) with year and industry fixed effects. To address potential endogeneity and valuation persistence, robustness checks are performed using two-step system GMM, in which lagged Tobin's Q is treated as endogenous. Standard diagnostic tests are applied to assess model validity.

## 4. Results and Discussions

### 4.1. Summary statistics

Table 1 reports descriptive statistics for the main variables. The mean Tobin's Q is 2.72, with substantial dispersion, indicating considerable heterogeneity in firm valuation. ESG performance also exhibits wide variation across firms, suggesting uneven sustainability engagement.

Among the ESG pillars, governance shows the highest average score, while environmental and social dimensions display greater dispersion. Approximately 14.5% of firm-year observations are audited by Big 4 auditors. Control variables indicate meaningful heterogeneity in leverage, firm size, investment intensity, growth, and listing age.

**Table 1. Variable descriptions and descriptive statistics**

| Variable             | Symbol | Mean    | Std. Dev. | Min     | Max     |
|----------------------|--------|---------|-----------|---------|---------|
| Firm value           | TobinQ | 2.7155  | 3.1705    | 0.2647  | 18.0739 |
| ESG performance      | ESG    | 31.3563 | 15.5035   | 1.0693  | 81.0506 |
| Social pillar        | SOC    | 24.0687 | 18.2037   | 1.0549  | 88.6073 |
| Governance pillar    | GOV    | 46.5925 | 20.7037   | 0.8995  | 90.6314 |
| Environmental pillar | ENV    | 24.3470 | 21.2485   | 0.0000  | 86.2546 |
| Audit quality        | AQ     | 0.1446  | 0.3518    | 0       | 1       |
| Leverage             | LEV    | 0.0634  | 0.0715    | 0.0000  | 0.2856  |
| Firm size            | SIZ    | 21.6605 | 0.7538    | 19.7786 | 23.3054 |
| Growth               | GRO    | 0.1043  | 0.2929    | -0.4310 | 1.5544  |
| Capital expenditure  | CAP    | 0.0511  | 0.0443    | 0.0008  | 0.2151  |
| Listing age (years)  | AGE    | 12.9477 | 7.8015    | 0       | 31      |

### 4.2. Empirical Results

Table 2 shows that aggregate ESG performance is positively and statistically significant in explaining firm value. The coefficient on ESG

equals 0.0100 and is significant at the 5% level ( $p = 0.047$ ), indicating that higher ESG performance is associated with a higher Tobin's Q. This result provides support for Hypothesis H1.

When ESG is decomposed into its constituent pillars, environmental performance exhibits a positive and statistically significant effect on firm value, with a coefficient of 0.0077 ( $p = 0.044$ ), supporting Hypothesis H2. Social performance also shows a positive and significant association with Tobin's Q (coefficient = 0.0086,  $p = 0.041$ ), providing support for Hypothesis H3. In contrast, the governance pillar is positive but statistically insignificant (coefficient = 0.0054,  $p = 0.142$ ), indicating that governance-related ESG performance does not exert a distinct valuation effect. Accordingly, Hypothesis H4 is not supported.

**Table 2. OLS estimates of the impact of ESG and its pillars on firm value**

| Variables   | (1) TobinQ            | (2) TobinQ            | (3) TobinQ            | (4) TobinQ            |
|-------------|-----------------------|-----------------------|-----------------------|-----------------------|
| ESG         | 0.0100**<br>[0.047]   |                       |                       |                       |
| ENV         |                       | 0.0077**<br>[0.044]   |                       |                       |
| SOC         |                       |                       | 0.0086**<br>[0.041]   |                       |
| GOV         |                       |                       |                       | 0.0054<br>[0.142]     |
| AQ          | 0.8618***<br>[0.000]  | 0.8626***<br>[0.000]  | 0.8708***<br>[0.000]  | 0.9040***<br>[0.000]  |
| LEV         | -1.9518*<br>[0.089]   | -1.9861*<br>[0.083]   | -1.8667<br>[0.104]    | -2.1631*<br>[0.059]   |
| SIZ         | -1.3120***<br>[0.000] | -1.3321***<br>[0.000] | -1.3149***<br>[0.000] | -1.2620***<br>[0.000] |
| CAP         | 5.5505***<br>[0.002]  | 5.4905***<br>[0.002]  | 5.4907***<br>[0.002]  | 5.3423***<br>[0.003]  |
| AGE         | -0.0271**<br>[0.015]  | -0.0280**<br>[0.011]  | -0.0269**<br>[0.016]  | -0.0282**<br>[0.011]  |
| Constant    | 28.9117***<br>[0.000] | 29.3975***<br>[0.000] | 29.0214***<br>[0.000] | 27.9384***<br>[0.000] |
| Year FE     | Yes                   | Yes                   | Yes                   | Yes                   |
| Industry FE | Yes                   | Yes                   | Yes                   | Yes                   |
| R-squared   | 0.3613                | 0.3614                | 0.3615                | 0.3595                |

Notes: p-values are reported in brackets. \*, \*\*, and \*\*\* denote statistical significance at the 10%, 5%, and 1% levels, respectively. All financial variables are winsorized at the 1st and 99th percentiles. Year and industry fixed effects are included in all specifications. ESG and its individual pillars are estimated in separate models to avoid multicollinearity.

#### 4.3. Robustness Check

The system GMM results reported in Table 3 confirm the robustness of the baseline findings after accounting for potential endogeneity and valuation persistence. Aggregate ESG performance remains positively associated with firm value, while the environmental and social

pillars continue to exhibit value-enhancing effects. In contrast, the governance pillar remains statistically insignificant.

These consistent patterns across static and dynamic specifications indicate that the positive relationship between ESG particularly its environmental and social dimensions and firm value is not driven by reverse causality or unobserved heterogeneity, but reflects a stable valuation effect in the Chinese market.

**Table 3. System GMM estimates of the impact of ESG and its pillars on firm value**

| Variables           | (1) TobinQ            | (2) TobinQ            | (3) TobinQ            | (4) TobinQ            |
|---------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| ESG                 | 0.0112*<br>[0.052]    |                       |                       |                       |
| ENV                 |                       | 0.0072*<br>[0.075]    |                       |                       |
| SOC                 |                       |                       | 0.0091*<br>[0.082]    |                       |
| GOV                 |                       |                       |                       | 0.0055<br>[0.176]     |
| AQ                  | 0.7770**<br>[0.027]   | 0.7814**<br>[0.022]   | 0.8040**<br>[0.021]   | 0.8487**<br>[0.015]   |
| LEV                 | -1.7002*<br>[0.071]   | -1.7525*<br>[0.063]   | -1.6139*<br>[0.079]   | -1.8224*<br>[0.054]   |
| SIZ                 | -1.2729***<br>[0.000] | -1.2679***<br>[0.000] | -1.2737***<br>[0.000] | -1.2353***<br>[0.000] |
| CAP                 | 3.7781<br>[0.157]     | 3.7784<br>[0.158]     | 3.8457<br>[0.145]     | 3.5273<br>[0.181]     |
| AGE                 | -0.0325**<br>[0.025]  | -0.0341**<br>[0.015]  | -0.0316**<br>[0.024]  | -0.0328**<br>[0.026]  |
| Constant            | 29.4487***<br>[0.000] | 28.9873***<br>[0.000] | 29.0924***<br>[0.000] | 28.7440***<br>[0.000] |
| Year FE             | Yes                   | Yes                   | Yes                   | Yes                   |
| Industry FE         | Yes                   | Yes                   | Yes                   | Yes                   |
| AR(2) p-value       | 0.810                 | 0.935                 | 0.922                 | 0.924                 |
| Hansen test p-value | 0.970                 | 0.949                 | 0.972                 | 0.991                 |

Notes: p-values are reported in brackets. \*, \*\*, and \*\*\* denote statistical significance at the 10%, 5%, and 1% levels, respectively. All models are estimated using two-step system GMM with Windmeijer-corrected robust standard errors. Year and industry fixed effects are included in all specifications. The AR(2) and Hansen test statistics indicate no second-order serial correlation and valid instrument sets.

#### 4.4. Discussion and Implications for Emerging Economies

The results indicate that ESG performance is value-relevant in the Chinese market, but this relevance is asymmetric across ESG dimensions. The consistent valuation effects of the environmental and social pillars suggest that investors place greater weight on ESG activities that directly address regulatory risk, operational stability, and stakeholder relationships. This pattern is consistent with stakeholder theory, which emphasizes that firms creating value for key stakeholder groups are more likely to achieve superior market valuation (Freeman, 1984; Waddock & Graves, 1997).



The stronger valuation effects of environmental performance reflect China's regulatory and institutional environment, where environmental compliance is closely linked to regulatory enforcement, environmental risk exposure, and access to external financing (Broadstock et al., 2021; Zhang et al., 2024; Fang et al., 2025). Similarly, social performance enhances corporate legitimacy by strengthening relationships with employees, customers, and local communities an important mechanism in markets where formal institutions are still evolving and stakeholder trust remains salient (Deegan, 2002; Yuan et al., 2022).

In contrast, the absence of a significant valuation effect for the governance pillar suggests that governance-related ESG indicators convey limited incremental information to investors. This outcome likely reflects relatively standardized governance practices shaped by regulatory requirements and state influence, which reduce perceived cross-firm variation in governance quality (Jensen & Meckling, 1976; Pu, 2023; Zhang et al., 2024). Overall, the findings imply that ESG value relevance in China is conditioned by institutional salience rather than uniform ESG engagement.

These insights offer relevant implications for other emerging economies with comparable institutional characteristics, such as Vietnam. In such contexts, strong state involvement, bank-oriented financial systems, and evolving ESG frameworks suggest that investors may similarly prioritize ESG dimensions that directly mitigate environmental and social risks (Wong et al., 2021). While governance improvements remain essential for long-term sustainability, their valuation effects may be weaker or delayed in markets where governance standards are largely regulation-driven and exhibit limited firm-level differentiation (Barko et al., 2022; Wei & Yang, 2024).

## Conclusion

This study examines the relationship between ESG performance and firm value in the Chinese stock market using static and dynamic panel estimations. The results show that higher overall ESG performance is associated with higher firm value, with this effect primarily driven by the environmental and social pillars, while the governance pillar does not exhibit a significant valuation effect. These findings highlight the heterogeneous valuation relevance of ESG dimensions in an emerging-market context.

By providing firm-level evidence from China, this study contributes to the ESG–firm value literature by demonstrating that ESG value relevance is conditioned by institutional context and pillar-specific salience rather than uniform ESG engagement. While governance practices remain important for long-term sustainability, investors appear to place greater weight on environmental and social performance in valuation decisions. Future research may extend this analysis to other emerging markets or explore alternative ESG measurement frameworks and transmission channels through which ESG performance affects firm value.

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# ASEAN-CHINA TRADE: PATTERNS, DRIVERS AND CHALLENGES IN THE NEW CONTEXT

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**Abstract:** ASEAN-China trade has deepened significantly since 2020, reflecting not only economic complementarities but also evolving patterns of regional geoeconomic influence and shifting power dynamics. Despite pandemic disruptions, supply chain shocks, and intensifying great-power rivalry, bilateral trade expanded to historic levels, underscoring a high degree of strategic interdependence. This article examines how China's demand-stimulus measures, infrastructure diplomacy under the Belt and Road Initiative, and strategic deployment of regional institutions such as RCEP and the ACFTA 3.0 upgrade reinforce its geoeconomic footprint and regional leadership ambitions in Southeast Asia. At the same time, ASEAN leverages its emerging role in regional value chains and a diversified FTA network to hedge against structural vulnerabilities and manage asymmetric dependence. The study assesses recent trade patterns, identifies structural risks, including persistent trade imbalances and technology-linked supply chain exposure, and evaluates their implications for regional order and strategic stability. The article concludes with policy recommendations aimed at sustaining mutually beneficial cooperation while preserving ASEAN's strategic autonomy in an increasingly contested regional environment.

• Keywords: ASEAN-China trade; geo-economic influence; regional value chains; RCEP and ACFTA 3.0; strategic vulnerabilities.

Date of receipt: 08<sup>th</sup> Feb., 2026

Date of delivery revision: 27<sup>th</sup> Feb., 2026

DOI:

Date of receipt revision: 21<sup>th</sup> Mar., 2026

Date of approval: 31<sup>th</sup> Mar., 2026

## Introduction

In recent years, ASEAN-China trade relations have expanded rapidly and become one of the most dynamic bilateral trade corridors in the world. Since 2020, China has consistently remained ASEAN's largest trading partner, while ASEAN has emerged as a key regional market and production base supporting China's industrial supply chains. Despite the disruptions caused by the COVID-19 pandemic, global inflationary pressures, logistics bottlenecks, and volatile commodity prices, bilateral trade has not only recovered quickly but also reached new record levels. This trend reflects the growing economic complementarities between the two sides, the deepening integration of regional production networks, and the continued strengthening of institutional frameworks such as the ASEAN-China Free Trade Area (ACFTA) and the Regional Comprehensive Economic Partnership (RCEP).

At the same time, ASEAN-China trade has increasingly taken on strategic significance as both sides navigate a more contested regional environment shaped by shifting power dynamics, intensifying geoeconomic competition, and the reconfiguration of global supply chains. The evolving trade landscape is closely shaped by a "new context" characterized by both opportunities and challenges. On one hand, China's economic transformation and consumption-

led growth model, the expansion of e-commerce and digital trade, and the restructuring of global value chains have created new momentum for ASEAN-China trade flows. China's rising imports of agricultural products, intermediate goods, and components have opened wider market access for ASEAN exporters. Simultaneously, the implementation of RCEP and the ongoing upgrade of ACFTA have reduced tariff and non-tariff barriers, improved rules of origin, and enhanced connectivity across the region. These developments help consolidate ASEAN's role in China-linked value chains and strengthen its position within the regional economic architecture.

On the other hand, the bilateral trade relationship also faces increasing challenges. ASEAN's persistent trade deficits with China, structural dependence on a narrow range of export products, and vulnerability to external shocks such as supply chain disruptions and global commodity price fluctuations pose risks to long-term stability. Moreover, ASEAN's rising exposure to technology-related supply chain fragmentation and the emergence of competing standards in sensitive sectors such as semiconductors and digital infrastructure highlight the geopolitical dimensions of economic cooperation. For China, rising production costs, the need to diversify supply sources, and the restructuring of domestic industries have driven adjustments in

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import and export patterns. At the same time, broader global uncertainties, including post-pandemic recovery asymmetries, tightening financial conditions, and the trend toward supply chain de-risking, continue to influence trade performance across the region.

Against this backdrop, assessing the changing patterns, underlying drivers, and emerging challenges of ASEAN-China trade is essential for understanding the evolving dynamics of regional order and geoeconomic strategy in East Asia. This article adopts an integrated approach that combines economic analysis with insights from international political economy to examine how bilateral trade has evolved under conditions of heightened strategic rivalry and institutional transformation. The study evaluates bilateral trade developments in the period 2020-2025, analyzes the key economic and institutional factors shaping current trends, and identifies the main constraints and vulnerabilities that may affect future cooperation. The findings aim to provide a comprehensive and updated perspective that can support policymakers, researchers, and businesses in formulating more effective strategies for enhancing ASEAN-China trade relations in the new context.

### Theoretical Framework

This study draws on three interconnected theoretical perspectives to analyze recent developments in ASEAN-China trade.

**First**, complex interdependence theory by Keohane & Nye (2012) provides a foundation for understanding the deepening two-way economic dependence between ASEAN and China. The rapid growth of bilateral trade, the resilience of supply networks during global shocks, and the expansion of cross-border production systems reflect a form of strategic interdependence that increasingly shapes regional behavior. Complex interdependence posits that economic ties, multiple channels of interaction, and issue-linkages constrain the use of coercive force and make states more sensitive to the costs of disruption in mutually beneficial exchanges. In the ASEAN-China context, this interdependence is not symmetrical; rather, it exhibits varying degrees of sensitivity and vulnerability across sectors, creating both opportunities and structural risks for policymakers.

**Second**, the framework of geo-economic statecraft helps explain how economic instruments, such as trade agreements, targeted import policies, infrastructure initiatives under the Belt and Road Initiative, and state-backed investment flows, are deployed by China and ASEAN to pursue broader strategic objectives. As argued by Blackwill & Harris

(2016), states increasingly use economic tools as instruments of strategic influence in shaping regional outcomes. China's demand-oriented import strategy, its infrastructure diplomacy through mechanisms such as BRI and AIIB, and its role in defining regional standards and institutional norms illustrate the use of economic statecraft to consolidate influence and secure supply-chain resilience. Likewise, ASEAN uses its diversified FTA network and emerging value-chain strengths to hedge against asymmetric exposure and safeguard strategic autonomy.

**Third**, regional institutionalism highlights the role of regional agreements and institutional architectures, especially the ASEAN-China Free Trade Area (ACFTA), the Regional Comprehensive Economic Partnership (RCEP), and the recent ACFTA 3.0 upgrade, in shaping trade patterns, tariff regimes, rules of origin, and cross-border value-chain integration. New regionalism scholars such as Acharya (2014), Breslin (2007), and Katzenstein (2005) emphasize that regional institutions do more than facilitate trade; they embed economic behavior within a broader regional order, structure incentives, and reflect the evolving balance of influence. In the ASEAN-China context, these institutional frameworks serve simultaneously as platforms for cooperation and arenas of strategic contestation, influencing not only economic outcomes but also the trajectory of regional power relations.

Together, these three theoretical approaches provide a comprehensive and coherent foundation for interpreting the economic patterns, strategic drivers, and geopolitical implications of ASEAN-China trade in an era of heightened regional uncertainty.

### Factors Influencing ASEAN-China Trade

#### Subjective Factors

*China's opening-up and demand-stimulus policies:* The Chinese government has set ambitious import targets for goods originating from ASEAN. A notable example is China's commitment to import USD 150 billion worth of high-quality agricultural products from ASEAN during 2022-2026. As of October 2025, imports under this pledge had reached USD 141.2 billion, equivalent to 94% of the targeted value (Xinhua, 2025b). In addition to agricultural commodities such as coconuts, coffee, and palm oil, China has also increased purchases of strategic imports, including metals, raw materials, and energy products, from ASEAN in an effort to diversify supply sources and reduce domestic energy shortfalls. Beijing's goal of expanding domestic consumption and rebalancing its trade accounts further encourages higher import volumes from markets like ASEAN. These demand-driven import commitments



function not only as economic measures but also as instruments of geoeconomic engagement that help China consolidate influence across Southeast Asia.

*Geopolitical policies and connectivity initiatives:* China's Belt and Road Initiative (BRI) has stimulated infrastructure development, transport connectivity, and port expansion across Southeast Asia, thereby facilitating smoother trade flows. Regional security commitments and high-level platforms such as APEC and other international economic forums have also strengthened China-ASEAN economic cooperation. However, tensions in the South China Sea and the geopolitical confrontation strategies of several major powers pose potential risks, compelling ASEAN to carefully balance the interests of its key partners. In this context, connectivity initiatives serve a dual function: they support commercial integration while simultaneously shaping regional alignments and influencing the strategic landscape in which ASEAN must navigate.

*ASEAN's economic growth and population scale:* ASEAN is one of the fastest-growing regions globally, with GDP reaching about USD 3.8 trillion in 2024 (Latiff & Azhar, 2025). The bloc's population of nearly 700 million, with an expanding middle class, creates strong demand for Chinese consumer goods, electronics, automobiles, and machinery. Differences in labor costs and production expenses between China and several ASEAN economies (such as Vietnam and Indonesia) have motivated Chinese enterprises to relocate manufacturing facilities abroad. This relocation not only increases intra-regional trade (including exports of technology, automobiles, and components to ASEAN) but also boosts China's imports of raw materials and intermediate goods from ASEAN to support export-oriented production. These shifts in production patterns illustrate how ASEAN's domestic economic transformation intersects with China's industrial restructuring, creating a web of asymmetric dependencies that shape the evolving regional order.

### **Objective Factors**

*COVID-19 and supply-chain disruptions:* The global pandemic in 2020 caused severe shocks to international supply chains; however, China-ASEAN trade demonstrated strong resilience. In 2020, bilateral trade still reached RMB 1.7 trillion, up 4.2% year-on-year (HSBC China, 2020), indicating robust supply-chain integration between the two sides and joint efforts to maintain production and commercial flows during the crisis. China's rapid economic rebound and its export-import support measures also contributed to sustaining trade growth. The ability of both sides to

maintain trade continuity during systemic disruption highlights the depth of their interdependence and reinforces the strategic relevance of these supply chains within broader regional stability.

*International trade tensions:* The U.S.-China trade war and regional political frictions prompted many global firms to redirect supply chains toward Asia, particularly ASEAN. China strengthened its economic engagement with ASEAN to mitigate risks associated with single-source dependence. Imports of industrial equipment and components from ASEAN expanded significantly as multinational companies shifted production out of China. At the same time, the United States and other major economies increasingly view ASEAN as a critical partner, enhancing the bloc's competitive position. As major power rivalry intensifies, ASEAN's role as a strategic alternative manufacturing base has increased its geoeconomic significance, compelling the region to balance between competing supply chain spheres of influence.

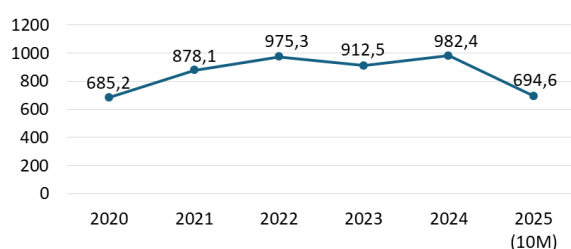
*Free trade agreements and regional integration:* The system of free trade agreements between China and ASEAN continues to expand. The ASEAN-China Free Trade Area (ACFTA), established in 2005, was upgraded with an expanded services and investment chapter in 2019, and the latest upgrade (ACFTA 3.0) was signed in October 2025 (Xinhua, 2025a). The ACFTA 3.0 protocol broadens cooperation into digital economy, green economy, and supply-chain connectivity, with expectations of further facilitating trade. In addition, agreements such as the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) and particularly the Regional Comprehensive Economic Partnership (RCEP), which entered into force in early 2022, further reinforce ASEAN's centrality in the Asia-Europe economic landscape. RCEP, which includes China and all 10 ASEAN members, eliminates tariffs on more than 90% of goods and creates new opportunities for coordinated production and export across the region. These institutional developments do more than reduce transaction costs; they function as platforms through which regional norms, standards, and economic alignments are negotiated, thereby shaping the geoeconomic architecture of East Asia.

Overall, these broader forces have shaped a setting in which ASEAN-China trade has continued to grow steadily since 2020. At the same time, the presence of geopolitical frictions and shifting supply chain pressures means that both sides need to approach the relationship with greater care if long-term cooperation is to remain stable and predictable.

### Current Situation of Bilateral Trade in the New Context

Bilateral trade between ASEAN and China expanded strongly during the period 2020-2025. In 2020, total two-way trade reached approximately USD 685.2 billion (China Daily, 2021) and continued to rise in subsequent years. Notably, bilateral trade grew to USD 975.3 billion in 2022 (Thanh Truc, 2023) and recorded a historic high of USD 982.4 billion in 2024 (Anh Tho, 2025) (Figure 1). During the first ten months of 2025, trade turnover amounted to around USD 694.6 billion, an increase of 9.7 percent year-on-year (Multilateral Trade Policy Department, 2025). ASEAN has remained China's largest trading partner for sixteen consecutive years, while China has been ASEAN's top trading partner since 2009. These figures underscore not only commercial dynamism but also the growing weight of ASEAN-China exchanges in shaping economic conditions across East Asia.

**Figure 1. ASEAN-China Bilateral Trade Turnover in 2020-2025 (USD billion)**



In the trade structure, China consistently maintains a trade surplus with ASEAN. According to China Customs statistics, as of October 2025, China's exports to ASEAN reached RMB 2.03 trillion (approximately USD 283.2 billion), while imports from ASEAN amounted to RMB 1.33 trillion (USD 185.6 billion), generating a trade surplus of roughly USD 97.6 billion for China (Arendse Huld, 2024). This surplus reflects ASEAN's substantial demand for Chinese industrial goods, while the region primarily supplies raw materials, intermediate inputs, and agricultural products to China. The persistence of this surplus highlights a structural imbalance that, while economically manageable in the short term, may carry political sensitivities and long-term implications for how both sides perceive the overall fairness of the relationship.

Regarding commodity composition, China's major exports to ASEAN remain manufactured industrial goods. In the first ten months of 2025, China's exports consisted largely of electronic equipment and machinery valued at USD 128.66 billion, followed by mechanical machinery at USD 64.94 billion. Petroleum

and mineral fuels reached approximately USD 20.05 billion, while plastics and plastic products and iron and steel totaled USD 18.50 billion and USD 18.01 billion, respectively (Table 1). In contrast, China's imports from ASEAN are dominated by agricultural and mineral commodities as well as intermediate goods. Virtually all of China's palm oil imports, one of its key agricultural inputs, originate from ASEAN. China announced cumulative imports of USD 141.2 billion worth of ASEAN agricultural products from 2022 to October 2025, nearly fulfilling its five-year target of USD 150 billion (Xinhua, 2025b). Products such as rice, coffee, cocoa, rubber, and tropical fruits hold significant market shares in China. In the energy sector, Indonesia and Malaysia are critical suppliers of coal, palm oil, and natural gas. The region's green transition has also stimulated demand for renewable energy-related products, such as lithium batteries and solar panels, which have seen rapid export growth from China to ASEAN in recent years.

Overall, manufactured industrial goods, including machinery, electronics, and transport equipment, have recently accounted for over 90 percent of total bilateral trade between China and ASEAN in the first eight months of 2025, while the remainder consists of agricultural products, minerals, fuels, and raw materials (Global Times, 2025). In terms of growth trajectory, ASEAN-China trade continues to expand steadily. In 2021, trade rebounded strongly following the pandemic. According to China Customs statistics, bilateral trade in goods between China and ASEAN reached USD 878.2 billion in 2021, up 28.1 percent year-on-year, and further increased to around USD 970 billion (6.52 trillion yuan) in 2022, representing about 15 percent year-on-year growth (Embassy of the People's Republic of China in Brunei Darussalam, 2022). This steady performance, even during periods of external strain, illustrates the resilience of the economic ties between the two sides and highlights their role as an anchor of regional commercial stability.

**Table 1. China's Major Exports to ASEAN in 2025 (January-October)**

| China's Major Export Categories to ASEAN                    | Value (USD billion) |
|-------------------------------------------------------------|---------------------|
| Electronic equipment (computers, phones, televisions, etc.) | 128.66              |
| Mechanical machinery (boilers, generators, etc.)            | 64.94               |
| Petroleum and mineral fuels                                 | 20.05               |
| Plastics and plastic products                               | 18.50               |
| Iron and steel                                              | 18.01               |
| Chemicals (pharmaceuticals, organic chemicals)              | 14.13               |
| Automotive parts (wheels, engines, etc.)                    | 13.06               |

Source: Arendse Huld (2024)

At the country level, China's trade with the six major ASEAN economies (ASEAN-6) accounts for the vast majority of total turnover. In recent years, Vietnam has remained China's largest trade partner

within ASEAN. In the first ten months of 2025, bilateral trade between China and Vietnam exceeded USD 208 billion (approximately RMB 1.50 trillion) (Nguyen Hanh, 2025). Other major markets include Malaysia, Indonesia, Thailand, Singapore, and the Philippines. In contrast, Laos, Cambodia, Myanmar, and Brunei together represent only about 5 percent of regional trade turnover. These differences reflect variations in economic scale and integration depth among ASEAN members; for instance, Indonesia recently surpassed Thailand to become China's third-largest trading partner in the bloc. This growth has been reinforced by FTAs and RCEP commitments, which have consistently supported trade expansion between the two sides. Even in 2025, when global economic conditions remained challenging, ASEAN-China trade increased robustly, rising 9.7 percent in the first eight months of the year (Multilateral Trade Policy Department, 2025). These country-level patterns reveal how ASEAN's internal diversity translates into different forms of engagement with China, shaping each member state's degree of leverage, dependence, and strategic sensitivity within the broader relationship.

In summary, the 2020-2025 period highlights a deepening and increasingly diversified ASEAN-China trade relationship. The breadth of export and import structures demonstrates strong complementary advantages, forming a solid foundation for sustained bilateral economic cooperation. At the same time, the uneven distribution of benefits and exposure across sectors and among ASEAN member states underscores the need for both sides to manage the relationship with an eye toward long-term balance and regional stability.

#### **Prospects and Policy Recommendations for ASEAN**

##### ***Prospects for Bilateral Cooperation***

In the new context, the outlook for ASEAN-China trade relations is generally positive, though accompanied by emerging challenges. On the positive side, the post-pandemic economic recovery of both sides continues to generate strong trade momentum. In 2025, China's economy rebounded with a growth rate of 6.2 percent, remaining the largest contributor to global economic expansion (accounting for 32 percent) (OECD, 2025). This robust recovery signals China's sustained demand for inputs and products from ASEAN, including agricultural goods, minerals, and electronic components, while providing ASEAN with a stable supply of competitively priced consumer goods, machinery, and equipment. These trends suggest that trade will remain a central pillar of the broader relationship, even as both sides adapt to shifts

in global demand and new strategic pressures.

In addition, the improvement and upgrading of free trade frameworks will create further opportunities for trade expansion. The Regional Comprehensive Economic Partnership (RCEP), which came into effect in early 2022, provides broader coverage than ACFTA 2.0 and reduces tariffs on the majority of goods traded within the bloc. The signing of the Protocol to Upgrade ACFTA 3.0 in October 2025 is expected to deepen cooperation in high-potential areas such as the digital economy, green economy, logistics, and sustainable agriculture. Emerging industries, including electronics, electric vehicles, renewable energy technologies, and pharmaceuticals, are projected to benefit significantly from enhanced market-access commitments. According to China's Ministry of Commerce, ACFTA 3.0 will create substantial opportunities for industrial cooperation and market expansion, generating strong regional and global demand growth (Xinhua, 2025a). Furthermore, ASEAN has simultaneously concluded a wide network of bilateral and plurilateral FTAs (such as CPTPP and FTAs with the EU, Japan, and India), enabling the bloc to diversify its trade partners and reduce dependence on any single market.

ASEAN's medium-term growth prospects also reinforce the positive outlook. The region's GDP is forecast to grow at 4-5 percent annually, driven by infrastructure investment, a young demographic profile, and accelerating urbanization. Domestic demand in ASEAN is expected to expand, particularly in electronics, automobiles, and telecommunications services. At the same time, China is gradually shifting toward consumption-led growth and higher-quality domestic demand, which will sustain its imports of higher value-added products from ASEAN (such as technological components and premium agricultural goods). According to the Asian Development Bank, bilateral trade is likely to continue rising in the medium term as both sides capitalize on the benefits of RCEP and the upgraded ACFTA. However, long-term prospects will depend on how effectively both sides can balance growth with resilience amid increasingly complex regional conditions.

The outlook is further reinforced by the growing interdependence of the two sides' supply chains. The ongoing relocation of manufacturing activities from China, driven by rising labor costs and China's "dual-circulation" strategy, has elevated ASEAN's role as an emerging production hub. Vietnam, Thailand, and Malaysia are attracting Chinese FDI and technology inflows, creating new value chains between the two sides. This trend increases China's imports of raw materials and advanced machinery while boosting



ASEAN's exports of manufactured goods to China. For example, several Chinese automakers have built manufacturing bases in Thailand and Indonesia to leverage CPTPP/RCEP preferences, while some electric-vehicle models assembled in Vietnam are now exported to the Chinese market. Digital industries such as 5G, IoT, and cross-border e-commerce also hold considerable potential, supported by digital-infrastructure connectivity and pro-innovation policies in both regions. Furthermore, new areas of cooperation, including digital transformation, e-commerce, and the green economy, are expanding opportunities for trade. With both sides committed to emissions reduction and renewable-energy development, the exchange of green technologies (e.g., Chinese lithium batteries and solar panels, ASEAN's critical minerals) is expected to grow rapidly. These cross-border production links strengthen the economic logic of cooperation but also create new points of vulnerability should global or regional tensions escalate.

However, the medium-term outlook is not without risks. Strategic competition between the United States and China may persist, placing ASEAN under pressure to "choose sides" in sensitive supply-chain domains, such as 5G infrastructure and semiconductors. If geopolitical tensions escalate, certain high-tech goods may face export controls, potentially disrupting industrial-goods flows between ASEAN and China. These dynamics underline how shifts in major-power relations can directly affect the trajectory of ASEAN-China trade. On the economic side, China faces structural challenges, including a slowdown in the property sector and population aging, which could weigh on its future import demand. Notably, China's imports from ASEAN fell by nearly 3 percent in 2023 (Global Times, 2024). Should China's growth weaken more sharply than expected, resource-exporting economies such as Indonesia and Malaysia would be exposed to adverse shocks. In addition, growing trade imbalances pose macroeconomic risks: several ASEAN countries are recording widening trade deficits with China, which may intensify concerns over economic dependence and market vulnerability. External risks, such as a potential global recession, commodity-price volatility, natural disasters, or new pandemics, could also disrupt trade flows, underscoring the need for ASEAN and China to strengthen coordination mechanisms and ensure trade continuity. Taken together, these risks suggest that the next phase of ASEAN-China economic engagement will require a more careful balance between opportunity and resilience.

In summary, the medium- and long-term prospects for ASEAN-China trade remain broadly positive.

Expanding FTAs, deeper regional integration, and the shift toward a multipolar global economy will continue to support trade growth. Many forecasts suggest that bilateral trade could maintain an annual expansion rate of 7-10 percent provided that tariff-reduction commitments are upheld and the business environment continues to improve. Yet the durability of this outlook will ultimately depend on how effectively both sides can manage political sensitivities, economic asymmetries, and emerging strategic risks.

### *Policy Recommendations for ASEAN*

The outlook for ASEAN-China trade in the coming years remains broadly optimistic, supported by next-generation free trade agreements (FTAs) and the large market demand on both sides. Although growth may not be as rapid as in earlier periods, cooperation is expected to deepen and diversify across more sectors. Over the next decade, bilateral trade could surpass USD 1.5 trillion annually if integration commitments are fully implemented and the regional environment remains stable (HSBC China, 2020). To realize this potential and ensure sustainable development, ASEAN needs to proactively prepare and adjust its strategies. The following sections outline key policy recommendations for ASEAN:

First, diversify production and enhance intra-regional value addition. ASEAN should capitalize on incoming investment and technology transfers from China to develop supporting industries and gradually reduce dependence on Chinese inputs. Currently, an estimated 30-40 percent of input materials used in ASEAN's exports originate from China (Laksono & Rafitrandi, 2025). Increasing the level of domestic value addition would improve production efficiency and strengthen ASEAN's competitiveness, enabling member states to export higher value-added goods to China and reduce trade deficits. Countries should prioritize attracting investment in deep-processing industries (e.g., processed agricultural products instead of raw exports, production of electronic components instead of full import dependence), thereby generating employment while narrowing structural deficits. Reducing overdependence on any single source of inputs is not only an economic objective but also a strategic necessity in an era of supply chain fragmentation. ASEAN should also diversify its sources of raw material imports, such as Japan, South Korea, and India, to mitigate risks from potential supply-chain disruptions in China. Expanding market access through existing FTAs can help reduce overreliance on a single export destination. For example, Vietnam and several ASEAN members have concluded FTAs with the EU and India; these preferential agreements should be

leveraged to rebalance the bloc's overall trade position. In addition, strengthening cooperation with the United States and Japan can reduce geopolitical risks linked to excessive concentration in the Chinese market. Such diversification would give ASEAN greater room to maneuver as major power rivalry intensifies.

Second, improve logistics infrastructure and digital connectivity. ASEAN's intra-regional transport and logistics infrastructure remains uneven in quality, contributing to higher transaction and trade-related costs. ASEAN should combine Chinese financing (through the Belt and Road Initiative and AIIB) with domestic resources to modernize ports, railways, and warehousing facilities in accordance with regional standards. However, careful economic assessment is necessary to avoid potential debt risks associated with Chinese-financed projects. Completing major logistics corridors, such as the North-South and East-West economic corridors, would accelerate market access for ASEAN goods entering China and vice versa, enhancing competitiveness. Well-developed connectivity links also carry strategic value, as they influence the movement of supply chains and the relative positions of ASEAN economies within them. At the same time, ASEAN's natural endowments (land, wind, solar energy) create opportunities for developing "green" industries such as renewable energy, organic agriculture, and resource-efficient manufacturing. China has a rapidly growing demand for clean products and green technologies, including batteries and energy-efficient electronics, to meet its climate commitments. Bilateral cooperation may expand into joint renewable-energy projects and environmental-technology exchanges. Strengthening ASEAN's high-skilled technical workforce will also help the region supply technologically advanced products that meet China's rising quality requirements. Building such capabilities contributes not only to economic upgrading but also to long-term strategic resilience.

Third, manage risks and promote sustainable trade development. ASEAN must anticipate and mitigate risks inherent in its trade relationship with China. A key concern is excessive dependence: several ASEAN industries, including electronics, machinery, and chemicals, rely heavily on China for both inputs and final-market demand (Kelly & Wester, 2025). Therefore, ASEAN should diversify export markets by leveraging FTAs with the EU, the United States, and India to avoid overconcentration. Such diversification will help insulate the region from shocks arising from China's domestic restructuring or shifts in major power strategies. Another risk is the growing bilateral trade imbalance. ASEAN should strengthen

dialogue with China through bilateral and regional mechanisms to encourage greater imports of ASEAN products, particularly agricultural goods and consumer products where the bloc has comparative advantage, while reducing technical barriers to ASEAN exports. Competition and labor displacement also require attention. The influx of low-cost Chinese goods can challenge domestic producers in ASEAN countries. Governments should support vulnerable sectors, improve competitiveness, and encourage technological upgrading. This approach would enable ASEAN to manage adjustment pressures without undermining the broader partnership. Finally, ASEAN and China should jointly develop sustainability standards in trade, covering traceability, phytosanitary requirements, product quality, and environmental standards, to ensure that trade growth aligns with sustainable-development goals and improves living standards. Shared standards would also reduce friction and help stabilize expectations on both sides, which is essential for long-term cooperation

*Fourth, maximize the benefits of FTAs (RCEP, ACFTA) and strengthen intra-ASEAN integration.* ASEAN governments must go beyond signing agreements and focus on implementation. Following the entry into force of RCEP, enterprises need clearer guidance to utilize tariff preferences and simplified customs procedures. Updated rules of origin under RCEP allow for full cumulation within the bloc, an opportunity for ASEAN and China to co-develop regional value chains. ASEAN firms should take advantage of Chinese intermediate goods to produce final products that qualify for preferential tariffs when exported to other RCEP members. Making full use of these provisions will determine how effectively ASEAN can position itself within emerging production networks. Meanwhile, ASEAN should continue strengthening its internal integration under the ASEAN Economic Community (AEC) to build a unified market, thereby enhancing its bargaining power with China. The bloc should fully leverage RCEP and ACFTA 3.0 while accelerating the implementation of CPTPP commitments. Member states should eliminate remaining technical and tariff barriers, modernize customs processes, and prepare for deeper tariff reductions in key sectors (e.g., agriculture, technology). ASEAN should also actively propose new areas of cooperation within the ACFTA 3.0 framework, such as e-commerce, environmental protection, and digital-trade facilitation, to keep pace with emerging trends and safeguard regional interests. A more cohesive ASEAN will be better positioned to manage asymmetries in its relationship with China.

*Fifth, reinforce ASEAN's centrality and strengthen a unified regional voice.* In an increasingly uncertain geopolitical environment, ASEAN must maintain unity and prevent trade relations with China from becoming a source of internal division. Through platforms such as the ASEAN-China Summit and the China-ASEAN Expo, the bloc should collectively articulate concerns and propose solutions on issues such as trade deficits, technology transfer, and sustainable development. A unified stance helps ASEAN negotiate from a position of strength and ensures equitable benefits for all members, not only the larger economies. Maintaining centrality will become even more important as major power rivalry intensifies in the region. At the same time, ASEAN should skillfully balance relations with other major partners, including the United States, the European Union, Japan, and India, to retain strategic flexibility and encourage China to engage on the basis of mutual respect and shared benefit. A cohesive, independent, and confident ASEAN will be better equipped to benefit from cooperation with China while reducing exposure to geopolitical risks.

### Conclusion

The period 2020-2025 demonstrates a clear deepening of ASEAN-China economic ties, supported by strong trade growth, expanding supply-chain linkages, and the continued development of institutional frameworks such as RCEP and the ACFTA upgrades. These trends reflect not only market complementarities but also the broader restructuring of production networks across East Asia.

At the same time, the evolving trade relationship carries implications that reach beyond the economic domain. The persistent trade imbalance, varying levels of exposure among ASEAN member states, and the increasing relevance of strategic sectors, such as electronics, renewable energy technologies, and digital infrastructure, highlight the need to view economic cooperation in connection with wider regional dynamics. While the fundamental drivers of trade are likely to remain strong, long-term stability will depend on how effectively both sides can manage structural vulnerabilities and shifts in the regional strategic environment.

For ASEAN, the central policy challenge is to strengthen its position within regional value chains while reducing excessive dependence on any single market or supplier. This requires sustained efforts to diversify production, deepen intra-ASEAN integration, and make fuller use of the opportunities provided by RCEP and ACFTA 3.0. At the same time, ASEAN must ensure that its trade engagement remains aligned with its broader development goals, including digital

transformation, sustainability, and industrial upgrading.

For China, continued engagement with ASEAN offers a stable and expanding market, but it also requires careful attention to concerns over market access, non-tariff barriers, and the distribution of benefits across the region. Addressing these issues constructively will help maintain confidence in the partnership and support the broader goal of maintaining economic stability in East Asia.

Looking ahead, ASEAN-China trade cooperation will remain a key economic anchor in the region. However, its resilience will increasingly depend on the ability of both sides to balance opportunity with prudence by expanding economic ties while navigating geopolitical uncertainty, technological competition, and the pressures of a more contested regional environment. Achieving this balance will be essential for ensuring that the partnership continues to deliver broad and sustainable benefits in the years to come.

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# INTEREST RATE SPILLOVERS FROM THE UNITED STATES AND SINGAPORE TO SOUTHEAST ASIA: IMPLICATIONS FOR A LAYERED TRANSMISSION MECHANISM

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**Abstract:** *This paper investigates interest rate spillovers to Southeast Asia from the United States and Singapore. While prior studies focus mainly on the U.S. as the primary source of global financial shocks, this study highlights a layered transmission mechanism in which Singapore acts as a regional intermediary. Using time series, panel regressions, and rolling estimations, the results show that although Singapore's interest rates move positively with U.S. rates, most Southeast Asian economies exhibit weak or negative relationships with U.S. rates once Singapore is included. In contrast, spillovers from Singapore are consistently positive across the region. These findings suggest that global shocks are transmitted through regional financial hubs rather than directly, underscoring the importance of intermediary economies in regional financial dynamics.*

• Keywords: *global financial center, regional financial center, financial spillover, policy rate, layered transmission mechanism.*

Date of receipt: 06<sup>th</sup> Feb., 2026

Date of delivery revision: 28<sup>th</sup> Feb., 2026

DOI:

Date of receipt revision: 21<sup>th</sup> Mar., 2026

Date of approval: 29<sup>th</sup> Mar., 2026

## 1. Introduction

Financial globalization has significantly intensified the transmission of shocks across countries, particularly through interest rate channels. In an increasingly interconnected global financial system, changes in monetary policy in major economies, especially the United States, have profound implications for smaller and open economies. This phenomenon is commonly referred to as financial spillovers. Traditional approaches to analyzing financial spillovers often assume a relatively direct transmission mechanism from global centers to peripheral economies. Under this view, changes in U.S. interest rates are expected to propagate directly to emerging markets through capital flows, exchange rate adjustments, and financial integration. However, this perspective may oversimplify the actual transmission process. In reality, financial spillovers are embedded within a complex network of relationships, where certain economies may act as intermediaries. In Southeast Asia, Singapore stands out as a highly integrated financial center, potentially serving as a conduit through which global shocks are transmitted to neighboring economies.

This paper aims to address the following research question: Do interest rate spillovers from the United

States reach Southeast Asian economies directly, or are they mediated through regional financial hubs such as Singapore? To answer this question, we employ a set of regression-based approaches, including panel estimations and country-level time series regressions. The analysis focuses on comparing spillover effects from the United States and Singapore across several Southeast Asian economies. The main contribution of this paper lies in providing empirical evidence that spillovers in Southeast Asia are not purely bilateral but exhibit a layered transmission mechanism. Specifically, we find that Singapore plays a central role in mediating global financial shocks.

## 2. Literature review

This study connects to three main strands of literature on international financial transmission. First, the global financial cycle literature emphasizes the dominant role of global factors, particularly U.S. monetary policy, in shaping domestic financial conditions (Rey, 2015; Bruno & Shin, 2015). Global financial cycles and cross-border banking flows limit domestic policy autonomy and transmit liquidity shocks internationally. Second, interest rate parity and capital mobility theories provide a foundation for cross-country linkages. Arbitrage mechanisms under

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CIP and UIP lead to co-movement in interest rates, but market frictions and transaction costs mean capital flows become a key channel for transmitting external shocks (Keynes, 1923; Frenkel & Levich, 1975, 1977; Obstfeld & Rogoff, 1996; Fama, 1984). Third, network-based research highlights the role of financial interconnections in shaping shock propagation (Allen & Gale, 2000). Spillovers operate through multi-layered networks rather than simple bilateral channels, potentially amplifying or mitigating shocks depending on the structure of linkages.

Despite these insights, empirical evidence on regional intermediaries in emerging markets is limited. This paper contributes by showing that in Southeast Asia, U.S. interest rate spillovers are not transmitted directly but are mediated through the regional hub of Singapore, with effects further shaped by country-specific characteristics and time-varying global conditions.

### 3. Methodology

#### 3.1. Research sample

The analysis focuses on six Southeast Asian economies: Vietnam, Indonesia, Malaysia, Thailand, the Philippines, and Singapore. These countries are chosen for their open financial systems and sensitivity to global monetary conditions, while also differing in economic development, monetary frameworks, and financial integration. To capture external spillovers, policy interest rates from the United States (global financial center) and Singapore (regional hub) are included. This allows the study to distinguish between global and regional transmission channels in interest rate spillovers.

#### 3.2. Estimation Approaches

The study uses three complementary approaches. First, panel OLS is applied to all Southeast Asian economies, including both U.S. and Singapore interest rates, to estimate average regional spillover effects while controlling for country-specific factors. Second, country-specific time series regressions are conducted with both interest rates to capture heterogeneity in individual economies' responses to external shocks. Third, rolling OLS with an 84-month window is used at the country level to allow spillover coefficients to vary over time, reflecting changes in global financial conditions and domestic policies. Including U.S. and Singapore rates jointly allows the coefficients to be interpreted as conditional spillovers: U.S. rates capture global effects after accounting for regional transmission via Singapore, while Singapore rates reflect the regional spillover channel. This framework

distinguishes the roles of global and regional financial centers in Southeast Asia.

#### 3.3. Research Model

To measure financial spillovers through policy interest rates, this study employs a linear regression framework in which the dependent variable is the policy interest rate of each Southeast Asian economy. The key explanatory variables are the policy interest rates of two central economies, namely the United States (global center) and Singapore (regional center), together with a set of macroeconomic control variables.

The baseline specification is given by:

$$Y_{it} = \alpha_{it} + \gamma_{it}^{US} x_t^{US} + \gamma_{it}^{SG} x_t^{SG} + \beta_T Z_t + \varepsilon_{it} \quad (1)$$

where  $Y_{it}$  denotes the domestic policy rate  $i$ ,  $x_t^{US}$ ,  $x_t^{SG}$  represent policy rates of the United States and Singapore;  $\gamma_{it}^{US}$ ,  $\gamma_{it}^{SG}$  are coefficients representing the degree of interest rate dependence of peripheral economies  $i$  on the central economies (CE), namely the United States and Singapore, respectively;  $\beta_T$  is the matrix of coefficients associated with  $Z_t$ ;  $Z_t$  is a vector of control variables;  $\alpha_{it}$  is the intercept term;  $\varepsilon_{it}$  is the error term (disturbance) of the estimation.

Importantly, both U.S. and Singapore interest rates are included simultaneously in all baseline specifications. This allows the estimation to capture the relative contribution of global and regional spillovers within a unified framework.

**Table 1. Variable definitions and data sources**

| Symbol          | Description                                                                                                                                         | Construction                                                                                                                        | Source                                                                                                                                                                                                                                                                               |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| $Y_{it}$        | policy rate of peripheral country $i$ at time $t$                                                                                                   | collected directly from original datasets                                                                                           | IMF DATABASE                                                                                                                                                                                                                                                                         |
| $x_t^{US}$      | U.S. policy rate                                                                                                                                    | collected directly from original datasets                                                                                           | Note:<br>For advanced economies such as the United States, Japan, and the Euro area, this study follows Aizenman, Chinn, and Ito (2020) by employing shadow policy rates instead of official rates, in order to better capture monetary policy conditions near the zero lower bound. |
| $x_t^{SG}$      | Singapore policy rate                                                                                                                               | collected directly from original datasets                                                                                           |                                                                                                                                                                                                                                                                                      |
| $oc\_prices$    | composite index representing global oil and commodity price movements                                                                               | derived as the first principal component using Principal Component Analysis (PCA)                                                   | computed by the author                                                                                                                                                                                                                                                               |
| $VIX\ INDEX_t$  | market-based volatility indicator reflecting expected fluctuations of the U.S. equity market (S&P 500) over a 30-day horizon                        | sourced directly from market data                                                                                                   | Chicago Board Options Exchange (CBOE)                                                                                                                                                                                                                                                |
| $TEDSpread$     | difference between short-term USD interbank funding costs and 3-month U.S. Treasury yields                                                          | $TED\ Spread = LIBOR_{3m} - Tbill_{3m}$ ;<br>alternatively, $TED\ Spread = SOFR_{3m} - Tbill_{3m}$ when $LIBOR_{3m}$ is unavailable | computed by the author                                                                                                                                                                                                                                                               |
| $FSIndex_t$     | U.S. financial stress indicator at time $t$                                                                                                         | collected directly from original datasets                                                                                           | IMF DATABASE                                                                                                                                                                                                                                                                         |
| $\gamma_{it}^C$ | Sensitivity coefficient capturing the extent to which interest rates in peripheral economies respond to the core economy ( $C = U.S.$ or Singapore) | estimated from regression model (1)                                                                                                 | computed by the author                                                                                                                                                                                                                                                               |

Source: Constructed by the author

### 3.4. Research Dataset

The dataset consists of monthly policy interest rates for six Southeast Asian economies - Vietnam, Indonesia, Malaysia, Thailand, the Philippines, and Singapore - along with policy rates from two central economies, namely the United States and Singapore. The sample period spans from January 2001 to December 2023, covering both tranquil periods and major episodes of economic turbulence, including the 2008 global financial crisis and the COVID-19 pandemic.

The data are compiled from official publications of central banks, as well as international databases such as the IMF, World Bank, and CEIC. In cases where policy rates may not fully capture the stance of monetary policy - particularly during periods when rates approach the lower bound - the study considers the use of shadow interest rates to better reflect the effective degree of monetary accommodation in the central economies.

## 4. Discussion of empirical results

### 4.1. Descriptive Statistics of Policy Interest Rates

**Table 2. Descriptive statistics of panel data for policy interest rates in Southeast Asia (2001-2024)**

| Variable          | Statistic Type | Mean     | Std. Dev. | Min       | Max       | Observations |
|-------------------|----------------|----------|-----------|-----------|-----------|--------------|
| Interest rate (r) | overall        | 3.820298 | 3.088752  | -2.985643 | 15.000000 | N = 2016     |
|                   | between        |          | 2.532549  | 1.25973   | 7.426215  | n = 7        |
|                   | within         |          | 2.010002  | -4.383235 | 12.32203  | T = 288      |

Source: Author's calculations

Table 2 presents the descriptive statistics of policy interest rates across Southeast Asian economies in the sample. The results indicate that the average policy interest rate for the entire sample is 3.82%, with an overall standard deviation of 3.09, reflecting a moderate degree of variability across the region.

Decomposing the variation, the between-country standard deviation is 2.53, while the within-country standard deviation over time is 2.01. This suggests that differences in policy interest rates across countries are slightly more pronounced than their fluctuations over time within each country.

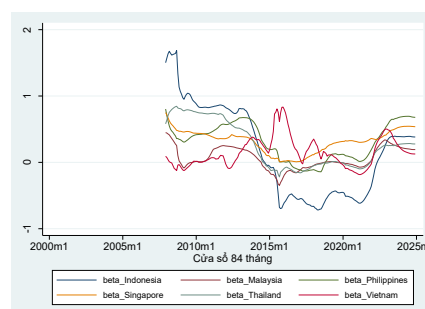
Policy interest rates in the sample range from approximately -2.99% to 15%, indicating the presence of both expansionary and contractionary monetary policy periods across the region. This wide range reflects heterogeneity in macroeconomic conditions and monetary policy responses among Southeast Asian economies over time.

### 4.2. Sensitivity coefficients measuring financial spillovers in Southeast Asian economies

#### Rolling-window OLS estimates and coefficient instability

This study employs a rolling-window OLS approach with a fixed window of 84 months, focusing on spillovers from the United States as the central economy.

**Figure 1. Rolling-window OLS estimates and evidence of instability in interest rate spillover coefficients across ASEAN countries (2001 - 2024)**



Source: Author's estimates

The rolling estimates reveal substantial variation in both the magnitude and direction of spillover coefficients across time and across countries. In several periods, the estimated coefficients increase sharply or even switch signs, indicating that the transmission of U.S. interest rate shocks to Southeast Asian economies is neither stable nor uniform.

These fluctuations are not random but tend to coincide with periods of heightened global financial uncertainty, suggesting that the strength of spillovers is closely linked to the broader global financial cycle. This finding is consistent with the notion that global financial conditions, largely driven by U.S. monetary policy, play a central role in shaping cross-border capital flows and spillover dynamics (Rey, 2015; Bruno and Shin, 2015). As a result, interest rate transmission can be characterized as state-dependent, varying according to external conditions as well as domestic responses.

Moreover, the results highlight significant cross-country heterogeneity in the dynamics of spillover coefficients. Some economies exhibit stronger and more volatile responses, while others display relatively muted or more stable patterns over time. This heterogeneity reflects differences in financial openness, policy frameworks, and the capacity to absorb external shocks.

Overall, the rolling-window evidence confirms that the assumption of constant spillover coefficients



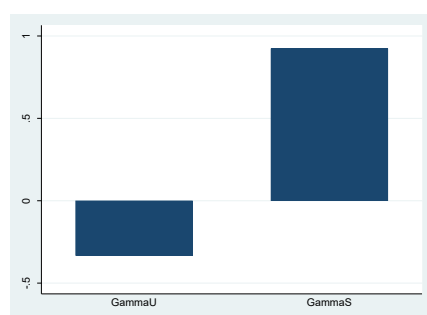
is restrictive and may obscure important dynamics in cross-border transmission. Instead, the results point to a time-varying and context-dependent mechanism through which U.S. monetary shocks propagate to Southeast Asia.

*Panel linear regression over the full sample period for five Southeast Asian countries*

When spillover variables from both the United States and Singapore are jointly included in the same specification, the estimated coefficient for the United States is negative, whereas that for Singapore is positive. This result suggests that the impact of the United States on Southeast Asia does not operate solely through a direct transmission channel, but is also mediated through Singapore - a regional financial hub that functions as an intermediary node within the transmission network.

The negative coefficient on the United States should not be interpreted as a diminished role of the U.S. economy. Rather, it indicates that a substantial portion of U.S.-originated financial spillovers is intermediated through Singapore, thereby reinforcing the view that international financial transmission is complex, structured, and layered in nature. This interpretation is also consistent with the view that financial spillovers are not strictly unidirectional. As argued by Fang et al. (2021), spillovers can be bidirectional, with effects not only flowing from advanced economies to emerging markets but also feeding back in the opposite direction.

**Figure 2. Panel data linear regression over the full sample period for five Southeast Asian countries (2001 - 2024)**



Source: Author's estimates

In this context, the estimated coefficients can be interpreted as reflecting the net effect of both direct and indirect transmission channels. Specifically, once the regional intermediary role of Singapore is accounted for, the residual effect associated with the United States captures a reconfigured transmission pathway

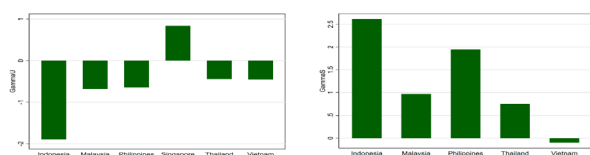
rather than a simple bilateral linkage. This provides empirical support for the presence of a multi-stage propagation mechanism in which regional financial hubs play a critical role in shaping the direction and magnitude of cross-border spillovers.

*Time-series OLS estimates over the full sample period for each Southeast Asian economy*

When examining interest rate spillovers from the United States, a clear divergence emerges between Singapore and the other Southeast Asian economies. While Singapore exhibits a positive relationship with U.S. interest rates, the remaining countries in the region tend to display a negative relationship. This contrast reflects differences in their positions within the international financial system. As a highly integrated regional financial hub and a key destination for global capital flows, Singapore tends to respond in a synchronized manner to U.S. monetary shocks. In contrast, other Southeast Asian economies appear to adopt more flexible policy responses aimed at mitigating adverse external impacts, leading to a non-synchronous or even countervailing relationship when assessed within a static framework. When examining spillovers from Singapore, the results show a predominantly positive relationship across most Southeast Asian economies, with Vietnam standing out as the only case exhibiting a negative relationship. This finding suggests that regional financial spillovers are not uniform but instead depend on country-specific characteristics such as financial structure, degree of integration, and domestic policy frameworks. The observed heterogeneity implies the presence of domestic adjustment mechanisms that partially offset or reshape the transmission of regional shocks. In this context, spillovers from Singapore can be interpreted as reflecting a secondary layer of transmission within the region, reinforcing the role of Singapore as an intermediary in the broader spillover process.

Overall, these results indicate that even within a relatively integrated region, financial spillovers remain heterogeneous rather than uniform. This reinforces the view that cross-border transmission mechanisms are shaped not only by external shocks but also by domestic structural conditions and policy responses, and that regional spillovers operate through differentiated and context-dependent channels.

**Figure 3. Time-series regression results over the full sample period for each country (2001 - 2024)**



Source: Author's estimates

*Integrated interpretation: layered and state-dependent transmission mechanism*

Taken together, the results from the panel regression, country-specific time-series analysis, and rolling-window estimation provide a coherent picture of interest rate spillovers in Southeast Asia. Rather than operating through a single and stable channel, spillovers appear to follow a structured, multi-layered, and time-varying transmission process.

The panel regression highlights the existence of an indirect transmission mechanism, in which the impact of the United States on Southeast Asia is not purely bilateral but mediated through Singapore as a regional financial hub. This finding points to a layered structure of financial transmission, where shocks originating from global centers are redistributed through intermediate nodes before reaching peripheral economies.

The time-series results further reveal that this transmission mechanism is not uniform across countries. While Singapore responds positively and synchronously to U.S. interest rate movements, other Southeast Asian economies tend to exhibit countervailing or weaker responses. This heterogeneity reflects differences in financial integration, policy frameworks, and structural characteristics, suggesting that spillovers are filtered and reshaped at the country level.

The rolling-window estimates add a dynamic dimension to this framework by showing that spillover coefficients are not stable over time. Instead, the magnitude and even the direction of transmission vary across periods, often in line with shifts in global financial conditions. This indicates that the strength of U.S.-driven spillovers is state-dependent, increasing during periods of global financial stress and weakening or reversing during more stable periods.

Summary, these findings support the existence of a layered and state-dependent transmission mechanism. In this framework, global shocks originate from major economies such as the United States, are conditionally transmitted through regional

financial hubs like Singapore, and are ultimately filtered through domestic structures and policy responses in recipient economies. This multi-stage process underscores the importance of considering both network structures and temporal dynamics when analyzing cross-border financial spillovers.

## 5. Conclusion and policy implications

This study investigates interest rate spillovers from the United States and Singapore to Southeast Asia using panel regression, country-specific time series, and rolling-window estimation. The results indicate that spillovers follow a layered and time-varying process: U.S. shocks are partly transmitted indirectly through Singapore, which acts as a regional financial hub. Singapore responds positively and synchronously to U.S. interest rate changes, while other Southeast Asian economies show weaker or even countervailing responses. Spillover effects also vary over time, often in line with global financial turbulence.

Policy implications are as follows: Southeast Asian policymakers should monitor both global and regional financial conditions, recognizing that shocks are transmitted through multi-stage channels. Policy frameworks must consider direct and indirect spillovers, and responses should be flexible and state-contingent. Macprudential measures can mitigate adverse effects, and policies should be tailored to each country's financial structure and capacity. Strengthening domestic financial resilience through deeper markets, better risk management, and adequate reserves is essential to reduce vulnerability to external shocks.

**Acknowledgements:** This paper is part of the doctoral thesis by Nguyen Kim Thai Ngoc at Ho Chi Minh University of Banking, under the supervision of Prof. Le Dinh Hac and Dr. Vuong Thi Huong Giang.

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# AGENCY FAILURE, CORPORATE GOVERNANCE COLLAPSE, AND SYSTEMIC FRAUD: A CASE STUDY OF THE VAN THINH PHAT IN VIETNAM

PhD. Dao Manh Huy\*

**Abstract:** *The Van Thinh Phat Group scandal involved an unprecedented scale of financial loss, posing a significant challenge to existing theories of management, control, and criminology. This study utilizes an integrated framework encompassing agency, fraud, and behavioral theories to conduct a qualitative case analysis based on legal and financial documentation. The findings elucidate the mechanisms that allowed such misconduct to persist over several decades. The research further identifies a systemic collapse resulting from the intersection of severe agency conflicts and the failure of multi-level control networks. These results offer vital implications for corporate governance and public policy to effectively recognize and prevent similar systemic risks in the future.*

• Keywords: fraud; agency theory; governance; systemic collapse.

Date of receipt: 30<sup>th</sup> Jan., 2026

Date of delivery revision: 28<sup>th</sup> Feb., 2026

DOI:

Date of receipt revision: 19<sup>th</sup> Mar., 2026

Date of approval: 25<sup>th</sup> Mar., 2026

## 1. Introduction

The financial scandal involving Van Thinh Phat Group and SCB Bank has transcended the boundaries of isolated corporate fraud to become a systemic event with negative spillover effects across the entire economy. Extensive financial losses, estimated to represent a significant proportion of the national GDP, alongside direct impacts on tens of thousands of investors, have exposed severe vulnerabilities in corporate governance architecture and national financial supervision. Given its unprecedented scale and complexity, this case provides a unique research opportunity to re-examine the validity and limitations of classic theoretical frameworks concerning financial crime.

At the heart of the matter are allegations that Truong My Lan and her associates manipulated and utilized SCB as a private financial vehicle for over a decade. However, explaining such a comprehensive collapse poses a major challenge to existing academic theories. Fraud Triangle Theory, which focuses on pressure, opportunity, and rationalization at the individual level (Cressey, 1953), appears insufficient to explain a large-scale organized criminal network. Similarly, Agency Theory, while useful for analyzing conflicts of interest between principals and agents (Jensen & Meckling, 1976), struggles to clarify why all layers of monitoring

from the board of directors and Big Four auditing firms to state bank inspectors failed simultaneously and systematically (Coffee, 2006).

A key scholarly gap lies in the absence of an integrated analytical framework capable of bridging macro-level failures in governance structures and supervisory institutions with micro-level dynamics such as psychology and individual decision-making processes. Prior research suggests that serious misconduct is often not the result of isolated decisions but is the product of a normalization process for deviant behavior where unethical acts gradually become accepted as standard practice within an organization (Anand et al., 2004). Therefore, this study poses a central question regarding how the resonant interaction between agency failures, structural opportunities, and behavioral biases can explain the emergence, persistence, and extraordinary scale of the fraud at Van Thinh Phat.

The primary contribution of this research is the proposal and empirical testing of a multi-theoretical framework. This framework integrates perspectives from Agency Theory, expanded versions of Fraud Theory (Wolfe & Hermanson, 2004), and behavioral economics. The core thesis posits that in cases of systemic fraud, governance deficiencies at the structural level create unparalleled opportunities.

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These opportunities are then fully exploited by actors with compromised ethics who are supported by a toxic organizational culture (Bazerman & Tenbrunsel, 2011). Consequently, the research aims to develop a Systemic Fraud Analysis Framework. This theoretical tool is essential for analyzing and preventing complex financial risks, particularly within the context of emerging markets characterized by challenging institutional environments (Khanna & Palepu, 2000).

## 2. Theoretical Framework

To comprehensively analyze a systemic and complex financial fraud such as the Van Thinh Phat case, it is essential to construct an integrated theoretical framework. This analytical structure comprises three primary pillars within the study of corporate crime. These include Fraud Triangle Theory and its extended versions, Agency Theory, and Behavioral Theory. Each pillar offers a distinct analytical perspective that clarifies various facets of the case, ranging from macro-level governance failures to the micro-level psychological motives of individual offenders.

The primary foundation for explaining fraudulent behavior is Fraud Triangle Theory, initiated by Donald R. Cressey, which posits that financial crime occurs at the convergence of pressure, opportunity, and rationalization (Cressey, 1953). However, subsequent complex cases demonstrate that this classical model requires supplementation. Consequently, scholars developed more multifaceted models such as the Fraud Diamond, which incorporates the capability of the offender (Wolfe & Hermanson, 2004). Furthermore, the Fraud Pentagon and later polygonal models integrated factors such as arrogance and collusion (Roffia & Poffo, 2025). Applying an expanded polygonal model is essential because the Van Thinh Phat case clearly exhibits all these elements, from the capability to organize a sophisticated criminal network to widespread collusion among multiple stakeholders.

The second theoretical pillar is Agency Theory, which focuses on the inherent conflict of interest within the relationship between the principal and the agent (Jensen & Meckling, 1976). Core issues of this theory, including information asymmetry and moral hazard, are highly relevant when analyzing governance failures. In the context of this case, the theory provides a sharp analytical tool to dissect the

collapse of monitoring mechanisms. It helps explain the failure of the Board of Directors at SCB Bank in their role as agents for shareholders and depositors. Additionally, this theory applies to the failure of independent auditors and the corruption of state regulatory agencies, who serve as agents for the interests of the market and the public (Al-Faryan, 2024).

The final pillar of the framework shifts from structural factors to individual psychological aspects through the lens of Behavioral Theories. These theories suggest that humans do not always make decisions in a purely rational manner. Cognitive biases, such as confirmation bias, optimism bias, and particularly groupthink, can lead to the normalization of deviance within an organization (Langevoort, 1998). This phenomenon helps explain why a large network of individuals could participate in and rationalize misconduct over a prolonged period.

Synthesizing these three pillars enables the construction of a multi-level and comprehensive analytical model. At the macro level, Agency Theory explains the structural conditions and governance failures that created an environment conducive to fraud. At the intermediate level, Fraud Polygon Theory clarifies the specific organizational circumstances that generated opportunity and pressure, as well as the methods by which behaviors were rationalized. Finally, at the micro level, Behavioral Theory illuminates the decision-making process, cognitive biases, and psychological drivers of individuals who choose to exploit those opportunities. This integrated model systematically links macro-level failures with specific organizational and individual behaviors, providing a complete picture of the collapse of Van Thinh Phat.

## 3. Research Methodology

This research adopts a single case study design due to the complex and unprecedented nature of the Van Thinh Phat case. This method is appropriate for an in-depth investigation of a contemporary phenomenon within its real-world context, aiming for analytical rather than statistical generalization (Yin, 2018). Data were collected exclusively from public secondary sources. These sources include official legal documents such as indictments and court judgments, investigative reports from reputable media organizations between 2022 and

2025, and financial statements from SCB Bank.

The qualitative analysis followed a thematic approach using two coding cycles. The first cycle utilized structural coding based on core theoretical concepts. The second cycle applied pattern coding to identify emerging themes (Miles et al., 2020). Scientific rigor was maintained by adhering to established qualitative research standards. Validity was reinforced through data triangulation and pattern matching techniques. Objectivity was ensured by a transparent analytical process that facilitates the verification of findings. Regarding research ethics, this study relies solely on public information and does not interfere with ongoing legal proceedings.

A limitation of this study is the dependence on secondary data, which may reflect the biases of various stakeholders. Therefore, the analysis focuses on interpreting behavioral and structural mechanisms through management theory instead of formulating legal conclusions.

#### 4. Results and Discussion

Empirical analysis based on an integrated theoretical framework reveals that the Van Thinh Phat case reflects a multi-level systemic collapse, operating through tightly linked mechanisms at the macro, organizational, and micro levels. The evidence strongly supports the study's central proposition: The collapse did not originate from a single deviant act but was the product of a cascading interaction, wherein structural failures at the institutional level facilitated corporate fraud, while psychological and behavioral dynamics at the individual level sustained and amplified the consequences over time. The subsequent discussion sequentially examines the role of agency conflicts, the substantive neutralization of oversight mechanisms, the convergence of fraudulent elements as conceptualized by multifaceted models, and the micro-level mechanisms of behavioral rationalization. These components are then integrated to delineate the self-reinforcing loop that culminated in institutional collapse.

Foremost, the case challenges the explanatory capacity of the classic agency framework, which centers on owner–manager conflicts. The data reveal an extreme form of agency conflict between ownership groups, consistent with emerging market contexts characterized by highly concentrated ownership and weak investor protection mechanisms (Claessens et al., 2000; Young et al., 2008). Deviating

from the normative assumption of decentralized power, actual authority at the bank was restructured through complex proxy and trust arrangements, enabling a single entity to control a majority stake without direct nominal representation. Public disclosures indicate a dominant level of control, thereby shifting the locus of power from the board mechanism to individualized decision-making. This disparity between legal ownership and actual control inverted the principal–agent relationship, hollowing out the representative function of the board of directors and executive management. When the link between management and the collective body of shareholders was severed, the incentive to serve minority interests sharply increased, and asset expropriation became the dominant strategy (Johnson et al., 2000). From a theoretical perspective, this exemplifies the spiraling agency costs that arise when controlling shareholders are not constrained by effective checks and balances, causing the governance equilibrium to shift toward self-serving extraction, no longer optimizing for the welfare of minority shareholders or depositors.

At the organizational level, this eccentric power structure precipitated the degradation of internal controls. Process mapping reveals that key controls in credit approval, risk management, and financial reporting were neutralized by extra-procedural interventions. The tunneling activities were not spontaneous but were operationalized through mechanisms designed to legitimize cash flows, including fictitious credit dossiers, non-independently appraised collateral, and the use of intermediary legal entities to diffuse responsibility. When the approval and appraisal functions were not substantively independent, the capacity for deviation detection sharply declined, and fraudulent behavior transitioned from localized to systemic. Consequently, financial statements were persistently distorted, while cash flows were diverted from core business objectives to serve the related ownership network. This represents a typical state of internal control exhaustion, where compliance norms are superseded by interest-aligned directives, and the control function operates merely as a formal veneer.

When the internal control layer weakened, expectations placed on external oversight mechanisms became critical. However, evidence indicates these barriers failed to perform their intended role (Coffee, 2006). Audit reports for multiple years issued unqualified opinions, even as

risk indicators regarding asset quality, liquidity, and credit concentration surpassed warning thresholds. This outcome suggests two non-mutually exclusive possibilities: detection capabilities were limited by deliberate concealment, and professional independence was compromised by economic dependence on a major client (Beattie et al., 1999; Francis, 2004). From a normative standpoint, fee dependence on a dominant client creates an intractable conflict of interest, eroding professional skepticism and lowering the threshold for accepting evidence below the necessary level of diligence. Concurrently, the final oversight instrument from regulatory agencies was neutralized by institutional capture, manifested through systematic bribery and structured interference in inspection activities. With all three lines of defense (internal controls, independent audit, and state supervision) compromised, agency costs accumulated unchecked and metastasized into systemic collapse risk.

To explain how the fraud achieved such scale and longevity, the analysis must extend from the traditional fraud triangle to multidimensional models, such as the fraud diamond and the fraud polygon (Cressey, 1953; Wolfe & Hermanson, 2004). In the research context, the opportunity element approached an absolute state due to the substantive neutralization of the control system. Financial pressure escalated in tandem with the real estate credit cycle, particularly during market corrections, which created incentives to sustain cash flow by expropriating bank resources. The capability of key actors was demonstrated through their ability to design and maintain sophisticated tunneling mechanisms, fragmenting transactions into hundreds of files and legal layers, thereby obscuring the causal link between the source and destination of funds. The arrogance element, a belief in the ability to override controls, was conspicuous, as decisions were made assuming superior power could insulate legal risks at the operational level. The confluence of these factors created a stable action space for fraud, where detection risk was suppressed long enough for behavioral inertia to form.

At the micro level, behavioral analysis provides an explanation for the persistence of the fraud. The rationale of “saving the bank” not only emerges during the defense phase but also operates as a cognitive mechanism to rationalize decisions within the organization. When a collective continuously

makes deviant decisions without incurring sanctions, internal norms shift, and deviation comes to be seen as effective operational practice (Vaughan, 1996). This socialization of deviance is often accompanied by neutralization techniques, wherein actors invoke higher goals to temporarily suspend ethical standards (Sykes & Matza, 1957). Group cohesion, heightened by concentrated power, led to groupthink, silencing warnings and stifling internal dissent. On an individual plane, moral blindness caused the ethical dimension to be excluded from the cognitive frame during complex decision-making (Bazerman & Tenbrunsel, 2011). Concurrently, moral disengagement mechanisms allowed actors to maintain a positive self-image by using euphemistic language, blaming the system, or diffusing responsibility onto the collective (Bandura, 1999). These mechanisms operated simultaneously, creating an ethical gray zone where internal rationality superseded legality, and where psychological barriers to fraudulent behavior were lowered significantly.

Connecting these analytical layers reveals a self-reinforcing loop that initiated and sustained the collapse. In the first cycle, concentrated ownership combined with proxy networks skewed power and disrupted the principal-agent equilibrium. In the next cycle, weakened internal controls and the failure of the oversight system expanded opportunities for fraud and reduced detection probability. In the third cycle, the proceeds from fraud were reinvested to consolidate central power, fund bribery, and further neutralize monitoring mechanisms. In the final cycle, the organizational culture adapted to deviance, forming new norms that rewarded results while ignoring process, thereby stifling internal critique and propagating the behavior. This cyclical chain explains the extraordinary scale and duration of the misconduct, as each cycle created the conditions for the next to operate more effectively. Once the loop stabilized, late-stage policy interventions faced enormous recovery costs.

These findings carry several noteworthy theoretical implications. First, the principal-principal perspective provides a more suitable explanatory framework than the classic agency model in contexts of concentrated ownership and weak protective mechanisms (Young et al., 2008). The study’s empirical results show that agency costs arise not only from information asymmetry between owners and managers but also from the



abusive power of controlling shareholders over other stakeholders. This expands the concept of agency costs to include organized expropriation mechanisms, where ownership is leveraged to neutralize oversight and divert benefit streams away from the firm. Second, the evidence reinforces the view of the oversight profession (gatekeepers) as a core component of market governance, yet one that is highly vulnerable when facing economic dependence and concentrated client structures (Coffee, 2006; Beattie et al., 1999; Francis, 2004). In such contexts, formal standards of independence are necessary but insufficient, and the economic incentive design for auditors and other assurance providers must be reconsidered to reduce single-source fee dependency. Third, multifaceted fraud models demonstrate that the motivation for fraud cannot be explained along a single axis; it requires networking the elements of opportunity, pressure, capability, and attitude, while linking them to the specific organizational dynamics of emerging markets (Wolfe & Hermanson, 2004).

The governance and policy implications drawn from these results are systemic. Regarding ownership structure, disclosure and monitoring mechanisms for proxy agreements must be tightened to reduce the gap between legal ownership and actual control. For internal controls, the risk management function must be independent in its reporting lines and budget, with direct access to the board and audit committee, bypassing executive management. For auditing, mandatory auditor rotation, client revenue concentration caps, and public disclosure of economic independence indicators should be designed as behavioral guardrails, rather than focusing solely on standards compliance. Regarding state supervision, inspection teams require mechanisms to protect them from interference, systemic real-time transaction data analysis, and the application of anomaly detection based on risk models, reducing reliance on institution-provided records. Finally, organizational ethics programs should not be mere declarations but must be tied to specific incentives and disciplinary mechanisms, while empowering secure whistleblowing channels that protect informants from retaliation. These measures are significant because they target the links in the self-reinforcing loop, rather than addressing superficial symptoms.

The research also offers a methodological contribution by combining case data with a

multi-level analytical framework. This approach permits tracing causal chains across institutional, organizational, and individual layers, avoiding the pitfall of a single explanatory narrative. By triangulating behavioral traces with theoretical propositions, the study reinforces the external validity of the principal–principal framework in emerging market contexts, while establishing the role of the oversight profession as a critical mediating variable between ownership structure and fraudulent outcomes. When combined with behavioral models, the framework clarifies why actors persist in high-risk behavior under escalating risk conditions, and why organizations can adapt to large-scale deviance without self-correcting.

Nevertheless, several limitations must be acknowledged. The case study analysis, while rich in detail, is limited in its quantitative generalizability. The complexity of the proxy agreements and ownership networks means that reconstructing the full chain of control faces the risk of incomplete data. Conclusions regarding micro-level motivations are based on theoretical models and available narratives, making it difficult to completely exclude hindsight bias. Therefore, future research is needed using multi-source data, including legal records, audit work papers, governance information flows, and organizational sociology investigations, to test the generalizability of the described self-reinforcing loop. Another valuable research direction would be the development of a bank-level principal–principal risk index, combining public disclosures on ownership structure, related-party transactions, and client concentration, to provide early warning of such vulnerabilities.

In summary, the evidence in this study validates a multi-level model of systemic fraud and provides a robust explanation for the collapse trajectory of the bank and its related ecosystem. At the macro level, principal–principal agency conflicts, exacerbated by weak investor protection, shattered the governance foundation, allowing controlling shareholders to dominate the organization outside the framework of balanced interests (Claessens et al., 2000; Young et al., 2008). At the organizational level, the convergence of elements in the fraud polygon expanded the opportunity for expropriation to near-absolute levels, while oversight systems failed due to distorted economic incentives and institutional capture (Coffee, 2006; Beattie et al., 1999; Francis, 2004). At the micro level, rationalization mechanisms

such as neutralization, moral blindness, and moral disengagement blurred the lines between right and wrong, enabling actors to maintain a positive self-concept while engaging in high-risk behavior (Sykes & Matza, 1957; Bazerman & Tenbrunsel, 2011; Bandura, 1999; Vaughan, 1996).

These three layers interacted through a self-reinforcing loop, where the benefits of fraud financed power, power neutralized oversight, and the organizational culture normalized deviance. Once this loop was established, collapse became a high-probability outcome, and interventions must be aimed at severing these interlocking links, not merely treating the consequences. In other words, the case was not an isolated, idiosyncratic risk but the consequence of a vulnerable structure, one where the agency mechanism was distorted, the oversight system was compromised, and the organizational culture was recalibrated toward a tolerance for deviance. This finding suggests a reform agenda geared toward building buffers at multiple levels, synchronizing ownership reforms, reinforcing the economic independence of assurance mechanisms, and restructuring internal incentives around operational ethical standards. Only when these layers of reform work in concert can the self-reinforcing loop be dismantled, and the probability of systemic collapse recurring be reduced to an acceptable level. From an academic perspective, this case study adds critical evidence to governance theories in emerging market contexts and demonstrates the value of a multi-level approach in explaining organized fraud and systemic collapses.

### Conclusion

This study examines the Van Thinh Phat scandal through an integrated theoretical framework that synthesizes agency theory, fraud triangle theory, and behavioral perspectives. Findings suggest that the case represents a systemic breakdown rather than an isolated failure. This collapse stemmed from the interplay among three distinct dimensions, including severe structural agency conflicts, the emergence of organized fraud opportunities, and the reinforcement of unethical conduct facilitated by cognitive biases and internal organizational compliance cultures.

Theoretically, this research underscores the necessity of multi-level analytical approaches when explaining systemic fraud. Furthermore, it challenges the direct transferability of Western governance frameworks to emerging market

contexts. In terms of practical implications, the study advocates for heightened regulatory scrutiny of ultimate beneficial owners and expanded legal liability for auditors. It also emphasizes the need for boards of directors to achieve substantive rather than merely formal independence.

One limitation of this investigation resides in its reliance on secondary data sources. Future research could adopt comparative international perspectives or utilize quantitative methods to examine the correlation between ownership structures and fraud risks. Subsequent inquiries might also offer more profound explorations of organizational psychological dynamics. Ultimately, the comprehensive decoding of this case facilitates the development of more robust preventive mechanisms for the broader financial system.

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# DIGITAL TRANSFORMATION AND NIGHT-TIME ECONOMY IN HO CHI MINH CITY: EXTENDING UTAUT WITH NIGHTTIME DESTINATION IMAGE AS A MEDIATOR

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**Abstract:** *This study extends the Unified Theory of Acceptance and Use of Technology (UTAUT) by incorporating Nighttime Destination Image (NDI) as a mediating variable to investigate the role of digital transformation in promoting the night-time economy in Ho Chi Minh City, Vietnam. Data were collected from 250 night-time economy businesses and analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM). The results show that Effort Expectancy, Performance Expectancy, and Social Influence are positively and significantly associated with Intention to Use digital platforms, which in turn strongly relates to actual Digital Platform Use. Digital Platform Use exhibits both a direct positive association with Customer Attraction and an indirect association through NDI, confirming partial mediation. The findings underscore the critical mediating role of NDI in linking digital adoption to enhanced customer attraction in the night-time economy context. Limitations include the use of convenience sampling and a cross-sectional design, which limit generalizability. The study provides practical implications for night-time businesses to prioritize user-friendly digital platforms and collective destination image building, and for policymakers to offer targeted digital training and supportive infrastructure. This research contributes to the literature by extending UTAUT with NDI mediation in the under-researched domain of Vietnam's night-time economy.*

• Keywords: digital transformation; night-time economy; UTAUT; nighttime destination image; Ho Chi Minh City.

Date of receipt: 30<sup>th</sup> Jan., 2026

Date of delivery revision: 27<sup>th</sup> Feb., 2026

DOI:

Date of receipt revision: 18<sup>th</sup> Mar., 2026

Date of approval: 27<sup>th</sup> Mar., 2026

## 1. Introduction

The nighttime economy, encompassing leisure, entertainment, and cultural activities after dark, has become a critical driver of urban economic vitality and development worldwide (McArthur et al., 2019). Studies show that integrating nighttime activities into urban planning contributes to GDP while enhancing urban identity (McAvoy & Vadrevu, 2024). In South and Southeast Asia, major cities increasingly recognize the nighttime economy as a response to rapid urbanization (McAvoy & Vadrevu, 2024).

In Vietnam, the nighttime economy is gaining prominence in urban development, particularly in Hanoi and Ho Chi Minh City (Son et al., 2023). Ho Chi Minh City is developing its nighttime economy through tourism sectors including bars, restaurants, and cultural activities. Despite strong ICT infrastructure (Tung et al., 2024), digital adoption among nighttime businesses faces barriers including limited finances, inadequate digital marketing expertise, and operational challenges (Sinh & Thai, 2025). While some businesses use digital platforms, adoption remains uneven. Despite strong ICT

infrastructure (Tung et al., 2024), these constraints impact nighttime economy competitiveness.

Despite applying the Unified Theory of Acceptance and Use of Technology (Venkatesh et al., 2003) across sectors, its use in nighttime economy remains limited. Studies have overlooked how digital platforms influence customer attraction through perceived Nighttime Destination Image (NDI) encompassing vibrancy, safety, cultural atmosphere, and attractiveness. Integrating NDI as a mediating variable into UTAUT offers a promising approach to understanding digital transformation's role in nighttime economy competitiveness.

This study extends UTAUT by incorporating NDI as a mediator to examine digital transformation's impact on nighttime economy products in Ho Chi Minh City. Using data from 250 nighttime businesses and PLS-SEM modeling, the research tests hypothesized associations among constructs. The study contributes by extending UTAUT with NDI as a mediator for technology adoption, provides evidence of NDI's role between digital platforms and customer attraction in Vietnam, and offers insights for leveraging digital

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transformation in nighttime economy development.

The remainder of the paper is structured as follows: Section 2 reviews the relevant literature and develops the research hypotheses; Section 3 outlines the research methodology; Section 4 presents the empirical results; and Section 5 discusses the findings, theoretical and practical implications, limitations, and directions for future research.

## 2. Literature Review and Hypothesis Development

### 2.1. The Nighttime Economy and the Role of Digital Transformation

The nighttime economy encompassing food, leisure, culture, entertainment, and tourism activities between 6:00 p.m. and 6:00 a.m. has become vital for urban economic vitality worldwide (McArthur et al., 2019). In Ho Chi Minh City, it is emerging as a strategic development pillar, driven by infrastructure improvements and consumer preferences for nighttime experiences (Son et al., 2023). However, challenges persist, including restricted hours, safety concerns, and regulatory constraints (McArthur et al., 2019). Digital platforms have become essential for connecting nighttime businesses with younger consumers who are active on social media (Dung et al., 2024). Despite Ho Chi Minh City's advanced ICT infrastructure (Tung et al., 2024), many small enterprises face digital adoption barriers, including limited finances and inadequate digital skills (Sinh & Thai, 2025). These constraints necessitate investigating how digital transformation can promote the nighttime economy in Ho Chi Minh City.

### 2.2. Theoretical Foundation and Hypothesis Development

#### 2.2.1. Unified Theory of Acceptance and Use of Technology (UTAUT)

The Unified Theory of Acceptance and Use of Technology (Venkatesh et al., 2003) explains intention to adopt new information technologies. The model includes four core constructs Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), and Facilitating Conditions that influence behavioral intention and technology use. In tourism, Performance Expectancy and Effort Expectancy strongly predict intention to adopt digital tools like mobile applications and booking systems (Topsakal & Çuhadar, 2025). In Vietnamese SMEs, Effort Expectancy has significant influence due to limited technical expertise and digital literacy among owners (Sinh & Thai, 2025). Social Influence from peer networks drives adoption of digital payment

systems and e-commerce platforms (Linh et al., 2024). Given resource constraints of nighttime economy businesses in Ho Chi Minh City, these UTAUT constructs are expected to shape their intention to use digital platforms.

Accordingly, the following hypotheses are proposed:

H1: Performance Expectancy positively influences Intention to Use digital platforms.

H2: Effort Expectancy positively influences Intention to Use digital platforms.

H3: Social Influence positively influences Intention to Use digital platforms.

H4: Intention to Use positively influences actual Digital Platform Use.

#### 2.2.2. Nighttime Destination Image and Its Role

Destination image represents beliefs, ideas, and impressions about a place (Ekinci, 2003). Nighttime Destination Image (NDI) extends this to capture perceptions of a destination after dark, including vibrancy, safety, culture, entertainment, and attractiveness (Son et al., 2023). A positive NDI influences tourist and local consumer decisions in urban nighttime settings. Digital platforms shape NDI through visual content, reviews, updates, and engagement (Dung et al., 2024). Through these mechanisms, digital platforms enhance a destination's perceived vibrancy and safety. A favorable NDI increases customer attraction, as consumers prefer destinations evoking positive responses (Li & Tsai, 2022).

Accordingly, the following hypotheses are proposed:

H5: Digital Platform Use positively influences Nighttime Destination Image.

H6: Nighttime Destination Image positively influences Customer Attraction.

#### 2.2.3. Direct and Mediating Effects of Digital Transformation

Digital platforms enhance customer engagement through targeted marketing, personalized content, and real-time interaction between businesses and consumers (Dung et al., 2024). These mechanisms are vital in the nighttime economy, where consumers use digital channels to discover venues. Digital platform use influences customer attraction through Nighttime Destination Image. A positive NDI, reflecting vibrancy, safety, and attractiveness, amplifies digital efforts' impact on customer behavior (Li & Tsai, 2022). Effective digital platform use builds a favorable

nighttime destination image, driving customer visits.

Accordingly, the following hypotheses are proposed:

H7: Digital Platform Use positively influences Customer Attraction.

H8: Nighttime Destination Image mediates the relationship between Digital Platform Use and Customer Attraction.

### 2.3. Proposed Research Model

Drawing on theoretical foundations, the research model integrates core constructs of the Unified Theory of Acceptance and Use of Technology (UTAUT) Performance Expectancy (PE), Effort Expectancy (EE), and Social Influence (SI) with Nighttime Destination Image (NDI) as a mediating variable. This framework shows how digital transformation influences nighttime economy promotion through direct effects on customer attraction and indirect effects via destination perceptions.

The conceptual model in Figure 1 shows PE, EE, and SI shaping Intention to Use (ITU) digital platforms (H1–H3). ITU drives Digital Platform Use (DPU; H4), which positively affects Customer Attraction (CA; H7) and NDI (H5). NDI enhances CA (H6), while the partial mediation (DPU → NDI → CA; H8) shows destination image's role in converting digital adoption to business outcomes.

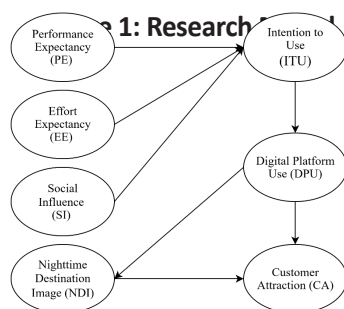


Figure 1 shows the research model with UTAUT constructs (Performance Expectancy, Effort Expectancy, Social Influence) influencing Intention to Use, which affects Digital Platform Use. This use impacts Customer Attraction directly and indirectly through Nighttime Destination Image.

## 3. Research Methods

### 3.1. Research Design

This study employs a quantitative research design using Partial Least Squares Structural Equation Modeling (PLS-SEM) to test the proposed theoretical model. The research was conducted in two phases. In the first phase (May 2025), semi-structured

interviews were conducted with 15 owners/managers of nighttime economy businesses in Ho Chi Minh City to refine measurement items and verify construct relevance. In the second phase (June to August 2025), a structured questionnaire was administered to collect data from a larger sample of nighttime businesses.

### 3.2. Measurement Scales

All latent constructs were operationalized using reflective scales adapted from prior studies and contextualized to Ho Chi Minh City's nighttime economy. Responses used a five-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). The constructs, items, and sources are detailed below:

- Performance Expectancy (PE): 3 items, adapted from Venkatesh et al. (2003) and Nguyen & Ho (2022).

- Effort Expectancy (EE): 3 items, adapted from Venkatesh et al. (2003) and Nguyen & Ho (2022).

- Social Influence (SI): 3 items initially, adapted from Venkatesh et al. (2003) and Linh et al. (2024). One item (SI3) was removed during measurement model assessment due to low outer loading (< 0.60), resulting in a final scale of 2 items.

- Intention to Use (ITU): 3 items, adapted from Venkatesh et al. (2003).

- Digital Platform Use (DPU): 4 items, measuring frequency and diversity of platform usage (e.g., TikTok, Google Maps, ShopeeFood), adapted from established digital adoption studies.

- Nighttime Destination Image (NDI): 4 items, adapted from (Ekinci, 2003) and Nixon et al. (2017), capturing perceptions of vibrancy, safety, cultural atmosphere, and nighttime attractiveness.

- Customer Attraction (CA): 4 items, assessing perceived increases in customer visits, patronage, and revenue attributable to digital platform activities.

Two items (PE3 and SI3) were removed due to low outer loadings (< 0.60), in accordance with established PLS-SEM guidelines (Hair et al., 2022). The final scales for PE and SI consist of 3 and 2 items, respectively.

Scales were assessed for content validity through expert review and pilot testing (May 2025). During PLS-SEM analysis, items with outer loadings below 0.60 were removed for convergent validity and model parsimony (Hair et al., 2022).

### 3.3. Sampling and Data Collection

The target population comprised owners/managers of nighttime economy businesses in Ho

Chi Minh City, focusing on establishments active after 6:00 p.m. like bars, pubs, restaurants, karaoke venues, cafes, and entertainment spots. Due to lack of a comprehensive sampling frame for nighttime operations, non-probability convenience sampling was used. While this limits generalizability, it was suitable given the practical challenges in accessing this dispersed business population.

Questionnaires were distributed both physically and online (via email, Zalo, and Facebook groups) between June-August 2025. From 350 distributed questionnaires, 268 usable responses were obtained (76.6% response rate). After screening for outliers and missing values, 250 valid responses were retained (71.4% effective rate). Respondents were assured anonymity and confidentiality.

### 3.4. Common Method Bias

As this study uses self-reported data from a single source and time point, common method bias (CMB) was carefully addressed. Procedural measures during questionnaire design included clear instructions, randomized items, varied response formats, and assured respondent anonymity (Podsakoff et al., 2003). Harman's single-factor test showed the first unrotated factor accounted for 38.6% of total variance, below the 50% threshold, indicating CMB was not significant. All variance inflation factors (VIF) in the structural model were below 3.3 (1.12 to 2.87), confirming no problematic multicollinearity (Hair, 2014).

### 3.5. Data Analysis

Data were analyzed using SmartPLS 4.0 software, suited for PLS-SEM analysis in exploratory research with complex models (Hair et al., 2022). The analysis used a two-stage approach. First, the measurement model was evaluated for reliability (Cronbach's alpha and composite reliability), convergent validity (AVE), and discriminant validity (Fornell-Larcker criterion and HTMT). Second, the structural model was assessed through path coefficients, significance (bootstrapping with 5,000 resamples),  $R^2$ ,  $Q^2$ , and mediation effects. Tests were conducted at  $p < 0.05$ .

### 3.6. Ethical Considerations

All ethical standards for human research were observed. Before completing the questionnaire, respondents received a clear explanation of the study's purpose and voluntary nature. They were assured their responses would remain confidential and anonymous, with no personal information collected. Participants could withdraw anytime without consequence. The research was conducted independently by the authors, without external funding or conflicts of interest.

## 4. Results

### 4.1 Common Method Bias and Multicollinearity

Harman's single-factor test was performed to evaluate common method bias. The first unrotated factor accounted for 38.6% of total variance, below the 50% threshold for serious common method variance (Podsakoff et al., 2003). This result and procedural remedies during data collection indicate that common method bias does not threaten validity. Additionally, variance inflation factors (VIF) in the structural model ranged from 1.000 to 1.855, below the 3.3 threshold recommended by Hair et al. (2022), confirming no problematic multicollinearity among predictors.

### 4.2. Measurement Model Assessment

The measurement model was assessed for reliability, convergent, and discriminant validity following PLS-SEM guidelines (Hair et al., 2022). After initial evaluation, two items (PE3, SI3) were removed due to low outer loadings ( $< 0.60$ ). Remaining items showed strong outer loadings  $> 0.70$ . Results are in Table 1.

**Table 1: Measurement model results**

| Construct | Items         | Outer loadings | Cronbach's $\alpha$ | CR    | AVE   |
|-----------|---------------|----------------|---------------------|-------|-------|
| CA        | CA1 – CA4     | 0.789 – 0.825  | 0.817               | 0.818 | 0.646 |
| DPU       | DPU1 – DPU4   | 0.759 – 0.800  | 0.779               | 0.781 | 0.602 |
| EE        | EE1 – EE3     | 0.765 – 0.854  | 0.739               | 0.781 | 0.650 |
| ITU       | ITU1 – ITU3   | 0.829 – 0.889  | 0.739               | 0.781 | 0.650 |
| NDI       | NDI1 – NDI4   | 0.797 – 0.828  | 0.823               | 0.824 | 0.653 |
| PE        | PE1, PE2, PE4 | 0.777 – 0.857  | 0.784               | 0.834 | 0.682 |
| SI        | SI1 – SI2     | 0.903 – 0.939  | 0.824               | 0.853 | 0.845 |

Note: PE3 and SI3 have been removed due to loading  $< 0.6$

As shown in Table 2, Cronbach's alpha (0.739-0.824) and composite reliability values (0.781-0.853) exceeded 0.70, confirming internal consistency. Average variance extracted values ranged from 0.602 to 0.845, above 0.50, indicating satisfactory convergent validity.

Discriminant validity was established using two criteria. First, the Fornell-Larcker criterion showed each construct's AVE square root exceeded correlations with other constructs (see Table 2). Second, all Heterotrait-Monotrait (HTMT) ratios were below 0.85, confirming discriminant validity.

**Table 2: Fornell-Larcker criterion (square root of AVE on diagonal)**

|     | PE           | EE           | SI           | ITU          | DPU          | NDI          | CA           |
|-----|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| PE  | <b>0.787</b> |              |              |              |              |              |              |
| EE  | 0.542        | <b>0.812</b> |              |              |              |              |              |
| SI  | 0.518        | 0.487        | <b>0.801</b> |              |              |              |              |
| ITU | 0.563        | 0.601        | 0.524        | <b>0.801</b> |              |              |              |
| DPU | 0.489        | 0.512        | 0.441        | 0.421        | <b>0.776</b> |              |              |
| NDI | 0.521        | 0.498        | 0.463        | 0.467        | 0.679        | <b>0.810</b> |              |
| CA  | 0.538        | 0.507        | 0.492        | 0.485        | 0.612        | 0.721        | <b>0.921</b> |



### 4.3. Structural Model Assessment

The structural model showed acceptable fit with a Standardized Root Mean Square Residual (SRMR) of 0.061, below the 0.08 threshold (Hair et al., 2022). Path coefficients, standard deviations, t-values, p-values, and hypothesis testing results are summarized in Table 3. Given the cross-sectional data, path coefficients indicate associations rather than causal relationships, requiring validation through longitudinal or experimental designs.

**Table 3: Structural model results and hypothesis testing**

| Hypothesis | Path                  | $\beta$ | SD    | t-value | p-value | Result    |
|------------|-----------------------|---------|-------|---------|---------|-----------|
| H1         | PE $\rightarrow$ ITU  | 0.185   | 0.058 | 3.181   | 0.001   | Supported |
| H2         | EE $\rightarrow$ ITU  | 0.252   | 0.053 | 4.750   | 0.000   | Supported |
| H3         | SI $\rightarrow$ ITU  | 0.151   | 0.060 | 2.518   | 0.012   | Supported |
| H4         | ITU $\rightarrow$ DPU | 0.421   | 0.054 | 7.813   | 0.000   | Supported |
| H5         | DPU $\rightarrow$ NDI | 0.679   | 0.032 | 21.312  | 0.000   | Supported |
| H6         | NDI $\rightarrow$ CA  | 0.554   | 0.055 | 10.072  | 0.000   | Supported |
| H7         | DPU $\rightarrow$ CA  | 0.252   | 0.062 | 4.078   | 0.000   | Supported |

All eight direct hypotheses were supported at 5% significance. Effort Expectancy was the strongest predictor of Intention to Use ( $\beta = 0.252$ ,  $p < 0.001$ ), followed by Performance Expectancy ( $\beta = 0.185$ ,  $p < 0.001$ ) and Social Influence ( $\beta = 0.151$ ,  $p = 0.012$ ). Intention to Use predicted Digital Platform Use ( $\beta = 0.421$ ,  $p < 0.001$ ). Digital Platform Use showed positive associations with Nighttime Destination Image ( $\beta = 0.679$ ,  $p < 0.001$ ) and Customer Attraction ( $\beta = 0.252$ ,  $p < 0.001$ ). Nighttime Destination Image positively associated with Customer Attraction ( $\beta = 0.554$ ,  $p < 0.001$ ).

Mediation analysis using bootstrapping with 5,000 resamples showed that Nighttime Destination Image partially mediates the Digital Platform Use–Customer Attraction relationship (indirect effect = 0.376,  $t = 9.288$ ,  $p < 0.001$ , 95% CI [0.299, 0.459]). A sensitivity analysis, removing one NDI item at a time, confirmed the stability of this partial mediation finding, with indirect effects remaining significant ( $p < 0.001$ ). Results are shown in Table 4.

**Table 4: Mediation analysis**

| Path                                        | Indirect Effect | SD    | t-value | p-value | CI 95%         | Result            |
|---------------------------------------------|-----------------|-------|---------|---------|----------------|-------------------|
| DPU $\rightarrow$ NDI $\rightarrow$ CA (H8) | 0.376           | 0.041 | 9.288   | 0.000   | [0.299, 0.459] | Partial mediation |

The model explained variance in Customer Attraction ( $R^2 = 0.561$ ), Nighttime Destination Image ( $R^2 = 0.461$ ), and Digital Platform Use ( $R^2 = 0.177$ ), with modest explanatory power for Intention to Use ( $R^2 = 0.159$ ). All Stone–Geisser  $Q^2$  values were positive, indicating satisfactory predictive relevance.

### 4.5. Discussion of Results

The empirical findings support the extended UTAUT model for nighttime economy businesses in Ho Chi Minh City. Effort Expectancy was the strongest predictor of Intention to Use digital platforms ( $\beta = 0.252$ ,  $p < 0.001$ ), followed by Performance Expectancy ( $\beta = 0.185$ ,  $p < 0.001$ ) and Social Influence ( $\beta = 0.151$ ,  $p = 0.012$ ). This aligns with studies in Vietnamese SMEs (Nguyen & Ho, 2022; Sinh & Thai, 2025), where ease of use outweighs perceived usefulness due to limited technical skills. The path from Intention to Use to Digital Platform Use ( $\beta = 0.421$ ,  $p < 0.001$ ) confirms the UTAUT linkage. Digital Platform Use strongly affected Nighttime Destination Image ( $\beta = 0.679$ ,  $p < 0.001$ ), highlighting digital tools' role in shaping perceptions after dark. This extends research (Nixon et al., 2017; Dung et al., 2024) by showing digital engagement builds favorable nighttime destination image. The partial mediation of Nighttime Destination Image (indirect effect = 0.376,  $p < 0.001$ ) shows that digital platform use drives Customer Attraction through operational effects and image-building (Li & Tsai, 2022). The modest  $R^2$  value for Intention to Use (0.159) aligns with prior UTAUT applications in emerging markets (Sinh & Thai, 2025), where barriers reduce core antecedents' explanatory power.

## 5. Conclusions and Implications

### 5.1. Summary of Findings

This study extends the Unified Theory of Acceptance and Use of Technology (UTAUT) by incorporating Nighttime Destination Image (NDI) as a mediator to examine digital transformation's impact on nighttime economy in Ho Chi Minh City, Vietnam. Using data from 250 nighttime businesses and Partial Least Squares Structural Equation Modeling (PLS-SEM), the analysis supported all hypotheses. Effort Expectancy showed the strongest influence on Intention to Use digital platforms ( $\beta = 0.252$ ,  $p < 0.001$ ), followed by Performance Expectancy ( $\beta = 0.185$ ,  $p < 0.001$ ) and Social Influence ( $\beta = 0.151$ ,  $p = 0.012$ ). Intention to Use predicted Digital Platform Use ( $\beta = 0.421$ ,  $p < 0.001$ ). Digital Platform Use enhanced Customer Attraction directly ( $\beta = 0.252$ ,  $p < 0.001$ ) and indirectly through Nighttime Destination Image (indirect effect = 0.376,  $p < 0.001$ ), showing partial mediation.

### 5.2. Theoretical Contributions

The study makes three key contributions. First, it extends UTAUT by introducing Nighttime Destination Image as a mediator, linking technology acceptance to destination outcomes in the nighttime economy. Second, it provides initial quantitative

evidence from Vietnam showing NDI's mediating role between digital platform use and customer attraction, connecting individual technology adoption to destination perception. Third, the importance of Effort Expectancy highlights UTAUT's context-specific relevance in emerging markets, contributing to technology adoption theory in urban development.

### 5.3. Practical Implications

The findings offer actionable recommendations for nighttime economy businesses and policymakers in Ho Chi Minh City.

For nighttime business operators, particularly small enterprises, three priorities are recommended. First, adopt user-friendly digital platforms (TikTok, Google Maps, ShopeeFood) that align with limited digital literacy. Second, monitor key metrics engagement rates, click-through rates, and digital sales for data-driven optimization. Third, collaborate to create content reinforcing a shared Nighttime Destination Image emphasizing safety and cultural authenticity. Collective branding can yield greater benefits than individual campaigns.

For policymakers, four directions are proposed. First, provide subsidized digital training workshops tailored to nighttime businesses' schedules. Second, develop a branding strategy positioning Ho Chi Minh City as a safe nighttime destination through coordinated campaigns. Third, establish regulations on data privacy and consumer protection to build trust. Finally, invest in infrastructure including public Wi-Fi, pedestrian zones, late-night transportation, and digital maps to enhance visitor experience.

### 5.4. Limitations

Despite its contributions, this study has limitations. First, convenience sampling may have introduced selection bias, as digitally active businesses were over-represented, limiting generalizability. Second, the cross-sectional design prevents establishing causal inferences, though PLS-SEM provides robust relationship estimates. Third, the model excludes potential moderating variables like firm size and location, which may influence relationships. Finally, Digital Platform Use measurement focused on frequency and variety, without capturing content quality factors affecting outcomes.

### 5.5. Directions for Future Research

The findings suggest key directions for future research. First, studies should examine moderators like firm size and technological readiness. Second, comparative analyses across Vietnamese cities or Southeast Asian nighttime economies would enhance

validity. Third, longitudinal research should track changes in platform adoption and destination image over time. Fourth, future work could explore AI, AR, VR, and metaverse applications in nighttime promotion. Finally, consumer surveys would show how digital content impacts different demographics.

### 5.6. Conclusion

Digital transformation is critical for enhancing Ho Chi Minh City's nighttime economy competitiveness. Digital platforms help businesses gain customers through visibility while cultivating a Nighttime Destination Image (NDI) of vibrancy, safety, and culture. NDI's partial mediation effect shows the importance of destination branding in the digital era.

The extension of UTAUT with NDI provides a framework for understanding technology adoption in nighttime economies. The findings guide businesses to focus on ease of use, digital training, and infrastructure. As Vietnam positions cities as 24/7 destinations, digital transformation will be crucial for nighttime economies in emerging markets.

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# THE IMPACT OF ECONOMIC UNCERTAINTY ON VIETNAMESE REAL ESTATE FIRMS' AGENCY COST

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**Abstract:** *This study examines the impact of economic uncertainty on agency costs in Vietnamese real estate companies. Data from 122 listed firms on the Vietnam Stock Exchange (2011-2024) indicate that uncertainty reduces asset utilization, increasing agency costs. State-owned companies face greater challenges due to bureaucracy and risk aversion, despite political advantages.*

• Keywords: *uncertainty, state ownership, agency cost, moderating effects, Vietnam.*

Date of receipt: 30<sup>th</sup> Jan., 2026

Date of delivery revision: 27<sup>th</sup> Feb., 2026

DOI:

Date of receipt revision: 19<sup>th</sup> Mar., 2026

Date of approval: 29<sup>th</sup> Mar., 2026

## 1. Introduction

Firms frequently encounter economic uncertainty, spanning from sporadic financial market disruptions and subtle monetary policy changes to major global events such as the 1997 Asian Financial Crisis, the 2008 Global Financial Crisis, and the COVID-19 pandemic. Adequate preparation against these uncertainties is crucial for firm survival and growth, with optimal corporate governance serving as a key component. Governance mechanisms must strike a balance between long-term value creation and short-term crisis adaptability. This equilibrium is complicated by agency problems, which arise from the separation of ownership and management. Owners (principals) bear monitoring costs (agency costs) as managers (agents) may pursue self-interested actions that diverge from shareholder goals (Jensen & Meckling, 1976). Uncertainty exacerbates these issues, negatively impacting firm performance.

Volatile macroeconomic conditions can diminish cash flow expectations and overall firm efficiency, with ripple effects on national economic growth. This is particularly relevant for the real estate sector, which drives economic expansion and social stability in developing nations. Understanding how uncertainty influences agency costs is crucial for illuminating sector-wide implications.

This study analyzes data from 122 listed Vietnamese real estate firms from 2011 to 2024, gaining added significance amid recent disruptions, such as COVID-19, which highlight the critical interactions among uncertainty, governance, and

performance in Vietnam's real estate landscape.

Subsequent sections include literature review and hypotheses (2), methodology (3), results and discussion (4), and conclusions with implications (5).

## 2. Literature review and hypotheses development

### *Agency theory*

At its core, agency theory posits a separation of interests between shareholders (principals) and managers (agents), where differing objectives can lead agents to prioritize personal gains, necessitating costly monitoring by principals. While the complete eradication of agency costs is unattainable in separated ownership structures, factors such as ownership composition and governance practices can substantially alleviate them (Jensen & Meckling, 1976; Ang et al., 2000).

### *Uncertainty*

Uncertainty refers to managers' perceptions of environmental instability that impairs firm performance, erodes profitability, and elevates agency costs (Gordon & Narayanan, 1984). Studies demonstrate that macroeconomic uncertainty correlates negatively with leverage, prompting firms to curtail borrowing amid expected revenue declines and cash shortages, which in turn lower investment, efficiency, and heighten agency conflicts through impaired decision-making in production, investment, and financing (Baum et al., 2012).

*H1: Uncertainty positively correlates with agency costs in a firm.*

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### *Interaction of uncertainty and state ownership on agency cost*

In emerging markets like Vietnam, state-owned firms often leverage political connections to gain advantages; however, they frequently deviate from profit-maximizing goals due to government oversight, inadequate incentives, and risk-averse priorities (Nguyen & Freeman, 2009). During times of uncertainty, these firms prioritize stability over high-return ventures, constrained by political and social mandates, leading to decreased asset efficiency and increased agency costs (Boubakri et al., 2013).

*H2: The positive relationship between state ownership and*

### *Interaction of uncertainty and managerial ownership on agency cost*

Managerial ownership, defined as the percentage of shares held by executives such as the CEO, CFO, and COO, reduces asset misuse through information asymmetry and aligns interests, thereby fostering better asset utilization and lower agency costs (Singh & Davidson, 2003). In uncertain macroeconomic conditions, higher ownership discourages entrenchment behaviors, such as overinvestment, as managers bear greater personal risk, motivating them to be proactive in risk management and cost reductions (Florackis, 2008).

*H3: The negative correlation between managerial ownership and agency costs will be stronger during times of uncertainty.*

### *Interaction of uncertainty and board of directors' characteristics (size and number of non-executive directors) on agency costs*

Board traits, including size and the presence of non-executive directors (NEDs), play a pivotal role in mitigating agency costs amid volatility. Larger boards offer expertise but suffer from coordination inefficiencies that delay decisions and dilute accountability in uncertain times (Jensen, 1993). Conversely, NEDs bolster independence, enhancing oversight to prevent short-term risky managerial choices and improve performance (Henry, 2010). Uncertainty thus moderates these dynamics, making compact, independent boards more adept at minimizing costs.

*H4: The negative relationship of board size with agency costs is stronger during uncertainty.*

*H5: The negative relationship of the number of non-executive directors with agency costs is stronger*

*during uncertainty.*

## **3. Research methodology**

### **3.1. Data collection**

Research data are collected from the websites of two Vietnamese Stock Exchanges and several websites of other securities companies. The research data covers all real estate companies listed on Vietnam's Ho Chi Minh City and Hanoi Stock Exchange between 2011 and 2024. The sample consisted of 122 companies, which corresponded to 1,708 observations. Other financial information is collected annually from the consolidated financial statements.

### **Dependent variable:**

Ang et al. (2000) propose the total asset turnover (TAT) ratio as a measure of agency costs through residual losses, evaluating the efficiency of agents' assets. Low TAT signals investments in non-productive assets due to poor decisions or shirking, resulting in high residual losses amid severe conflicts (Singh & Davidson, 2003). This study employs inverse TAT, where higher values indicate greater agency costs.

### **Independent variables**

Consistent with previous literature, the leading independent variables include a wide range of factors, are presented in Table 1, below:

**Table 1. Definition of variables**

| Variables                      | Definition                                                                  |
|--------------------------------|-----------------------------------------------------------------------------|
| Uncertainty                    | Dummy variable denoting 1 for period of time with macroeconomic instability |
| State ownership                | Percentage of total common share owned by the State                         |
| Managerial ownership           | Percentage of common share owned by the managers of the firm                |
| Board of directors' size       | Number of directors within the board of director of the firm                |
| No. of non-executive directors | Number of non-executive directors within the board of director of the firm  |
| Firm age (control)             | Age of the firm since its inception                                         |
| Size (control)                 | Natural logarithm of the firm's total asset                                 |
| Leverage (control)             | Total Liability/total assets                                                |

### **Estimated model**

The panel data regression model is formulated to test research hypotheses with the following specific equation:

$$Agency_{it} = \beta_0 + \beta_1 UNC_{it} + \beta_2 STA_{it} + \beta_3 ManO_{it} + \beta_4 BOD_{it} + \beta_5 NED_{it} + \gamma_j Control_j + \theta_j Interaction_j + u_{it}$$

Where:

$Agency_{it}$  is a dependent variable showing the Agency cost (measured either by bonding, monitoring cost, or residual losses) in Firm i during time t;

$UNC$  – Dummy variable with period of uncertainty in Viet Nam denoting 1,

$STA_{it}$  - percentage of ownership of common share in firm  $i$  by the State of Viet Nam during time  $t$ ,

$ManO_{it}$  - is the percentage share owned by executive officers in firm  $i$  during time  $t$

$BOD_{it}$  - Number of directors within the board of directors in firm  $i$  during time  $t$

$NED_{it}$  - Number of non-executive directors within the board of directors in firm  $i$  during time  $t$

$Control_{it}$  is a vector consisting of control variables, including firm's size (SIZE), age (Age) and leverage (DEBT)

$Interaction_{it}$  is the vector of interaction variables calculated as the product of value of SO and the corresponding independent variable:  $UNCSTA_{it}$  (Uncertainty x State Ownership),  $UNCBOD_{it}$  (Uncertainty x Board size);  $UNCNED_{it}$  (Uncertainty x Non-executive),  $UNCMANO_{it}$  (Uncertainty x Managerial Ownership) and  $u$  is the error component.

### 3.2. Regression techniques

The study employed panel data regression to examine the relationships between agency costs and corporate governance. Fixed- and random-effects models were tested; the Hausman test favored the fixed-effects (FE) model, rejecting the null hypothesis ( $p < 0.05$ ), which indicated heteroskedasticity. After addressing heteroskedasticity and autocorrelation, Feasible Generalized Least Squares (FGLS) was applied to manage unequal variances and correlations.

## 4. Results and discussion

### 4.1. Research results

#### Descriptive analysis

Descriptive statistics values, including mean value and standard deviation as well as the variables correlation matrix, are presented in Table 2 and Table 3:

**Table 2. Statistical summary**

| Variables                        | Observations | Mean      | Std. Dev. | Min      | Max      |
|----------------------------------|--------------|-----------|-----------|----------|----------|
| Residual losses (Level)          | 1708         | 0.8739744 | 1.19539   | 0        | 12.155   |
| Uncertainty (Dummy)              | 1708         | 0.2479508 | 0.4319707 | 0        | 1        |
| SO (%)                           | 1708         | 0.173828  | 0.2362271 | 0        | 0.915    |
| Managerial ownership (ManO) (%)  | 1708         | 0.0568873 | 0.1008029 | 0        | 0.761    |
| Board size (Person)              | 1708         | 4.545765  | 1.584471  | 0        | 11       |
| Non-executive directors (Person) | 1708         | 2.937671  | 1.690867  | 0        | 9        |
| Age (Year)                       | 1708         | 20.53894  | 1.97052   | 0        | 60       |
| Size (Level)                     | 1708         | 0.5801571 | 0.219507  | 0.00002  | 1.748    |
| Leverage (Level)                 | 1708         | 13.67799  | 1.571181  | 9.896211 | 19.87463 |

Table 2 offers insights into financial and ownership metrics. State ownership averages 17.4% (standard

deviation, SD, 23.6%), reflecting substantial dispersion. Managerial ownership averages 5.7% (SD 10.1%), showing moderate variability. Board size means 4.5 members (SD 1.6), NEDs 2.9 (SD 1.7). These variations highlight the importance of examining their interactions with agency costs.

**Table 3. Summary statistics and correlation matrix**

|                         | 1         | 2         | 3         | 4         | 5        | 6        | 7     | 8        | 9     |
|-------------------------|-----------|-----------|-----------|-----------|----------|----------|-------|----------|-------|
| Residual losses         | 1.000     |           |           |           |          |          |       |          |       |
| Uncertainty             | -0.184*** | 1.000     |           |           |          |          |       |          |       |
| SO                      | 0.366***  | -0.112*** | 1.000     |           |          |          |       |          |       |
| Managerial Ownership    | 0.264***  | -0.028    | -0.001    | 1.000     |          |          |       |          |       |
| Board Size              | 0.031     | -0.408*** | 0.045*    | -0.001    | 1.000    |          |       |          |       |
| Non-Executive Directors | -0.060**  | -0.425*** | 0.000     | -0.142*** | 0.791*** | 1.000    |       |          |       |
| Age                     | 0.021     | 0.074***  | 0.032     | -0.030    | -0.031   | -0.049*  | 1.000 |          |       |
| Size                    | 0.146***  | -0.040    | 0.239***  | 0.098***  | 0.083*** | 0.033    | 0.016 | 1.000    |       |
| Leverage                | -0.269*** | 0.178***  | -0.075*** | -0.100*** | 0.186*** | 0.118*** | 0.002 | 0.155*** | 1.000 |

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

Table 3 shows correlations between independent variables below 80%, indicating no high multicollinearity. SO correlates significantly with residual losses ( $p < 0.01$ ).

#### Panel regression

For panel regression, controls (age, size, leverage) were included first (Model 1). FGLS then tested main independents (uncertainty, state ownership, managerial ownership, board size, NEDs) in Model 2. Interactions were added stepwise (Models 3-5) and fully (Model 6); results in Table 4.

**Table 4: Panel data regression for agency cost measured by residual losses**

| Determinants                                 | Model 1            | Model 2           | Model 3            | Model 4            | Model 5            | Model 6             | Model 7             |
|----------------------------------------------|--------------------|-------------------|--------------------|--------------------|--------------------|---------------------|---------------------|
| Firm's Age                                   | -0.00201 (0.00217) | -0.0020 (0.00217) | -0.00119 (0.00217) | -0.00202 (0.00217) | -0.00222 (0.00217) | -0.00201 (0.00217)  | -0.00313 (0.00217)  |
| Firm's Size                                  | 0.159*** (0.0178)  | 0.159*** (0.0178) | 0.159*** (0.0178)  | 0.159*** (0.0178)  | 0.159*** (0.0178)  | 0.199*** (0.0178)   | 0.179*** (0.0178)   |
| Firm's Leverage                              | -0.512*** (0.129)  | -0.510*** (0.129) | -0.512*** (0.129)  | -0.522*** (0.129)  | -0.514*** (0.139)  | -0.512*** (0.159)   | -0.512*** (0.129)   |
| Uncertainty                                  |                    | 0.486*** (0.719)  | 0.462*** (0.0834)  | 0.485*** (0.0816)  | 0.706*** (0.117)   | 0.792*** (0.178)    | 0.601*** (0.178)    |
| State Ownership                              |                    | -1.732*** (0.118) | -1.767*** (0.133)  | -1.731*** (0.118)  | -1.714*** (0.118)  | -1.732*** (0.114)   | -1.419*** (0.221)   |
| Managerial Ownership                         |                    | -2.804*** (0.281) | -2.734*** (0.282)  | -2.806*** (0.280)  | -2.696*** (0.284)  | -2.751*** (0.282)   | -2.293*** (0.584)   |
| Board of Directors' Size                     |                    | -0.0477 (0.0295)  | -0.0470 (0.0296)   | -0.0478 (0.0296)   | -0.0418 (0.0296)   | -0.00716 (0.0365)   | -0.0383 (0.0400)    |
| Number of non-executive directors            |                    | 0.105*** (0.0281) | 0.104*** (0.0281)  | 0.105*** (0.0281)  | 0.127*** (0.0295)  | 0.093*** (0.0218)   | 0.083*** (0.0340)   |
| Uncertainty x State Ownership                |                    |                   | 0.163*** (0.286)   |                    |                    |                     | 0.311*** (0.261)    |
| Uncertainty x Managerial Ownership           |                    |                   |                    | -0.102*** (0.631)  |                    |                     | -0.311*** (0.261)   |
| Uncertainty x Board of Directors' Size       |                    |                   |                    |                    | -0.101 (0.0426)    |                     | -0.442 (0.659)      |
| Uncertainty x No. of non-executive directors |                    |                   |                    |                    |                    | -0.0768*** (0.0407) | -0.0429*** (0.0586) |
| Constants                                    | -0.624*** (0.104)  | -0.618*** (0.105) | -0.623*** (0.105)  | -0.737*** (0.106)  | -0.786*** (0.135)  | -0.747*** (0.138)   | 2.460*** (0.256)    |
| Observations                                 | 1,708              | 1,708             | 1,708              | 1,708              | 1,708              | 1,708               | 1,708               |

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

From Table 4, uncertainty is positively associated with residual losses ( $\beta = 0.486$ ,  $p < 0.01$ , Model 2), indicating lower asset utilization and higher agency costs during uncertain periods, supporting H1. State ownership shows a stronger negative association with residual losses ( $\beta = -1.767$ ,  $p < 0.01$ , Model 3). Still, uncertainty weakens this link ( $\beta = 0.163$ ,  $p < 0.05$ , Model 3), confirming H2: uncertainty diminishes the agency cost-mitigating effect of state ownership. Uncertainty also moderates the relationship between managerial ownership and residual losses, increasing its negative association ( $\beta = -0.102$ ,  $p < 0.05$ , Model 4), which supports H3. Board size has an insignificant negative relationship with residual losses (Models 5-6). NEDs have a positive impact on agency costs ( $\beta = 0.093$ ,  $p < 0.01$ ), but a negative interaction with uncertainty ( $\beta = -0.0768$ ,  $p < 0.05$ ) is observed, linking NEDs to lower costs during periods of volatility, which supports H5.

#### 4.2. Discussion

Unpredictable economic changes heighten volatility in micro and macro factors, harming firm growth and profitability (Bloom, 2014). This prompts managers to delay investments due to risk aversion, resulting in inefficient asset utilization and increased agency costs. Understanding the impact of uncertainty on agency costs is crucial for effective responses in critical sectors, such as real estate. In developing economies, weak legal systems enable managerial evasion of duties under risk-averse pretexts, complicating agency issues in varied ownership structures. Our study fills literature gaps by probing these interactions in Vietnam's real estate sector.

Findings indicate lower asset utilization in uncertain environments, which raises agency costs and aligns with managers' loss-minimizing behaviors that conflict with shareholder goals (Anh et al., 2024). In capital-intensive real estate, errors amid volatility exacerbate losses, intensifying aversion and curtailing investment.

State-owned firms benefit from political ties, which facilitate access to resources such as land (Nguyen & Freeman, 2009), thereby boosting revenues and reducing costs. Yet, uncertainty erodes this: managers become ultra-cautious due to the risk of mismanagement penalties, and bureaucracy limits flexibility, thereby increasing agency costs (Boubakri et al., 2013).

Uncertainty also shapes the role of managerial ownership: higher stakes align interests and enable

swift adaptations in the face of instability. Non-executive directors (NEDs) further mitigate costs through independent oversight, aligning decisions with those of shareholders, and reinforcing operational and financial resilience in the face of volatility (Henry, 2010).

#### Conclusion

Economic uncertainty significantly raises agency costs in Vietnamese real estate firms, especially state-owned ones, with implications for managers, regulators, and policymakers in developing contexts such as Vietnam. To adapt to crises, managers need contingency plans that bypass bureaucratic hurdles; owners should establish accountable yet flexible frameworks. The growth-driving role of real estate demands such agility for sector survival and economic stability.

Fostering an ownership culture through stock options aligns the interests of managers and shareholders, thereby reducing costs. Recruiting expert NEDs ensures oversight in volatility. Firms must train managers to make decisions under uncertainty and enhance their ability to adapt.

Policymakers should update regulations to create stable and transparent environments that curb risk avoidance and boost accountability. Reforming state firm governance reduces rigidity, thereby enhancing market responsiveness. Incentives such as tax relief or funding can spur investment, offsetting the aversion.

These steps create supportive settings, building resilience to volatility and advancing Vietnam's real estate stability and growth.

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# THE IMPACT OF MOBILE BANKING APP SERVICE QUALITY ON CUSTOMER SATISFACTION: A SEM APPROACH IN VIETNAM

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**Abstract:** *This study examines the impact of mobile banking app service quality on customer satisfaction in Vietnam. Data from 400 valid surveys were analyzed using SPSS 24 and AMOS 20 with EFA, CFA, and SEM. The findings show that five dimensions including mobile app integration and continuity (MIC), AI support quality (MAS), personalization (MAP), biometric login (BSL), and data privacy (DPC) all have positive effects on customer satisfaction. Among these factors, personalization, AI support, and data security have the strongest influence. The study contributes to the literature on digital banking service quality and provides practical implications for improving customer experience, trust, and satisfaction in the context of digital transformation.*

• Keywords: *mobile banking applications, customer satisfaction, structural equation modeling (SEM).*

Date of receipt: 30<sup>th</sup> Jan., 2026

Date of delivery revision: 27<sup>th</sup> Feb., 2026

DOI:

Date of receipt revision: 19<sup>th</sup> Mar., 2026

Date of approval: 30<sup>th</sup> Mar., 2026

## 1. Introduction

Digital transformation has accelerated mobile banking, making apps a key service channel where users expect convenience, stability, and security. Prior studies confirm that service quality strongly affects user experience, trust, and satisfaction (Ho et al., 2025). Recent research also emphasizes the role of modern features such as AI support, biometric authentication, and data control, suggesting that traditional models like SERVQUAL may be insufficient (Lopes, 2025; Schrank, 2025). In Vietnam, empirical evidence shows that service quality significantly influences customer satisfaction, with factors such as responsiveness, reliability, transaction speed, security, system quality, and trust playing key roles (Nguyen, 2024; Nguyen, 2025). However, gaps remain as existing studies rarely incorporate emerging technologies like AI, personalization, and data privacy, and still rely on traditional SERVQUAL dimensions. This study addresses these gaps by proposing an SEM model with five constructs: MIC, MAS, MAP, BSL, and DPC, to better explain mobile banking service quality in Vietnam.

## 2. Literature review

### 2.1. Mobile banking service quality

Service quality is a cornerstone of marketing, with SERVQUAL and E-SERVQUAL serving as key foundations (Parasuraman et al., 1988; Zeithaml et al., 2002). In mobile banking, these traditional dimensions are often inadequate. Recent research suggests

expanding frameworks to include technology related factors like AI, biometrics and data security. As mobile banking operates as a technology platform, users' technology readiness may also shape the links between quality, satisfaction and loyalty (Ho et al., 2025). Thus, service quality should be treated as a multidimensional construct covering functional and technological aspects to reflect current digital requirements.

### 2.2. Components of mobile banking service quality

1) *Mobile app integration and continuity (MIC):* Refers to seamless system synchronization and uninterrupted services. Integration of functions like payments and investments enhances convenience, perceived value, and customer loyalty (Nguyen, 2025).

2) *Mobile app AI support quality (MAS):* AI improves service through chatbots and behavioral analytics, enabling 24/7 support, higher efficiency, and early fraud detection, thereby enhancing trust (Lopes, 2025; Schrank, 2025).

3) *Mobile app personalization (MAP):* Tailored services and notifications enhance user experience and are key drivers of satisfaction and loyalty, especially when aligned with individual needs (Nguyen, 2024).

4) *Biometric and seamless login (BSL):* Biometric authentication increases security and convenience, reduces access barriers, and improves transaction efficiency, which is highly relevant in Vietnam (Ho et al., 2025; Nguyen, 2025).

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5) *Data privacy and control (DPC)*: Ensuring user control over data and transparent privacy policies strengthens trust and long-term satisfaction, while weak protection can lead to loss of confidence and switching behavior.

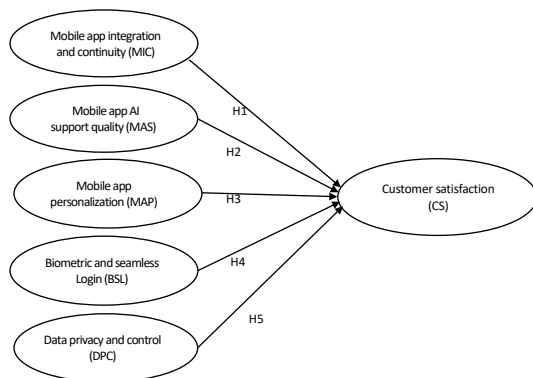
### 2.3. Customer satisfaction (CS) and its relationship with service quality

Customer satisfaction (CS) is the positive emotional state when service performance meets or exceeds expectations. In mobile banking, service quality factors such as reliability, speed and security directly drive CS (Ho et al., 2025; Nguyen, 2025). Vietnamese studies confirm these elements foster long term trust and positive word of mouth (Nguyen, 2024). Furthermore, CS acts as a vital mediator between service quality and outcomes like re-use intention (Lopes, 2025). Consequently, this study utilizes an SEM model to evaluate these relationships within the Vietnamese commercial banking sector.

### 3. Proposed research model and hypotheses

Based on service quality theory (Parasuraman et al., 1988; Zeithaml et al., 2002) and recent studies on digital banking services (Ho et al., 2025; Nguyen, 2025), this study proposes a conceptual framework to examine the relationship between service quality components of mobile banking applications and customer satisfaction.

Figure 1-Proposed research model



Specifically, five independent variables including: Mobile app integration and continuity (MIC), Mobile app AI support quality (MAS), Mobile app personalization (MAP), Biometric and seamless login (BSL), Data privacy and control (DPC) are assumed to have a direct and positive impacts on the dependent variable Customer satisfaction (CS). On that basis, five hypotheses are formed as follows:

*H1: Mobile app integration and continuity (MIC) has a positive impact on customer satisfaction.*

*H2: Mobile app AI support quality (MAS) has a positive impact on customer satisfaction.*

*H3: Mobile app personalization (MAP) has a positive impact on customer satisfaction.*

*H4: Biometric and seamless login (BSL) has a positive impact on customer satisfaction.*

*H5: Data privacy and control (DPC) has a positive impact on customer satisfaction.*

## 4. Research methodology

### 4.1. Research design

This quantitative study examines the impact of mobile banking service quality on customer satisfaction in Vietnam. The analysis follows three steps: reliability testing using Cronbach's alpha, validation through CFA, and hypothesis testing using SEM (Hair et al., 2022). Model fit is evaluated using indices such as CMIN/df, CFI, TLI, IFI, RMSEA, and PCLOSE. SEM is applied due to its ability to analyze multiple relationships simultaneously and its flexibility for future model extensions.

### 4.2. Sample and data collection

The study surveyed mobile banking users in Vietnam using convenience sampling across major banks (Nguyen, 2024). From June to August 2025, 450 questionnaires were distributed via online and direct methods, resulting in 400 valid responses, exceeding the minimum required sample size (Hair et al., 2019). A pilot test with 30 participants was conducted to refine the questionnaire. Ethical standards were ensured, including informed consent, confidentiality, and the right to withdraw.

### 4.3. Measurement instrument

The variables in the research model are measured using a 5-point Likert scale (1 = completely disagree, 5 = completely agree). The scale is inherited and adjusted from recent international studies, combined with researches in Vietnam to ensure the context suitability.

Table 1-Constructs, number of items and sources of measurement

| Factor/Code                                 | Number of items | Description                                                                                                                        | Sources of Measurement                                    |
|---------------------------------------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|
| Mobile app integration and continuity (MIC) | 4               | Inheriting the system quality scale in the ISS model, adding efficiency and system availability factors in e-banking services.     | Malc (2023); Akin (2023)                                  |
| Mobile app AI support quality (MAS)         | 4               | Inheriting the AISQUAL scale, adding AI chatbot elements, artificial intelligence and the level of humanization in mobile banking. | Noor et al. (2022); Chen et al. (2022); Lee & Chen (2023) |
| Mobile app personalization (MAP)            | 4               | Inheriting elements that create a personalized feel, design and customize mobile banking services.                                 | De Keyser et al. (2022); Malc (2023)                      |

| Factor/Code                        | Number of items | Description                                                                                                        | Sources of Measurement                              |
|------------------------------------|-----------------|--------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|
| Biometric and seamless login (BSL) | 4               | Inheriting research on biometric mobile payment systems, adding convenience and usability when logging in.         | Cabanillas et al. (2024); Amirkhalili & Wong (2025) |
| Data privacy and control (DPC)     | 4               | Inheriting the security and privacy scale in e-banking, adding the element of transparency in data sharing policy. | Nguyen (2025); Akin (2023); Xu et al. (2012)        |
| Customer satisfaction (CS)         | 3               | Inheriting the basic satisfaction scale and adjusting it for the mobile banking context in Vietnam.                | Nguyen (2024)                                       |

Source: Compiled by the authors based on prior studies

#### 4.4. Data analysis methods

Data were analyzed using SPSS 24 and AMOS 20. Descriptive statistics were first applied, followed by reliability testing using Cronbach's Alpha ( $\geq 0.7$ ) and item-total correlation ( $> 0.3$ ) (Nunnally and Bernstein, 1994). EFA was used to refine constructs, and CFA validated the measurement model with factor loadings  $> 0.5$ , AVE  $> 0.5$ , and CR  $> 0.7$ . Discriminant validity was confirmed using Fornell-Larcker (1981) and HTMT  $< 0.85$  (Henseler et al., 2015). SEM was then employed to test hypotheses, with model fit assessed by  $\chi^2/df < 3$ , CFI and TLI  $> 0.9$ , and RMSEA and SRMR  $< 0.08$  (Hu & Bentler, 1999). Hypotheses were accepted at  $p < 0.05$ .

### 5. Results

#### 5.1. Descriptive statistics of respondents

**Table 2- Respondents' demographic profile (n = 400)**

| Variable                     | Frequency | Percent (%) |
|------------------------------|-----------|-------------|
| <b>Gender</b>                |           |             |
| Male                         | 212       | 53          |
| Female                       | 188       | 47          |
| <b>Age</b>                   |           |             |
| Under 30 years old           | 181       | 45.3        |
| From 30 TO 40                | 128       | 32          |
| Over 40                      | 91        | 22.8        |
| <b>Region</b>                |           |             |
| In the North                 | 150       | 37.5        |
| In the Middle                | 100       | 25          |
| In the South                 | 150       | 37.5        |
| <b>Job</b>                   |           |             |
| State servant                | 66        | 16.5        |
| Company employee             | 145       | 36.3        |
| Student                      | 95        | 23.8        |
| Other                        | 94        | 23.5        |
| <b>Education Attainment</b>  |           |             |
| Below university level       | 218       | 54.5        |
| Bachelor degree              | 158       | 39.5        |
| Master's degree and above    | 24        | 6           |
| <b>Length of Service Use</b> |           |             |
| Less than 2 year             | 62        | 15.5        |
| From 2 to 5 years            | 156       | 39          |
| More than 5 years            | 182       | 45.5        |

Source: Compiled by the authors

The study analyzed 400 valid responses with a balanced gender distribution (53% male, 47% female). Most participants were under 30 (45.3%), followed by those aged 30 to 40 (32%). The North and South each accounted for 37.5% of the sample,

while the Central region made up 25%. Company employees (36.3%) and students (23.8%) were the main occupational groups.

In terms of education, 54.5% had below university level and 39.5% held bachelor's degrees. Most respondents were experienced users, with 45.5% using services for over five years and 39% for two to five years. This diversity and experience provide a reliable basis for analysis.

#### 5.2. Descriptive analysis of factors

**Table 3- Descriptive statistics for mobile banking app factors and customer satisfaction**

| Construct                                   | Mean (M) | Std. Deviation (SD) |
|---------------------------------------------|----------|---------------------|
| Mobile app AI support quality (MAS)         | 3.46     | 0.69                |
| Data privacy and control (DPC)              | 3.48     | 0.80                |
| Mobile app personalization (MAP)            | 3.34     | 0.77                |
| Mobile app integration and continuity (MIC) | 3.52     | 0.72                |
| Biometric and seamless login (BSL)          | 3.51     | 0.76                |
| Customer satisfaction (CS)                  | 3.54     | 0.60                |

Source: Compiled by the authors

Factor means range from 3.34 to 3.54 on a 5-point Likert scale. Customer satisfaction (CS) achieved the highest score ( $M = 3.54$ ,  $SD = 0.60$ ), reflecting generally positive perceptions of mobile banking services. High ratings were also observed for integration and continuity (MIC) ( $M = 3.52$ ) and biometric login (BSL) ( $M = 3.51$ ), indicating that users value convenience and secure access.

In contrast, personalization (MAP) recorded the lowest mean ( $M = 3.34$ ), while AI support (MAS) and data privacy (DPC) remained at moderate levels. These results suggest that while core functions are well received, improvements in personalization and AI quality are necessary to further enhance the user experience.

#### 5.3. Reliability analysis

**Table 4 -Cronbach's Alpha for factors**

| Factors                                     | No. of Items | Cronbach's Alpha ( $\alpha$ ) |
|---------------------------------------------|--------------|-------------------------------|
| Mobile app AI support quality (MAS)         | 4            | 0.840                         |
| Data privacy and control (DPC)              | 4            | 0.862                         |
| Mobile app personalization (MAP)            | 4            | 0.894                         |
| Mobile app integration and continuity (MIC) | 4            | 0.868                         |
| Biometric and seamless login (BSL)          | 4            | 0.882                         |
| Customer satisfaction (CS)                  | 3            | 0.959                         |

Source: Compiled by the authors

Table 4 shows that all scales have Cronbach's Alpha values above 0.8, exceeding the 0.7 threshold (Nunnally & Bernstein, 1994), indicating high reliability. MAP (0.894), BSL (0.882), and MIC (0.868) demonstrate very strong consistency, while DPC (0.862) and MAS (0.840) are also reliable. The CS scale achieves an excellent value of 0.959. Overall, all scales are reliable and suitable for further CFA to assess validity.



#### 5.4. Exploratory factor analysis (EFA)

**Table 5-Results of exploratory factor analysis (EFA)**

| Indicator                             | Value                          |
|---------------------------------------|--------------------------------|
| Kaiser-Meyer-Olkin - KMO              | .879                           |
| Measure of Sampling                   | 6147.467 (df = 253, p < 0.001) |
| Number of Components (Eigenvalue > 1) | 6                              |
| Cumulative Variance Explained         | 73.435                         |

Source: Compiled by the authors

Table 5 confirms the suitability of the data for factor analysis, with KMO = 0.879 (> 0.7) and Bartlett's Test significant (p < 0.001). Six factors with Eigenvalues > 1 were extracted, consistent with the proposed model. The total variance explained is 73.435%, exceeding the 50% threshold. Overall, the EFA results support the scale structure and provide a basis for CFA to test validity.

#### 5.5. Confirmatory factor analysis (CFA)

CFA results for the mobile banking service quality and customer satisfaction model indicate an excellent fit. Model fit indices meet all recommended thresholds: chi-square/df = 1.706 (< 3), CFI = 0.975, TLI = 0.970, NFI = 0.942, RMSEA = 0.042 (< 0.08) and PCLOSE = 0.964 (> 0.05). These values confirm the measurement model's high explanatory power and lack of fit violations, providing a reliable basis for subsequent SEM.

**Table 6- Summary of CFA results**

| Construct | Cronbach's $\alpha$ | CR   | AVE  | Conclusion      |
|-----------|---------------------|------|------|-----------------|
| MAP1234   | 0.894               | .895 | .682 | Reliable, valid |
| BSL1234   | 0.882               | .884 | .656 | Reliable, valid |
| DCP1234   | 0.862               | .865 | .618 | Reliable, valid |
| MIC1234   | 0.868               | .871 | .629 | Reliable, valid |
| MAS1234   | 0.840               | .842 | .570 | Reliable, valid |
| CS123     | 0.959               | .961 | .892 | Reliable, valid |

Source: Compiled by the authors

Table 6 confirms the scales' reliability and convergent validity. Cronbach's Alpha (0.840–0.959) and Composite Reliability (0.842–0.961) both exceed the 0.7 threshold. Furthermore, all AVE values range from 0.570 to 0.892, surpassing the required 0.5 and demonstrating that the latent factors explain most of the observed variance. Notably, the CS123 scale shows exceptional reliability (CR = 0.961, AVE = 0.892). Overall, these CFA results establish a statistically sound foundation for the following SEM analysis.

**Table 7-HTMT Ratios among Constructs**

| Construct | HTMT    |         |         |         |         |       |
|-----------|---------|---------|---------|---------|---------|-------|
|           | MAP1234 | BSL1234 | DCP1234 | MIC1234 | MAS1234 | CS123 |
| MAP1234   | —       | .266    | .590    | .453    | .126    | .603  |
| BSL1234   |         | —       | .263    | .426    | .126    | .387  |
| DCP1234   |         |         | —       | .371    | .239    | .599  |
| MIC1234   |         |         |         | —       | .134    | .538  |
| MAS1234   |         |         |         |         | —       | .436  |
| CS123     |         |         |         |         |         | —     |

Source: Compiled by the authors

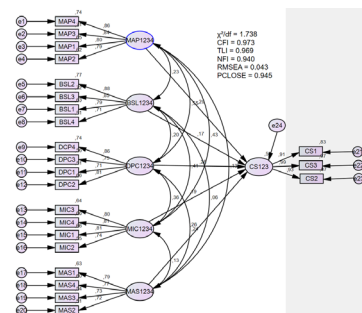
Note: All HTMT values < 0.85 (Henseler et al., 2015), confirming discriminant validity.

Discriminant validity was assessed using the Heterotrait-Monotrait Ratio (HTMT). According to Henseler et al. (2015), values must be below 0.85 to confirm distinct conceptual structures. As shown in Table 7, all HTMT values range from 0.126 to 0.603, well below the threshold. This confirms that the scales do not overlap and each represents a separate concept, strengthening the evidence for a solid measurement model before conducting SEM.

#### 5.6. Structural model and hypotheses testing

After testing the measurement model using CFA, the study continued to conduct structural equation modeling (SEM) analysis to test the hypothesized relationships between independent factors and customer satisfaction. Figure 3 illustrates the SEM model with standardized estimated coefficients. Model fit indices are also reported to assess the compatibility between the theoretical model and the empirical data.

**Figure 2- SEM for Mobile banking app service quality and Customer satisfaction**



Source: Compiled by the authors

The SEM results show a good model fit, with all indices meeting required thresholds ( $\chi^2/df = 1.738$ , CFI = 0.973, TLI = 0.969, NFI = 0.940, RMSEA = 0.043, PCLOSE = 0.945), confirming model reliability. All five factors positively affect customer satisfaction. MIC and BSL have the strongest impact, followed by DPC and MAP, while MAS has the weakest effect. Overall, the findings confirm that mobile banking service quality significantly enhances customer satisfaction, supporting the research model.

**Table 8- Standardized regression Weights, Standard errors, Critical ratios and hypothesis testing**

| Hypo-thesis | Path                 | Estimate ( $\beta$ ) | S.E.  | C.R.  | p-value | Result    |
|-------------|----------------------|----------------------|-------|-------|---------|-----------|
| H1          | MIC $\rightarrow$ CS | 0.187                | 0.042 | 4.006 | ***     | Supported |
| H2          | MAS $\rightarrow$ CS | 0.264                | 0.035 | 6.490 | ***     | Supported |
| H3          | MAP $\rightarrow$ CS | 0.286                | 0.037 | 5.855 | ***     | Supported |
| H4          | BSL $\rightarrow$ CS | 0.174                | 0.032 | 4.188 | ***     | Supported |
| H5          | DPC $\rightarrow$ CS | 0.257                | 0.034 | 5.266 | ***     | Supported |

Source: Compiled by the authors

Note: \*\*\* p < 0.001; \*\* p < 0.01; \* p < 0.05. The model explains 58.2% of the variance in Customer Satisfaction ( $R^2 = 0.582$ ).

Table 8 shows that all hypotheses (H1–H5) are supported with positive and significant effects ( $p < 0.001$ ), confirming that all service quality factors enhance customer satisfaction. MAP has the strongest impact ( $\beta = 0.286$ ), followed by MAS ( $\beta = 0.264$ ) and DPC ( $\beta = 0.257$ ), highlighting the importance of personalization, AI support, and data security. MIC ( $\beta = 0.187$ ) and BSL ( $\beta = 0.174$ ) also have significant but smaller effects. The model explains 58.2% of the variance in customer satisfaction ( $R^2 = 0.582$ ), indicating strong explanatory power.

## 6. Discussion

The results show that all five factors MAP, MAS, DPC, MIC, and BSL have positive and significant effects on customer satisfaction, aligning with prior studies that emphasize the growing importance of personalization and AI in digital banking (Ali et al., 2023). In particular, AI-driven features enhance both engagement and trust (Ahmed et al., 2024), while biometric authentication improves perceptions of security and convenience (Kumari & Gupta, 2023; Hussain et al., 2024).

A key contribution of this study is the integration of these five dimensions into a unified model, extending traditional frameworks that mainly focused on reliability and convenience (Parasuraman et al., 1988; Zhou, 2013). The findings highlight that MAP and MAS are the most influential factors, underscoring the critical role of intelligent and personalized services in modern banking. At the same time, the significant effects of DPC and MIC reflect increasing customer expectations for data security and seamless system performance. Although BSL has the smallest coefficient, it remains an essential feature in enhancing user experience.

Overall, the model explains 58.2% of the variance in customer satisfaction, indicating strong explanatory power. This confirms the importance of integrating both traditional service quality elements and advanced technological factors, providing robust empirical support for contemporary digital banking models.

## 7. Conclusion and implications

### 7.1. Conclusion

This study has built and tested a model to measure the quality of mobile banking application services with five independent factors (Mobile app integration and continuity, Mobile app AI support quality, Mobile app personalization, Biometric and seamless login, Data privacy and control) and one dependent factor which is Customer satisfaction. Through EFA, CFA

and SEM analysis, the results show that all scales have achieved reliability and validity, the structural model fits the data well and all five hypotheses are accepted. In which, personalization (MAP), AI support quality (MAS) and data security (DPC) are the three factors that have the strongest impacts on customer satisfaction, followed by integration - continuity (MIC) and biometric login (BSL).

### 7.2. Managerial implications

The findings suggest several key implications for banks and digital service providers. First, personalization should be prioritized by tailoring interfaces, recommendations, and services based on customer behavior to enhance satisfaction and loyalty. Second, banks should strengthen AI-based support systems such as chatbots and real-time analytics to improve service efficiency, responsiveness, and customer trust. Third, ensuring data security and transparency is essential. Investing in encryption, privacy controls, and clear communication helps build long-term trust in digital services. Fourth, optimizing login processes through biometric authentication and seamless system performance can significantly improve user experience and perceived service quality. Overall, these strategies help enhance customer satisfaction, loyalty, and competitive advantage in the digital banking environment.

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# INVESTIGATING THE PURCHASE INTENTION OF COUNTERFEIT FASHION PRODUCTS AMONG VIETNAMESE CONSUMERS: AN APPLICATION OF THE THEORY OF PLANNED BEHAVIOR

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**Abstract:** *This study examines socio-psychological factors influencing the intention to purchase counterfeit fashion in Vietnam, a prominent issue in developing economies. Extending the Theory of Planned Behavior by incorporating Modern Status Orientation (MSO), data from 304 consumers were analyzed using Structural Equation Modeling. Results show that attitude and subjective norms are the strongest predictors of purchase intention, while perceived behavioral control and MSO have no significant direct effects. Further analysis suggests that in the Vietnamese context, where counterfeit products are widely accessible, availability no longer differentiates behavior. Instead, status-seeking motives play an indirect role by shaping attitudes rather than directly driving intention. These findings challenge traditional TPB assumptions and offer deeper insights with practical implications for brand managers and policymakers in emerging markets.*

• Keywords: counterfeit, purchase intention, theory of planned behavior, modern status orientation.

Date of receipt: 31<sup>st</sup> Jan., 2026

Date of receipt revision: 20<sup>th</sup> Mar., 2026

Date of delivery revision: 06<sup>th</sup> Feb., 2026

Date of approval: 31<sup>st</sup> Mar., 2026

DOI:

## 1. Introduction

In recent decades, the market for counterfeit products, especially fashion goods, has expanded rapidly, becoming a serious global concern. It not only erodes brand value and business revenue but also threatens consumer safety and weakens intellectual property protection. In transitional economies like Vietnam, counterfeit fashion consumption is particularly prevalent, driven by limited income alongside growing needs for social status expression.

Vietnam currently serves as a representative environment for studying counterfeit fashion consumption. Evidence shows that many consumers are not deceived by counterfeit fashion products; rather, they actively choose to buy them as a symbolic substitute - a low-cost means of expressing status or achieving social integration. In this context, the consumption of counterfeit fashion is not merely a result of ignorance or deception, but a careful consideration guided by psychological, social, and cultural factors.

Although the issue of counterfeit fashion products has received significant attention from policymakers and businesses, the majority of current research still focuses on the supply side, including production, distribution, and legal sanctions (Tang et al. 2014). Conversely, research on the demand side, especially

studies exploring the factors affecting the attitude and intention to deliberately purchase counterfeit fashion, remains relatively limited (Teah and Phau 2008). Furthermore, existing studies have mainly been conducted in Western contexts or limited to a few Asian countries with more developed research in this field, such as Singapore, Taiwan, or Hong Kong (Tseng et al. 2021; Triandewi and Tjiptono 2013). This situation reveals a significant research gap in exploring counterfeit consumption behavior in non-Western cultural contexts, where social characteristics, cultural values, and community norms may distinctly influence the consumer decision-making process.

To explain this behavior across cultural contexts, the Theory of Planned Behavior (TPB) is widely used to analyze unethical consumer actions, including counterfeit fashion purchases. TPB posits that attitude, subjective norms, and perceived behavioral control shape behavioral intention. While prior studies in Asian contexts have applied TPB to counterfeit consumption, they often lack sensitivity to local cultural factors, particularly in explaining symbolic consumption driven by social values.

To fill this gap, this study extends TPB by incorporating Modern Status Orientation (MSO), a sociological construct reflecting consumption patterns in Vietnam's transitional economy. The research focuses on

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intentional counterfeit purchases rather than unintentional consumption, aiming to offer a more contextually grounded perspective for developing countries.

This study contributes to the academic literature in three main ways: (1) Extending the TPB model with a cultural variable relevant to the Vietnamese context; (2) Clarifying counterfeit consumption behavior from the perspective of a symbolic strategy rather than a purely ethical issue; and (3) Proposing practical implications for businesses and policymakers in developing communication and anti-counterfeiting management strategies that are better aligned with consumer psychology, especially as the government enters a more decisive phase against counterfeit fashion.

## 2. Theoretical background and Hypotheses development

### 2.1. Counterfeit Products

Counterfeit products are illegal copies of registered trademarks, typically produced to deceive consumers or substitute for genuine goods for illegal commercial gain (Grossman and Shapiro, 1988). From a market perspective, counterfeit products cause revenue loss, damage brand reputation, and undermine consumer trust. However, from a consumer behavior perspective, counterfeit fashion items are not always reluctant substitutes; they can also be deliberate choices driven by social, psychological, and symbolic motivations (Penz and Stöttinger, 2005).

From this perspective, counterfeit products can be categorized into two types: deceptive and non-deceptive counterfeiting (Grossman and Shapiro, 1988; Staake et al., 2009). This classification is based on consumers' awareness of the counterfeit nature of the product rather than its technical characteristics.

Deceptive counterfeit products are purchased without consumers knowing they are fake, often because of sophisticated imitation and seemingly reliable sellers. This type frequently occurs in sectors such as auto parts, pharmaceuticals, or cosmetics, where packaging and technical quality can closely resemble genuine products.

In contrast, for non-deceptive counterfeits, consumers are aware of the product's inauthenticity and recognize differences in price, distribution, and quality. This is common in the luxury fashion sector, where consumers seek symbolic benefits such as social status while avoiding the high cost of genuine goods (Wilcox et al., 2009). In developing countries like Vietnam, limited income and strong social pressure on personal image further reinforce this behavior (Eisend & Schuchert-Güler, 2006).

Understanding this distinction is important because policy and managerial responses differ. If consumers are deceived, solutions should focus on improving product authentication and information transparency. If purchases are intentional, interventions should address attitudes, social norms, and ethical perceptions. Therefore, this study focuses on the intentional purchase of non-deceptive counterfeit fashion products.

### 2.1. Intention to Purchase Counterfeit Products

Over the past two decades, much research has focused on exploring the motivations and psychological factors behind counterfeit consumption, primarily in emerging market contexts where intellectual property protection is limited and social norms are not clearly defined. Research in this area can be divided into three main approaches:

**Ethics-based Approach:** This perspective emphasizes perceptions of right and wrong, personal moral norms, and ethical barriers to consuming counterfeit products (Wilcox et al. 2009). However, prior studies suggest that ethical concerns alone are often insufficient to discourage counterfeit consumption, especially when consumers justify their choices with economic or social benefits.

**Social-cultural Approach:** This line of research focuses on the influence of social norms, perceived community acceptance, and the desire to signal social status through consumption (Khan et al. 2023). Within this perspective, counterfeit goods are viewed as symbolic alternatives that enable consumers to achieve social recognition at a lower cost.

**Rational Behavior Approach:** This approach applies behavioral theories such as the Theory of Planned Behavior (TPB) (Ajzen 1991) to explain counterfeit consumption through constructs including attitudes, subjective norms, and perceived behavioral control. TPB has been widely used in consumer behavior research because it allows systematic and quantifiable analysis of socio-psychological factors. Studies conducted in several Asian markets have shown that TPB effectively explains counterfeit consumption in societies where social image and symbolic consumption are highly valued.

According to TPB, behavioral intention is the most immediate predictor of actual behavior. Intention becomes stronger when individuals hold favorable attitudes, perceive supportive social norms, and believe they have sufficient control over the behavior. In consumer research, purchase intention refers to the consumer's willingness to buy a product (Elbeck and Tirtiroglu 2008). In the context of counterfeit fashion, purchase

intention represents the deliberate willingness to buy and use counterfeit products. This study adopts this concept while extending the TPB framework by incorporating the MSO variable, which reflects social characteristics relevant to the Vietnamese consumer context.

### **2.3. Factors Affecting the Intention to Purchase Counterfeit Fashion Products**

As mentioned, the model in this study is built on the three core factors of TPB, extended with the MSO variable, reflecting the growing trend of image-driven and self-affirming consumption in Vietnam. This factor has not been addressed in traditional TPB studies but is highly prevalent among young consumers in developing nations.

#### **2.3.1. Attitude (ATT)**

Attitude toward a behavior refers to an individual's favorable or unfavorable evaluation of that specific behavior (Ajzen and Fishbein 1980). According to TPB, attitude positively impacts behavioral intention. Attitude is influenced by two factors: the individual's belief about the consequences of the behavior and their evaluation of those consequences.

In the context of counterfeit consumption, many studies show that a positive attitude is a strong driver of the deliberate intention to purchase counterfeits (Penz and Stöttinger 2005; Eisend et al. 2017). The products being counterfeited are typically high-end, luxury, and symbolic fashion brands. The need for self-expression, the desire for social integration, or simply the wish to own a fashion symbol reinforces a positive attitude toward counterfeit products (Wilcox et al. 2009; Eisend and Schuchert-Güler 2006). Those with positive attitudes often believe that buying and using these products can better convey their status, help them overcome personal feelings of shame or guilt. Recent studies in developing countries, such as Vietnam and India, also show that consumers feel less guilt when purchasing counterfeits if the behavior is normalized by society (Purwanto et al. 2019; Tran et al. 2022). Therefore, a positive attitude is considered a key predictor in forming the strategic intention to consume counterfeits. Based on this, the study proposes:

*H1: Attitude has a positive relationship with the intention to purchase counterfeit fashion products.*

#### **2.3.2. Subjective Norms (SN)**

Subjective norms (SN) are an individual's perception of how significant others (e.g., family, friends, colleagues) would judge their performance of a certain behavior (Ajzen and Fishbein 1980). This social pressure forces consumers to perform certain actions to gain approval in social situations.

In counterfeit fashion consumption, SN often plays a critical role. Research by Jiang and Cova (2012) and more recently by Shepherd et al. (2023) indicates that if the act of buying counterfeits is supported by friends or social media communities, consumers feel the behavior is more rational, less ethically risky, and more socially acceptable. Particularly in collectivist cultures like Vietnam, the influence of reference groups is stronger, especially among youth who are sensitive to trends and social recognition (Nguyen and Tambyah 2011). SN is therefore not just a predictor of behavior but also a manifestation of a shift in social norms toward rationalizing counterfeit consumption. Accordingly, the study proposes:

*H2: Subjective norms have a positive relationship with the intention to purchase counterfeit fashion products.*

#### **2.3.3. Perceived Behavioral Control (PBC)**

According to the Theory of Planned Behavior, Perceived Behavioral Control (PBC) refers to the extent to which individuals believe they can control and easily perform a particular behavior based on their abilities and external facilitating conditions (Ajzen, 1991). Unlike attitude, which reflects emotional evaluation, and subjective norms, which represent social pressure, PBC captures a more practical dimension related to perceived resources and self-confidence in performing the behavior.

In counterfeit consumption, PBC is reflected in consumers' beliefs that counterfeit products are easily accessible through channels such as online markets, social media, or traditional marketplaces, and that purchasing them involves few obstacles (Penz and Stöttinger, 2005; Eisend et al., 2017). In environments where counterfeits are widespread and enforcement is weak, consumers may feel that the risks are manageable, which further strengthens their perceived control (Purwanto et al., 2019). When individuals believe they have sufficient resources and opportunities to obtain counterfeit products, their purchase intention is likely to increase. Therefore, the study proposes:

*H3: Perceived Behavioral Control has a positive relationship with the intention to purchase counterfeit fashion products.*

#### **2.3.4. Modern Status Orientation (MSO)**

Status Orientation (SO) is a concept developed by Tambyah et al. (2009) in the context of transitional economies like Vietnam. It refers to the consumer's tendency to emphasize the importance of status symbols and the belief that acquiring these symbols can help them achieve a desired social position. SO comprises

two sub-concepts: Modern Status Orientation (MSO), which emphasizes modern (post-transition) status symbols, and Traditional Status Orientation (TSO), which values traditional (pre-transition) symbols.

In transitional economies like Vietnam, the rise of the middle class and increasing pressure for self-expression have made symbolic consumption more prevalent. According to symbolic consumption and social signaling theories, products carry social meaning beyond functional value, reflecting desired self-image. When authentic goods are unaffordable, high-end counterfeits serve as symbolic substitutes, enabling similar status expression at lower cost.

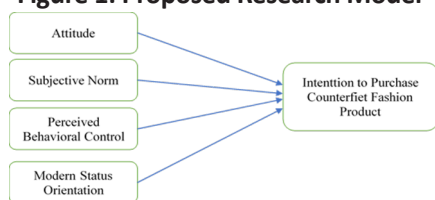
In a high power-distance culture like Vietnam, where counterfeits are relatively tolerated, such behavior may be viewed as rational and less criticized. Therefore, individuals with high Modern Status Orientation (MSO) are more likely to develop stronger intentions to purchase counterfeits as a means of maintaining a modern and socially integrated image. Based on this, the study proposes:

*H4: Modern Status Orientation has a positive relationship with the intention to purchase counterfeit fashion products.*

#### 2.4. Proposed Research Model

Figure 1 presents the proposed research model illustrating the factors affecting the intention to purchase counterfeit fashion products. In addition to the three TPB factors and MSO, the model includes four control variables: gender, age, education and income.

**Figure 1: Proposed Research Model**



### 3. Methodology

#### 3.1. Measures

The concepts used in this study include purchase intention (PI), attitude (ATT), subjective norms (SN), perceived behavioral control (PBC), and modern status orientation (MSO). All scales were adapted from previous studies. The scales for PI, ATT, and SN were adapted from De Matos et al. (2007). The PBC scale was adapted from Van den Putte et al. (2005). The MSO scale was adapted from Tambyah et al. (2016). All items were measured on a 5-point Likert scale, where 1 = "Strongly disagree" and 5 = "Strongly agree".

Prior to the main survey, a pilot study was conducted with a small sample ( $n = 30$ ) to test the initial reliability

of the scales and ensure the clarity of the questions. Pilot study participants, who had demographic characteristics similar to the main target audience, were encouraged to provide feedback on clarity. The pilot results showed all questions were easily understood. Preliminary reliability analysis (Cronbach's Alpha) for all scales exceeded the 0.7 threshold, indicating good internal consistency. Based on this positive feedback, the questionnaire was retained without significant adjustments for the main data collection.

#### 3.2. Sampling Technique

This study employed snowball sampling to reach consumers who purchase counterfeit fashion products, a group that is difficult to access through conventional methods. The online questionnaire was initially distributed to a seed group with experience purchasing counterfeit fashion items. Participants were then asked to share the survey link with eligible individuals in their social networks, generating a snowball effect. Data collection continued until the required sample size was reached.

### 4. Research findings

#### 4.1. Sample Demographics

The online questionnaire was distributed from February 10, 2025, to May 30, 2025. A total of 304 responses were collected. After data cleaning, 304 observations remained, representing a 100% usable response rate. The sample demographics are summarized in Table 1.

**Table 1: Results of Descriptive Statistics**

| Variable   | Category            | Frequency (n) | Percentage (%) |
|------------|---------------------|---------------|----------------|
| Gender     | Female              | 197           | 64.8           |
|            | Male                | 106           | 34.9           |
|            | Others              | 1             | .3             |
| Age group  | Under 20            | 36            | 11.8           |
|            | 20 - 40             | 204           | 67.1           |
|            | 41- 50              | 58            | 19.1           |
|            | Over 50             | 6             | 2.0            |
| Occupation | Government employee | 41            | 13.5           |
|            | Office staff        | 114           | 37.5           |
|            | Student             | 122           | 40.1           |
|            | Self-employed       | 27            | 8.9            |

#### 4.2. Construct Reliability and Convergent Validity

The study's scales were assessed for reliability using Cronbach's Alpha, and for convergent validity using Composite Reliability (CR) and Average Variance Extracted (AVE). According to recommendations, Cronbach's Alpha and CR should be 0.7 or higher, and AVE should be 0.5 or higher.

The results (Table 2) show that all scales satisfied these criteria. Cronbach's Alpha values ranged from 0.856 to 0.962, exceeding the 0.7 threshold. Similarly, CR values ranged from 0.860 to 0.963, and all AVE values were greater than 0.5 (ranging from 0.552 to



0.896), confirming the scales achieved appropriate reliability and convergent validity.

**Table 2: Construct Reliability and Validity Results**

| Construct                          | Cronbach's Alpha | CR    | AVE   |
|------------------------------------|------------------|-------|-------|
| Attitude (ATT)                     | 0.856            | 0.860 | 0.552 |
| Subjective Norms (SN)              | 0.962            | 0.963 | 0.896 |
| Perceived Behavioral Control (PBC) | 0.901            | 0.903 | 0.701 |
| Modern Status Orientation (MSO)    | 0.941            | 0.943 | 0.768 |
| Intention to Purchase (PI)         | 0.893            | 0.893 | 0.675 |

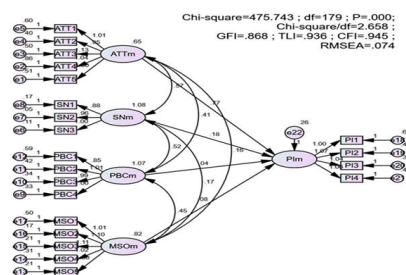
#### 4.3. Confirmatory Factor Analysis (CFA)

After confirming reliability and convergent validity, the measurement model was tested using Confirmatory Factor Analysis (CFA). The CFA results indicated that the measurement model fit the data well: Chi-square/df (CMIN/df) = 2.7 (< 3); RMSEA = 0.075 (< 0.08); CFI = 0.956 ( $\geq$  0.90); TLI = 0.947 ( $\geq$  0.90). These indices are all within the acceptable thresholds, showing the measurement model has a good fit with the empirical data.

#### 4.4. Structural Model and Hypotheses Testing

Following the validation of the measurement model, the structural model was tested to evaluate the research hypotheses. The results indicated that the structural model had an acceptable fit with the collected data. Specifically, the fit indices were good: Chi-square/df = 2.658 (< 3); CFI = 0.945 (> 0.9); TLI = 0.936 (> 0.9); RMSEA = 0.074 (< 0.08) (Figure 2).

**Figure 2: Results of the structural model**



The results of the hypothesis testing are summarized in Table 3. Hypothesis 1, which predicted that attitude positively impacts purchase intention, was strongly supported ( $\beta = 0.654$ ,  $p < 0.001$ ). Similarly, subjective norms also had a significant influence on purchase intention, supporting Hypothesis 2 ( $\beta = 0.195$ ,  $p < 0.05$ ). Hypothesis 3 predicted that perceived behavioral control (PBC) would have a positive relationship with purchase intention. However, the analysis showed this relationship was not statistically significant ( $\beta = 0.039$ ,  $p = 0.488$ ). Therefore, Hypothesis 3 was not supported. Likewise, hypothesis 4, which posited that modern status orientation (MSO) positively impacts purchase intention, also found no support from the empirical data. Although the coefficient was positive, it was very weak and not statistically significant ( $\beta = 0.073$ ,  $p =$

0.125). Thus, Hypothesis 4 was also rejected.

**Table 3: Results of Hypothesis Testing**

| Hypothesis | Relationship         | Unstandardized Coef. | Standardized Coef. ( $\beta$ ) | P_value | Conclusion |
|------------|----------------------|----------------------|--------------------------------|---------|------------|
| H1         | ATT $\rightarrow$ PI | .767                 | .654                           | ***     | Supported  |
| H2         | SN $\rightarrow$ PI  | .177                 | .195                           | .002    | Supported  |
| H3         | PBC $\rightarrow$ PI | .036                 | .039                           | .488    | Rejected   |
| H4         | MSO $\rightarrow$ PI | .076                 | .073                           | .125    | Rejected   |

The research model explained 26% of the variance in consumers' intention to purchase counterfeit fashion products ( $R^2 = 0.26$ ). Although this figure may seem modest, in the field of consumer behavior research, where decisions are influenced by countless complex psychological and environmental factors, a model that can explain 26% of the variance is considered valuable and significant (Hair et al., 2017).

#### 5. Discussion

This study examines factors influencing Vietnamese consumers' intention to purchase counterfeit fashion using an extended TPB framework. The findings both support existing theories and offer new insights into consumer behavior in an emerging market context.

The results strongly confirm that attitude and subjective norms are the two most important predictors of the intention to purchase counterfeit fashion. This finding is entirely consistent with previous research in the field (Penz and Stöttinger, 2005; Wilcox et al., 2009; Nguyen and Nguyen, 2017). This indicates that the purchase intention of Vietnamese consumers is primarily driven by two main forces: first, a positive personal evaluation of this behavior (viewing it as a smart cost-effective choice that still meets fashion needs), and second, the influence of social pressure, where the act of buying and using counterfeits is accepted or even normalized within their social circles (family, friends, colleagues).

Among these, attitude was the most powerful factor influencing purchase intention. This shows that the intention to buy counterfeits is not an impulsive act but the result of a deliberate, individual cost-benefit analysis. Consumers appear to focus on the benefits of counterfeit products (e.g., affordable price, satisfying fashion demands, expressing style) as more important than potential risks related to poor quality or ethical issues. This finding highlights that the core of counterfeit consumption originates from the consumers' own acceptance and rationalization.

Furthermore, the behavior is strongly governed by the social environment. When buying and using counterfeits is socially normalized, it reinforces positive attitudes and promotes purchase intention. The influence of subjective norms highlights the

importance of community and social factors in consumption decisions in Vietnam, a characteristic of collectivist cultures.

One of the most interesting and valuable results of this study is the rejection of the hypotheses regarding Perceived Behavioral Control (Hypothesis 3) and Modern Status Orientation (Hypothesis 4). These unexpected findings do not represent a limitation of the model; instead, they provide profound insights into the specific context of the Vietnamese market and the complex psychological mechanisms behind counterfeit purchasing. Regarding PBC (H3), TPB suggests that the easier a behavior is to perform, the higher the intention. However, in a market where counterfeit fashion products are widespread, easily accessible, and saturated, behavioral control is no longer a differentiating factor. The purchase intention no longer depends on whether consumers can easily buy fakes (as access is a given), but rather shifts to deeper psychological factors. This partly explains why the traditional TPB model cannot tell the whole story.

Second, the finding that MSO (Hypothesis 4) does not directly impact purchase intention is also significant. Instead of being a direct driver, MSO may function as an antecedent that shapes attitude. An individual with high MSO (a strong desire to signal status) will gradually cultivate a more tolerant or favorable attitude toward counterfeit products as a means to achieve their goal of status expression. This is an important theoretical contribution, suggesting the TPB model can be enriched by examining indirect relationships rather than just direct effects. This also helps explain why attitude was the strongest factor, as it may have already absorbed the influence of deeper value orientations like MSO. The fact that the current model did not test this indirect relationship also helps account for the 74% of unexplained variance. Future research should focus on testing more complex mediation models.

## 6. Contributions and future research

### 6.1. Contributions

From a theoretical standpoint, this research contributes to the consumer behavior literature in two ways. First, it demonstrates the limitation of the Perceived Behavioral Control (PBC) in contexts where counterfeit products are available. Second, and more importantly, it proposes a new role for individual orientation variables like MSO - not as a direct predictor of intention, but as an antecedent variable that shapes attitude, suggesting the need to test more complex mediation models in the future.

From a managerial standpoint, the findings offer important suggestions for brand managers and

policymakers. Anti-counterfeiting communication campaigns should prioritize changing consumer attitudes. There is a need for strong, persuasive messages focused on altering the cost-benefit calculation in consumers' minds - for example, by emphasizing the risks of poor quality, the lack of uniqueness in counterfeit products, and the emotional value and experience that only genuine products can provide. Concurrently, efforts to influence subjective norms, such as building social role models who view using counterfeits as undesirable or not proud, are also critical steps.

### 6.2. Future Research

Despite achieving important results, this study has several limitations. The first limitation is the snowball sampling technique. While suitable for accessing hard-to-reach subjects, this technique can create a less diverse sample, as participants tend to refer others similar to themselves (friends, colleagues). This may affect the generalizability of the results; the sample may not be fully representative of all Vietnamese consumers. Future research should aim to overcome this by recruiting participants from more diverse social groups or combining this method with others, such as random sampling based on geography or income, to enhance sample representativeness.

Second, the  $R^2$  value of 26% indicates that while the model has predictive value, 74% of the variance remains unexplained. We suggest this variance could be further clarified by testing indirect relationships, particularly the mediating role of attitude in the relationship between MSO and purchase intention, as proposed in the discussion. Additionally, qualitative studies, such as in-depth interviews, could help explore the justifications and complex psychological mechanisms behind the decision to choose counterfeit products, further enriching our understanding of this challenging phenomenon.

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# IMPACTS OF LOCAL MARKETING ON TOURIST SATISFACTION IN TAN CUONG TRADITIONAL TEA VILLAGE: APPLYING A STRUCTURAL EQUATION MODEL

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**Abstract:** *This study examines the factors influencing tourist satisfaction at Tan Cuong tea village, Thai Nguyen province. Data were collected from 230 tourists and analyzed using structural equation modeling (SEM). The results show that the measurement model achieved reliability and validity (Cronbach's alpha = 0.834–0.963; CR = 0.835–0.964; AVE = 0.560–0.899; maximum HTMT = 0.590), and the CFA/SEM model showed very good fit. The five factors, destination promotion (DP), visitor facilities (VF), cultural experience (CE), environmental quality (EQ), and destination management (DM), all have a positive and significant impact on satisfaction (VS), with EQ having the strongest influence ( $\beta = 0.284$ ), followed by VF ( $\beta = 0.264$ ), CE ( $\beta = 0.258$ ), DP ( $\beta = 0.252$ ), and DM ( $\beta = 0.157$ ). The model explains 62.8% of the variance of VS, suggesting that policy priorities should focus on the environment, amenities, and enhancing the cultural tea experience.*

• Keywords: tea craft village tourism, visitor satisfaction, structural equation modeling (SEM), destination management, Thai Nguyen province.

Date of receipt: 28<sup>th</sup> Jan., 2026

Date of delivery revision: 07<sup>th</sup> Feb., 2026

DOI:

Date of receipt revision: 20<sup>th</sup> Mar., 2026

Date of approval: 25<sup>th</sup> Mar., 2026

## 1. Introduction

Traditional craft village tourism is emerging as a development direction aligned with the trend of experiential tourism, emphasizing identity and sustainability. In this context, Tan Cuong tea village (Thai Nguyen province) possesses distinct advantages in terms of product branding, tea-growing landscape, and the ability to organize experiences related to tea culture. However, in practice, the number of visitors to the village is not commensurate with its strengths, experiential activities lack coordination, and tourism potential has not been adequately translated into high and consistent levels of visitor satisfaction.

From an academic perspective, recent studies emphasize that satisfaction is a key link connecting destination evaluations with positive behavioral responses from tourists, and is influenced by destination quality, image, experiences, and communication (Lee & Xue, 2020). In the digital media environment, tourist-generated social media can strengthen destination brand awareness and value, thereby increasing satisfaction and behavioral outcomes (Abbasi et al., 2024). Specifically for tea tourism, empirical evidence shows that the experiential environment and cultural identity play a significant role in shaping tourist

evaluations, emotions, and behavioral intentions (Fu et al., 2023; Jiang & Garrod, 2025).

From a destination management perspective, tourist satisfaction at tea villages is often the combined result of many components of “experiential delivery capabilities.” Based on the research questionnaire, the independent factor groups can be broadly categorized as: (i) destination promotion (DP), (ii) tourist facilities (VF), (iii) cultural experience (CE), (iv) environmental quality (EQ), and (v) destination management (DM). These factors are expected to influence tourist satisfaction (VS) in Tan Cuong. However, research applying SEM to the context of tourism in Tan Cuong’s tea-making villages is limited, especially studies that simultaneously validate both measurement and structural models to quantify the relative impact of each factor. Stemming from this practical need and gap, this paper aims to validate an SEM model to assess the impact of DP, VF, CE, EQ, and DM on VS, thereby providing a scientific basis for management implications for the effective and sustainable development of tourism in Tan Cuong’s tea-making villages.

## 2. Theoretical basis, research overview, and hypothesis development

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### 2.1. Destination Promotion (DP)

Destination promotion helps shape awareness, reinforce the image and perceived value of tourists, thereby increasing satisfaction levels. Particularly in the digital environment, communication generated by destination management organizations and by tourists can impact destination brand value and satisfaction through relationship chains that can be tested using SEM (Abbasi et al., 2024).

### 2.2. Visitor Facilities (VF)

Facilities and amenities at a destination (such as sanitation, parking, rest areas, and facility layout) are fundamental conditions that help reduce inconvenience, increase perceived convenience, and support the experience. SEM research on satisfaction at attractions and entertainment spaces shows that destination attributes and experiential activities (related to service conditions) are significantly associated with overall satisfaction levels (Halkos et al., 2021).

### 2.3. Culture Experience (CE)

For craft village tourism, cultural experiences are the “core value” that determines the memorability, emotions, and overall evaluation of tourists. In the context of tea tourism, experiential environmental factors and cultural identity have been shown to play a crucial role in shaping emotional values and tourist responses implying an impact on satisfaction/behavioral intention (Fu et al., 2023).

### 2.4. Environmental Quality (EQ)

Environmental quality (cleanliness, maintenance, landscaping, eco-friendliness) is often a “fundamental” factor: poor quality leads to strong dissatisfaction, while good quality contributes to an improved overall rating. Research based on guest rating data shows that environmental aspects within service spaces, particularly related to “cleanliness/maintenance”, are significantly correlated with guest satisfaction (Zhang et al., 2025)..

### 2.5. Destination Management (DM)

Destination management is demonstrated through coordinating visitor flow, communicating regulations, providing on-site support, and handling feedback. When management is weak, destinations are prone to overcrowding, causing inconvenience and degrading the experience. A meta-analysis shows that perceived crowding generally negatively impacts satisfaction and many other experience indicators, thus highlighting the role of destination management/coordination (Luo et al., 2025).

### 2.6. Visitor Satisfaction (VS)

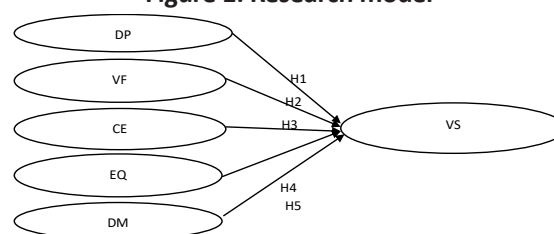
Satisfaction reflects the degree to which expectations are met and the overall quality of the experience; it

also forms the basis for positive behavioral responses (loyalty/referral). The sustainable image-integrated destination loyalty model highlights the central role of satisfaction in the chain of impacts from destination evaluation to tourist behavior (Lee & Xue, 2020).

### 2.7. Hypothesis development

Based on the above arguments, the study proposes a structural model with VS as the dependent variable and the independent variables including DP, VF, CE, EQ, and DM. Recent SEM studies have also shown that experience/destination condition components can enhance satisfaction and thus promote behavioral outcomes (Torabi et al., 2022). On that basis, the study proposes: H1–H5: DP, VF, CE, EQ, and DM have a positive impact on VS.

Figure 1: Research model



## 3. Research Methods

### 3.1. Research Design

The study uses a quantitative design focused on hypothesis testing, with data collected using structured questionnaires and a 5-point Likert scale. The research model includes latent variables (DP, VF, CE, EQ, DM, VS) and is tested using SEM, allowing simultaneous estimation of both the measurement model and the structural model (Rosseel, 2012). The analysis process adheres to recommendations for model fit assessment with indicators such as CFI/TLI, RMSEA, and SRMR (Hu & Bentler, 1999). Results are reported according to SEM research standards, prioritizing standardized coefficients to compare the relative impact between factors.

### 3.2. Survey Subjects, Sampling, and Data Collection

The survey subjects were tourists who had experienced tourism in Tan Cuong tea village, Thai Nguyen province, including visitors and those who had activities related to tea products. The sample was selected using a controlled convenience sampling method, ensuring that respondents met the condition of “having experienced” the destination before completing the questionnaire. Data was collected directly at the destination (and/or online channels with confirmed experiences), ensuring the principles of voluntariness,

anonymity, and for research purposes only. The sample size was considered according to the requirements of CFA/SEM, ensuring sufficient reliability for parameter estimation and model testing (Rosseel, 2012)

### 3.3. Scales and Research Variables

**Table 1: Structures, number of observed variables and scale sources**

| Factors | No of observations | Description                                                                                 | Sources               |
|---------|--------------------|---------------------------------------------------------------------------------------------|-----------------------|
| DP      | 4                  | Destination promotion/communication (clear, accessible, attractive, consistent)             | Abbasi et al., 2024   |
| VF      | 4                  | Amenities for visitors (cleanliness, parking, rest areas, facility layout)                  | Halkos et al. (2021)  |
| CE      | 4                  | Tea culture experience (unique, easy to participate in, culturally informative, memorable)  | Fu et al., 2023       |
| EQ      | 4                  | Environmental quality (cleanliness, maintenance, landscape protection, eco-friendly)        | Lee & Xue, 2020       |
| DM      | 4                  | Destination management (coordination, regulations/guidelines, support/feedback)             | Laesser et al. (2025) |
| VS      | 3                  | Visitor satisfaction (overall satisfaction, meeting expectations, willingness to recommend) | Zeng & Li (2021)      |

### 3.4. Data Analysis Process

The data was processed in four steps:

Step 1: Descriptive statistics (Mean, SD) and correlations between variables, as a basis for identifying general trends.

Step 2: Evaluation of the measurement model using CFA, considering standardized load, reliability, and convergent validity (CR/AVE) according to classical logic in marketing-behavioral research (Fornell & Larcker, 1981).

Step 3: Testing discriminant validity using HTMT, aiming to increase sensitivity compared to traditional criteria (Henseler et al., 2015).

Step 4: Estimation of the structural model SEM, reporting model fit and path coefficients ( $\beta$ , SE, p), and interpreting the  $R^2$  of the dependent variable according to recommendations on the fit index (Hu & Bentler, 1999).

## 4. Research Results

### 4.1. Descriptive Statistics of Respondents

**Table 2. Demographics of Respondents (n = 230)**

| Factors                   | Frequency | (%)   |
|---------------------------|-----------|-------|
| <b>Gender</b>             |           |       |
| Male                      | 142       | 61.74 |
| Female                    | 88        | 38.26 |
| <b>Marital status</b>     |           |       |
| Single                    | 117       | 50.87 |
| Married                   | 113       | 49.13 |
| <b>Age</b>                |           |       |
| Under 30                  | 126       | 54.78 |
| From 30 to 45             | 63        | 27.39 |
| More than 45              | 41        | 17.83 |
| <b>Residence</b>          |           |       |
| From Thai Nguyen province | 137       | 59.57 |
| Surrounding areas         | 93        | 40.43 |
| <b>Occupation</b>         |           |       |
| Student                   | 84        | 36.52 |
| Employee                  | 79        | 34.35 |
| Freelancer and other      | 67        | 29.13 |

Source: Compiled by the authors

Table 2 describes the characteristics of the survey sample (n = 230) according to basic demographic variables. The gender structure shows that males accounted for 61.74% (142 people), while females accounted for 38.26% (88 people). Marital status was relatively balanced between the single group (50.87%, 117 people) and the married group (49.13%, 113 people), thus limiting sample bias based on family characteristics. Regarding age, the group under 30 years old accounted for the highest proportion (54.78%, 126 people), followed by the 30–45 age group (27.39%, 63 people) and the over 45 age group (17.83%, 41 people), implying that younger customers were the dominant group in the study sample. Regarding place of residence, 59.57% (137 people) of respondents were from Thai Nguyen province, and 40.43% (93 people) were from neighboring areas, reflecting that the current customer market is mainly concentrated in nearby regions. In terms of occupation, the sample distribution was relatively diverse, including students (36.52%), workers/civil servants (34.35%), and self-employed/others (29.13%), facilitating a multi-faceted reflection of tourists' perceptions.

### 4.2. Descriptive statistical analysis of factors

**Table 3. Descriptive Statistics and Correlation Matrix (N = 230)**

| Construct | Mean  | SD    | DP      | VF      | CE      | EQ      | DM      | VS      |
|-----------|-------|-------|---------|---------|---------|---------|---------|---------|
| DP        | 3.524 | 0.692 | 1.000   | 0.233** | 0.128   | 0.125   | 0.022   | 0.360** |
| VF        | 3.541 | 0.803 | 0.233** | 1.000   | 0.465** | 0.268** | 0.144*  | 0.537** |
| CE        | 3.376 | 0.774 | 0.128   | 0.465** | 1.000   | 0.348** | 0.168*  | 0.544** |
| EQ        | 3.504 | 0.715 | 0.125   | 0.268** | 0.348** | 1.000   | 0.342** | 0.522** |
| DM        | 3.396 | 0.770 | 0.022   | 0.144*  | 0.168*  | 0.342** | 1.000   | 0.341** |
| VS        | 3.539 | 0.595 | 0.360** | 0.537** | 0.544** | 0.522** | 0.341** | 1.000   |

\*  $p < 0.05$ ; \*\*  $p < 0.01$

Source: Compiled by the authors

Table 3 shows that the scales have mean values ranging from 3.376 (CE) to 3.541 (VF), reflecting a generally fairly positive rating from tourists. The Pearson correlation matrix shows that the independent variables are generally positively correlated and statistically significant, with VF–CE having the strongest correlation ( $r = 0.465$ ;  $p < 0.01$ ), followed by CE–EQ ( $r = 0.348$ ;  $p < 0.01$ ) and EQ–DM ( $r = 0.342$ ;  $p < 0.01$ ). For the dependent variable VS, the correlations were all positive, notably CE–VS ( $r = 0.544$ ;  $p < 0.01$ ), VF–VS ( $r = 0.537$ ;  $p < 0.01$ ), and EQ–VS ( $r = 0.522$ ;  $p < 0.01$ ), suggesting the important role of cultural experience, amenities, and environmental quality. DP–DM showed no significant correlation ( $r = 0.022$ ), indicating that destination promotion may be relatively independent of perceived destination management in the survey sample.

### 4.3. The goodness-of-fit index of the confirmatory factor analysis (CFA)

Table 4. CFA Model Fit Indices

| Fit Index    | Value         | Threshold   | Assessment |
|--------------|---------------|-------------|------------|
| $\chi^2(df)$ | 222.695 (215) | —           |            |
| p-value      | 0.362         | > 0.05      | Good       |
| CFI          | 0.998         | $\geq 0.90$ | Excellent  |
| TLI          | 0.998         | $\geq 0.90$ | Excellent  |
| RMSEA        | 0.012         | $\leq 0.08$ | Excellent  |
| SRMR         | 0.035         | $\leq 0.08$ | Excellent  |

Source: Compiled by the authors

The CFA results in Table 4 show that the measurement model has a very good fit with the data:  $\chi^2(215)=222.695$  and  $p\text{-value}=0.362$  ( $>0.05$ ) implying that the model is not significantly different from the observed data. The incremental indices are excellent with CFI=0.998 and TLI=0.998 (both exceeding the recommended threshold). At the same time, the low error indices (RMSEA=0.012; SRMR=0.035) confirm that the measurement model has an excellent fit, making it eligible for conversion to SEM.

#### 4.4. Reliability and convergent validity of structures

Table 5. Reliability and Convergent Validity

| Construct | N Items | Cronbach's $\alpha$ | CR    | AVE   |
|-----------|---------|---------------------|-------|-------|
| DP        | 4       | 0.834               | 0.835 | 0.560 |
| VF        | 4       | 0.863               | 0.864 | 0.615 |
| CE        | 4       | 0.881               | 0.882 | 0.652 |
| EQ        | 4       | 0.850               | 0.850 | 0.587 |
| DM        | 4       | 0.871               | 0.871 | 0.630 |
| VS        | 3       | 0.963               | 0.964 | 0.899 |

Source: Compiled by the authors

Table 5 shows that the scales achieve very good reliability, with Cronbach's alpha ranging from 0.834 to 0.963, all exceeding the acceptable threshold ( $\geq 0.70$ ). The composite reliability CR is in the range of 0.835–0.964, confirming the intrinsic stability of the underlying structures. Regarding convergence validity, the AVE indices are all greater than 0.50 (0.560–0.899), indicating that each structure explains a significant proportion of the variance of the observed variables. Notably, the VS structure has very high alpha (0.963), CR (0.964), and AVE (0.899), reflecting strong consistency in the satisfaction scale. Overall, these results confirm that the measurement model simultaneously meets the requirements of reliability and convergence validity, qualifying it for structural model testing.

#### 4.5. Discriminant Value (HTMT)

Table 6. Discriminant Validity (HTMT)

|    | DP    | VF    | CE    | EQ    | DM    | VS    |
|----|-------|-------|-------|-------|-------|-------|
| DP | 1.000 | 0.276 | 0.149 | 0.149 | 0.074 | 0.401 |
| VF | 0.276 | 1.000 | 0.536 | 0.312 | 0.174 | 0.589 |
| CE | 0.149 | 0.536 | 1.000 | 0.403 | 0.196 | 0.590 |
| EQ | 0.149 | 0.312 | 0.403 | 1.000 | 0.397 | 0.577 |
| DM | 0.074 | 0.174 | 0.196 | 0.397 | 1.000 | 0.373 |
| VS | 0.401 | 0.589 | 0.590 | 0.577 | 0.373 | 1.000 |

Source: Compiled by the authors

Table 6 presents the HTMT index for the structural

pairs, with values ranging from 0.074 to 0.590. The highest HTMT value is 0.590 (CE–VS), still lower than the recommended threshold of 0.85, indicating that the structures are conceptually well-discriminant. The remaining pairs are at low-to-medium levels (e.g., VF–VS = 0.589; EQ–VS = 0.577), implying negligible overlap between the scales. Thus, the measurement model achieves discriminant validity, qualifying it for SEM structural model testing.

#### 4.6. Structural model fit indices (SEM)

Table 7. SEM Model Fit Indices

| Fit Index    | Value         | Threshold   | Assessment |
|--------------|---------------|-------------|------------|
| $\chi^2(df)$ | 222.695 (215) | —           |            |
| p-value      | 0.319         | > 0.05      | Good       |
| CFI          | 0.997         | $\geq 0.90$ | Excellent  |
| TLI          | 0.997         | $\geq 0.90$ | Excellent  |
| RMSEA        | 0.014         | $\leq 0.08$ | Excellent  |
| SRMR         | 0.037         | $\leq 0.08$ | Excellent  |

Source: Compiled by the authors

Table 7 shows that the SEM structural model has a very good fit with the data:  $\chi^2(215)=222.695$  and  $p\text{-value}=0.319$  ( $>0.05$ ) implying that the model fits the observed data. The incremental indices are excellent with CFI=0.997 and TLI=0.997, exceeding the recommended threshold. At the same time, the low error indices (RMSEA=0.014; SRMR=0.037) confirm that the SEM model has an excellent fit. Therefore, the model can be used to interpret the path coefficients and test the research hypotheses.

#### 4.7. Structural modeling and hypothesis testing

Table 8. Structural Model Results

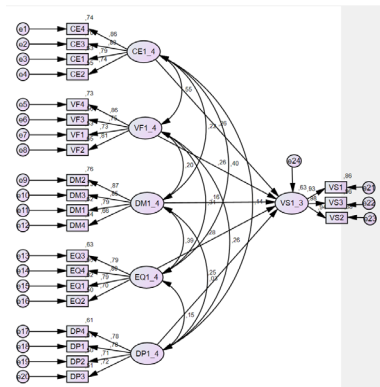
| Hypothesis        | Path                | $\beta$ | S.E.  | p-value | Supported |
|-------------------|---------------------|---------|-------|---------|-----------|
| H1                | DP $\rightarrow$ VS | 0.252   | 0.052 | <0.001  | Yes       |
| H2                | VF $\rightarrow$ VS | 0.264   | 0.044 | <0.001  | Yes       |
| H3                | CE $\rightarrow$ VS | 0.258   | 0.042 | <0.001  | Yes       |
| H4                | EQ $\rightarrow$ VS | 0.284   | 0.050 | <0.001  | Yes       |
| H5                | DM $\rightarrow$ VS | 0.157   | 0.044 | 0.004   | Yes       |
| $R^2(VS) = 0.628$ |                     |         |       |         |           |

Source: Compiled by the authors

Table 8 shows that all hypotheses H1–H5 are supported, with positive and statistically significant effects on visitor satisfaction (VS). Among the factors, EQ has the strongest effect ( $\beta = 0.284$ ;  $p < 0.001$ ), followed by VF ( $\beta = 0.264$ ;  $p < 0.001$ ), CE ( $\beta = 0.258$ ;  $p < 0.001$ ), and DP ( $\beta = 0.252$ ;  $p < 0.001$ ). The DM factor also has a significant but lower impact ( $\beta = 0.157$ ;  $p = 0.004$ ), implying that destination management remains important but is not the driving factor in the model. The  $R^2(VS)$  value of 0.628 indicates that the model explains approximately 62.8% of the variance in satisfaction, demonstrating strong explanatory power. Overall, the results highlight the priority of improving environmental quality, service amenities, and cultural experiences to enhance visitor satisfaction at Tan Cuong tea village.



**Figure 2: Structural Equation Modeling (SEM) with standardized Path Coefficients**



Note: The structural model was estimated using SEM in R (lavaan and lavaan survey packages), and the diagram was visualized using IBM SPSS AMOS for clarity in presentation.

### 5. Conclusion and Implications

This study tested the SEM model of factors influencing tourist satisfaction (VS) at Tan Cuong tea village, Thai Nguyen province, on a sample of 230 observations. The results showed that the measurement model achieved reliability and validity (Cronbach's alpha, CR, and AVE all exceeded the threshold; HTMT < 0.85), and the structural model had a very good fit. The five factors - destination promotion (DP), tourist facilities (VF), cultural experience (CE), environmental quality (EQ), and destination management (DM) - all had a positive and significant impact on VS; the model explained 62.8% of the variation in satisfaction. In this study, the influence decreases in the following order: EQ (strongest), followed by VF, CE, DP, and DM (lower but still significant), implying that satisfaction in Tan Cuong is primarily determined by the quality of the space-environment and the experiential conditions at the destination.

Regarding policy implications, interventions should be prioritized in the order of impact. First, the locality should consider improving the quality of the environment and landscape as a central task: strengthening sanitation, waste collection and sorting, maintaining pathways, controlling discharge points, and standardizing criteria for a "clean destination" linked to the specific characteristics of the tea-growing region. This group of solutions can create rapid and noticeable improvements in tourists' perceptions, thereby increasing satisfaction.

Secondly, there is a need for targeted investment in infrastructure and amenities serving tourists (standard restrooms, reasonable parking, rest areas/seating spots, signage), while encouraging social participation through co-financing mechanisms and clearly assigning operational and maintenance responsibilities between

the government, cooperatives, and service businesses. Simultaneously, minimum standards for amenities should be established to ensure consistency among the various experience points within the craft village.

Thirdly, develop tea culture experiences with a "scripted" approach and standardized services: standardize the experiential tour (tea picking – tea processing – tea tasting), train community tour guides, design spaces for storytelling about tea culture, and increase interactive activities (workshops, check-ins, performances). This set of solutions helps increase the uniqueness and memorability of the destination, thereby reinforcing satisfaction and promoting its widespread appeal.

Fourth, regarding destination promotion, it is necessary to shift from fragmented communication to campaign-based communication, consistently conveying the message "Tan Cuong – Tea Culture," optimizing digital content (short videos, experience maps, event calendars), and linking with the province's and region's tourism ecosystem to expand the market beyond Thai Nguyen. Finally, although the impact is lower, destination management is still significant; therefore, it is necessary to improve the mechanism for coordinating tourist flows during peak season, publish clear visiting regulations, establish support/feedback reception points, and implement a "one-stop" complaint handling process to reduce experiential risks and improve overall service quality.

In summary, the above implications will help Tan Cuong improve the quality of the experience, increase tourist satisfaction, and create a foundation for sustainable tourism attraction, contributing to the effective development of the tea village tourism potential of Thai Nguyen province.

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# THE IMPACT OF SERVICE FACTORS ON TOURISTS' SATISFACTION WITH THE HOMESTAY EXPERIENCE IN MOC CHAU, SON LA PROVINCE: AN SEM APPROACH

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**Abstract:** *This study analyzes the impact of service factors on tourist satisfaction with homestay experiences in Moc Chau, Son La province. Data were collected from 200 valid questionnaires and analyzed using one-level SEM. The measurement model met the requirements for fit (CFI = 0.959; TLI = 0.951; RMSEA = 0.047; SRMR = 0.055), reliability, and validity (Cronbach's  $\alpha$  = 0.776–0.859; CR = 0.779–0.860; AVE = 0.502–0.607; HTMT < 0.85). The structural model results show that all four factors have a positive impact on satisfaction, with local experience having the strongest impact ( $\beta$  = 0.425), followed by service attitude ( $\beta$  = 0.391), perceived value ( $\beta$  = 0.264), and facilities ( $\beta$  = 0.182). The model explains 55.2% of the variation in satisfaction. The managerial implications emphasize prioritizing the upgrading of local experiences, standardizing service attitudes, increasing perceived value, and maintaining the quality of facilities.*

• Keywords: *fhomestay; local experience; satisfaction; SEM; Moc Chau.*

Date of receipt: 28<sup>th</sup> Jan., 2026

Date of delivery revision: 27<sup>th</sup> Feb., 2026

DOI:

Date of receipt revision: 17<sup>th</sup> Mar., 2026

Date of approval: 30<sup>th</sup> Mar., 2026

## 1. Introduction

In the time of the booming experiential tourism industry, homestays are becoming increasingly important due to their ability to create differentiated value through host-guest interaction, the level of “living with the locality,” and the feeling of authenticity in the experience. As competition among destinations and accommodations increases, tourist satisfaction becomes a key outcome variable, reflecting a comprehensive assessment of post-consumption service evaluation and serving as a basis for quality improvement and enhanced competitiveness.

International studies show that satisfaction is simultaneously influenced by components related to authenticity, level of participation, and experience evaluation; these relationships can be effectively tested using the SEM model (Lu et al., 2015). In the context of homestays, service and experience factors (especially when linked to sustainability) have been shown to significantly influence satisfaction, indicating that SEM is a suitable method for quantifying the relative impact between groups of factors (Basak et al., 2021). Furthermore, analysis of online reviews of shared accommodations also shows that satisfaction/dissatisfaction stems from attributes very “closely related to operations” such as service attitude, responsiveness, hygiene, amenities, and information transparency - important suggestions for scale design in homestay

research (Ding et al., 2021). The role of perceived value is also reinforced as a foundation for promoting satisfaction and behavioral outcomes in tourism (Qiu et al., 2024).

In Vietnam, research on homestays has increased, but research gaps remain clear in three areas. Firstly, quantitative evidence for testing the structural model of homestay customer satisfaction is limited for Moc Chau (Son La) - a destination rich in potential and cultural identity. Secondly, many studies emphasize individual groups of factors, while lacking integrated models that incorporate easily manageable factors such as service attitude, facilities, perceived value, and local experience to determine the relative impact on satisfaction. Thirdly, some recent studies in Vietnam adopt a qualitative approach, helping to identify factors but limiting the quantification of impact and the full testing of the measurement model - the structural model (Quang et al., 2024).

Stemming from these gaps, this study proposes and tests a single-level SEM model to assess the impact of four groups of factors: Service Attitude (ATT), Facilities (FAC), Perceived Value (VAL), and Local Experience (EXP) on Tourist Satisfaction (SAT) regarding homestay experiences in Moc Chau, Son La province. The expected results provide empirical evidence for the Moc Chau context and suggest priority improvements for the factors with the strongest influence on satisfaction.

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## 2. Theoretical Basis, Research Overview, and Hypothesis Development

### 2.1. Service Attitude and Satisfaction (*ATT* → *SAT*)

In homestays, the interaction between guests and hosts/staff is the “touchpoint” that determines the emotional experience. Positive service attitudes (politeness, friendliness, attentiveness, timely support) help guests feel respected, reduce uncertainty during their stay, and increase positive post-experience evaluations; therefore, they can increase satisfaction (Ding et al., 2021; Quang et al., 2024).

H1: ATT has a positive impact on SAT.

### 2.2. Facilities and Satisfaction (*FAC* → *SAT*)

Facilities (hygiene, amenities, space, safety) are fundamental conditions for accommodation quality. When rooms are clean, amenities are well-functioning, the space is comfortable, and safety is ensured, guests tend to have higher satisfaction; Conversely, deficiencies in room conditions/amenities are often a source of dissatisfaction (Ding et al., 2021; Quang et al., 2024).

H2: FAC has a positive impact on SAT.

### 2.3. Perceived Value and Satisfaction (*VAL* → *SAT*)

Perceived value reflects the degree of “worth the money” between the benefits received and the costs incurred (Zeithaml, 1988). When tourists see that the price matches the quality, fee information is transparent, and the choice offers good value compared to alternatives, satisfaction increases; this result is also observed in the context of community homestays and tourist destinations (Rasoolimanesh et al., 2016; Qiu et al., 2024).

H3: VAL has a positive impact on SAT.

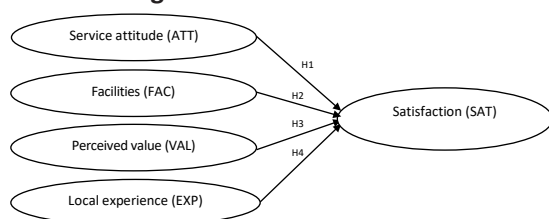
### 2.4. Local Experience and Satisfaction (*EXP* → *SAT*)

Local experience (indigenous culture, experiential activities, service/destination connections, authenticity) is a distinct advantage of homestays. When tourists experience authentic experiences and deeply participate in local activities, the quality of the experience and satisfaction tend to increase (Lu et al., 2015; Basak et al., 2021).

H4: EXP has a positive impact on SAT.

### 2.5. Proposed Research Model

Figure 1: Research model



A one-level SEM model is used to test the impact

of ATT, FAC, VAL, and EXP on SAT in the context of homestays in Moc Chau, Son La.

## 3. Research Methods

### 3.1. Research Design

This study uses a quantitative design based on a cross-sectional survey to test the model of the impact of service factors on tourist satisfaction (SAT) with homestay experiences in Moc Chau, Son La. The model was tested using single-level SEM with 4 independent variables (ATT, FAC, VAL, EXP) and 1 dependent variable (SAT). The observed variables were measured using a 5-point Likert scale (1 = Strongly disagree... 5 = Strongly agree).

### 3.2. Survey Subjects, Sampling and Data Collection

The survey subjects were tourists who had used or were currently using homestay services in Moc Chau (Son La) during the survey period. Data was collected through structured questionnaires distributed directly at homestays. The sampling method applied was convenient and appropriate to the context of reaching tourists at the destination.

The final sample size used in the analysis was N = 200, meeting the minimum requirements for SEM at a moderate model level and with a not excessively large number of estimated parameters; while also ensuring the stability of the estimates in CFA/SEM according to the recommendations in the SEM methodology research.

### 3.3. Scales and Research Variables

The scales were inherited and adapted to the homestay context in Vietnam (translation-semantic correction), then reviewed for language and preliminary testing. The structure, number of observed variables, descriptions, and sources are presented in Table 1.

Table 1: Structures, number of observed variables and scale sources

| Factor                 | No of observed variables | Description                                                                                           | Sources                                                         |
|------------------------|--------------------------|-------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|
| Service attitude (ATT) | 4                        | The level of courtesy, friendliness, attentiveness, and timely support from the owner/staff           | Parasuraman et al., 1988; Ding et al., 2021; Quang et al., 2024 |
| Facilities (FAC)       | 4                        | Cleanliness, amenities, comfort, and sense of safety of the accommodation                             | Ding et al., 2021; Quang et al., 2024                           |
| Perceived value (VAL)  | 4                        | Value for money: balance of benefits and costs, cost transparency, and comparative value              | Zeithaml, 1988; Rasoolimanesh et al., 2016                      |
| Local experience (EXP) | 4                        | Local cultural experience, experiential activities, service/destination connections, and authenticity | Lu et al., 2015; Basak et al., 2021                             |
| Satisfaction (SAT)     | 3                        | Overall satisfaction, level of expectation fulfillment, and assessment of making the right choice     | Bhattacharjee, 2001; Zeithaml, 1988                             |

Source: Compiled by the author

### 3.4. Data Analysis Process

Data was processed in a four-step process:

Data screening: checking for missing data, outliers, and descriptive distribution; eliminating invalid observations according to criteria.



Descriptive statistics and correlation: calculating Mean, SD, and Pearson correlation coefficient between structures.

Evaluating the measurement model: (i) Scale reliability using Cronbach's alpha; (ii) Convergent validity using CR and AVE; (iii) Discriminant validity using HTMT.

CFA and SEM: (i) Performing CFA to test the fit of the measurement model before testing the structural model; (ii) Performing SEM to estimate the effector coefficient (normalized  $\beta$ ), test hypotheses H1–H4 ( $p < 0.05$ ), and report  $R^2(\text{SAT})$ ; (iii) The indicators suitable for the reporting model include  $\chi^2/\text{df}$ , CFI, TLI, RMSEA, SRMR; the reference thresholds for evaluation are CFI/TLI  $\geq 0.90$  and RMSEA/SRMR  $\leq 0.08$ .

## 4. Research Results

### 4.1. Descriptive Statistics of Respondents

**Table 2. Demographics of Respondents (n = 200)**

| Factor                        | Frequency | (%)  |
|-------------------------------|-----------|------|
| <b>Gender</b>                 |           |      |
| Male                          | 143       | 71,5 |
| Female                        | 57        | 28,5 |
| <b>Ages</b>                   |           |      |
| Under 30                      | 76        | 38   |
| From 30 to 45                 | 98        | 49   |
| More than 45                  | 26        | 13   |
| <b>Occupation</b>             |           |      |
| Student                       | 48        | 24   |
| Company workers/state servant | 67        | 33,5 |
| Other                         | 85        | 42,5 |
| <b>Monthly income</b>         |           |      |
| Below 10 million dong         | 92        | 46   |
| From 10 to 20 million         | 65        | 32,5 |
| More than 20                  | 43        | 21,5 |

Source: Author's calculations

The survey sample consisted of 200 tourists staying in homestays in Moc Chau. Regarding gender, males accounted for 71.5% and females 28.5%, indicating a gender imbalance that should be considered when generalizing the results. In terms of age, the 30–45 age group had the highest proportion (49%), followed by those under 30 (38%) and over 45 (13%), reflecting the majority of guests being of working age. Regarding occupation, self-employed/other workers accounted for 42.5%, factory workers/civil servants 33.5%, and students 24%, showing a diverse sample but leaning towards the employed group. Regarding income, those earning under 10 million VND accounted for 46%, 10–20 million VND 32.5%, and over 20 million VND 21.5%, suggesting the majority of guests belong to the middle-to-upper income range, consistent with the spending patterns of homestays.

### 4.2. Descriptive statistical analysis of factors

Table 3 shows that the average scores of the factors ranged from 2.820–3.311, with FAC being the highest ( $M = 3.311$ ) and EXP the lowest ( $M = 2.820$ ), implying that tourists rated the facilities relatively better than other aspects. The correlation matrix shows that SAT has

a significant positive correlation with ATT ( $r = 0.349$ ;  $p < 0.01$ ), FAC ( $r = 0.312$ ;  $p < 0.01$ ), VAL ( $r = 0.282$ ;  $p < 0.01$ ) and EXP ( $r = 0.392$ ;  $p < 0.01$ ); the strongest correlation is EXP–SAT. Among the independent variables, the correlations were generally low to moderate, notably FAC–VAL ( $r = 0.373$ ;  $p < 0.01$ ) and ATT–FAC ( $r = 0.140$ ;  $p < 0.05$ ). Overall, the correlation coefficients were below the high threshold, suggesting that the risk of multicollinearity is not significant and is suitable for further CFA/SEM analysis.

**Table 3. Descriptive statistics and correlation matrix (N = 200)**

| Factor | Mean  | SD    | ATT     | FAC     | VAL     | EXP     | SAT   |
|--------|-------|-------|---------|---------|---------|---------|-------|
| ATT    | 3.283 | 0.684 | 1.000   |         |         |         |       |
| FAC    | 3.311 | 0.814 | 0.140*  | 1.000   |         |         |       |
| VAL    | 2.857 | 0.739 | -0.004  | 0.373** | 1.000   |         |       |
| EXP    | 2.820 | 0.833 | 0.063   | 0.063   | 0.037   | 1.000   |       |
| SAT    | 2.870 | 0.712 | 0.349** | 0.312** | 0.282** | 0.392** | 1.000 |

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

Source: Author's calculations

### 4.3. Goodness of Fit Indexes of the Confirmatory Factor Analysis (CFA) Model

**Table 4. CFA Model Fit Indices**

| Fit index           | Value         | Threshold   | Assessment |
|---------------------|---------------|-------------|------------|
| $\chi^2(\text{df})$ | 204.123 (142) | —           | —          |
| CFI                 | 0.959         | $\geq 0.90$ | Good       |
| TLI                 | 0.951         | $\geq 0.90$ | Good       |
| RMSEA               | 0.047         | $\leq 0.08$ | Good       |
| PCLOSE              | 0.076         | $\geq 0.05$ | Good       |
| SRMR                | 0.055         | $\leq 0.08$ | Good       |

Source: Author's calculations

Table 4 shows that the Convergent Model (CFA) has a good fit to the data: CFI = 0.959 and TLI = 0.951 both exceed the recommended threshold  $\geq 0.90$ . The approximate error index RMSEA = 0.047 and SRMR = 0.055 are both below the threshold  $\leq 0.08$ , reflecting small bias and good model description of the data. The PCLOSE value = 0.076  $\geq 0.05$  supports the hypothesis of small RMSEA (approximate fit). Although  $\chi^2(142) = 204.123$  may be sensitive to sample size, the composite indices are consistent showing that the convergent model is satisfactory. Therefore, the model is eligible to continue with reliability/convergent validity assessment and structural model testing (SEM).

### 4.4. Reliability and convergence validity of structures

**Table 5. Reliability and Convergence Validity**

| Factor | No of items | Cronbach's $\alpha$ | CR    | AVE   |
|--------|-------------|---------------------|-------|-------|
| ATT    | 4           | 0.798               | 0.798 | 0.502 |
| FAC    | 4           | 0.830               | 0.842 | 0.574 |
| VAL    | 4           | 0.826               | 0.826 | 0.544 |
| EXP    | 4           | 0.859               | 0.860 | 0.607 |
| SAT    | 3           | 0.776               | 0.779 | 0.541 |

Source: Author's calculations

Table 5 shows that all scales achieved good reliability, with Cronbach's  $\alpha$  ranging from 0.776 – 0.859 (all  $\geq 0.70$ ). The composite reliability CR of the constructs was in the range of 0.779 – 0.860, meeting the recommended threshold of  $\geq 0.70$ . Convergent

validity was also ensured with AVE reaching 0.502 - 0.607 (all  $\geq 0.50$ ), indicating that the observed variables adequately explain the variance of the latent construct. Overall, the measurement model met the requirements for reliability and convergent validity, qualifying it for discriminant validity assessment and SEM testing.

#### 4.5. Discriminant Validity (HTMT)

Table 6. Discriminant Validity

|     | ATT   | FAC   | VAL   | EXP   | SAT   |
|-----|-------|-------|-------|-------|-------|
| ATT | 1.000 |       |       |       |       |
| FAC | 0.172 | 1.000 |       |       |       |
| VAL | 0.091 | 0.447 | 1.000 |       |       |
| EXP | 0.138 | 0.112 | 0.085 | 1.000 |       |
| SAT | 0.439 | 0.396 | 0.352 | 0.481 | 1.000 |

Source: Author's calculations

Table 6 shows that the HTMT coefficients between pairs of structures range from 0.085–0.481, all lower than the threshold of 0.85, thus confirming the discriminant validity of the scale. The highest HTMT level is between EXP - SAT (0.481) and ATT - SAT (0.439), indicating that the structures are reasonably related but still clearly distinguishable. The remaining pairs have relatively low HTMT (e.g., VAL - EXP = 0.085), suggesting negligible conceptual overlap. Overall, the measurement model meets the requirements for discriminant validity and is eligible for SEM structural model testing.

#### 4.6. Structural Model and Hypothesis Testing

After the measurement model met the criteria for reliability and validity (CFA), the study proceeded to estimate the structural model (SEM) to test hypotheses H1 - H4. First, the overall fit of the SEM model was assessed through the indices  $\chi^2/df$ , CFI, TLI, RMSEA, PCLOSE, and SRMR. The results of the model fit indices are presented in Table 7, serving as the basis for interpreting the impact coefficients and drawing hypothesis conclusions in Table 8.

Table 7. SEM Model Fit Index

| Fit index    | Value         | Threshold   | Assessment |
|--------------|---------------|-------------|------------|
| $\chi^2(df)$ | 204.123 (142) | —           | —          |
| CFI          | 0.958         | $\geq 0.90$ | Good       |
| TLI          | 0.950         | $\geq 0.90$ | Good       |
| RMSEA        | 0.047         | $\leq 0.08$ | Good       |
| PCLOSE       | 0.625         | $\geq 0.05$ | Good       |
| SRMR         | 0.055         | $\leq 0.08$ | Good       |

Source: Author's calculations

Table 7 shows that the SEM model achieved a good fit with the data: CFI = 0.958 and TLI = 0.950 both exceeded the threshold  $\geq 0.90$ . The approximate error index RMSEA = 0.047 and SRMR = 0.055 are both lower than 0.08, reflecting a small bias and good model description of the data. PCLOSE = 0.625  $\geq 0.05$  supports the hypothesis of small RMSEA, indicating a satisfactory approximate fit. Overall, the consistent indices confirm that the structural model is suitable and qualified to interpret the effector coefficients.

Table 8 shows that all four hypotheses H1–H4 are supported ( $p < 0.05$ ), confirming that service factors

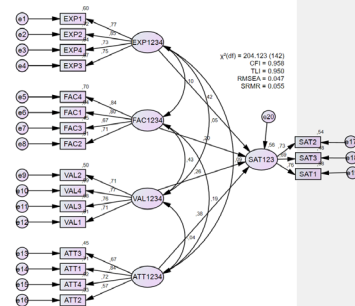
have a positive impact on satisfaction. EXP  $\rightarrow$  SAT has the strongest impact ( $\beta = 0.425$ ;  $p < 0.001$ ), followed by ATT  $\rightarrow$  SAT ( $\beta = 0.391$ ;  $p < 0.001$ ) and VAL  $\rightarrow$  SAT ( $\beta = 0.264$ ;  $p = 0.002$ ). The impact of FAC  $\rightarrow$  SAT is the smallest but still significant ( $\beta = 0.182$ ;  $p = 0.029$ ), indicating that physical facilities remain an important condition for satisfaction. The  $R^2(\text{SAT})$  value of 0.552 shows that the model explains approximately 55.2% of the variation in satisfaction, reflecting a fairly strong explanatory power. The results suggest prioritizing the enhancement of local experiences and service attitudes, while reinforcing perceived value and maintaining the quality of facilities.

Table 8. Structural Model Results

| Hypothesis                | Paths                 | $\beta$ | S.E.  | p-value | Conclusion |
|---------------------------|-----------------------|---------|-------|---------|------------|
| H1                        | ATT $\rightarrow$ SAT | 0.391   | 0.057 | <0.001  | Support    |
| H2                        | FAC $\rightarrow$ SAT | 0.182   | 0.063 | 0.029   | Support    |
| H3                        | VAL $\rightarrow$ SAT | 0.264   | 0.076 | 0.002   | Support    |
| H4                        | EXP $\rightarrow$ SAT | 0.425   | 0.055 | <0.001  | Support    |
| $R^2(\text{SAT}) = 0.552$ |                       |         |       |         |            |

Source: Author's calculations

Figure 2: Structural Equation Model (SEM) with standardized path coefficients



Note: The structural model was estimated using SEM in R (lavaan and lavaan survey packages), and the diagram was visualized using IBM SPSS AMOS for clarity.

Figure 2 illustrates the SEM model with normalized path coefficients, consistent with the results in Tables 7 and 8. The impact curves from EXP, ATT, VAL, FAC to SAT all have positive signs, with EXP  $\rightarrow$  SAT being the strongest, followed by ATT  $\rightarrow$  SAT, and FAC  $\rightarrow$  SAT being the weakest. The model explains 55.2% of the variation in satisfaction ( $R^2(\text{SAT}) = 0.552$ ), indicating a fairly good explanatory power.

#### 5. Discussion

The SEM results show that the model has a good fit and explains 55.2% of the variation in satisfaction ( $R^2 = 0.552$ ), implying that the four groups of service factors selected have a fairly strong explanatory power for the homestay experience in Moc Chau. Notably, Local Experience (EXP) has the strongest impact on satisfaction ( $\beta = 0.425$ ). This result is consistent with the argument that the core differentiating value of homestays lies in the “local” experience and the sense of authenticity, the level of participation in local activities, thereby enhancing the overall experience quality (Lu et al., 2015; Basak et al., 2021). At the same time, the fact that EXP has the lowest average score among the factors

( $M = 2.820$ ) but has the strongest impact shows that it is an important “lever” for improvement: if the quality/attractiveness of the local experience is improved, the expected increase in satisfaction will be significant.

Attitude towards service (ATT) had the second strongest impact ( $\beta = 0.391$ ), highlighting the role of human interaction in the homestay context. This finding is consistent with results from online review data: communication, support, and the behavior of hosts/staff are often sources of satisfaction (and also sources of dissatisfaction when weak) in shared accommodation (Ding et al., 2021). In the Vietnamese context, evidence from rural homestays also shows that positive experiences are closely linked to the attitude and hospitality of the host family (Quang et al., 2024). Thus, investing in service standards and the responsiveness of hosts/staff is a direct, relatively inexpensive but clearly effective approach.

Perceived Value (VAL) has a moderate impact ( $\beta = 0.264$ ), supporting the view that satisfaction increases when tourists perceive it as “worth the money” and that costs are transparent (Zeithaml, 1988). This result is also consistent with evidence in the context of community homestays: perceived value is an important predictor of satisfaction (Rasoolimanesh et al., 2016). In Moc Chau, the average VAL is still relatively low ( $M=2.857$ ), indicating significant room for improvement through price transparency, service packages, and enhancing “value-for-money”.

Finally, Facilities (FAC) has the smallest but still significant impact ( $\beta = 0.182$ ). This suggests that facilities play a background condition role: when acceptable, the marginal impact on satisfaction may be lower than that of experience and interaction; but if not, it can easily lead to a decrease in rating. Combined with the descriptive results (FAC had the highest average score), it can be understood that the “material” aspect was relatively stable, while the differentiating factors (EXP, ATT) had a stronger influence on satisfaction.

## 6. Conclusion and Implications

### 6.1. Conclusion

The study tested a one-level SEM model of service factors affecting tourist satisfaction (SAT) when experiencing homestays in Moc Chau ( $n=200$ ). The results showed that all four factors had a positive and significant impact on satisfaction; the impact, in decreasing order, was Local Experience (EXP), Service Attitude (ATT), Perceived Value (VAL), and Facilities (FAC). The model explained 55.2% of the variation in satisfaction, reflecting its strong explanatory power and its potential for management application.

### 6.2. Management Implications

Prioritize upgrading the local experience (the strongest lever): standardize the “experience package” (local cuisine, agricultural/lifestyle activities, cultural

exchange), increase authenticity, and design flexible activity schedules according to guest groups.

Standardize service attitudes: training in communication and feedback skills, quick support procedures, and hospitality standards; build “service commitments” and mechanisms for receiving and handling feedback on-site.

Increase perceived value: transparency of prices and surcharges, creating service packages according to budget levels, emphasizing specific benefits “received” (including accompanying experiences) to reinforce value-for-money.

Maintain facilities as a foundation: prioritize hygiene, safety, essential amenities, and conduct regular inspections; avoid allowing minor flaws to accumulate and diminish satisfaction.

### 6.3. Implications for Destination Management

Local management agencies/DMOs can support by: (i) developing minimum criteria for homestays (hygiene, safety, service procedures); (ii) developing local experiential products along routes/chains; (iii) Unified communication guidelines on “Moc Chau local experience” to improve overall quality and increase satisfaction.

### 6.4. Limitations and Directions for Further Research

The study used a non-probability sample and cross-sectional data, so the generalizability is still context-dependent; further studies could expand the sample size, compare by season/tourist group, add outcome variables such as intention to return or word-of-mouth, and test the mediating model (e.g., VAL or EXP mediating between service and satisfaction).

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# ANALYZING THE MULTI-DIMENSIONAL IMPACT OF SERVICE QUALITY ON CUSTOMER SATISFACTION: EVIDENCE FROM A LARGE-SIZED BANK'S MOBILE APP IN VIETNAM

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**Abstract:** *This study examines how mobile banking service quality influences customer satisfaction in the case of a large-sized commercial bank in Vietnam. A structured questionnaire survey of 280 mobile banking users was conducted and analyzed using covariance-based structural equation modeling (SEM). The measurement model demonstrated excellent fit (CFI = 0.978; TLI = 0.974; RMSEA = 0.038; SRMR = 0.039), with satisfactory reliability and convergent validity (Cronbach's  $\alpha$  = 0.808–0.885; CR = 0.809–0.886; AVE = 0.571–0.661) and acceptable discriminant validity (HTMT < 0.85). Structural results show that efficiency ( $\beta$  = 0.290), system availability ( $\beta$  = 0.347), privacy/security ( $\beta$  = 0.221), and digital empathy ( $\beta$  = 0.238) all have positive and significant effects on customer satisfaction ( $p$  < 0.001), explaining 56.6% of its variance ( $R^2$  = 0.566). The findings suggest that large banks should prioritize system reliability and process efficiency while strengthening security assurance and digitally delivered support to enhance customer satisfaction.*

• Keywords: mobile banking, service quality, customer satisfaction, structural equation modeling (SEM), Vietnam commercial banks.

Date of receipt: 07<sup>th</sup> Feb., 2026

Date of delivery revision: 22<sup>th</sup> Feb., 2026

DOI:

Date of receipt revision: 19<sup>th</sup> Mar., 2026

Date of approval: 30<sup>th</sup> Mar., 2026

## 1. Introduction

Mobile banking has become a dominant retail-banking interface, reshaping how customers transact, monitor accounts, and evaluate service encounters. For large commercial banks in Vietnam, the mobile app increasingly functions as a “digital branch,” meaning that competitive advantage depends not only on product offerings but also on the quality of the in-app experience. Prior research shows that customer satisfaction in mobile banking is strongly associated with customers’ evaluations of app-based service performance and the broader digital service ecosystem (Geebren et al., 2021). In particular, customers tend to judge mobile banking through multiple interrelated dimensions, including the efficiency of task completion, system availability and stability, and perceptions of privacy and security factors that are often intertwined rather than independent in shaping users’ overall evaluations (Zhou et al., 2021).

Despite the growing literature, two gaps remain practically important. First, a substantial share of studies continues to focus on adoption intention, while post-adoption satisfaction, a critical antecedent of sustained usage and relationship outcomes, still needs richer empirical explanation across contexts

(Kumar et al., 2024). Second, empirical models frequently treat service quality in a fragmented way (e.g., relying on composite indices or testing a narrow set of predictors), which may mask the joint effects of technical quality (efficiency and system availability), risk-related perceptions (privacy and security), and digitally mediated support or empathy. Evidence from digital banking indicates that service quality dimensions and satisfaction are best understood as a system of latent constructs with simultaneous relationships (Raza et al., 2020).

To address these gaps, this study investigates customer satisfaction with mobile banking in the situation of a large commercial bank in Vietnam and evaluates the relative influence of key service-quality dimensions. Methodologically, the study employs covariance-based Structural Equation Modeling (SEM) to validate the measurement model via confirmatory factor analysis and to estimate structural paths among latent variables while accounting for measurement error. This approach is consistent with recent mobile banking research that uses SEM to examine how service-quality perceptions translate into satisfaction and post-adoption outcomes (Pokhrel & K.C., 2024). By providing latent-variable evidence

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on the determinants of mobile banking satisfaction in a large-bank setting, the study offers actionable priorities for digital service quality improvement and customer experience management.

## 2. Theoretical basis, research overview, and hypothesis development

### 2.1. Efficiency (EFF)

Efficiency reflects how quickly and easily customers can complete core banking tasks via the mobile app (e.g., logging in, navigating features, executing transfers). In mobile banking, higher efficiency reduces user effort and friction, thereby strengthening positive evaluations of the service encounter. Prior evidence indicates that efficiency-related app quality is a significant driver of satisfaction and loyalty intentions in mobile banking settings (Zhou et al., 2021).

### 2.2. System Availability (SYS)

System availability captures the stability and reliability of the mobile banking app, including uptime, responsiveness during peak periods, and error-free transactions. For large banks with high transaction volumes, stable availability is essential because service interruptions can quickly translate into widespread dissatisfaction and complaint escalation. Studies on mobile banking service quality show that system-related performance and reliability are strongly associated with user evaluations and post-adoption outcomes (Pokhrel & K.C., 2024).

### 2.3. Privacy and Security (SEC)

Privacy and security represent customers' perceptions that the app protects personal data and transactions against misuse, fraud, or unauthorized access. In digital banking, security concerns are often a central risk component shaping satisfaction because perceived vulnerability can offset functional convenience. Recent meta-analytic evidence in mobile banking indicates that perceived security and privacy are positively and significantly related to satisfaction across contexts (Kumar et al., 2024).

### 2.4. Digital Empathy (EMP)

Digital empathy refers to customers' perceptions of care, responsiveness, and helpful guidance delivered through digital touchpoints (e.g., timely support, clear instructions, and considerate handling of issues). In mobile banking, empathy signals service commitment and reduces uncertainty when customers face errors, unfamiliar features, or account concerns. Evidence from online/digital banking service research suggests that customer-centric practices often including

responsiveness and empathic support which are associated with higher e-satisfaction and stronger relationship outcomes (Gautam et al., 2023).

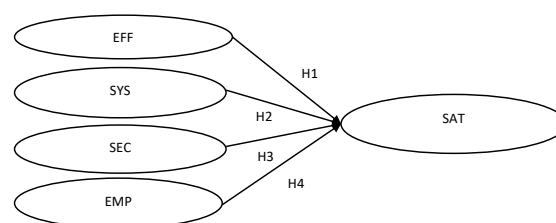
### 2.5. Customer Satisfaction (SAT)

Customer satisfaction is a cumulative evaluation reflecting how well the mobile banking experience meets or exceeds customers' expectations in routine usage. In digital financial services, satisfaction is typically treated as a key post-adoption outcome and a pathway to continuance and loyalty behaviors. Empirical work on mobile banking ecosystems highlights satisfaction as a pivotal outcome shaped by perceived quality and experience factors (Geebren et al., 2021).

### 2.6. Hypothesis development

Integrating the above logic, this study conceptualizes customer satisfaction as an outcome of multiple service-quality dimensions in mobile banking. Technical quality (EFF, SYS) reduces effort and service disruption, risk-related perceptions (SEC) strengthen confidence in transactions, and interactional digital quality (EMP) enhances perceived support and care. Prior SEM-based mobile banking research supports specifying direct paths from service-quality dimensions to satisfaction (Raza et al., 2020).

Figure 1: Research model



H1: Efficiency (EFF) positively affects Customer Satisfaction (SAT).

H2: System Availability (SYS) positively affects Customer Satisfaction (SAT).

H3: Privacy and Security (SEC) positively affects Customer Satisfaction (SAT).

H4: Digital Empathy (EMP) positively affects Customer Satisfaction (SAT).

## 3. Research Methods

### 3.1. Research Design

This study employed a quantitative, cross-sectional research design to examine how mobile banking service-quality dimensions influence customer satisfaction. Data were collected using a structured questionnaire administered to retail customers of a large commercial bank in Vietnam. The proposed

relationships were tested using covariance-based SEM, which is appropriate for simultaneously assessing latent measurement properties and structural paths. This approach aligns with prior mobile banking studies that model satisfaction as a latent outcome influenced by multiple quality dimensions (Geebren et al., 2021).

### 3.2. Survey Subjects, Sampling, and Data Collection

The target population comprised individual customers who had experience using the bank's mobile banking application for routine transactions (e.g., transfers, payments, balance checks). A non-probability (convenience) sampling approach was used due to access constraints typical in bank-customer surveys, while ensuring respondents had actual usage experience. The questionnaire was distributed online/offline (depending on access channels), and responses were screened for completeness and consistency. After data cleaning, 280 valid observations were retained for analysis, which is adequate for SEM estimation in similar mobile banking contexts. The data collection emphasized respondent anonymity and voluntary participation. The study context, a large commercial bank, provides a meaningful setting because high user volumes amplify the managerial importance of service quality and satisfaction. Similar survey-based SEM designs are widely used in mobile banking service-quality research (Pokhrel & K.C., 2024).

### 3.3. Scales and Research Variables

All constructs were operationalized as reflective latent variables measured by multiple observed indicators using a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). Service quality was captured through four dimensions which consist of Efficiency (EFF), System Availability (SYS), Privacy & Security (SEC), and Digital Empathy (EMP) were adapted from established e-banking/m-banking service-quality research streams (Raza et al., 2020; Zhou et al., 2021). Customer Satisfaction (SAT) was measured as an overall evaluative outcome consistent with prior mobile banking satisfaction studies (Geebren et al., 2021).

### 3.4. Data Analysis Process

Data analysis followed a two-stage SEM procedure. First, descriptive statistics and Pearson correlations were computed to summarize construct-level patterns. Second, a confirmatory factor analysis (CFA) was conducted to assess the measurement model, including standardized loadings and model-fit indices. Reliability and convergent validity

were evaluated using Cronbach's alpha, composite reliability (CR), and average variance extracted (AVE), while discriminant validity was assessed via HTMT. Finally, the structural model was estimated to test hypotheses (H1–H4) using standardized path coefficients and explained variance ( $R^2$ ). This sequence is consistent with recent SEM-based mobile banking research focused on service quality and satisfaction (Pokhrel & K.C., 2024).

## 4. Research Results

### 4.1. Descriptive Statistics of Respondents

**Table 1. Demographics of Respondents (n = 280)**

| Factors                  | Frequency | (%)   |
|--------------------------|-----------|-------|
| <b>Gender</b>            |           |       |
| Male                     | 128       | 45.71 |
| Female                   | 152       | 54.29 |
| <b>Marital status</b>    |           |       |
| Single                   | 74        | 26.43 |
| Married                  | 206       | 73.57 |
| <b>Age</b>               |           |       |
| Under 25                 | 53        | 18.93 |
| From 25 to 40            | 142       | 50.71 |
| More than 40             | 85        | 30.36 |
| <b>Residence</b>         |           |       |
| In the North             | 106       | 37.86 |
| In the Central provinces | 76        | 27.14 |
| In the South             | 98        | 35.0  |
| <b>Occupation</b>        |           |       |
| Student                  | 38        | 13.57 |
| Company employee         | 79        | 28.21 |
| State servant            | 91        | 32.50 |
| Other                    | 72        | 25.72 |

Source: Authors' calculation

The respondent profile in Table 1 shows a relatively balanced gender composition, with females accounting for 54.29% and males 45.71%. Most participants are married (73.57%), indicating that the sample largely represents customers with stable household and financial routines. In terms of age, the dominant group is 25–40 years old (50.71%), followed by those above 40 (30.36%), suggesting that the dataset mainly reflects mature, economically active users rather than very young users. Regarding residence, respondents are distributed across regions, with the North (37.86%) and South (35.00%) slightly outweighing the Central provinces (27.14%), supporting geographic diversity within Vietnam. Occupationally, state servants form the largest group (32.50%), followed by company employees (28.21%), while students represent a smaller share (13.57%). Overall, the demographic structure suggests that findings primarily reflect the perceptions of working-age mobile banking users, which is appropriate for examining service quality and satisfaction in a large-bank context. The relatively diversified regional and occupational composition also helps reduce the risk



that results are driven by a single locality or a narrow customer segment.

#### 4.2. Descriptive statistical analysis of factors

**Table 2. Descriptive Statistics and Correlation Matrix (N = 280)**

| Construct | Mean | SD    | EFF     | SYS     | SEC     | EMP     | SAT     |
|-----------|------|-------|---------|---------|---------|---------|---------|
| EFF       | 3.09 | 0.673 |         | 0.298** | 0.210** | 0.251** | 0.442** |
| SYS       | 2.73 | 0.739 | 0.298** |         | 0.298** | 0.232** | 0.487** |
| SEC       | 2.81 | 0.711 | 0.210** | 0.298** |         | 0.153** | 0.380** |
| EMP       | 3.24 | 0.747 | 0.251** | 0.232** | 0.153** |         | 0.383** |
| SAT       | 3.08 | 0.699 | 0.442** | 0.487** | 0.380** | 0.383** |         |

\*\* $p < 0.01$

Source: Authors' calculation

Table 2 indicates that respondents reported moderate evaluations across constructs, with mean scores ranging from 2.73 (SYS) to 3.24 (EMP). System Availability shows the lowest mean ( $M = 2.73$ ,  $SD = 0.739$ ), suggesting relatively weaker perceptions of system stability compared with other dimensions. All correlations are positive and significant at  $p < 0.01$ , supporting the expected direction among service-quality dimensions and satisfaction. Customer Satisfaction is most strongly correlated with System Availability ( $r = 0.487$ ) and Efficiency ( $r = 0.442$ ), followed by Digital Empathy ( $r = 0.383$ ) and Privacy/Security ( $r = 0.380$ ). Overall, the correlation pattern provides preliminary evidence that higher perceived mobile banking service quality is associated with higher customer satisfaction in the studied large-bank context.

#### 4.3. The goodness-of-fit index of the confirmatory factor analysis (CFA)

**Table 3. CFA Model Fit Indices**

| Fit Index | Value | Threshold                        | Conclusion                                      |
|-----------|-------|----------------------------------|-------------------------------------------------|
| CMIN/DF   | 1.400 | $\leq 3.0$ (good: $\leq 2.0$ )   | Good fit                                        |
| p-value   | 0.001 | $\geq 0.05$                      | Not met ( $\chi^2$ is sensitive to sample size) |
| CFI       | 0.978 | $\geq 0.90$ (good: $\geq 0.95$ ) | Excellent fit                                   |
| TLI       | 0.974 | $\geq 0.90$ (good: $\geq 0.95$ ) | Excellent fit                                   |
| RMSEA     | 0.038 | $\leq 0.08$ (good: $\leq 0.06$ ) | Excellent fit                                   |
| SRMR      | 0.039 | $\leq 0.08$                      | Excellent fit                                   |
| PCLOSE    | 0.954 | $\geq 0.05$                      | Close fit supported                             |

Source: Authors' calculation

Table 3 shows that the CFA measurement model fits the data very well. The parsimony index (CMIN/DF = 1.400) indicates a good fit, and the incremental fit indices are excellent (CFI = 0.978; TLI = 0.974). The absolute fit indices also meet stringent criteria (RMSEA = 0.038; SRMR = 0.039), while PCLOSE = 0.954 supports a close-fitting model. Although the chi-square test is significant ( $p = 0.001$ ), this statistic is known to be sensitive to sample size. Overall, the results confirm that the proposed five-construct measurement model is acceptable for subsequent SEM analysis.

#### 4.4. Reliability and convergent validity of structures

**Table 4. Reliability and Convergent Validity**

| Construct | N Items | Cronbach's $\alpha$ | CR    | AVE   |
|-----------|---------|---------------------|-------|-------|
| EFF       | 4       | 0.841               | 0.842 | 0.571 |
| SYS       | 4       | 0.874               | 0.874 | 0.635 |
| SEC       | 4       | 0.854               | 0.855 | 0.597 |
| EMP       | 4       | 0.885               | 0.886 | 0.661 |
| SAT       | 3       | 0.808               | 0.809 | 0.587 |

Source: Authors' calculation

Table 4 confirms strong internal consistency and convergent validity for all constructs. Cronbach's alpha values range from 0.808 to 0.885, exceeding the recommended 0.70 threshold and indicating satisfactory reliability. Composite reliability (CR) values are also high (0.809–0.886), further supporting the stability of the measurement scales. All AVE values are above 0.50 (0.571–0.661), demonstrating adequate convergent validity and suggesting that each construct explains more than half of the variance in its indicators. Overall, the results indicate that the measurement model is reliable and suitable for subsequent structural model testing.

#### 4.5. Discriminant Value (HTMT)

**Table 5. Discriminant Validity (HTMT)**

|     | EFF   | SYS   | SEC   | EMP   | SAT   |
|-----|-------|-------|-------|-------|-------|
| EFF |       | 0.347 | 0.246 | 0.290 | 0.533 |
| SYS | 0.347 |       | 0.343 | 0.262 | 0.577 |
| SEC | 0.246 | 0.343 |       | 0.174 | 0.455 |
| EMP | 0.290 | 0.262 | 0.174 |       | 0.454 |
| SAT | 0.533 | 0.577 | 0.455 | 0.454 |       |

Source: Authors' calculation

Table 5 reports the HTMT ratios used to assess discriminant validity among the study constructs. All HTMT values are well below the commonly accepted threshold of 0.85, indicating that each construct is empirically distinct from the others. The highest HTMT value is 0.577 (SYS–SAT), which remains comfortably within acceptable limits and suggests no problematic overlap. Most other ratios fall in the low-to-moderate range (e.g., 0.174–0.533), further supporting clear construct separation. Overall, the HTMT results confirm adequate discriminant validity for the measurement model, enabling robust interpretation of the subsequent SEM paths.

#### 4.6. Structural model fit indices (SEM)

**Table 6. SEM Model Fit Indices**

| Fit Index | Value | Threshold                        | Conclusion                                      |
|-----------|-------|----------------------------------|-------------------------------------------------|
| CMIN/DF   | 1.417 | $\leq 3.0$ (good: $\leq 2.0$ )   | Good fit                                        |
| p-value   | 0.001 | $\geq 0.05$                      | Not met ( $\chi^2$ is sensitive to sample size) |
| CFI       | 0.977 | $\geq 0.90$ (good: $\geq 0.95$ ) | Excellent fit                                   |
| TLI       | 0.972 | $\geq 0.90$ (good: $\geq 0.95$ ) | Excellent fit                                   |
| RMSEA     | 0.039 | $\leq 0.08$ (good: $\leq 0.06$ ) | Excellent fit                                   |

| Fit Index | Value | Threshold   | Conclusion          |
|-----------|-------|-------------|---------------------|
| SRMR      | 0.039 | $\leq 0.08$ | Excellent fit       |
| PCLOSE    | 0.944 | $\geq 0.05$ | Close fit supported |

Source: Authors' calculation

Table 6 indicates that the structural model demonstrates an excellent overall fit to the data. The parsimony index is acceptable (CMIN/DF = 1.417), and incremental fit indices exceed recommended cutoffs (CFI = 0.977; TLI = 0.972). Absolute fit measures also confirm strong model adequacy (RMSEA = 0.039; SRMR = 0.039), while PCLOSE = 0.944 supports a close-fitting model. Although the chi-square test is significant ( $p = 0.001$ ), this is common in SEM with moderate samples and should be interpreted alongside the other fit indices. Overall, the SEM results provide a sound basis for testing the hypothesized relationships among constructs.

#### 4.7. Structural modeling and hypothesis testing

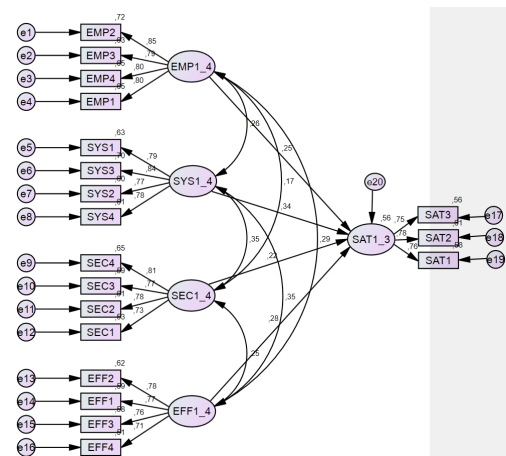
Table 7. Structural Model Results

| Hypothesis                | Path                  | $\beta$ | S.E.  | p-value | Supported |
|---------------------------|-----------------------|---------|-------|---------|-----------|
| H1                        | EFF $\rightarrow$ SAT | 0.290   | 0.113 | <0.001  | Yes       |
| H2                        | SYS $\rightarrow$ SAT | 0.347   | 0.103 | <0.001  | Yes       |
| H3                        | SEC $\rightarrow$ SAT | 0.221   | 0.088 | <0.001  | Yes       |
| H4                        | EMP $\rightarrow$ SAT | 0.238   | 0.096 | <0.001  | Yes       |
| $R^2(\text{SAT}) = 0.566$ |                       |         |       |         |           |

Source: Authors' calculation

Table 7 presents the SEM structural results and hypothesis tests for the proposed model. All four service-quality dimensions have positive and statistically significant effects on customer satisfaction ( $p < 0.001$ ), indicating strong empirical support for H1–H4. Among the predictors, System Availability (SYS) exerts the strongest impact on SAT ( $\beta = 0.347$ ), highlighting the critical role of system stability and uninterrupted access in mobile banking. Efficiency (EFF) is the second strongest driver ( $\beta = 0.290$ ), suggesting that quick and effortless task completion materially enhances satisfaction. Digital Empathy (EMP) ( $\beta = 0.238$ ) and Privacy/Security (SEC) ( $\beta = 0.221$ ) also contribute meaningfully, implying that supportive digital interactions and perceived protection jointly shape users' evaluations. The model explains a substantial proportion of satisfaction variance ( $R^2 = 0.566$ ), indicating good explanatory power for a behavioral outcome in a service setting. Overall, the findings suggest that large banks should prioritize system reliability and transaction efficiency while simultaneously strengthening security assurances and customer-support responsiveness. These results provide coherent evidence that improving mobile banking service quality can translate into higher customer satisfaction in the studied context.

Figure 2: Structural Equation Modeling (SEM) with standardized Path Coefficients



Note: The diagram was visualized using IBM SPSS AMOS for clarity in presentation.

Figure 2 visualizes the SEM results with standardized coefficients for both the measurement and structural components. The four latent service-quality constructs (EFF, SYS, SEC, and EMP) are specified as reflective factors measured by their corresponding observed indicators, all showing satisfactory standardized loadings. The structural paths indicate positive effects from EFF, SYS, SEC, and EMP on customer satisfaction (SAT), consistent with the hypothesized model. Correlations among the exogenous latent constructs are also presented, capturing the interrelated nature of service-quality perceptions in mobile banking. Overall, the diagram illustrates that the model explains a substantial proportion of variance in SAT, supporting the adequacy of the proposed framework.

#### 5. Discussion

The SEM results provide clear evidence that mobile banking service quality is a strong antecedent of customer satisfaction in a large-bank context, explaining 56.6% of the variance in SAT ( $R^2 = 0.566$ ). The most influential predictor is System Availability ( $\beta = 0.347$ ), suggesting that stability, uptime, and error-free performance are the most salient drivers of satisfaction when customers rely on mobile apps for frequent, high-volume transactions. This finding aligns with prior mobile banking research emphasizing the centrality of system-related quality for favorable user evaluations and post-adoption outcomes (Minh & Nam, 2023).

Efficiency is the second strongest predictor ( $\beta = 0.290$ ), indicating that fast, effortless task completion meaningfully enhances satisfaction, particularly

relevant for large banks where customer segments are diverse and expectations for convenience are high. Similar patterns have been documented in digital banking service-quality studies, where functional performance and ease-of-use features substantially shape e-satisfaction (Kumalasari et al., 2022).

Both Digital Empathy ( $\beta = 0.238$ ) and Privacy/Security ( $\beta = 0.221$ ) are also significant ( $p < 0.001$ ), implying that “humanized” digital support (guidance, responsiveness) and confidence in data/transaction protection jointly contribute to customer satisfaction. This is consistent with evidence that satisfaction in mobile banking ecosystems is reinforced by relational mechanisms and trust-related perceptions, not only by technical performance (Khan et al., 2021). The significance of security-related perceptions also mirrors broader syntheses showing security/privacy as reliable correlates of satisfaction across mobile banking contexts (Adiningtyas & Auliani, 2024).

Managerially, the pattern of effects suggests a clear prioritization logic for large banks: first, ensure system reliability and availability at scale; second, optimize process efficiency for key journeys (login, transfers, payments); and third, strengthen security assurance and digitally delivered support to sustain satisfaction and reduce service recovery burdens. The results are also in line with recent mobile banking studies using SEM to demonstrate that service-quality improvements translate into satisfaction and post-adoption outcomes (Pokhrel & K.C., 2024).

## 6. Conclusion and Implications

This study examined how key dimensions of mobile banking service quality influence customer satisfaction in the context of a large commercial bank in Vietnam, using covariance-based SEM. The results confirm that the proposed model fits the data well and that all hypothesized relationships are supported. Specifically, Efficiency, System Availability, Privacy/Security, and Digital Empathy each exert a positive and statistically significant effect on Customer Satisfaction ( $p < 0.001$ ). Collectively, these factors explain a substantial proportion of satisfaction variance ( $R^2 = 0.566$ ), indicating that service-quality perceptions are powerful determinants of customer satisfaction in a large-bank mobile banking environment.

From a managerial perspective, the findings suggest a clear set of priorities for banks seeking to strengthen mobile banking satisfaction. First, System Availability shows the strongest effect, implying that investments in infrastructure resilience, uptime management, peak-load handling, and error reduction should be treated

as top priorities. Second, Efficiency also has a strong impact, highlighting the importance of streamlining customer journeys (e.g., login, transfers, bill payments), reducing processing time, and improving user interface clarity to minimize effort and friction. Third, Privacy and Security remains a significant contributor, indicating that banks should continuously enhance authentication, fraud monitoring, and transparent communication about data protection to reinforce customer confidence. Finally, the significance of Digital Empathy underscores that satisfaction is not driven solely by technical performance; responsive support, clear guidance, and considerate service recovery via digital channels are essential for sustaining positive customer experiences.

Theoretically, the study contributes by validating a multi-dimensional service-quality framework for mobile banking satisfaction in an emerging-market, large-bank setting, while demonstrating the usefulness of SEM for jointly assessing measurement quality and structural effects among latent constructs. Practically, the results provide actionable insights for digital service quality management: banks can improve satisfaction most effectively by prioritizing system reliability and functional efficiency, while simultaneously strengthening security assurance and digitally delivered support. Future research could extend this work by using multi-bank samples, incorporating longitudinal data to capture satisfaction dynamics over time, and examining downstream outcomes such as continuance intention, loyalty, or word-of-mouth to further clarify the strategic value of mobile banking service quality.

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# RESEARCH ON THE RELATIONSHIP BETWEEN SOCIAL WELFARE POLICIES AND SOCIAL DISEASES IN THE CURRENT VIETNAMESE CONTEXT

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**Abstract:** *This study synthesizes empirical evidence from both domestic and international sources to develop an analytical framework for the relationship between social protection policies and social disorders in the current Vietnamese context, including social disorders such as postpartum depression (PPD). Through systematic searching of online databases and screening according to predefined criteria, 37 studies out of a total of 96 initial studies were selected for analysis. The results show that perceived social support has a significant impact on the risk of developing PPD symptoms, with support from family and partners playing a prominent role as a crucial protective factor. However, the existing evidence remains scattered and incomplete, indicating the need for more in-depth studies to clarify the mechanisms of impact and propose appropriate intervention implications for the Vietnamese context.*

• Keywords: *postpartum depression, social support, perceived social support, symptoms.*

Date of receipt: 07<sup>th</sup> Feb., 2026

Date of delivery revision: 22<sup>th</sup> Feb., 2026

DOI:

Date of receipt revision: 19<sup>th</sup> Mar., 2026

Date of approval: 30<sup>th</sup> Mar., 2026

## 1. Introduction

Postpartum depression (PPD) is a typical mental illness, which is defined by the development of depressive symptoms in four weeks of childbirth (Wisner et al., 2010) or in the first six postpartum weeks, as the World Health Organization (2022) claims. Despite the traditional perspective on it as an early postpartum situation, the symptoms of depression can continue well beyond this time by continuing into the first and even second years of the older child (Cornish et al., 2005). PPD has an estimated global prevalence of over one in ten women in the first year of the postnatal period and is generally considered to be the most common postnatal complication. As a result, the last few years have seen a growing interest in determining the prevalence patterns and changeable risk factors to become more effective in terms of detection and prevention methods at an early stage (Nguyen et al., 2023).

Although postpartum depression can be treated through medical or pharmacological therapies, many women remain undiagnosed or inadequately treated, particularly in developing countries such as Vietnam. Moreover, while pharmacological interventions can be effective, they are not always ideal for breastfeeding mothers because medications may pass into breast milk and potentially affect infants (Stephens et al.,

2016). Consequently, preventive measures and early interventions become more feasible and appropriate strategies for managing PPD among postpartum women. In this context, social support emerges as a crucial protective factor that not only reduces the risk of developing depressive symptoms but also facilitates psychological recovery after childbirth. Empirical evidence consistently shows that low levels of social support are strongly associated with higher rates of PPD, regardless of cultural or socio-economic differences (Seymour-Smith et al., 2021).

The more recent research has been conceptualising social support in a multidimensional way making a distinction between structural sources (e.g., family members, partners, friends, and significant others) and functional components (e.g., emotional, instrumental, and informational support). This kind of differentiation enables one to further comprehend which aspects of support have the most protective properties against maternal mental health. However, despite the increasing literature on the association of social support and PPD, there is still no exhaustive synthesis of these dimensions, especially in the Vietnamese context. To cover this gap, the current systematic review is an amalgamation of Vietnamese and international research evidence to investigate the association between social support and postpartum depressive symptoms.

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The research questions that guide this review are the following:

RQ1: What is the evidence of the studies exploring the connections between social support and postpartum depression?

RQ2: What are the gaps in the literature about the associations between social support and postpartum depression?

## 2. Research Method

### 2.1. Literature Search

The literature search was conducted across ScienceDirect, Web of Science, Google Scholar, MEDLINE, CINAHL, PubMed, and EBSCOhost. To maximize coverage, we also performed manual searching by screening the reference lists of relevant articles to identify additional eligible studies. The search terms were constructed around the core constructs of the review and combined using Boolean operators, including: “postpartum depression” or “postpartum depressive symptoms” and “social support” (including “perceived social support”), with limits applied for publication years (2018-2025) and language (English or Vietnamese). Studies were eligible even when a formal clinical diagnosis was not reported, provided that postpartum depressive symptoms were assessed using validated measurement instruments and aligned with the aims of the review.

All retrieved records were exported to a reference management file and duplicates were removed prior to screening. The remaining records were screened by title and abstract, and potentially eligible articles were then assessed through full-text review. After this eligibility assessment, 96 articles met the initial inclusion criteria. Because multiple papers sometimes reported results from the same underlying study, overlapping reports were merged; as a result, a final total of 37 independent studies were retained and included in the synthesis.

### 2.2. Inclusion and Exclusion Criteria

**Table 1. Inclusion and Exclusion Criteria for Eligible Studies**

| Criteria            | Inclusion                                                                                                                                                 | Exclusion                                                                         |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Type of publication | Peer-reviewed journal articles; studies using secondary data; indexed conference proceedings (domestic & international); national health research reports | Theses (undergraduate, master's, doctoral); non-indexed conference proceedings    |
| Study sample        | Women with childbirth experience                                                                                                                          | Men; women not yet given birth or currently pregnant; children; other populations |
| Research content    | Relationship between two factors: social support, postpartum depressive symptoms                                                                          | Relationship between other factors                                                |
| Publication period  | 2018 - 2025                                                                                                                                               | Before 2018                                                                       |

Source: Authors (2026)

### 2.3. Study Selection Process

After retrieving, all the selected studies were systematically coded based on the predetermined

criteria: (1) bibliographic details; (2) sample aspects; (3) study design; (4) research purposes or hypotheses; (5) measurements of social support; (6) instruments used to measure postpartum depression and (8) key findings and estimated effects. The studies were independently screened and coded by five separate reviewers and cross-checking practices had been introduced to guarantee consistency and accuracy. The agreement of the inter-reviewers was over 99%, which means that the selection of the studies and the extraction of their data were both very reliable.

## 3. Results

Across the included literature, social support consistently functions as a protective factor against postpartum depressive symptoms. Such a trend is also repeatedly evident in the Vietnamese literature and also supported by the various international settings, such as South Korea (Kim et al., 2023), Japan (Yamada et al., 2020), and also multiple countries in the Middle East, Africa, and South Asia (Amer et al., 2024). The literature conceptualises social support primarily through two perspectives: structural support (sources) and functional support (types).

### 3.1. Structural social support

We identified 21 quantitative studies reporting longitudinal associations between perceived social support and PPD outcomes. Despite methodological variation, findings consistently show an inverse relationship between perceived social support and depressive symptoms, indicating protective and predictive potential for PPD risk.

Synthesised evidence suggests social support influences PPD through direct and indirect mechanisms. In terms of direct effects, 16 out of 21 studies recognise social support as an independent protective factor, including those that investigated confounders and validated independence. Besides that, the Multidimensional Scale of Perceived Social Support (MSPSS) is the most common instrument (12 of 21 studies). Support sources are typically grouped into (1) family, (2) significant others and (3) friends. Alternative measures largely map onto these categories; for example, the Hopkins Social Support Scale differentiates biological/in-law parents under family, while “spouse” or “intimate partner” is operationalised as significant others (Hajipoor et al., 2021). Results are synthesised below using these MSPSS-aligned sources.

#### (1) Family support and postpartum depression

Family support is the strongest and most consistent protective factor against PPD. Most studies report a direct inverse association between perceived family support and depressive symptom severity. Women reporting stronger support from husbands, parents, or

in-laws show significantly lower risk of developing or sustaining PPD.

Vietnamese evidence likewise suggests family relationships are critical. High agreement on “lack of family support” (94.0%) indicates its importance for psychological well-being (Vu, 2024). Adolescent mothers show 15.1% PPD prevalence without family childcare support, increasing to 22.7% with insufficient postpartum family support (Nguyen & Bui, 2024). However, non-significant findings also appear: spousal help with chores/childcare was not significantly associated with depression risk ( $p > 0.05$ ) in Nguyen et al. (2024), and within one week postpartum, family support and internal conflict sometimes showed limited psychological association (Nguyen & Nguyen, 2023). Moreover, cross-national differences likely reflect sociocultural context and family structure (multigenerational vs nuclear). In Japan, where over 80% of child-rearing families are nuclear, lack of extended-family support may increase depression risk (Yamada et al., 2021). In China, Taiwan, Hong Kong, Singapore, and Vietnam, “doing the month” increases reliance on relatives during a 30-day confinement period (Xiao et al., 2024; Tran, 2018).

### *(2) Significant other support and postpartum depression*

“Significant others” is the most common term that refers to husbands or intimate partners, though some studies have adopted a wider context and included anyone that they trust. Most of the studies have found a strong inverse relation between the support provided by the significant other and postpartum depression, with family support often being the most protective factor in general. The moderate negative correlations include the effect sizes reported as  $r = -0.332$  ( $p < 0.01$ ) (Akbari et al., 2020). In addition, a series of studies have found indirect mechanisms by which significant other support has an impact on postpartum mental health. Acoba (2024) found significant mediation through stress: higher support reduced stress ( $a = -0.12$ ,  $p = 0.01$ ), and lower stress reduced depression ( $b = 0.48$ ,  $p = 0.000$ ).

When “significant others” are explicitly defined as partners, protective effects are pronounced. Yamada et al. (2021) reported that lack of partner support increased PPD risk 3.13 times (95% CI: 2.11–4.63), and Kim et al. (2023) found significant other support was negatively associated with PPD at 6–12 months postpartum, suggesting partner support may remain critical later in the first postpartum year.

### *(3) Friend support and postpartum depression*

Friend-based support shows weaker and less consistent associations with PPD, often depending on other support sources. Several studies report non-

significant associations after controlling confounders. Hajipoor et al. (2021) found negligible correlation ( $r = -0.007$ ,  $p = 0.907$ ), and Kim et al. (2023) found no significant relationship at any postpartum timepoint ( $p > 0.05$ ). However, peer-based interventions suggest friend support can reduce depressive symptoms: Neill et al. (2019) reported improvements in the MSPSS “Friends” subscale strongly linked to lower depression ( $r = 0.56$ ,  $p < 0.01$ ), with this subscale increasing 50% more than others.

### *3.2. Functional social support*

Nine quantitative studies examined functional social support, and all confirmed that social support protects against postpartum depressive symptoms (Zheng et al., 2022; Lee & Hung, 2022). Eight studies reported direct inverse relationships, identifying social support as both protective and predictive; risk increased substantially among women with insufficient support (Holicky et al., 2024; Pao et al., 2019). One study extended analysis using neuroimaging, showing perceived social support moderated biological risk via brain connectivity (Cheng et al., 2022).

Cohen and Wills’ (1981) buffering hypothesis was seldom utilised explicitly; however, numerous studies embody its conceptual framework. Functional support is typically grouped into instrumental, emotional, and informational support, which is operationalised by instruments such as MOS-SSS (Pao et al., 2019) and BSSS (Zyrek et al., 2024).

#### *(1) Instrumental support and postpartum depression*

Instrumental (tangible) support includes practical assistance such as household chores, childcare, and financial help. Evidence shows strong inverse associations with PPD risk; women with low instrumental support have roughly three times higher odds of depressive symptoms ( $aOR = 3.1$ ) (Holicky et al., 2024). Higher instrumental support is associated with lower stress at six months and reduced likelihood of positive PPD screening ( $OR = 0.67$ ) and postpartum anxiety ( $OR = 0.64$ ) (White et al., 2023).

Effects vary by culture and demographics. Among Latina mothers, instrumental support predicted outcomes for Spanish-speaking but not English-speaking mothers (Corona et al., 2023). Pao et al. (2019) reported disparities across groups: 84.7% of White women reported high instrumental support compared to 58.7% of Asian women. Holicky et al. (2024) found higher support among married women, those with planned pregnancies, ages 30–34, and higher education; low support was more common among women under 25, with lower education, unmarried, using Medicaid, or with unplanned pregnancies. Instrumental support effects may also diminish over time: associations observed at



6 months ( $p < 0.001$ ) were no longer significant at 12 months (Corona et al., 2023).

### *(2) Emotional support and postpartum depression*

Emotional support includes empathy, reassurance, encouragement, and listening. It is consistently associated with reduced PPD risk (Pao et al., 2019). Holicky et al. (2024) discovered that insufficient partner emotional support correlated with a 2.5-fold increase in the risk of depressive symptoms. Emotional support may show sustained protective effects even when other supports decline. In Latina samples, emotional support diminished stress at both 6 months ( $p = 0.01$ ) and 12 months ( $p = 0.01$ ), whereas instrumental and informational support ceased to be significant at 12 months (Corona et al., 2023).

Interaction effects suggest emotional support is particularly protective when instrumental support is low: emotional support reduced PPD risk ( $OR = 0.48$ , 95%  $CI = 0.36-0.63$ ) and bonding disorders ( $OR = 0.49$ , 95%  $CI = 0.34-0.71$ ) specifically among those reporting low instrumental support (White et al., 2023). Cultural moderation patterns are similar to instrumental support; effects were stronger for Spanish-speaking mothers ( $B = -0.04$ ,  $p = 0.002$ ) and for recent immigrants, diminishing with longer residency (Corona et al., 2023).

### *(3) Informational support and postpartum depression*

Informational support involves advice, guidance, and referrals to specialised services. It generally acts as a protective factor, though effects appear weaker and time-sensitive. Informational support was associated with reduced perceived stress at six months postpartum ( $p = 0.03$ ) among Latina women, but effects were moderated by years in the U.S.; significant associations appeared primarily among mothers who had lived in the U.S. for less than eight years (Corona et al., 2023). Park et al. (2021) reported informational support had the weakest inverse correlation with PPD ( $r = -0.27$ ;  $p < 0.001$ ). Long-term sustainability is uncertain, as informational support was not significantly associated with distress at 12 months (Corona et al., 2023).

## **4. Discussion**

This systematic review identifies modifiable protective factors against postpartum depression (PPD) that align with established theoretical frameworks, particularly the stress-coping theory (Lazarus & Folkman) and the stress-buffering hypothesis (Cohen & Wills). Across the included studies, PPD was clearly distinguished from broader perinatal depression, and postpartum psychosis was excluded, ensuring conceptual precision. The findings consistently emphasize the importance of conceptualizing social

support as a multidimensional construct encompassing both structural and functional components.

Structurally, insufficient support from husbands or intimate partners and family members was associated with the highest risk of PPD in Vietnam and other Asian contexts (Nguyen et al., 2024; Yamada et al., 2020). These results suggest that interventions should prioritise strengthening close interpersonal relationships rather than relying solely on peer or community-level support. Among functional dimensions, instrumental support emerged as particularly critical during the first postpartum month, when mothers face intense practical demands related to sleep deprivation, newborn care, and cognitive overload. Interventions facilitating shared childcare, domestic assistance, and adequate maternal rest may therefore yield immediate reductions in stress and vulnerability to depressive symptoms. Emotional support also plays a vital role by enhancing maternal self-efficacy, mitigating negative self-evaluation, and reducing feelings of isolation, especially in sociocultural contexts characterised by high expectations of motherhood.

Several studies highlighted timing effects, indicating that support-based interventions should begin in late pregnancy and extend through the first three months postpartum, a period of heightened psychological vulnerability. A common decline in perceived support following hospital discharge underscores the importance of discharge planning, psychoeducation, and early follow-up initiated within healthcare settings (Kim et al., 2023; Tran, 2018). Ensuring continuity of care during the transition from hospital to home may prevent erosion of support at a critical stage. Importantly, inadequate support affects not only maternal mental health but also partner well-being, family functioning, and early child development.

Partner involvement emerged as a central determinant of maternal outcomes, as limited participation in caregiving and emotional reassurance was strongly linked to increased maternal stress and PPD risk. Effective interventions should therefore actively engage husbands or intimate partners and equip them with practical caregiving skills and emotional responsiveness (Kim et al., 2023). While support from in-laws can be beneficial, it may also generate conflict or reduce maternal autonomy, highlighting the need for family-based programs that promote communication, role clarity, and respect for maternal agency. Strengthening early postpartum support may also protect mother-infant bonding and promote favorable child developmental outcomes.

Methodological heterogeneity across studies, particularly in measuring social support, reflects broader challenges in cross-cultural research. Widely

used instruments such as the Multidimensional Scale of Perceived Social Support and the Medical Outcomes Study Social Support Survey were frequently adapted to local contexts, underscoring the need for culturally sensitive measurement tools. From a clinical perspective, these findings call for a shift from a purely structural view of support toward a functional, mother-centered approach that prioritizes the subjective experience of being supported (Acoba et al., 2024). Community-based services and digital follow-ups may help sustain support after discharge.

These implications are especially salient in Vietnam, where declining fertility rates and negative postpartum experiences may influence future reproductive decisions. Framing postpartum mental health support as essential family infrastructure rather than solely individual care may enhance acceptability and effectiveness. Addressing gaps in instrumental support may also require collaboration with employers and policymakers to expand parental leave, workplace lactation support, and childcare provision.

### 5. Limitations of the review

Several limitations should be considered. First, methodological heterogeneity limited comparability and prevented meta-analysis. Studies used more cross-sectional designs, EPDS cut-offs, follow-up periods, and more than ten social support instruments. This heterogeneity limited subgroup comparisons and moderator analyses. Cross-sectional dominance also restricts causal inference and limits control of confounders such as pre-pregnancy mental health, socioeconomic conditions, culture, and obstetric complications.

Second, publication bias is possible because null findings are less likely to be published; thus, protective effects may be overestimated. Searches were limited to peer-reviewed English and Vietnamese publications, excluding grey literature and potentially relevant work in non-indexed Vietnamese journals or other languages.

### 6. Future research

Future research should prioritise (1) longitudinal designs to clarify bidirectional social support-PPD relationships and determine when social support functions as risk factor versus symptom; (2) deeper focus on functional support, which appears more consistently protective, and examination of how dimensions interact over postpartum stages (Kent-Marvick et al., 2022); (3) systematic reviews with sufficient homogeneity enabling subgroup analyses by design, culture, severity, and postpartum timing; (4) culturally tailored intervention trials in Vietnam targeting family support enhancement; and (5) advanced statistical approaches (structural equation modelling, mediation analysis,

propensity score matching) to improve confounding control and strengthen causal inference.

**Conclusion:** Overall, the reviewed literature consistently indicates that social support is protective against postpartum depressive symptoms through both structural and functional mechanisms. Family and partner support emerge as the most influential structural sources, while instrumental support shows strong short-term associations and emotional support demonstrates sustained protective effects. Despite increasing attention to these relationships, Vietnamese evidence remains limited and methodologically heterogeneous. Future research should prioritise culturally validated longitudinal studies and intervention testing to strengthen evidence-based approaches targeting family support systems, particularly during the first three postpartum months.

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# FACTORS AFFECTING E-COMMERCE DELIVERY PERFORMANCE IN HO CHI MINH CITY

Nguyen My Hong Thi\* - Duong Thi Ha Giang\*\*

**Abstract:** *The rapid development of e-commerce in Vietnam has significantly increased the demand for efficient delivery services, particularly in major urban areas such as Ho Chi Minh City. The study examines the factors influencing e-commerce delivery services in the city. Based on a survey of 232 respondents, including students, workers, and delivery staff in Ho Chi Minh City, the study aims to identify the key factors affecting delivery operations in the e-commerce sector. The findings provide empirical evidence on the main factors influencing delivery performance in e-commerce. These results offer useful implications for businesses and policymakers in improving logistics efficiency and enhancing customer satisfaction in the digital marketplace.*

• Keywords: e-commerce, delivery of goods, Ho Chi Minh City.

Date of receipt: 07<sup>th</sup> Feb., 2026

Date of delivery revision: 22<sup>th</sup> Feb., 2026

DOI:

Date of receipt revision: 26<sup>th</sup> Mar., 2026

Date of approval: 31<sup>th</sup> Mar., 2026

## Introduction

Ho Chi Minh City is Vietnam's largest commercial hub, accounting for a major share of the country's online orders. Studies emphasize the city's advanced but strained logistics system. Phin et al. (2024) describe Ho Chi Minh City as having the most important logistics role in southern Vietnam, and note that a municipal Logistics Development Plan (to 2025) underscores the need to integrate e-commerce and logistics operations. However, they find that "a model to connect e-logistics... has not been formed yet," meaning that e-commerce and logistics businesses often work in parallel rather than in a coordinated chain. As a result, delivery processes are fragmented and inefficient. In summary, while the city's logistics infrastructure is relatively advanced, physical constraints and coordination gaps still limit delivery performance. This creates an urgent practical need to study and improve e-commerce delivery operations in the city.

Despite the practical importance, academic research on Vietnam's e-commerce delivery is still sparse. As Phin et al. (2024) observe, studies on factors affecting e-logistics in Vietnam are "relatively few". In particular, no comprehensive strategic model for Vietnam's e-logistics has been formulated. Most existing studies have tended to focus on customer satisfaction or high-level market trends, rather than systematically analyzing the operational factors that influence delivery performance (Gajewska and Zimon, 2018). This gap presents clear research opportunities. A detailed factor analysis of Ho Chi Minh City's e-commerce delivery operations can fill a theoretical void by identifying

locally relevant issues and relating them to established logistics theories. In short, there is an urgent need for research that explicitly links Vietnam's e-commerce delivery practices with academic logistics models, thereby providing both practical guidance and theoretical advancement.

## Hypothesis development

Based on the synthesis of the literature, specific causal links between the identified operational factors and delivery performance are established, leading to the formation of six formal hypotheses.

Numerous studies empirically confirm that traffic delays harm delivery performance. A global industry report projects that, if unchecked, urban deliveries could add an extra five minutes to the average commute by 2030 - a proxy for delivery vehicles spending far more time on the road (Sustainability Directory, 2025). Increased congestion means couriers sit idle or take longer routes, directly reducing the number of on-time deliveries per day. In Vietnam, Nguyen et al., (2023) found that driver fatigue and roadblocks during lockdowns caused notable delivery slowdowns. Thus, the authors propose the hypothesize:

*H1: Higher traffic congestion and poor urban infrastructure are associated with lower delivery performance and longer lead times.*

Empirical data show that rising operating costs constrain delivery performance. For instance, a McKinsey survey found that fuel and utility costs have surged above inflation in recent years, while logistics providers struggle to retain staff (Gosling, 2025). When

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costs go up, providers may cut routes, raise prices, or reduce service levels, which can lengthen delivery times or reduce frequency. Quantitative studies often link high shipping costs to decreased order volumes and repeat purchases (IBRAHIM, 2025), suggesting that expensive delivery directly hurts business. In Vietnam, the new truck driving limits compelled carriers to hire more drivers and pay higher wages, with over half reporting up to 10% cost increases and significant delivery delays (Vietnam Logistics Consultant, 2024). All else equal, higher cost-per-delivery is likely to slow carriers or force them to consolidate shipments, reducing speed. Therefore, the authors propose the hypothesize:

*H2: Higher operational costs (e.g. fuel, labor) and reduced workforce availability will worsen delivery performance (slower, less reliable deliveries).*

Studies consistently find that technology improvements boost delivery outcomes. For example, advanced routing algorithms and real-time tracking have been shown to increase on-time rates and reduce transport miles. In one controlled trial, introducing AI-based dynamic routing with electric vans cut delivery time by ~20% (Sustainability Directory, 2025). Thus, greater use of logistics technology should correlate with higher delivery speed and reliability. The hypothesis is proposed:

*H3: Greater application of modern delivery technologies (e.g. tracking, automation, alternative vehicles) improves delivery performance (faster and more predictable deliveries).*

The impact of regulations on delivery is often documented. For example, studies of hours-of-service rules in trucking find that stricter driving limits inevitably lengthen transit times and reduce utilization efficiency. The Vietnamese case of Decree 168/2024 provides concrete data: after limits were enforced, two-thirds of shippers reported delivery time increases (>10%), and on-time rates fell (fewer firms maintained 70-89% punctuality) (Vietnam Logistics Consultant, 2024). Similarly, compliance with emissions or noise rules (common in some cities) forces companies to invest in cleaner fleets or accept restricted time windows, which may lower productivity. We thus propose:

*H4: Stricter or poorly coordinated regulations (e.g. tight driving limits, restrictive zones) have a negative effect on delivery operations, whereas supportive policies (e.g. infrastructure investment) can mitigate delays.*

Empirical analyses suggest that better coordination raises efficiency. Cases where multiple carriers or retailers coordinate demonstrate gains. Although few formal studies quantify this directly, related research on supply chain collaboration shows that integrated

information systems (linking e-commerce orders to courier routing) improve fill rates and speed. Anecdotal evidence from combined logistics services indicates fewer missed deliveries and higher capacity utilization. The hypothesis is proposed:

*H5: Greater cooperation and integration between e-commerce platforms and logistics providers leads to smoother, faster deliveries (higher fill rates and on-time rates).*

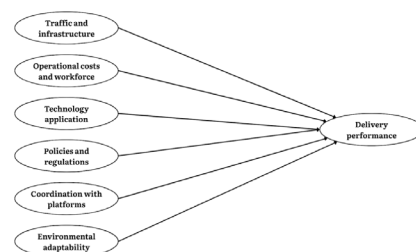
External shocks and environmental considerations can significantly perturb delivery outcomes. Empirical work on COVID-19's impact (e.g. in Vietnam) finds that lockdowns not only shifted demand patterns but also imposed mobility constraints that lengthened delivery cycles. Similarly, fuel price spikes (often due to global events) have been correlated with carriers reducing service levels or increasing fees, which can delay shipments. From an urban planning perspective, rising environmental pressures may lead to new restrictions on delivery vehicles; studies note that last-mile deliveries can account for ~13% of a city's transport emissions (Sustainability Directory, 2025), highlighting why cities might enforce green measures. While not always parameterized in single models, we posit:

*H6: Negative external events (e.g. sharp fuel price rises, extreme weather, pandemics) degrade delivery performance, as do stricter environmental policies that limit delivery operations.*

### Proposed research model

Based on the above literature, we propose a conceptual research model where six groups of factors influence e-commerce delivery performance in Ho Chi Minh City. The dependent variable, Delivery performance, is measured by outcomes such as on-time delivery rate, average delivery time and delivery cost per order. The independent factors are Traffic congestion (TC), Operating costs (OC), Technology application (TA), Policies/regulations (PR), Coordination between logistics units and e-commerce platforms (CO), and External environment (EE). Each of these dimensions is drawn from the literature review above. The model is proposed as:

Figure: Proposed research model



Source: Composed by the author

Each hypothesized link derives from the reviewed theory and evidence above (H1-H6). The proposed model will be tested (e.g. via regression) using data from e-commerce businesses and delivery providers in Ho Chi Minh City.

### Research methodology

This research was conducted using the method of analysis and synthesis to build a theoretical basis and interpret the results. During the implementation process, the main research method was Quantitative Research through social survey techniques. The topic used the sociological investigation method with the survey subjects being e-commerce consumers, students, professionals and shippers in Ho Chi Minh City, the sample size was N=232 valid samples, the sampling method was non-probability convenience. The collected data was processed using SPSS software program.

### Research results

#### *Assess the reliability of the scale using Cronbach's Alpha coefficient*

**Table 1: Results of Cronbach's Alpha reliability test of factors in the research model**

| Observation variables                                                                         | Scale average if variable is excluded | Scale variance if variable is eliminated | Variable-total correlation | Cronbach's Alpha if variable is excluded |
|-----------------------------------------------------------------------------------------------|---------------------------------------|------------------------------------------|----------------------------|------------------------------------------|
| Traffic Congestion Factor: Cronbach's alpha = 0.896                                           |                                       |                                          |                            |                                          |
| Operating Cost Factor: Cronbach's alpha = 0.841                                               |                                       |                                          |                            |                                          |
| Technology Application Factor: Cronbach's alpha = 0.888                                       |                                       |                                          |                            |                                          |
| Policy/Regulation Factor: Cronbach's alpha = 0.923                                            |                                       |                                          |                            |                                          |
| Factor Coordination between logistics units and e-commerce platforms Cronbach's alpha = 0.872 |                                       |                                          |                            |                                          |
| External Environment Factor: Cronbach's alpha = 0.896                                         |                                       |                                          |                            |                                          |
| Delivery Performance Factor: Cronbach's alpha = 0.875                                         |                                       |                                          |                            |                                          |

Source: Analysis results from SPSS software

The results of the reliability analysis of the scale using Cronbach's Alpha coefficient in Table 1 show that all seven factors in the research model all have Cronbach's Alpha values greater than 0.7. This proves that the measurement statements built in the questionnaire have relatively accurately reflected the content of each research concept. In addition, all observed variables have a Corrected Item-Total Correlation coefficient greater than 0.3, indicating that these variables are closely correlated with the total score of the scale, and no variable was removed from the model due to violating the reliability criterion.

### Exploratory factor analysis (EFA)

#### *Exploratory factor analysis EFA for independent variables*

The results of exploratory factor analysis (EFA) for independent variables show that the survey data fully meets the conditions for performing EFA. Specifically, the Kaiser-Meyer-Olkin (KMO) coefficient = 0.825, ranging from 0.5 to 1.0, demonstrating that the correlation between observed variables is high enough to conduct factor analysis. At the same time, Bartlett's

Test of Sphericity has a value of Sig. = 0.000 ( $< 0.05$ ), showing that the data set is completely suitable for extracting latent factors.

The results also show that the Eigenvalues of the factors are all greater than 1, in which the lowest factor has Eigenvalue = 1.569, proving that each factor has the ability to significantly explain the variance of the data set. At the same time, the total variance extracted reached 78.125%, far exceeding the 50% threshold recommended by Hair et al. (2010), which shows that the 6 extracted factors can explain up to 78.125% of the variation in the data - a high level, reflecting a measurement model with good fit and explanatory ability.

In addition, all observed variables have factor loading coefficients (Factor Loading)  $> 0.5$ , ensuring that the observed variables have a close relationship with the factors they represent. No variables are eliminated or grouped incorrectly, demonstrating that the convergence and differentiation of factors in the model are clear and consistent.

#### *Exploratory factor analysis EFA for dependent variable*

Through the results of exploratory factor analysis (EFA) for the dependent variable - Delivery performance, it can be seen that the data is completely suitable for conducting factor analysis. Specifically, the KMO coefficient = 0.805 (ranging from 0.5 to 1) shows that the appropriate level of data meets the requirements. At the same time, the Sig. value of Bartlett's Test = 0.000 ( $< 0.05$ ) proves that the observed variables are closely correlated with each other in the whole, so conducting EFA is necessary and reasonable.

The EFA results show that, at Eigenvalue = 3.341, a single factor was extracted from five observed variables of the dependent variable "Delivery performance". The total variance extracted reached 66.815%, meaning that this factor explained 66.815% of the variation in the data set - a high level, reflecting the concentration and consistency of observed variables in measuring the same concept.

### Linear regression model

#### *Assessing the explanatory power of variables in the model and testing for multiple autocorrelation*

**Table 2: Baseline values of the model and autocorrelation test**

| Correlation coefficient | Coefficient of determination | Correction coefficient of determination | Estimated error | Durbin-Watson test |
|-------------------------|------------------------------|-----------------------------------------|-----------------|--------------------|
| 0.710                   | 0.504                        | 0.49                                    | 0.5187          | 1.554              |

Source: Analysis results from SPSS software

The linear regression results in Table 2 provides basic parameters to evaluate the suitability of the research model, and at the same time test the autocorrelation

phenomenon through the Durbin-Watson index.

First of all, the correlation coefficient (R) of the model reached 0.710, showing a fairly close relationship between the dependent variable and the independent variables. This value is greater than 0.5, demonstrating that the relationship between delivery performance and influencing factors is relatively strong, reflecting that the independent variables in the model play an important role in explaining the variation of delivery performance in practice.

Next, the coefficient of determination ( $R^2$ ) reached 0.504, meaning that about 50.4% of the variation in delivery performance can be explained by the six independent factors in the model. In other words, half of the variation in delivery performance between the surveyed subjects can be explained by factors such as transport infrastructure, operating costs or the level of technology application.

In addition, the Durbin-Watson test shows that the test value = 1.554, ranging from 1 to 3, indicating that the model does not have residual autocorrelation.

#### *Assessing the impact of independent variables*

**Table 3: Linear regression results and multicollinearity test**

|          | Unstandardized regression coefficients |                | Standardized regression coefficients | t      | Sig.  | Multicollinearity test |       |
|----------|----------------------------------------|----------------|--------------------------------------|--------|-------|------------------------|-------|
|          | Regression coefficient                 | Standard error | Regression coefficient               |        |       | Tolerance              | VIF   |
| Constant | 4.847                                  | 0.329          |                                      | 14.753 | 0     |                        |       |
| TC       | -0.302                                 | 0.05           | -0.336                               | -6.078 | 0     | 0.72                   | 1.389 |
| OC       | -0.241                                 | 0.052          | -0.222                               | -4.655 | 0     | 0.966                  | 1.035 |
| TA       | 0.109                                  | 0.038          | 0.142                                | 2.853  | 0.005 | 0.893                  | 1.119 |
| PR       | -0.1                                   | 0.037          | -0.135                               | -2.687 | 0.008 | 0.876                  | 1.142 |
| CO       | 0.138                                  | 0.046          | 0.165                                | 2.983  | 0.003 | 0.721                  | 1.388 |
| EE       | -0.184                                 | 0.047          | -0.204                               | -3.906 | 0     | 0.809                  | 1.236 |

Source: Analysis results from SPSS software

Table 3 presents the results of multiple linear regression between the dependent variable Delivery performance (DP) and six independent variables including Traffic congestion (TC), Operating costs (OC), Technology application (TA), Policies/regulations (PR), Coordination between logistics units and e-commerce platforms (CO), and External environment (EE).

With the estimated unstandardized regression coefficients, the regression model takes the form:

$$DP = 4.847 - 0.302*TC - 0.241*OC + 0.109*TA - 0.100*PR + 0.138*CO - 0.184*EE$$

The test results show that all independent variables in the model have Sig. values less than 0.05, proving that they are statistically significant and have a significant impact on delivery performance. However, the direction of impact of each factor is different, specifically as follows:

Traffic congestion (TC) has a regression coefficient of -0.302, which is negative and significant at Sig. = 0.000.

Operating costs (OC) also have a negative coefficient (-0.241, Sig. = 0.000), indicating that high operating costs, including fuel, labor, and vehicle maintenance, reduce delivery performance.

Technology application (TA) has a positive coefficient (0.109, Sig. = 0.005), indicating that higher levels of technology adoption significantly improve delivery performance.

Policies/Regulations (PR) have a negative regression coefficient (-0.100, Sig. = 0.008), reflecting those restrictive regulations such as truck ban hours, intra-city transportation fees or complicated administrative procedures can reduce delivery performance.

The coefficient of coordination between logistics units and e-commerce platforms (CO) is positive (0.138, Sig. = 0.003), indicating that effective coordination between the two parties helps improve quality and reliability in the delivery process

External Environment (EE) has a negative coefficient (-0.184, Sig. = 0.000), indicating that external factors such as weather, fuel price fluctuations, or local policy changes can negatively affect delivery performance.

#### **Research conclusion and recommendations**

##### **Conclusion**

Reliability analysis and factor analysis identified six main groups of factors, including Traffic congestion (TC), Operating costs (OC), Technology application (TA), Policies/regulations (PR), Coordination between logistics units and e-commerce platforms (CO), and External environment (EE).

##### **Managerial implications**

###### *Traffic congestion*

A suitable and fundamental solution to reduce the impact of traffic congestion on e-commerce delivery activities in Ho Chi Minh City is to upgrade and re-plan the traffic infrastructure system. In addition, concentrated delivery areas need to be clearly planned, allowing small trucks or pickup trucks to have legal parking areas for short periods of time to reduce spontaneous deliveries that obstruct traffic. This solution requires large resources and long-term construction time, but brings sustainable benefits such as reducing travel time, limiting vehicle damage, saving fuel and significantly improving the smoothness of delivery operations in the city.

###### *Operating costs*

In terms of cost and human resources, the optimal solution at the current stage is to optimize operating costs



through process improvement and semi-automation. Enterprises can invest in automatic sorting equipment, high-capacity barcode scanners and conveyor systems to reduce manual labor in the warehouse. In parallel, restructuring the warehouse floor plan, such as arranging the picking area near the shipping area, setting up a “one-way flow” to reduce intersections, will help shorten order processing time. At the delivery stage, enterprises can deploy a model of sharing transportation resources with other units to take advantage of empty vehicles turning around or reduce the number of empty vehicles moving. The implementation process can be done within three to nine months depending on the scale. By operating more optimally, businesses can reduce labor costs, shorten processing times and reduce errors in product classification, thereby improving delivery performance without having to rely too much on seasonal labor, which is unstable in the long term.

#### *Technology application*

In the technology group, a sustainable solution that is in line with the green logistics development trend is to apply environmentally friendly delivery vehicles combined with a data analysis system. Enterprises can start by converting a part of their fleet to electric motorbikes or electric trucks, and installing mini charging stations at warehouses or collection points. The pilot phase of 20-50 electric vehicles in the first phase helps enterprises evaluate operating costs, battery life, power consumption and transportation efficiency. At the same time, enterprises build a data analysis system to forecast demand, identify areas with high risk of failed deliveries and optimize routes based on real-time data. This solution brings many benefits: significantly reducing fuel costs, limiting risks due to fluctuating gasoline prices, increasing the speed of delivery planning and improving brand image in a modern, sustainable and environmentally friendly direction.

#### *Policies and regulations*

One of effective solutions for the policy factor is to establish a regular dialogue mechanism between logistics enterprises, industry associations and management agencies to propose adjustments to regulations that hinder delivery activities. Enterprises can establish a legal team to coordinate with the Vietnam Logistics Enterprises Association (VLA) to synthesize problems, conduct impact surveys of new regulations, and then present proposed adjustments to the Department of Transport or the Ho Chi Minh City People’s Committee. Special meetings, policy discussions or joint working groups can be organized quarterly to ensure a two-way flow of information. The implementation roadmap can last from 6 to 12 months depending on the level

of adjustment. When policies are improved in a more flexible direction, delivery activities become smoother, reducing delivery delays due to complex compliance requirements and reducing costs for businesses.

#### *Coordination between logistics units and e-commerce platforms*

In the context of the interoperability API that has been deployed by many units, a suitable alternative solution is to develop a network of PUDO (Pick-Up and Drop-Off) points and smart lockers in residential areas and commercial centers. Logistics enterprises can cooperate with apartment management boards or large supermarket chains to install automatic lockers where customers can pick up or return goods at any time without having to meet the driver directly. The implementation process includes investing in a locker system with security software connection, integrating QR codes and setting up optimal routes so that drivers can deliver in batches instead of individually.

#### *External environment*

A suitable solution for the environmental adaptation factor is to switch to green delivery vehicles, especially in the context of Ho Chi Minh City often facing air pollution, erratic weather and emission reduction requirements. The implementation process can start with businesses testing electric or hybrid vehicles on fixed routes with short distances, avoiding flooding and having suitable infrastructure. Delivery staff are trained in operating techniques and troubleshooting related to electric vehicles. After a six-month testing period, businesses evaluate the fuel cost savings, durability and long-distance efficiency of the vehicles to consider expansion. This solution not only helps businesses maintain stable operations even when the source of gasoline and oil fluctuates, but also helps the city achieve green development goals, while creating a competitive advantage for businesses in the eyes of customers and partners.

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# DETERMINANTS OF PRICE-TO-EARNINGS RATIO OF NON-FINANCIAL COMPANIES ON HO CHI MINH STOCK EXCHANGE

PhD. Le Thanh Huyen\* - PhD. Le Hai Ha\* - Le Minh Phuc\*\*

**Abstract:** *Our article aims to explore factors impacting the price-to-earnings (P/E) ratio of non-financial companies on Ho Chi Minh stock exchange when the economy had experienced numerous fluctuations and there is the appearance of abnormal phenomenon such as COVID 19 outbreak. In order to achieve the study objectives, we utilize the data from 2014 to 2023 of 214 listed companies. The regression results indicate the positive influence of dividend payout ratio and the negative effect of three variables, including dividend yield, growth in sales and return in equity on P/E ratio. In addition, beside the regression analytical technique, the Blinder - Oaxaca decomposition analysis is used to study more deeply the effect of COVID 19 pandemic on P/E, and we found out the proof showing its influence. The findings of our study are meaningful to investors, managers of companies and policy makers.*

• Keywords: price-to-earnings ratio, COVID-19, Ho Chi Minh stock exchange.

JEL codes: G30

Date of receipt: 06<sup>th</sup> Feb., 2026

Date of delivery revision: 28<sup>th</sup> Feb., 2026

DOI:

Date of receipt revision: 16<sup>th</sup> Mar., 2026

Date of approval: 27<sup>th</sup> Mar., 2026

## 1. Introduction

Price-to-earnings ratio always has a great attractiveness to investors, decision makers, policy makers and academics, because many people have considered it as one of the most effective measures to evaluate firm status in both internal and external aspects. In reality, that ratio contains numerous layers of meaning. On the one hand, it can demonstrate the potentials of company in maximizing the wealth of shareholders. On the other hand, it partly reflects the expectation of participants in stock market. It is clear that both these problems impact strongly the development of firm, therefore, analyzing that ratio can bring useful information. Because of great advantages of its utilization, a range of studies on determinants of P/E ratio have been implemented. However, there is not the consensus on that issue, leading to the necessity on digging deeper that problem so as to have more accurate findings.

From a practical perspective, the matter of price to earnings is also an important indicator for participants in Vietnam stock market that is still young and not yet fully developed. In fact, that 24-year-old market of Vietnam has witnessed an abundance of fluctuation since its official commencement in 2000 with continuously

alternating periods of boom and stagnation. Because of the incomplete regulatory framework, some serious problems like lack of transparency, stock price manipulation occurred over long time, which have made operations of Vietnam stock market inefficient. In that situation, the deficiency in knowledge and experience of investors easily lead them to the fear of missing out (FOMO). As a result, Vietnam stock market witnessed a range of frenzied buying or panic selling periods when abnormal factors arise. That phenomenon appeared many times from 2014 to 2023. In reality, in the 10-year period, Vietnam market stock had significant changes in the number of listed companies and overall market capitalization, which reflects both potentials and vulnerability of market under the internal and external factors. This problem can be recognized by analyzing the data of firms on HOSE, because HOSE is saw as the center of the financial market where there are a lot of listed big companies in Vietnam. Between 2014 and 2021, Vietnam stock market saw a dramatic upward trend in overall market capitalization on HOSE from around 4500 thousand billion dong to the peak of more than 7500 thousand billion dong in 2022, followed by a plummet to around 5000 thousand billion dong in the next year, then a continuous

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drop to 4500 thousand billion dong in 2023. Those strong fluctuations came from the effect of up-and-down international economy, changes in domestic policies and especially the outbreak of COVID 19, which continuously changed the direction of cash flows and resulted in the volatility in price of stock. Similarly, the number of listed companies experienced upward trend before the slight decrease in 2023. The above data reflects that Vietnam stock market contains great potentials of booming, but it is also vulnerable because it is immature and still lacks some basis conditions to sustainably develop. That reality has been making market participants skeptical. Additionally, the sudden emergence of COVID 19 and its effects were unpredictable, the market's reaction was also beyond many people's expectations. Instead of following the negative scenario, it becomes extremely attractive and sets the stage for a boom period from 2021 to 2022. As a consequence, it is unforeseeable volatility of market that causes the confusion of participants. In response to that obstacle, there are some reliable indexes used as important indicators for participants in the stock market. The P/E ratio is one of them. Thus, studying determinants of price-to-earning ratio is useful to many people, such as investors, managers of companies and policy makers.

## 2. Literature review

There have been a range of studies relating to determinants of P/E ratio.

Ramcharan (2002) investigates the determinants of the P/E ratio across 21 emerging markets using annual data from 1992-1999 and applying seemingly unrelated regression (SUR) techniques. The findings show that economic growth is consistently significant in explaining cross-country variations in P/E ratios, while credit risk has a weaker and less consistent effect.

Shamsuddin and Hillier (2004) study the determinants of the P/E multiple in the Australian stock market between 1984 and 2001. They find that P/E ratios is explained by the dividend payout ratio, interest rates, and GDP growth. In an extended model, additional variables, the results show that P/E ratios rise with higher dividend payout, stronger GDP growth, currency appreciation, and consumer confidence, but fall with higher interest rates and increased volatility.

The analysis of Nezlobin, Rajan, and Reichelstein (2013) indicates that under

replacement cost accounting, the P/E ratio can be expressed as a convex combination of two classical benchmarks the permanent earnings model and the Gordon growth model with the relative weight determined entirely by Tobin's  $q$ . The study highlights that future growth opportunities in product markets increase P/E ratios, while the effect of past investment growth depends critically on the accounting regime. Under unbiased (replacement cost) accounting, higher past growth reduces P/E ratios, whereas under more conservative accounting rules (such as straight-line depreciation or expensing of intangibles), past growth can increase P/E.

Itemgenova and Sikveland (2019) examine the determinants of P/E ratio in the Norwegian aquaculture industry, with a focus on salmon farming firms listed on the Oslo Stock Exchange. Their findings reveal that return on equity (ROE) is negatively associated with the P/E ratio, reflecting the cyclical nature of profitability in the industry, while the dividend payout ratio is positively related to P/E, consistent with dividend signaling theory.

Fesokh and Haddad (2019) examine the determinants of the price-earnings (P/E) ratio in the Jordanian manufacturing sector, and indicate that Tobin's  $Q$  and leverage have a positive effect on the P/E ratio. In contrast, firm size and dividend growth are negatively associated with P/E.

Zhang (2022) conducts an empirical study on the determinants of the P/E ratio in China's media industry using quarterly data from 2000 to 2015. The study finds that dividend yield, price-to-book (P/B) ratio, return on equity (ROE), and debt-to-equity (D/E) ratio are the most significant determinants. Specifically, dividend yield shows a negative relationship with P/E, while P/B, ROE, and D/E exhibit positive effects.

## 3. Methodology

### 3.1. Hypothesis

Based on previous studies, six hypotheses are posed in this study is as follows:

*H1: Dividend policies influence price to earnings ratio*

*H2: Growth in sales influences price to earnings ratio*

*H3: Return on equity influences price to earnings ratio*

*H4: Leverage influences price to earnings ratio*



*H5: Change in stock price influences price to earnings ratio*

*H6: COVID 19 influences price to earnings ratio*

### 3.2. Data

In order to evaluate the influence of independent variables on the price to earnings of companies, 214 non-financial companies on HOSE are selected. For the purpose of completing research goals, dataset has to meet some requirements including: 214 selected companies must have been in business before 2014; There is no disruption in their business operation; The study is mainly based on secondary financial data including income statements, balance sheets, and cash flow statements for period of 2014 to 2023. This offered an improved understanding of the links existing among the variables.

### 3.4. Variables measurement

**Table 1: Variables**

(1) *Price to earnings ratio*

$$P/E = \frac{\text{Stock price per share}}{\text{Earnings per share}}$$

(2) *Dividend payout ratio (DPR)*

$$DPR = \frac{\text{Total dividends}}{\text{Net income}}$$

(3) *Growth in sales (GS)*

$$GS = \frac{(\text{Sales}_t - \text{Sales}_{t-1})}{\text{Sales}_{t-1}}$$

(4) *Return on equity (ROE)*

$$ROE = \frac{\text{Net income}}{\text{Average equity}}$$

(5) *Leverage (LEV)*

$$LEV = \frac{\text{Total debt}}{\text{Total assets}}$$

(6) *Dividend yield (DY)*

DY is the weighted average of the constituents' individual dividend yields, based on their market values at fiscal year-end

(7) *Change in stock prices (CSP)*

$$CPS = \frac{\text{Stock price}_{t-1}}{\text{Stock price}_t}$$

(8) *COVID 19:*

This variable is expressed by 0 and 1, 0 represents the period before The outbreak of

COVID 19, and 1 represents the period after the outbreak of COVID 19

### 3.4. Research method

#### 3.4.1. Empirical model of estimation

We modelled our study as follows:

$$PE_{i,t} = \beta_0 + \beta_1 DPR + \beta_2 GS_{i,t} + \beta_3 LEV_{i,t} + \beta_4 DY_{i,t} + \beta_5 ROE_{i,t} + \beta_6 CSP_{i,t} + \alpha_i + \varepsilon_{i,t}$$

Where: PE is price to earnings, GS is growth in sales, LEV is leverage, DY is dividend yield, ROE is return on equity, CSP is change in stock price and  $\varepsilon$  is error.

#### 3.4.2. Research method

Data processing technique include calculating data analysis model is assisted by STATA version 19. Firstly, we determine the fit model (Chow test, Breusch and Pagan Lagrangian multiplier test and Hausman test are used to help us to choose appropriate model for research sample). Secondly, the Wald test and Wooldridge test are used to check the existence of heteroskedasticity and the autocorrelation problem, if there are both issues, the Cluster regression will be carried out. Finally, Oaxaca - Blinder decomposition analysis is carried out to seek the difference in P/E ratio between the 2-year period of COVID 19 outbreak and non-outbreak periods, and find causes of the difference.

### 4. Empirical results

#### 4.1. Panel unit root test and multicollinearity test

From our results as presented in Table 2, it is proved that all seven variables in the model, including Price to earnings (PE), Dividend payout ratio (DPR), growth in sale (GS), Leverage (LEV), Dividend yield (DY), Return on equity (ROE), and Change in stock price (CPS) are stationary at level hence have no unit roots. Thus, we obtain all our series to be stationary as we reject the null hypotheses that the series are non-stationary.

According to the VIF results, it can be concluded that there is no multicollinearity problem in this model, thus, all variables are used for next analysis in our study.

#### 4.2. Descriptive analysis

**Table 1: Descriptive summary**

| Variable | Obs   | Mean     | Std. dev. | Min      | Max      | Status | VIF  |
|----------|-------|----------|-----------|----------|----------|--------|------|
| PE       | 2,140 | 16.54778 | 20.63276  | -1.24505 | 87.78675 | Level  |      |
| DPR      | 2,140 | 0.001527 | 0.001588  | 0.0000   | 0.006013 | Level  | 2.3  |
| GS       | 2,140 | 0.019831 | 0.853026  | -1.64234 | 2.305648 | Level  | 1.16 |

| Variable | Obs   | Mean     | Std. dev. | Min      | Max      | Status | VIF  |
|----------|-------|----------|-----------|----------|----------|--------|------|
| LEV      | 2,140 | 0.455464 | 0.201941  | 0.089978 | 0.785946 | Level  | 1.02 |
| DY       | 2,140 | 0.000154 | 0.000138  | 0.0000   | 0.000484 | Level  | 2.51 |
| ROE      | 2,140 | 0.125512 | 0.096496  | -0.0117  | 0.335567 | Level  | 1.37 |
| CSP      | 2,140 | 1.027241 | 0.31302   | 0.0000   | 1.69798  | Level  | 1.16 |

Source: Result calculated from financial statements of companies from 2014 to 2023

As can be seen from the Table 1, the mean value of P/E ratio is 16.54778. It is a relatively high figure, shows the positive behavior of investors in the 10-year period, they appreciated that channel of investment. However, the value of standard deviation is 20.63276 because of the big gap of P/E ratio among studied companies, indicating the significant difference in their efficiency of operations. Additionally, from 2014 to 2023, there are strong fluctuations in Vietnam economy which also create the dramatic changes in both price of stock and earnings per share, eventually, P/E ratio. This problem also appears for other ratios such growth in sales, return on equity, change in price of stock.

For leverage ratio, the mean value is 0.455464 and standard deviation is 0.201941, which indicates the difference in the use of debt among companies and among periods.

In term of dividend, both dividend payout ratio and dividend yield have a rather low mean value and the difference between maximum and minimum figures is small, which shows that in the studied period, dividend policies were not seen as a key strategy of firms.

#### 4.5. Analyzing regression results

Table 2: Regression results

| FEM(Robust) |             |           |        |       |            |           |
|-------------|-------------|-----------|--------|-------|------------|-----------|
| PE          | Coefficient | std. err. | t      | P>t   | [95% conf. | interval] |
| DPR         | 5317.627    | 546.7152  | 9.73   | 0.000 | 4239.962   | 6395.292  |
| GS          | -1.567379   | 0.4435    | -3.53  | 0.001 | -2.44159   | -0.69317  |
| LEV         | 2.951736    | 4.632741  | 0.64   | 0.525 | -6.18016   | 12.08363  |
| DY          | -61647.25   | 5310.951  | -11.61 | 0.000 | -72116     | -51178.5  |
| ROE         | -56.19093   | 7.389471  | -7.6   | 0.000 | -70.7568   | -41.6251  |
| CSP         | -0.9002925  | 1.523775  | -0.59  | 0.555 | -3.9039    | 2.103317  |
| _cons       | 24.62403    | 3.064192  | 8.04   | 0.000 | 18.584     | 30.66405  |

Source: Result calculated from financial statements of companies from 2014 to 2023

To know whether to use the simple ordinary least square (OLS) or fixed effect panel data regression we used the Chow test, and the results show that fixed effect is appropriate for surveyed enterprises, because the p-value (0,0000) is less than 0,05. In the next step, the result of Breusch and Pagan Lagrangian multiplier test is 0,0000, showing that random effect panel data regression is

more suitable for the sample of our study than OLS. Finally, the Hausman test result indicates the use of fixed effect model is better because p-value is 0.000, lower than 0,05. On the other hand, the Wald test indicates that there is the heteroskedasticity problem in the model and Wooldridge test shows that there is the existence of autocorrelation in panel data, so robust regression is used to achieve the accuracy in regression result.

The results in Table 2 indicate that four independent variables significantly impact the price to earnings of non-financial companies in HOSE in the 10-year period from 2014 to 2023, including Dividend payout ratio (DPR), Growth in sales (GS), Dividend yield (DY) and Return on equity (ROE). Additionally, while the factor of DPR positively affects on PE, three remaining variables have negative impacts the dependent variable.

#### 4.6. Testing the difference in the sales between food companies with ISO 22000 and others and Blinder - Oaxaca decomposition analysis

Table 3: Blinder - Oaxaca decomposition

| PE           | Coefficient | std. err. | z     | P>z   | [95% conf. | interval] |
|--------------|-------------|-----------|-------|-------|------------|-----------|
| Differential |             |           |       |       |            |           |
| Prediction_1 | 16.1677     | 0.491931  | 32.87 | 0.000 | 15.20353   | 17.13187  |
| Prediction_2 | 18.14363    | 1.049229  | 17.29 | 0.000 | 16.08718   | 20.20008  |
| Difference   | -1.975928   | 1.158825  | -1.71 | 0.088 | -4.24718   | 0.295328  |
| Explained    |             |           |       |       |            |           |
| DPR          | 1.101704    | 0.519755  | 2.12  | 0.034 | 0.083004   | 2.120404  |
| GS           | 0.035949    | 0.043957  | 0.82  | 0.413 | -0.05021   | 0.122104  |
| LEV          | -0.0205678  | 0.033537  | -0.61 | 0.54  | -0.0863    | 0.045164  |
| DY           | -2.475668   | 0.548846  | -4.51 | 0.000 | -3.55139   | -1.39995  |
| ROE          | -0.5064757  | 0.293634  | -1.72 | 0.085 | -1.08199   | 0.069036  |
| CSP          | 0.1055839   | 0.276877  | 0.38  | 0.703 | -0.43708   | 0.648252  |
| Total        | -1.759475   | 0.659418  | -2.67 | 0.008 | -3.05191   | -0.46704  |
| Unexplained  |             |           |       |       |            |           |
| DPR          | -0.4140207  | 1.469201  | -0.28 | 0.778 | -3.2936    | 2.465561  |
| EG           | -0.0743675  | 0.088508  | -0.84 | 0.401 | -0.24784   | 0.099105  |
| LEV          | -0.1496792  | 2.298006  | -0.07 | 0.948 | -4.65369   | 4.35433   |
| DY           | 2.261292    | 1.320275  | 1.71  | 0.087 | -0.3264    | 4.848983  |
| ROE          | 1.765052    | 1.376616  | 1.28  | 0.2   | -0.93307   | 4.46317   |
| CSP          | 2.932964    | 3.970267  | 0.74  | 0.46  | -4.84862   | 10.71454  |
| _cons        | -6.537693   | 5.46502   | -1.2  | 0.232 | -17.2489   | 4.173549  |
| Total        | -0.2164526  | 0.959549  | -0.23 | 0.822 | -2.09713   | 1.664229  |

Source: Result calculated from financial statements of companies from 2014 to 2023

In order to study the impact of the epidemic of COVID-19 on the relationship between in Price-to-earnings ratio and other variables, the decomposition analysis is implemented. Specifically, this methodology tests where there is the difference in Price-to-earnings ratio during the COVID-19 outbreak period compared to non-outbreak periods. Then, if the distinction is significance, determining

the contribution of each independent variable to that result will be indicated

This method was first built and developed by Blinder (1973) and Oaxaca (1973) with the aim of finding out why race and sex lead to wage gap between groups. Later, it was used in other research areas including corporate finance. In that analytical technique, the difference of the comparing groups is separated into two components:

(1) The first one called “explained” or “Component effect” is caused by the differences in average observable characteristics of the individuals;

(2) The second part called “unexplained” or “Structure effect” is not the result of group differences in the predictors, it is usually attributed to discrimination.

In this study, not only is the total decomposition of the outcome differential into an explained and an unexplained part, but also the detailed contributions of the single predictors are subject to investigation.

The results reported in Table 3 show that the difference between the 2-year period of COVID-19 outbreak and the remaining periods is significant, and that distinction is mainly explained by the composition effect, of which the variable of Dividend yield contributes dramatically to the difference, followed by Dividend payout ratio and Return on equity.

## 5. Discussion and conclusion

By carrying an empirical research on non-financial companies on HOSE, we have some following conclusions:

**Firstly**, all two variables relating to dividend significantly impact P/E ratio of listed companies in the studied period. However, while the increase in dividend payout ratio (DPR) can lead to the rise in PE, the influence of dividend yield (DY) is negative. These results indicate that investors are really attracted to dividend policies of companies. When companies spend more after-tax profit on dividend, the interest of participants in market could be improved. That impact could be used by corporate finance management when a firm wants to raise capital through issuing new stocks. Nonetheless, if the amount of dividend is rather high compared with the price, investor sentiment tends to be negative, because they think the potentials of that stock is decreasing. Thus, giving decisions on

dividend policies need to be carefully considered, and some problems should be taken into account, such as financial status, firm position, the trend of market development.

**Secondly**, return on equity (ROE) and growth in sales (GS) negatively affect the P/E ratio of listed companies. The reason of this phenomenon comes from the fact that when ROE and GS rise, earnings per share also climb. However, not all investors have immediate access to that information, which may lead to a slower increase in the stock price, eventually a reduce in P/E ratio. That result shows that the problem of asymmetric information dramatically impacts the efficiency of stock market, and policy makers should impose stricter and more severe regulations on the publication of information of listed companies in order to gradually eliminate the influence of asymmetric information and make stock market more attracting to investors.

**Thirdly**, when COVID 19 outbreak, investors behavior in the financial market changed. The proof is that P/E ratio in epidemic period is drastically different from that in non-outbreak periods, and that difference is partly contributed by dividend policies and ROE of companies. This finding is meaningful to managers and decision-makers when they must cope with abnormal circumstances that suddenly arise. It can help them have effective strategies to adapt to new situations and maintain good earning per shares and price of stock.

In conclusion, Price-to-earnings ratio plays an important role in evaluating the business operations. That figure contains numerous layers of meaning, and that makes it increasingly meaningful is its capacity of reflecting the expectation of participants in stock market. Therefore, findings of this article can bring benefits for many people, including investors, managers and policy makers.

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# FACTORS AFFECTING NON-PERFORMING LOANS IN VIETNAMESE JOINT-STOCK COMMERCIAL BANKS

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**Abstract:** *The study examines the determinants of non-performing loans in Vietnamese joint-stock commercial banks over the period 2014-2024, using data collected from banks' financial statements. The GLS estimation results indicate that LLR and INF positively affect non-performing loans, whereas SIZE, ROE, LGR, GDP, and UNF exhibit negative effects. Among these variables, SIZE, ROE, LLR, GDP, INF, and UNF are statistically significant, while LGR is only significant at the 10% level and EXL is not statistically significant. The study also provides several managerial implications to help joint-stock commercial banks enhance scale, profitability efficiency, and credit risk control, along with policy recommendations for the State Bank of Vietnam in macroeconomic management to stabilize the banking system.*

• Keywords: *non-performing loans; bank-specific determinants; macroeconomic factors; GLS.*

JEL codes: G21, E44, E32

Date of receipt: 06<sup>th</sup> Feb., 2026

Date of delivery revision: 28<sup>th</sup> Feb., 2026

DOI:

Date of receipt revision: 16<sup>th</sup> Mar., 2026

Date of approval: 31<sup>th</sup> Mar., 2026

## 1. Introduction

In recent years, non-performing loans have attracted increasing scholarly and policy attention due to their implications for banking stability and macroeconomic resilience. In particular, amid increasing global economic volatility and intense competition, default risk is not only a concern for managers but also poses significant challenges to banks, investors, business partners, and the macroeconomy. In banking operations, non-performing loans (NPLs) are consistently regarded as a critical risk factor, directly affecting financial safety, business performance, and the sustainability of the banking system (Phan Thị Linh, 2024).

According to information asymmetry theory (Akerlof, 1970), the party possessing more information in a transaction gains an advantage, which leads to adverse selection and the accumulation of non-performing loans within banks. In addition, the capital management hypothesis suggests that banks with higher equity capital tend to adopt more prudent lending practices and stronger risk monitoring. Adequate capital helps mitigate non-performing loans, whereas weak capitalization forces banks to assume higher risk levels (Kanapiyanova et al., 2023; Andersen et al., 2024).

In Vietnam, despite notable improvements in credit risk management, non-performing loan ratios remain highly volatile, particularly during periods of economic distress such as the 2008 global financial

crisis, the banking restructuring phase from 2011 to 2015, and the shock caused by the COVID-19 pandemic. Non-performing loans not only reflect credit quality and risk management capacity at the individual bank level but also generate spillover effects across the entire economy, influencing investor confidence, capital mobilization capacity, and national financial stability. According to the State Bank of Vietnam (2025), the sector-wide NPL ratio stood at approximately 4.3% as of January 2025. Previously, by the end of July 2024, this ratio reached 4.75%, higher than in 2023. Moreover, domestic and global macroeconomic developments, including inflation, exchange rate fluctuations, credit growth, and supply chain disruptions, have imposed considerable pressure on banks' credit risk management capabilities (Quỳnh Trang, 2025). Rising non-performing loan ratios not only constrain firms' access to capital but also pose potential threats to national financial stability (Quỳnh Trang, 2025).

Therefore, identifying bank-specific and macroeconomic determinants of non-performing loans is a pressing issue with both theoretical significance and practical relevance for policymaking and banking management. The remainder of this paper is organized as follows: Section 2 presents the theoretical framework and research hypotheses; Section 3 describes the model, data, and methodology; Section 4 reports and discusses the empirical results; and Section 5 provides

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policy implications.

## 2. Theoretical Framework and Research Hypotheses

### 2.1. Overview of Non-Performing Loans

#### *Concept of Non-Performing Loans*

According to IMF (2005), non-performing loans are loans for which borrowers fail to fulfill principal or interest payment obligations for 90 days or more, or loans for which future repayment is assessed as uncertain. According to BCBS (2017), when a loan is overdue for more than 90 days or when a bank considers that the borrower is unlikely to fully repay the debt without realizing collateral, such loans are classified as non-performing.

In Vietnam, pursuant to Circular No. 31/2024/TT-NHNN dated July 1, 2024 on asset classification, provisioning, utilization of risk provisions, and risk handling in the operations of credit institutions, non-performing loans are defined as debts classified under Group 3 (substandard loans), Group 4 (doubtful loans), and Group 5 (potential loss loans). Accordingly, in this study, non-performing loans are understood based on the definitions of IMF, BCBS, and the State Bank of Vietnam, and are identified and differentiated by repayment duration and repayment capacity. Therefore, non-performing loans include Group 3 (substandard loans), Group 4 (doubtful loans), and Group 5 (potential loss loans).

#### *Indicators for Measuring Non-Performing Loans*

According to Nguyễn Thanh Phương & Đặng Thị Lan Phương (2024), non-performing loans comprise Group 3 to Group 5 debts, and banks' credit risk levels are assessed through the ratio of total non-performing loans to total outstanding loans. In this measure, total non-performing loans represent the sum of Group 3 to Group 5 debts, while total outstanding loans include debts from Group 1 to Group 5.

According to Decree No. 86/2024/NĐ-CP, non-performing loans are also measured through the loan loss provision ratio. This ratio reflects the amount that credit institutions set aside to provision for potential risks associated with loans, aiming to compensate for possible losses when borrowers are unable to repay due to bankruptcy. Credit provisions are calculated based on borrowers' outstanding principal balances and are classified into two types: specific provisions for individual risky loans and general provisions for unidentified risks. Provisioning rates increase when banks' loan portfolios exhibit higher risk levels.

According to BCBS (2017), non-performing loans

are also evaluated through the NPL ratio, which is an important instrument under Basel II, helping banks maintain financial stability and enhance resilience against credit risk. This indicator excludes non-performing loans already "insured" by provisions, implying that banks retain the capacity to absorb losses associated with such non-performing loans.

#### 2.2.2. Credit Risk Theory

Credit risk theory (Merton, 1974) posits that banks incur losses when borrowers fail to repay their obligations on time; default probability depends on the value of borrowers' assets. Consequently, excessive credit expansion or poor risk management increases non-performing loans and reduces operational efficiency. Credit risk is considered a core risk faced by banks (Merton, 1974) and can be described as a financial option, whereby default probability depends on the value of borrowers' assets. Empirical evidence indicates that credit risk is significantly influenced by macroeconomic factors (Kolapo et al., 2012).

In this study, credit risk theory is employed to explain borrowers' inability to repay principal and interest on time, thereby generating losses for banks and increasing non-performing loans. NPLs rise when banks excessively expand credit or adopt weak risk management practices, leading to declining profitability and operational efficiency. Conversely, increasing the share of non-interest income, diversifying loan portfolios, and implementing strict risk management help control NPLs and stabilize profits. In Vietnam, Basel II, Basel III, and Circular No. 41/2016/TT-NHNN have been implemented to strengthen governance capacity and credit risk control.

#### 2.2.3. Business Cycle Theory

Business cycle theory explains cyclical economic fluctuations, including expansion, peak, recession, and recovery phases. According to Schumpeter (1939), these cycles arise naturally from innovation, investment, and adjustment within economic systems. During economic expansion, corporate revenues and profits increase, leading to lower NPLs. Conversely, during recessions, many firms experience financial distress due to declining income and rising unemployment, resulting in increased non-performing loans and defaults.

In this study, business cycle theory is used to explain how economic fluctuations affect customers' financial capacity through changes in income, employment, and output. These changes influence borrowers' repayment ability and consequently affect banks' credit quality.

#### 2.2.4. Economies of Scale Theory

According to economies of scale theory, as a firm's or bank's operational size increases, average costs per unit of product or service tend to decline due to more efficient utilization of resources, technology, and costs. Panzar and Willig (1981) define economies of scale as a condition whereby firms expand production scale to reduce long-run average costs through more efficient technologies and management processes, labor specialization, or the allocation of fixed costs over larger output volumes.

In banking, large banks possess advantages in portfolio diversification and risk management investment, thereby contributing to reductions in non-performing loans, whereas smaller banks face greater difficulties in risk diversification and are more prone to higher NPL levels (Athanasoglou et al., 2008). In this study, economies of scale theory is applied to explain the impact of operational scale on cost optimization capacity, loan portfolio diversification, and investment capability in risk management systems.

## 2.2. Review of Previous Studies

Numerous studies have examined non-performing loans; however, determinants of NPLs can generally be classified into two main groups: (i) bank-specific factors and (ii) macroeconomic factors. Table 1 presents a synthesis of prior empirical findings on the impacts and directional effects of individual determinants on non-performing loans.

**Table 1. Summary of Determinants of Non-Performing Loans from Previous Studies**

| No. | Factor                       | Effect |   | Source                                                                                         |
|-----|------------------------------|--------|---|------------------------------------------------------------------------------------------------|
|     |                              | +      | - |                                                                                                |
| 1   | Bank size (SIZE)             | +      |   | Nguyễn Ngọc Tân et al. (2021); Võ Minh Long et al. (2020)                                      |
| 2   | Return on equity (ROE)       |        | - | Bùi Đan Thanh & Nguyễn Ngọc Huyền (2022)                                                       |
| 3   | Loan loss provisions (LLR)   | +      |   |                                                                                                |
| 4   | Credit growth (LGR)          | +      |   | Kjosevski et al. (2019); Võ Minh Long et al. (2020)                                            |
| 5   | Economic growth rate (GDP)   |        | - | Kjosevski et al. (2019); Nguyễn Minh Phương et al., (2025)                                     |
|     |                              | +      |   | Bùi Đan Thanh và Nguyễn Ngọc Huyền (2022)                                                      |
| 6   | Inflation (INF)              |        | - | Bùi Đan Thanh và Nguyễn Ngọc Huyền (2022); Kjosevski et al. (2019); Võ Minh Long et al. (2020) |
| 7   | Exchange rate (EXI)          | +      |   | Kjosevski et al. (2019); Bùi Đan Thanh và Nguyễn Ngọc Huyền (2022);                            |
| 8   | Unemployment rate (UNF)      |        | - | Nguyễn Minh Phương et al., (2025)                                                              |
|     |                              | +      |   | Kjosevski et al. (2019)                                                                        |
| 9   | Interest rate                | +      |   | Võ Minh Long et al. (2020);                                                                    |
| 11  | Lagged non-performing loans  | +      |   | Bùi Đan Thanh và Nguyễn Ngọc Huyền (2022); Võ Minh Long et al. (2020)                          |
| 12  | Return on assets (ROA)       |        | - | Kjosevski et al. (2019); Võ Minh Long et al. (2020)                                            |
| 13  | Capital adequacy ratio (CAR) | +      |   | Kjosevski et al. (2019)                                                                        |
| 14  | Capital structure            | +      |   | Võ Minh Long et al. (2020)                                                                     |
| 15  | Leverage                     | +      |   |                                                                                                |
| 16  | Number of borrowers          | +      |   | Nguyễn Ngọc Tân et al. (2021)                                                                  |
| 17  | Total assets                 | +      |   |                                                                                                |
| 18  | Debt-to-equity ratio         | +      |   |                                                                                                |

Source: Authors

The literature review indicates that most previous studies primarily focus on the effects of macroeconomic factors such as inflation, GDP growth, and exchange rates on banks' non-performing loans, while the roles of micro-level factors including profitability, credit growth, and bank size have not been adequately examined in the context of Vietnam's implementation of Basel II and transition toward Basel III. At the same time, very few studies have updated their datasets through 2024, a period characterized by global inflationary pressures and monetary policy adjustments by the State Bank of Vietnam, which have introduced new dynamics. Therefore, this study extends the dataset through 2024 and simultaneously incorporates both microeconomic and macroeconomic factors to provide updated empirical evidence on the determinants of non-performing loans in Vietnamese joint-stock commercial banks.

## 3. Model and Research Methodology

### Research Model

Based on the theoretical framework presented in Section 2.2 and the review of prior studies in Section 2.3, this study develops a quantitative model grounded in theory and previous empirical research, including Phan Thị Linh (2024), Nguyễn Thanh Phương & Đặng Thị Lan Phương (2024), Nguyễn Minh Phương et al., (2025). The proposed research model is specified as follows:

$$NPL_{it} = + *SIZE_{it} + *ROE_{it} + *LLR_{it} + *LGR_{it} + *GDP_t + *INF_t + *UNF_t + *EXI_{it} + \epsilon_{it} \quad (2.5)$$

Where:  $i$  denotes bank,  $t$  denotes year, and  $\epsilon_{it}$  is the error term

NPL (Non-performing loan ratio) is calculated as total non-performing loans divided by total outstanding loans, multiplied by 100%. SIZE is measured as the natural logarithm of total assets ( $\ln(\text{Total Assets})$ ). ROE (Profitability) is defined as earnings after tax (EAT) divided by equity. LLR (Loan loss provisions) is calculated as loan loss provision expense divided by total outstanding loans. LGR is measured as the annual growth rate of total loans. GDP is measured as the annual GDP growth rate (%). INF is measured as the annual inflation rate (CPI, %). EXI is measured as the annual percentage change in the exchange rate. UNF (Unemployment rate) is defined as (number of unemployed individuals divided by the labor force) expressed as a percentage.

### Research Methodology

To identify the determinants of non-performing loans in joint-stock commercial banks, this study employs a quantitative research approach using STATA



17. Following descriptive statistical analysis, correlation matrix analysis, and multicollinearity diagnostics, satisfactory results were obtained. The study estimates three regression models: OLS, FEM, and REM. To select the most appropriate model, F-tests, Breusch-Pagan tests, and Hausman tests are conducted on the regression results of OLS, FEM, and REM.

If heteroskedasticity and autocorrelation are detected in the selected model, after testing for endogeneity and confirming the absence of endogeneity using the Wu-Hausman test, the GLS method is applied to address heteroskedasticity and autocorrelation (Nguyễn Thị Ánh Hoa, 2021). The dataset comprises 27 banks with transparent and complete financial disclosures, yielding 297 observations over the period from 2014 to 2024.

#### 4. Empirical Results

**Descriptive statistics:** Descriptive statistics for the period 2014-2024 indicate that the non-performing loan ratio (NPL) has a mean value of 0.022 (SD = 0.024), ranging from 0.02 to 0.298, reflecting differences in credit risk management capacity across banks. Although the average NPL ratio is relatively low (2.2%), the maximum value reaches 29.8%, indicating the presence of extreme observations. Therefore, outlier diagnostics are conducted and a 1% winsorization procedure is applied to mitigate the influence of extreme values on the estimation results. The post-winsorization dataset does not exhibit abnormal values, ensuring the reliability of subsequent regression analysis.

Bank size (SIZE) records an average of 32.82 with a standard deviation of 1.155, suggesting moderate variation in bank size. ROE averages 0.102 (SD = 0.089), fluctuating from -0.842 to 0.264, indicating substantial disparities in profitability performance. The negative values of ROE reflect periods of financial distress or restructuring among certain banks. The average loan loss provision ratio (LLR) is 0.013, showing that banks maintain relatively stable provisioning levels. Credit growth (LGR) averages 0.183, with wide variation from -0.113 to 0.653, reflecting differences in business strategies. GDP growth remains relatively stable at approximately 6% on average, inflation (INF) is low and stable, while the exchange rate (EXI) exhibits minor fluctuations, indicating effective macroeconomic management. The unemployment rate (UNF) is low and stable. These descriptive statistics provide initial insights into the distribution and variability of the variables and form the basis for subsequent econometric analysis.

**Correlation analysis:** Correlation coefficients among the independent variables are all below

0.8, suggesting no strong pairwise correlations. Multicollinearity is further examined using the variance inflation factor (VIF) in the subsequent analysis. (Gujarati, 2021).

**Multicollinearity analysis:** Variance inflation factor (VIF) values for all variables range from 1.03 to 5.54, with the highest VIF observed for UNF (5.54) and the lowest for LGR (1.03), while the mean VIF equals 2.5, all below the threshold of 10. This indicates that the model does not suffer from serious multicollinearity, as the independent variables do not exhibit excessively high linear relationships with each other (Gujarati, 2021).

#### Model selection among OLS, FEM, and REM:

After estimating the OLS, FEM, and REM models, the study applies F-tests, Breusch-Pagan tests, and Hausman tests (Gujarati, 2021) to determine the most appropriate specification. The results reported in Table 2 indicate that REM is the most suitable model for this dataset.

**Table 2. Results of F-test, Breusch-Pagan Test, and Hausman Test**

| F-test                                                                                                        | Breusch-Pagan Test                                                                                               | Hausman Test                                                                                                     |
|---------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
| H0: OLS model is appropriate<br>H1: FEM model is appropriate                                                  | H0: OLS model is appropriate<br>H1: REM model is appropriate                                                     | H0: FEM model is appropriate<br>H1: REM model is appropriate                                                     |
| Prob > F = 0.0003                                                                                             | chi2(01) = 16.29<br>Prob > chi2 = 0.0000                                                                         | Prob > chi2 = 0.9182                                                                                             |
| Conclusion:<br>Since Prob > F = 0.0003 < 5%, H0 is rejected and H1 is accepted. The FEM model is appropriate. | Conclusion:<br>Since Prob > chi2 = 0.0000 < 5%, H0 is rejected and H1 is accepted. The REM model is appropriate. | Conclusion:<br>Since Prob > chi2 = 0.9182 > 5%, H0 is accepted and H1 is rejected. The REM model is appropriate. |

Source: Results generated from Stata 17

**Heteroskedasticity test:** The test results show chi-square = 16.29 with Prob > chi2 = 0.0000, which is below the 5% significance level. This indicates that the selected model exhibits heteroskedasticity (Gujarati, 2021).

**Autocorrelation test:** The test results report an F-statistic of  $F(1, 26) = 28.865$  with Prob > F = 0.0000, which is lower than the 0.05 significance level (0.0000 < 0.05). This confirms the presence of autocorrelation in the model (Gujarati, 2021).

**Endogeneity test:** The study applies the Wu-Hausman test to assess the potential presence of endogeneity in the model (Gujarati, 2021). The Wu-Hausman test results show p-values of 0.0799, 0.0471, 0.5657, 0.9763, 0.7308, 0.9718, 0.9598, and 0.4832 for SIZE, ROE, LLR, LGR, GDP, INF, EXI, and UNF, respectively. Notably, the p-value for ROE is below the 5% significance level, suggesting that endogeneity may not be completely ruled out for this variable. Hence, the endogeneity issue should be interpreted cautiously rather than being fully dismissed..

However, since the model exhibits autocorrelation in the residuals and heteroskedasticity, the GLS method is employed to correct these model deficiencies (Table 3).

**Table 3. GLS Results**

| Variable | Coefficient | Standard Error | P-value |
|----------|-------------|----------------|---------|
| SIZE     | -0.003***   | 0.001          | 0.000   |
| ROE      | -0.041***   | 0.008          | 0.000   |
| LLR      | 1.098***    | 0.115          | 0.000   |
| LGR      | -0.006*     | 0.004          | 0.085   |
| GDP      | -0.092**    | 0.032          | 0.005   |
| INF      | 0.118***    | 0.029          | 0.000   |
| EXI      | 0.013       | 0.017          | 0.428   |
| UNF      | -0.470***   | 0.147          | 0.001   |
| Constant | 0.009       | 0.166          | 0.958   |

Source: Results generated from Stata 17

The results indicate that SIZE and ROE exert negative effects on NPLs. These findings support economies of scale theory (Panzar & Willig, 1981) and credit risk theory (Nguyễn Ngọc Tân et al., 2021, Võ Minh Long et al., 2020, Bùi Đan Thanh and Nguyễn Ngọc Huyền., 2022). In contrast, LLR is positively associated with NPLs, whereas LGR exhibits a negative relationship, in line with Laeven & Majnoni (2003), although contrary to Kjosovski et al. (2019). Within the macroeconomic group, GDP and UNF exert negative effects on NPLs, whereas INF has a positive and statistically significant impact. EXI carries a positive coefficient, but its effect is not statistically significant. These findings suggest that credit risk is influenced by both bank-specific and macroeconomic factors. The negative coefficient of unemployment is contrary to conventional expectations. One possible explanation is that the official unemployment rate in Vietnam may not fully capture underemployment or informal labor market pressures. Therefore, this result should be interpreted with caution and may reflect measurement limitations rather than a straightforward causal relationship.

## 5. Managerial Implications

### For Joint-Stock Commercial Banks

The empirical results suggest that joint-stock commercial banks should focus on sustainable scale expansion (SIZE) through increases in charter capital, technological investment, and network development in order to enhance financial capacity, diversify risk, and improve operational efficiency. At the same time, improving ROE should be prioritized by optimizing capital structure, controlling costs, enhancing lending efficiency, and increasing non-interest income to strengthen resources for credit risk management.

The positive association between LLR and NPLs likely reflects the fact that banks increase provisioning in response to deteriorating credit quality. Thus, LLR should be interpreted primarily as a signal of rising

credit risk rather than a direct causal driver of higher NPLs. Credit growth should also follow a selective approach, prioritizing customers with strong financial capacity, conducting rigorous cash-flow appraisal, and applying internal credit rating systems. In addition, banks should proactively develop response scenarios for GDP downturns, adjust credit policies in line with inflation fluctuations, and simultaneously restructure debt and support vulnerable customer groups when unemployment rises.

### For the State Bank of Vietnam (SBV)

At the macro level, the SBV should coordinate with the Government to promote stable economic growth in order to support the debt repayment capacity of firms and households, while developing economic cycle forecasting tools for the banking system. Under inflationary pressure, the SBV needs to flexibly conduct monetary policy, control interest rate levels, and allocate credit quotas appropriately, alongside issuing regulations that encourage stress assessment of borrowers. Although unemployment is generally expected to worsen borrowers' repayment capacity, the estimated coefficient in this study is negative. This unexpected result suggests that the relationship between labor market conditions and NPLs in Vietnam may be more complex, and therefore policy implications related to unemployment should be interpreted cautiously.

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# THE IMPACT OF CAPITAL STRUCTURE ON MARKET VALUATION: EVIDENCE FROM LISTED STEEL COMPANIES ON THE VIETNAMESE STOCK MARKET

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**Abstract:** *This study examines the impact of capital structure on the market valuation of 14 listed steel firms in the Vietnamese stock market over the period 2012-2023. Tobin's Q is employed as a proxy for firm market valuation, while capital structure is decomposed into short-term debt (SDA) and long-term debt (LDA) to capture potential maturity-based differences in their effects. Using an unbalanced panel dataset, the study applies Pooled OLS, Fixed Effects Model (FEM), Random Effects Model (REM), and Feasible Generalized Least Squares (FGLS) estimations, implemented in STATA 17. The empirical results indicate that both short-term and long-term debt exert negative and statistically significant effects on Tobin's Q. In contrast, profitability (ROA) and asset tangibility (TANG) have positive impacts, highlighting the importance of operational efficiency and asset structure in enhancing firm valuation. Corporate income tax (TAX) is found to have a negative effect, whereas firm size (SIZE) and asset growth (GROW) are statistically insignificant. The study provides policy implications for steel enterprises, investors, and policymakers in designing prudent financing strategies, particularly given the cyclical nature and high capital intensity of the steel industry.*

• Keywords: capital structure; tobin's q; market valuation; steel industry.

JEL codes: G32; G30; O16

Date of receipt: 24<sup>th</sup> Feb., 2026

Date of delivery revision: 28<sup>th</sup> Feb., 2026

DOI:

Date of receipt revision: 26<sup>th</sup> Mar., 2026

Date of approval: 04<sup>th</sup> Apr., 2026

## 1. Introduction

In the context of global economic instability and persistent geopolitical tensions, capital structure decisions play a critical role in ensuring sustainable corporate growth. Capital structure not only reflects a firm's financing strategy but also directly influences its capacity for expansion, risk management, and value maximization (Mensah et al., 2025). An appropriate financing mix enables firms to allocate financial resources efficiently, mitigate funding constraints, and enhance competitiveness. Conversely, suboptimal capital structure choices may increase financial imbalance risks and impair operational performance (Akali, 2025).

Modigliani and Miller (1963) argue that, in the presence of corporate taxes, debt financing generates tax shield benefits that can enhance firm value. However, when bankruptcy and agency costs are incorporated into the analysis, Trade-off Theory posits that firms determine an optimal leverage level by balancing tax advantages against expected financial distress costs. In addition, Pecking Order Theory emphasizes the role of information asymmetry in financing decisions (Myers & Majluf, 1984), while Signaling Theory (Ross, 1977) and Agency Theory (Jensen & Meckling, 1976) explain how

capital structure may serve as a market signal of firm quality or as a disciplinary mechanism for managers. Therefore, optimal capital structure extends beyond cost-of-capital considerations and is closely linked to how markets assess risk and growth prospects.

Within the steel industry, capital structure is crucial due to high capital intensity, long investment cycles, and sensitivity to input price and construction demand fluctuations. In Vietnam, 2025 marks a strong recovery driven by domestic demand, with real estate projects rising by 91 percent and public investment reaching USD 10.1 billion. However, exports declined sharply due to trade protection measures, especially for hot rolled coil and coated steel. Industry performance is uneven, as firms like Hoa Phat benefit from domestic demand, while coated steel producers face declining margins. Despite expected growth of 8 to 10 percent in 2026, leverage remains heterogeneous across firms.

Empirical evidence on the relationship between capital structure and firm value remains inconclusive. Aggarwal and Padhan (2017) document significant leverage effects on firm value. Bui et al. (2023) report a positive impact of total debt on ROA, ROE, and Tobin's Q, although short-term and long-term debt negatively

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affect Tobin's Q when disaggregated. Hoang Ngoc An and Tran Ngoc Tu (2024) find positive effects of overall debt and short-term debt, but a negative effect of long-term debt. Conversely, Luu (2021) documents a negative association between leverage and firm value in the chemical industry. Tripathi et al. (2024) highlight governance characteristics as moderating factors, whereas Utami et al. (2025) report insignificant effects in Indonesian real estate firms. These mixed findings suggest that the impact of capital structure is context-dependent and influenced by industry characteristics, economic cycles, and firm-specific conditions.

Although capital structure has been widely studied, industry-specific evidence for steel firms in emerging markets such as Vietnam remains limited. Following the COVID-19 shock, many steel firms increased their reliance on debt, highlighting the importance of debt maturity structure in firm valuation. However, the differential effects of short-term and long-term debt have not been fully examined. This study investigates the impact of SDA and LDA on Tobin's Q of listed Vietnamese steel firms, providing empirical evidence from a capital-intensive industry and offering policy and managerial implications for optimizing financing strategies.

## 2. Determinants of Firm Market Valuation

### 2.1. Debt to Total Assets (DA)

Debt to Total Assets represents the overall degree of financial leverage. A higher DA indicates greater reliance on debt financing, whereas a lower ratio reflects stronger dependence on equity capital. According to Modigliani and Miller (1963), under a corporate tax regime, increasing debt may reduce the weighted average cost of capital through tax shield benefits, thereby enhancing firm value. Trade-off Theory further suggests that firms operate at an optimal leverage level where the marginal tax benefits of debt are balanced against expected financial distress costs. However, when leverage exceeds its optimal threshold, bankruptcy risk, agency costs, and financial distress costs increase, leading to a decline in firm value (Jensen & Meckling, 1976; Bui et al., 2023).

Given the cyclical nature and input price volatility of the steel industry, excessive short-term leverage may amplify financial vulnerability. Empirical evidence in Vietnam documents a negative association between short-term debt and Tobin's Q (Nguyen Xuan Hung & Pham Kieu Trang, 2024), consistent with the view that firms with unstable cash flows tend to limit short-term borrowing (Sheikh & Wang, 2011). The impact of debt maturity may therefore be dual in nature. If tax shield benefits and signaling effects dominate, the expected coefficient is positive. Conversely, if financial distress costs outweigh these benefits, the expected coefficient becomes negative. Given the high cyclical and cash

flow volatility of the Vietnamese steel industry during the period 2012-2023, a negative effect is expected. Therefore:

**H1:** Short-term debt to total assets (SDA) negatively affects Tobin's Q of steel companies listed on the Vietnamese stock market.

Similarly, under Trade-off Theory, long-term debt provides more stable financing and facilitates tax shield utilization compared to short-term debt. However, higher fixed interest obligations may increase financial distress and agency costs, leading the market to discount firm value (Myers, 1984; Jensen & Meckling, 1976). For steel firms, large-scale long-term investments may constrain cash flows during downturns, thereby increasing financial risk. Empirical evidence in Vietnam shows that LDA is negatively related to Tobin's Q (Luu, 2021), and Hoang Ngoc An and Tran Ngoc Tu (2024) also report a negative impact of long-term debt on firm value in the HOSE sample. Therefore:

**H2:** Long-term debt to total assets (LDA) negatively affects Tobin's Q of steel companies listed on the Vietnamese stock market.

### 2.2. Firm Size (SIZE)

Firm size reflects financial capacity, capital accumulation, and competitive position. Larger firms typically possess more diversified operations and stronger bargaining power with financial institutions, allowing them to access capital at lower cost (Titman & Wessels, 1988). Theoretically, larger firms are generally more transparent, less risky, and enjoy better access to capital markets, which leads to higher market valuation. This argument is consistent with Agency Theory, which emphasizes reduced information asymmetry and monitoring costs (Jensen & Meckling, 1976), and Signaling Theory, which suggests that firm size and reputation convey positive signals regarding firm quality. Empirical studies document a positive association between SIZE and Tobin's Q (Vo Minh Long, 2017), and international research frequently includes firm size as an important control variable when examining capital structure and firm value (Aggarwal & Padhan, 2017; Jihadi et al., 2021). Therefore:

**H3:** SIZE positively affects Tobin's Q of steel companies listed on the Vietnamese stock market.

### 2.3. Asset Growth (GROW)

According to Signaling Theory, asset growth reflects expectations of business expansion and future profitability, thereby conveying positive signals to the market and increasing firm valuation (Ross, 1977). In steel firms, asset growth is closely associated with capacity expansion and long-term investment. If market demand is expected to increase, Tobin's Q may improve accordingly. Empirical evidence shows that

GROW has a significant positive effect on firm value (Bui et al., 2023). Asset growth therefore captures expansion capability, accumulation of new assets, and long-term investment intensity. Therefore:

**H4:** GROW positively affects Tobin's Q of steel companies listed on the Vietnamese stock market.

#### 2.4. Corporate Income Tax (TAX)

According to Modigliani and Miller (1963), in the presence of corporate income tax, interest payments are tax deductible, generating tax shield benefits that reduce WACC and increase firm value. Trade-off Theory further suggests that firms increase leverage to exploit tax benefits until the marginal tax advantage equals expected financial distress costs. In this context, tax does not directly influence firm value but affects it indirectly through capital structure decisions. Empirical studies show that taxation is positively associated with leverage usage (Sudiyatno et al., 2013), implying that firms facing higher effective tax rates have stronger incentives to increase debt in order to optimize value. In the capital-intensive steel industry, higher effective taxation may encourage greater leverage, which in turn affects Tobin's Q depending on financial risk exposure. Therefore:

**H5:** Corporate income tax (TAX) affects Tobin's Q of steel companies listed on the Vietnamese stock market through the tax shield mechanism and capital structure adjustments.

#### 2.5. Tangible Assets (TANG)

Under Trade-off Theory, tangible assets reduce expected financial distress costs by serving as collateral, enabling firms to access debt at lower cost. Under Pecking Order Theory, collateral assets reduce information asymmetry and facilitate debt financing instead of equity issuance (Myers & Majluf, 1984). Empirical evidence confirms that TANG positively affects leverage (Nguyen Thanh Cuong, Nguyen Thi Canh (2012); Sudiyatno et al., 2023). In terms of valuation, asset tangibility may enhance borrowing capacity and stabilize financing, thereby supporting growth and increasing market valuation, provided that leverage remains within prudent levels. Therefore:

**H6:** TANG positively affects Tobin's Q of steel companies listed on the Vietnamese stock market through its collateral role and reduction of information asymmetry.

#### 2.6. Return on Assets (ROA)

ROA reflects the efficiency with which firms utilize assets to generate profits and represents internal operational capability. According to Signaling Theory, highly profitable firms send positive signals regarding managerial quality and future cash flow prospects, leading to higher market valuation (Ross, 1977). Pecking Order Theory further suggests that profitable

firms prefer internal financing and reduce reliance on debt, thereby lowering financial risk and enhancing investor confidence (Myers & Majluf, 1984).

In the steel industry, where profitability is strongly influenced by commodity price cycles and construction demand fluctuations, ROA also reflects cost control capacity and margin sustainability under volatile market conditions. Empirical evidence in Vietnam documents a positive relationship between profitability and Tobin's Q (Bui et al., 2023; Jihadi et al., 2021).

**H7:** Return on Assets (ROA) positively affects Tobin's Q of steel companies listed on the Vietnamese stock market.

### 3. Model and Research Methodology

#### 3.1. Research Model

This study adopts an empirical framework consistent with prior research by Jihadi et al. (2021), Bui et al. (2023), and Hoang Ngoc An and Tran Ngoc Tu (2024). Building upon these established approaches, the proposed research model is specified as follows:

$$\text{Tobin's } Q_{it} = \beta_0 + \beta_1 \text{SDA}_{it} + \beta_2 \text{LDA}_{it} + \beta_3 \text{SIZE}_{it} + \beta_4 \text{GROW}_{it} + \beta_5 \text{TAX}_{it} + \beta_6 \text{TANG}_{it} + \varepsilon_{it}$$

Where:

#### Dependent variable - Tobin's Q

Tobin's Q is employed as the dependent variable to represent firm market valuation. It reflects the relationship between the firm's market value, including the market value of equity, debt, and preferred stock, and the book value of total assets. A Tobin's Q greater than one indicates that the market values the firm above the replacement cost of its assets, whereas a value below one suggests that the firm may not be utilizing its assets efficiently and could be undervalued by the market. In this study, Tobin's Q is used to capture changes in firm value associated with variations in capital structure (Bui et al., 2023; Luu, 2021; Vo Minh Long, 2017).

#### Independent variables representing capital structure

The capital structure variables include:

(i) Short-term Debt to Total Assets (SDA), measured as the ratio of short-term debt to total assets. This variable captures the firm's reliance on short-term financing. Although short-term debt may carry lower financing costs, it increases liquidity risk and refinancing risk.

(ii) Long-term Debt to Total Assets (LDA), measured as the ratio of long-term debt to total assets. This variable reflects the extent to which long-term liabilities finance long-term investments. While long-term debt provides more stable funding, it entails fixed financial obligations and exposure to interest rate risk.

The decomposition of total debt into SDA and LDA enables the examination of whether debt maturity

structure generates differentiated effects on firm valuation. This approach extends and builds upon prior studies by Bui et al. (2023), Hoang Ngoc An and Tran Ngoc Tu (2024), and Vo Minh Long (2017).

#### *Firm-level control variables*

Firm size (SIZE) is measured as the natural logarithm of total assets. This variable captures firm scale and controls for the influence of size on market valuation, as larger firms generally exhibit greater stability and improved access to capital markets.

Asset growth (GROW) is calculated as the annual percentage change in total assets relative to the previous year. This variable reflects expansion strategy and long-term growth potential.

Corporate income tax (TAX) is measured as corporate income tax expense divided by earnings before tax, representing the firm's effective tax burden.

Asset tangibility (TANG) is defined as the ratio of fixed assets to total assets. This variable captures the degree of asset tangibility, which influences collateral capacity, access to debt financing, and capital structure decisions. It is particularly relevant in the steel industry, given its high capital intensity.

### **3.2. Data and Research Methodology**

The dataset employed in this study consists of secondary unbalanced panel data collected from 14 steel firms listed on the Vietnam Stock Exchange over a 12-year period from 2012 to 2023, obtained from FiinPro. Panel models are estimated using Pooled OLS, FEM, and REM, with the Hausman test selecting between FEM and REM. Diagnostic tests include Modified Wald or Breusch Pagan for heteroskedasticity and Wooldridge for serial correlation. FGLS corrects violations (Hair et al., 2019).

### **4. Empirical Results**

Descriptive statistics show mean Tobin's Q of 0.366 with notable dispersion. Short term debt dominates capital structure (SDA 0.578; LDA 0.057). Firm size varies widely, while asset growth is highly volatile with extreme values; winsorization at 1 percent preserves model stability. ROA averages 2.7 percent and TANG 20.2 percent, consistent with capital intensity. TAX has a negative mean. Correlations are generally low, with a stronger link between LDA and TANG. VIF values below 3 indicate no multicollinearity concerns.

**Table 1. Descriptive Statistics of the Research Variables**

| Variable | Mean   | Std.Dev | Min      | Median | Max    |
|----------|--------|---------|----------|--------|--------|
| TobinsQ  | 0.366  | 0.242   | 0.072    | 0.288  | 1.214  |
| SDA      | 0.578  | 0.121   | 0.265    | 0.578  | 0.840  |
| LDA      | 0.057  | 0.077   | 0.000    | 0.020  | 0.291  |
| SIZE     | 7.526  | 1.576   | 4.233    | 7.598  | 12.143 |
| GROW     | -1.683 | 15.873  | -191.684 | 0.021  | 0.933  |
| ROA      | 0.027  | 0.069   | -0.469   | 0.028  | 0.217  |

|      |        |       |        |        |       |
|------|--------|-------|--------|--------|-------|
| TANG | 0.202  | 0.127 | 0.020  | 0.170  | 0.499 |
| TAX  | -0.150 | 0.152 | -0.786 | -0.154 | 0.249 |

Source: Results from Stata 17

Subsequently, the study estimates the model using Pooled OLS, FEM, and REM specifications (Table 2). Model selection is conducted using the F-test and the Hausman test. The F-test yields Prob > F = 0.0000, rejecting the null hypothesis and indicating that FEM is preferred over Pooled OLS. The Hausman test reports Prob >  $\chi^2$  = 0.0327, leading to the rejection of the null hypothesis and supporting the use of FEM over REM.

Based on the selected FEM specification, further diagnostic tests are performed. The Modified Wald test reveals the presence of heteroskedasticity (Prob >  $\chi^2$  = 0.0000), while the Wooldridge test detects serial correlation (Prob > F = 0.0000). To address these issues, the FGLS estimator is applied. The FGLS results (Wald  $\chi^2(7)$  = 1075.02; p = 0.000) show that both SDA (-0.7986) and LDA (-0.8471) exert statistically significant negative effects at the 1% level on Tobin's Q. These findings imply that increased leverage, regardless of maturity structure, reduces market valuation, consistent with the financial distress cost argument of Trade-off Theory.

In contrast, ROA (0.2222; p < 0.01) and TANG (0.0678; p < 0.01) have positive and significant effects, indicating that profitability and tangible asset backing enhance market expectations. TAX exhibits a negative effect at the 5% significance level, while SIZE and GROW are statistically insignificant.

**Table 2. Regression Results Across Model Specifications**

| Variable               | Pooled OLS                                       |         | FEM                                                       |         | REM                                                     |         | FGLS                                                       |         |
|------------------------|--------------------------------------------------|---------|-----------------------------------------------------------|---------|---------------------------------------------------------|---------|------------------------------------------------------------|---------|
|                        | Coeff.                                           | P-value | Coeff.                                                    | P-value | Coeff.                                                  | P-value | Coeff.                                                     | P-value |
| SDA                    | -1.0800<br>***                                   | 0.000   | -0.8415<br>***                                            | 0.000   | -0.8012<br>***                                          | 0.0012  | -0.7986<br>***                                             | 0.000   |
| LDA                    | -0.8288                                          | 0.143   | -0.4751                                                   | 0.145   | -0.842<br>*                                             | 0.0021  | -0.8471<br>***                                             | 0.000   |
| SIZE                   | 0.0183                                           | 0.368   | -0.0706                                                   | 0.108   | -0.475                                                  | 0.076   | -0.0019                                                    | 0.587   |
| GROW                   | 0.0005                                           | 0.244   | 0.0003                                                    | 0.371   | -0.071<br>**                                            | 0.028   | 0.0002                                                     | 0.589   |
| ROA                    | -0.0128                                          | 0.942   | 0.1354                                                    | 0.408   | 0.011                                                   | 0.687   | 0.2222<br>***                                              | 0.000   |
| TANG                   | 0.4704                                           | 0.225   | 0.1008                                                    | 0.582   | 0.135                                                   | 0.466   | 0.0678<br>***                                              | 0.002   |
| TAX                    | 0.1049                                           | 0.251   | -0.1352                                                   | 0.339   | 0.101                                                   | 0.588   | -0.0749<br>**                                              | 0.016   |
| Cons                   | 0.8209<br>***                                    | 0.000   | 1.7628<br>***                                             | 0.000   | -0.135                                                  | 0.113   | 1.2267<br>***                                              | 0.000   |
| N                      | 153                                              |         | 153                                                       |         | 153                                                     |         | 153                                                        |         |
| R-sq/<br>Wald $\chi^2$ | 0.387                                            |         | within = 0.65892<br>between = 0.6623<br>overall = 0.66061 |         | within = 0.5822<br>between = 0.5812<br>overall = 0.5817 |         | Wald $\chi^2(7) =$<br>1075.02<br>Prob > $\chi^2 = 0.00000$ |         |
| F                      | F = 9.948 ; Prob > F = 0.000243 (<1%)            |         |                                                           |         |                                                         |         |                                                            |         |
| Hausman                | Chi2 (7) = 22.29 and Prob > chi2 = 0.0327 < 0.05 |         |                                                           |         |                                                         |         |                                                            |         |
| Wald chi2              | Wald chi2 (7) = 263.54 and Prob > chi2 = 0.000   |         |                                                           |         |                                                         |         |                                                            |         |

Source: Results from Stata 17

(\*) Significant at the 10%; (\*\*) significant at the 5%; (\*\*\*) significant at the 1%

The variation in statistical significance of ROA between the FEM and FGLS estimations suggests that the FEM results may have been affected by heteroskedasticity and serial correlation, leading



to biased standard errors. After correcting for these econometric issues using FGLS, the coefficient of ROA becomes statistically significant at the 1 percent level, more clearly reflecting the role of profitability in enhancing market valuation. Additional estimations using cluster-robust standard errors at the firm level yield consistent coefficient signs and significance levels for the key variables, further confirming the robustness of the empirical findings.

## 5. Conclusion and Implications

### 5.1. Conclusion

The empirical results indicate that the market valuation of listed steel firms, measured by Tobin's Q, is significantly influenced by debt maturity structure and firm-specific characteristics. Both short-term and long-term debt ratios exhibit negative and statistically significant coefficients, suggesting that increased reliance on debt financing is associated with lower market valuation. In other words, investors respond cautiously to rising leverage levels. Higher debt ratios increase liquidity risk, refinancing risk, and the likelihood of financial distress, leading the market to perceive firms as riskier and adjust valuations downward. This finding is consistent with Trade-off Theory, which posits that firm value is maximized at an optimal leverage level; beyond this threshold, higher financial risk and distress costs reduce market value.

In contrast, profitability and asset tangibility have positive and statistically significant effects on Tobin's Q, highlighting the importance of operational efficiency and tangible asset backing in strengthening investor confidence and enhancing valuation. Corporate income tax exhibits a negative and statistically significant effect, suggesting that in the context of the Vietnamese steel industry during the study period, a higher effective tax burden may reflect compressed profit margins or suboptimal financial structures, thereby reducing market valuation. This result implies that tax shield benefits are insufficient to offset the financial costs and risks associated with elevated leverage within the sample.

Asset growth does not show a statistically significant impact, indicating that capacity expansion during downturn phases of the industry cycle may not be positively valued by the market unless accompanied by improvements in profitability. Similarly, firm size is statistically insignificant, which may reflect the structural characteristics of the steel industry, where valuation differences are driven more by operational efficiency and financing structure than by absolute asset scale.

### 5.2. Implications

For listed steel firms, financing strategies should be implemented cautiously, particularly given the cyclical

nature of the industry and its exposure to international trade fluctuations and input price volatility. Increasing debt ratios, whether short-term or long-term, may reduce Tobin's Q if leverage exceeds the optimal threshold. Firms should therefore prioritize improving profitability through production efficiency, cost optimization, and technology-intensive investment. Strengthening high-quality tangible asset bases may further enhance financial capacity and send positive signals to the market.

For investors, the findings underscore the importance of examining debt maturity structure rather than relying solely on aggregate leverage measures. Firms that maintain stable profitability and possess strong asset structures tend to achieve higher valuations and are less subject to market discounting during economic volatility. Simultaneous evaluation of operational performance and capital structure enhances investment decision quality in the steel sector.

For policymakers, the empirical evidence highlights the importance of a stable financial environment and regulatory framework in shaping capital structure decisions and firm value. Stable credit policies, development of medium- and long-term capital markets, and appropriate trade protection measures may alleviate financial pressure and support firms in optimizing capital structure. Such measures can contribute to sustainable improvement in the market value of the steel industry amid increasing global integration and competition.

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# THE INFLUENCE OF SUPPORTING FACTORS ON THE ENTREPRENEURIAL INTENTION OF UNIVERSITY STUDENTS

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**Abstract:** *This paper is conducted under the purpose of identifying the constructs that could function as the predictors for entrepreneurial intention of students in Vietnam. Data of the study was collected via a closed-ended survey questionnaire of 482 students in leading universities in Vietnam. Under the adoption of regression analysis, the study's results have found 2 factors whose impacts on entrepreneurship intention are direct, namely family support and structural support. Meanwhile, the role of education support seems not to be as significant as expected. The role of education support is also rejected by one school of thought, which highlights that the entrepreneurship intention is the results of entrepreneurial self-efficacy which is an inborn characteristic of individuals and could not be improved by education. Findings from the paper suggest that the focus on family support and structural support from policymakers is critical to promote entrepreneurship actions of students.*

Date of receipt: 24<sup>th</sup> Feb., 2026

Date of delivery revision: 28<sup>th</sup> Feb., 2026

DOI:

Date of receipt revision: 26<sup>th</sup> Mar., 2026

Date of approval: 04<sup>th</sup> Apr., 2026

## 1. Introduction

The development of economy depends greatly on the entrepreneurship, especially from the youth due to its significant impacts on job creation, welfare opportunities, innovation and increase in production (Aliyari, 2024). The intention to start entrepreneurship could be understood as the growth of personal aspiration to start a business or the intention to be self-employed (Tran and Duong, 2019). Entrepreneurship has become a well-known phenomenon all over the world. In fact, the reasons that an individual could be motivated to have the intention to run their own business are diverse and have attracted the attention of various prior studies in the literature.

### *Family Support and Entrepreneurial Intention*

The role of social networks where individuals are embedded in has been proved to have strong impacts on the intention to start a business (Tentama et al, 2024). Family support is generally understood as the informational, emotional, and instrumental support from family members (Annisa et al, 2021). First of all, supportive families in entrepreneurship could come in the form of informational assistance in which family gives feedbacks, guidance, information and counseling for individuals. In other words, the support from family roots from the behaviors and attitude of family through which the members are equipped with necessary mental relief to cope with stress while receiving the assistance in terms of information, advisory and motivation (Aliyari, 2024). Secondly, the support from

family makes it easier for individuals to make decision for business start-up and build up their confidence in their capabilities which is mentioned as the emotional support. The empathy and attention to the individual also contributes to the feeling of comfort, being loved and cared for which inspires entrepreneurship among individuals. Finally, instrumental support comprises of supervision and financial support if any during the entrepreneurship process.

Accordingly, hypothesis 1 (H1) is developed as follows:

*Hypothesis 1: Family support has positive impacts on the Entrepreneurship Intention*

### *Education Support and Entrepreneurship Intention*

As an environmental factor, education support is also examined as a predictor of entrepreneurship intention, especially the education in a university (Dewantara et al, 2024). Specifically, the intention to start entrepreneurship will be more favorably if individuals believe that entrepreneurship is not difficult. Sauola et al (2022) highlight that the initiative to start a new business needs a knowledge background and data, which could be supported by participating in entrepreneurial education. Before starting initiative to start-up, it is necessary for individuals to acquire relevant techniques and identify suitable opportunities through education and experience. Individuals who are equipped with appropriate skills and knowledge will be more motivated to initiate a business (Kadir et al, 2012).

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Accordingly, hypothesis 2 (H2) is developed as follows:

*Hypothesis 2: Education Support has positive impacts on the Entrepreneurship Intention*

### **Structural Support and Entrepreneurship Intention**

If social support (such as family support or education support) is usually mentioned as the experience of individuals to be a part of supportive social network in which they are valued and cared for by others (Edelman et al, 2016), the structural support plays an even more important role in entrepreneurship intention. It is argued by Tran and Duong (2019) that structural support could enhance or restrain individuals' initiative of business by affecting their perception of risks and opportunities if they involve in entrepreneurship. Structural support involves the suitable environment for entrepreneurship including technological, political and economic constructs which could function as either barriers or gateways for individuals to involve in entrepreneurship activities (Akhtar et al, 2023).

Accordingly, hypothesis 3 (H3) is developed as follows:

*Hypothesis 3: Structural Support has positive impacts on the Entrepreneurship Intention*

## **2. Research methodology**

### **2.1. Study Design**

This study was developed under a positivism theory and a quantitative design. Specifically, we adopted a research approach of deduction and made attempts to generalize the research's results under the use of a quantitative closed-ended questionnaire. We spent more than 1 month contacting shortlisted participants via email or phone calls. The questionnaire was designed carefully in order that it might take the respondents around 10 minutes to complete. There were 597 copies of questionnaires to be distributed among different respondents from leading universities in Vietnam in different cities, with the purpose of ensuring the diversity of collected data. In the end, we collected 482 completed questionnaires to be taken into analysis.

### **2.2. Measurements**

Along with other prior works to be conducts with the same topic of interests, within this paper, all constructed were measured under a Likert scale in which participants were required to rate their level of agreement following a scale from 1 (strongly disagree) to 5 (strongly agree).

### **2.3. Sample Characteristics**

Other demographic information was also collected with the purpose of assisting the researcher in the

interpretation of the analysis. The constructs used in this paper are indicated in the table below.

**Table 1. Profile of Respondents**

| Demographic Variables           | Category            | Frequency | (%)  |
|---------------------------------|---------------------|-----------|------|
| Gender                          | Male                | 108       | 22.5 |
|                                 | Female              | 372       | 77.3 |
| Major                           | Business Management | 27        | 5.6  |
|                                 | Marketing           | 1         | .2   |
|                                 | Finance - Banking   | 144       | 29.9 |
|                                 | Commerce            | 29        | 6.0  |
|                                 | Others              | 280       | 58.2 |
| School Year                     | Last year           | 40        | 8.3  |
|                                 | Other               | 441       | 91.7 |
| Involvement in Start-up Program | Yes                 | 76        | 15.8 |
|                                 | No                  | 405       | 84.2 |
| Parents' Occupation             | Self-employed       | 164       | 34.1 |
|                                 | Others              | 317       | 65.9 |

The profile of respondents reveals that most of the respondents are female (account for 77.3%) and the dominant major does not belong to the business-related fields (58.2%). As indicated in Table 1, most respondents (91.7%) have not come to their last year of education, which might explain the reason why 84.2% of them have not yet participated in any start-up programs. 34.1% of respondents have self-employed parents, who might act as their role model to start entrepreneurship intention.

## **3. Results of analyses**

### **Reliability Test**

With the purpose of testing the validity of the measurement model, the Cronbach alpha analysis test and factor analysis test were adopted.

First of all, the researcher made attempts to test the discriminant validity of the scale by the use of Cronbach's Alpha. Findings from the analysis showed that all constructs in the scale have the Cronbach's Alpha higher than 0.6 and have the Corrected Item-Total Correlation higher than 0.3 (as indicated in Table 2).

**Table 2. Cronbach's Alpha of Constructs in the Entrepreneurship Intention Measurement Scale**

| Independent variables                     | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item-Total Correlation | Cronbach's Alpha if Item Deleted |
|-------------------------------------------|----------------------------|--------------------------------|----------------------------------|----------------------------------|
| Family Support: Alpha = 0.902             |                            |                                |                                  |                                  |
| FS1                                       | 21.89                      | 26.488                         | .699                             | .889                             |
| FS2                                       | 22.10                      | 25.488                         | .734                             | .885                             |
| FS3                                       | 22.14                      | 25.150                         | .779                             | .880                             |
| FS4                                       | 21.95                      | 26.215                         | .688                             | .890                             |
| FS5                                       | 22.18                      | 25.887                         | .687                             | .890                             |
| FS6                                       | 21.81                      | 26.382                         | .693                             | .890                             |
| FS7                                       | 21.83                      | 25.969                         | .695                             | .889                             |
| Education Support: Alpha = 0.906          |                            |                                |                                  |                                  |
| ES1                                       | 12.09                      | 5.393                          | .804                             | .872                             |
| ES2                                       | 12.20                      | 5.184                          | .814                             | .868                             |
| ES3                                       | 12.26                      | 5.278                          | .771                             | .884                             |
| ES4                                       | 12.04                      | 5.446                          | .761                             | .887                             |
| Structural Support: Alpha = 0.906         |                            |                                |                                  |                                  |
| SS1                                       | 11.22                      | 5.808                          | .763                             | .860                             |
| SS2                                       | 11.16                      | 5.558                          | .778                             | .853                             |
| SS3                                       | 11.23                      | 5.548                          | .748                             | .865                             |
| SS4                                       | 11.21                      | 5.602                          | .756                             | .862                             |
| Entrepreneurship Intention: Alpha = 0.933 |                            |                                |                                  |                                  |



|     |       |        |      |      |
|-----|-------|--------|------|------|
| E11 | 18.44 | 17.960 | .749 | .927 |
| E12 | 18.36 | 17.368 | .830 | .917 |
| E13 | 18.30 | 17.587 | .830 | .917 |
| E14 | 18.36 | 17.768 | .826 | .917 |
| E15 | 18.30 | 18.023 | .774 | .924 |
| E16 | 18.30 | 17.477 | .804 | .920 |

Thus, all constructs are reliable enough to be kept in the scale and put further into the EFA test.

Table 3: EFA test

| Component | Initial Eigenvalues |               |              | Extraction Sums of Squared Loadings |               |              | Rotation Sums of Squared Loadings |
|-----------|---------------------|---------------|--------------|-------------------------------------|---------------|--------------|-----------------------------------|
|           | Total               | % of Variance | Cumulative % | Total                               | % of Variance | Cumulative % | Total                             |
| 1         | 10.486              | 49.932        | 49.932       | 10.486                              | 49.932        | 49.932       | 5.345                             |
| 2         | 2.180               | 10.380        | 60.312       | 2.180                               | 10.380        | 60.312       | 4.748                             |
| 3         | 1.684               | 8.017         | 68.329       | 1.684                               | 8.017         | 68.329       | 4.256                             |
| 4         | .899                | 4.280         | 72.610       |                                     |               |              |                                   |
| 5         | .657                | 3.128         | 75.738       |                                     |               |              |                                   |
| 6         | .545                | 2.593         | 78.331       |                                     |               |              |                                   |
| 7         | .479                | 2.282         | 80.613       |                                     |               |              |                                   |
| 8         | .466                | 2.220         | 82.833       |                                     |               |              |                                   |
| 9         | .402                | 1.915         | 84.748       |                                     |               |              |                                   |
| 10        | .353                | 1.682         | 86.430       |                                     |               |              |                                   |
| 11        | .343                | 1.633         | 88.063       |                                     |               |              |                                   |
| 12        | .333                | 1.584         | 89.647       |                                     |               |              |                                   |
| 13        | .303                | 1.440         | 91.088       |                                     |               |              |                                   |
| 14        | .294                | 1.400         | 92.487       |                                     |               |              |                                   |
| 15        | .266                | 1.267         | 93.755       |                                     |               |              |                                   |
| 16        | .249                | 1.188         | 94.943       |                                     |               |              |                                   |
| 17        | .248                | 1.183         | 96.126       |                                     |               |              |                                   |
| 18        | .237                | 1.128         | 97.253       |                                     |               |              |                                   |
| 19        | .206                | .979          | 98.232       |                                     |               |              |                                   |
| 20        | .192                | .914          | 99.146       |                                     |               |              |                                   |
| 21        | .179                | .854          | 100.000      |                                     |               |              |                                   |

### Structural Model

Regression analysis was used in order to test the Structural model. The ANOVA result showed that the regression result is compatible and reliable enough due to the very small F value (124.615) and Sig. (0.000). Table 4 indicates the multiple regression result as follows:

Table 4: Regression Analysis

| Model                | Unstandardized Coefficients |            | Standardized Coefficients | t     | Sig. | Correlations |         |
|----------------------|-----------------------------|------------|---------------------------|-------|------|--------------|---------|
|                      | B                           | Std. Error | Beta                      |       |      | Zero-order   | Partial |
| 1 (Constant)         | .808                        | .164       |                           | 4.916 | .000 |              |         |
| 1 Family Support     | .435                        | .044       | .438                      | 9.863 | .000 | .623         | .412    |
| 1 Education Support  | .077                        | .056       | .070                      | 1.375 | .170 | .487         | .063    |
| 1 Structural Support | .255                        | .057       | .237                      | 4.442 | .000 | .557         | .199    |

a. Dependent Variable: Entrepreneurship Intention

The "Education Support" has the Sig. of 0.170 > 0.05; thus, this construct is not significant in the regression model. In other words, this construct does not significantly affect the Entrepreneurship Intention. Other constructs, including Family Support and Structural Support, all have the Sig. value lower than 0.05; thus, these two constructs have significant impacts on Entrepreneurship Intention.

The regression equation was obtained based on the non-standard coefficients as follows:

$$y = 0.808 + 0.435 x_1 + 0.255 x_2$$

where  $x_1$  = family support and  $x_2$  = structural support.

### Conclusions

After the regression model results, we could see that one of the three independent variables was not significant enough to be the predictor for entrepreneurship intention. The results are the following:

- Family support has a Sig. of 0.000, which is lower than 0.05. Hypothesis 1, thus, is accepted with the unstandardized coefficient Beta of 0.435. Accordingly, if the family support fluctuates 1 unit, the entrepreneurship intention will also fluctuate 0.435 units.

- Structural support has the Sig. of 0.000, which is also lower than the standard of 0.05. Accordingly, hypothesis 3 is accepted with the unstandardized coefficient Beta of 0.255. The fluctuation of 1 unit in Structural support could affect 0.255 units of Social support.

The result of data analysis helps us to draw the following conclusions for the paper. Two of the three constructs, namely family support and structural supports are significant predictors for the dependent variable – Entrepreneurship Intention. Meanwhile, the role of education support seems not to be as significant as expected. The role of education support is also rejected by one school of thought, which highlights that the entrepreneurship intention is the result of entrepreneurial self-efficacy, which is an inborn characteristic of individuals and cannot be improved by education (Saoula et al, 2022). In other viewpoints, in spite of immense efforts from educational institutes, they could only motivate those who are passionate about entrepreneurship. For those individuals, education support could create the platform to improve their entrepreneurial skills (Kah et al, 2022). In contrast, for those who do not acquire entrepreneurial self-efficacy, the role of education support seems to be modest.

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# DEVELOPMENT OF THE INNOVATION AND STARTUP ECOSYSTEM IN VIETNAM: THE ROLE OF GOVERNMENT AND THE PRIVATE SECTOR

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**Abstract:** *Vietnam's innovation and startup ecosystem has expanded in recent years, as reflected in improved global innovation rankings and increased startup activity. This paper examines the development of the ecosystem in Vietnam, with a focus on the complementary roles of government and the private sector. Based on qualitative synthesis of policy documents and reliable secondary data, the study identifies key enabling factors and structural constraints. The findings indicate that state-led institutional building has supported early-stage ecosystem formation, while growth remains constrained by limited scale-up finance, weak university–industry linkages, and uneven private-sector engagement. The paper discusses policy implications aimed at improving regulatory coherence, mobilizing long-term innovation finance, and strengthening public–private coordination to support sustainable ecosystem development.*

• Keywords: government role; innovation ecosystem; private sector; startups; Vietnam.

JEL codes: O31, O38, L26, M13

Date of receipt: 22<sup>th</sup> Feb., 2026

Date of delivery revision: 28<sup>th</sup> Feb., 2026

DOI:

Date of receipt revision: 24<sup>th</sup> Mar., 2026

Date of approval: 04<sup>th</sup> Apr., 2026

## 1. Introduction

Innovation-led growth has become increasingly important for Vietnam's efforts to move beyond factor-driven development and enhance competitiveness in a volatile global economic environment. In recent years, the government has promoted entrepreneurship and innovation through national programs, institutional reforms, and the establishment of dedicated coordination mechanisms. These initiatives have contributed to greater ecosystem visibility and a rise in early-stage startup formation. However, the transition from startup creation to sustainable scaling remains constrained by limited growth-stage financing, fragmented policy implementation, and weak commercialization of research outcomes.

While existing literature and comprehensive reports from international organizations such as the World Bank, OECD, and the National Innovation Center (NIC) have provided extensive mappings of Vietnam's startup landscape and policy frameworks, most tend to focus on descriptive status updates or independent evaluations of state-led initiatives. There remains a significant scholarly gap in understanding the dynamic complementarity between government

interventions and private sector engagement. This paper departs from traditional descriptive approaches by analyzing the ecosystem through the lens of institutional synergy. It shifts the focus from merely listing infrastructure and legal documents to evaluating how public policies catalyze private investment and, conversely, how private sector dynamics necessitate regulatory evolution. By examining this reciprocal relationship, the study offers a more nuanced perspective on the structural bottlenecks and provides a strategic roadmap for a self-sustaining innovation ecosystem in Vietnam.

## 2. Literature Review and Analytical Framework

The concept of the "startup ecosystem" and "innovation ecosystem" has appeared frequently in management and economics research since the early 21st century. The theoretical foundation of this topic is based on the national innovation system theory of Freeman (1987) and Lundvall (1992), which emphasizes the interactive roles of key actors: the state, businesses, and academia. Following that, Etzkowitz & Leydesdorff's (2000) Triple Helix model describes the close relationship between government, industry, and universities in promoting

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innovation. According to this model, the government creates the environment and rules of the game and can directly invest in R&D; the private sector is at the center of technology commercialization and innovation; and research institutes/universities provide knowledge and human resources. An effective innovation ecosystem often forms where these three helices are tightly interconnected and support each other.

More recent literature introduces the concept of startup ecosystems as networks of entrepreneurs, investors, support organizations, markets, and regulatory environments that jointly influence startup creation and growth (Isenberg, 2010). Empirical studies identify core ecosystem components, including access to finance, human capital, supportive regulation, infrastructure, and entrepreneurial culture. While this body of work provides important insights, much of the evidence is drawn from advanced economies and tends to emphasize market-driven dynamics, with relatively limited attention to the specific role of government in emerging contexts.

In developing and transition economies, government involvement often plays a more prominent role in shaping innovation and startup ecosystems. Studies on East Asian economies suggest that state-led coordination, public investment, and targeted policy support can facilitate ecosystem formation, particularly in early stages when private capital and institutional capacity remain limited (OECD, 2020). At the same time, the literature also cautions that fragmented governance or excessive administrative intervention may constrain private initiative and weaken market incentives. This suggests that ecosystem performance depends less on the scale of government intervention and more on how effectively public actions complement private-sector dynamics.

Vietnam-related studies generally acknowledge notable progress in startup activity since the mid-2010s, driven by national support programs and improvements in the business and digital environment (World Bank, 2024). Existing research highlights the government's role in establishing early-stage support mechanisms, enhancing institutional visibility, and promoting entrepreneurship. However, these studies consistently point to structural challenges, including weak university–industry linkages, limited domestic venture capital, regulatory rigidity, and low commercialization of research outcomes. Most

analyses focus on individual constraints or policy instruments, rather than examining the interaction between government and private-sector roles in a systematic manner.

Comparative international research indicates that successful innovation ecosystems typically exhibit a functional division of roles, whereby governments focus on institutional quality, coordination, and long-term investment, while the private sector drives experimentation, investment selection, and market expansion (Mazzucato, 2018). When these roles are misaligned, ecosystems may experience high startup entry but weak scaling performance, or strong policy presence without sustained private investment. This pattern is increasingly relevant for Vietnam, where early-stage ecosystem indicators have improved more rapidly than scale-up outcomes.

Despite a growing body of literature on Vietnam's innovation and startup ecosystem, two gaps remain. First, existing studies often describe government and private-sector roles without sufficiently analyzing their interaction effects. Second, there is limited synthesis linking ecosystem outcomes to the alignment between state-led enabling mechanisms and private-sector-driven innovation and investment. Addressing these gaps is essential for understanding the imbalance between ecosystem expansion and sustainable growth.

To address these issues, this study adopts an analytical framework that conceptualizes the innovation and startup ecosystem as an interaction between two core role clusters: (i) the government's enabling and coordinating role, encompassing policy design, institutional infrastructure, and public investment; and (ii) the private sector's driving role, including entrepreneurship, venture investment, corporate innovation, and market formation. Ecosystem performance is assessed through observable outcomes such as startup formation, investment dynamics, and international competitiveness indicators. This framework provides a structured basis for analyzing how role alignment between government and private actors shapes the development of Vietnam's innovation and startup ecosystem.

### 3. Research Methodology

This study employs a qualitative research approach combined with descriptive statistical analysis to examine the development of Vietnam's innovation and startup ecosystem, with particular



attention to the respective roles of the government and the private sector.

Secondary data are collected from authoritative domestic and international sources for the period 2021–2024. These include the Global Innovation Index (GII) reports published by the World Intellectual Property Organization (WIPO), global startup ecosystem rankings by StartupBlink, national reports on innovation and startup investment issued by the National Innovation Center (NIC), and official statistics from the General Statistics Office of Vietnam. Together, these sources provide a consistent and reliable basis for assessing ecosystem performance and Vietnam's international positioning.

Regarding analytical methods, qualitative synthesis is applied to review key government policies, legal documents, and national programs related to startup development, such as Project 844 and the Law on Support for Small and Medium Enterprises. This approach helps clarify the government's role in institutional formation and ecosystem coordination. Descriptive statistical analysis is used to examine indicators, including the number of startups, venture capital investment flows, and international rankings, thereby illustrating the private sector's role in driving entrepreneurial activity and market-oriented innovation.

The analytical framework of the study draws on the National Innovation System approach and the Triple Helix perspective, which emphasize interactions among the state, enterprises, and universities or research institutions. This framework supports a systematic assessment of role alignment within the ecosystem, facilitates the identification of key structural constraints, and provides a coherent basis for the policy implications discussed in subsequent sections.

#### 4. Results and Discussion

##### 4.1. Overall development of Vietnam's innovation and startup ecosystem

The indicators reported in Table 1 indicate a notable expansion of Vietnam's innovation and startup ecosystem during the period 2021–2024. The number of innovative startups increased from approximately 1,600 in 2021 to around 4,000 by 2024, reflecting sustained entrepreneurial momentum and the expansion of early-stage ecosystem activity. This trend suggests that institutional support mechanisms and startup promotion programs have contributed

to reducing entry barriers and encouraging new venture formation.

By contrast, venture capital investment shows a more volatile and downward pattern. Total investment declined sharply from USD 1,442 million in 2021 to USD 634 million in 2022 and continued to decrease in subsequent years, reaching approximately USD 460 million in the first nine months of 2024. A similar decline is observed in the number of investment deals. These developments reflect both global capital market uncertainty and structural vulnerabilities within Vietnam's ecosystem, particularly its strong dependence on external funding sources and the limited availability of domestic growth-stage capital.

Vietnam's Global Innovation Index (GII) ranking remained relatively stable during the period, fluctuating between 44th and 48th place. This stability indicates that the country has broadly maintained its institutional and innovation capacity despite external economic shocks. However, the StartupBlink ecosystem ranking shows only modest variation and lacks a clear upward trend, suggesting that improvements in institutional readiness have not yet translated into significant gains in ecosystem depth or international competitiveness.

Notably, the number of unicorn startups remained unchanged at two throughout the period. This outcome highlights the persistent gap between rapid ecosystem expansion in terms of startup numbers and limited scaling outcomes. Taken together, the indicators in Table 1 suggest that Vietnam's innovation and startup ecosystem has primarily expanded in breadth, while challenges related to capital depth, scale-up capacity, and global positioning remain substantial.

**Table 1 summarizes key indicators reflecting the development of Vietnam's innovation and startup ecosystem during the 2021-2024 period**

| Indicator                                      | 2021   | 2022   | 2023   | 2024   |
|------------------------------------------------|--------|--------|--------|--------|
| Number of innovative startups                  | ~1.600 | ~3.000 | ~3.800 | ~4.000 |
| Total venture capital investment (Million USD) | 1.442  | 634    | 529    | ~460   |
| Number of investment deals                     | 165    | 134    | 122    | ~118   |
| Global Innovation Index (GII) ranking          | 44     | 48     | 46     | 44     |
| Startup Ecosystem Ranking (StartupBlink)       | 59     | 54     | 58     | 56     |
| Number of "Unicorn" companies                  | 02     | 02     | 02     | 02     |

*Source: Compiled from WIPO (Global Innovation Index), StartupBlink, National Innovation Center (NIC), and secondary synthesis by the authors*

Table 1 presents selected indicators reflecting the development of Vietnam's innovation and startup ecosystem during the period 2021–2024. The data

show a rapid increase in the number of innovative startups, indicating sustained entrepreneurial momentum and the expansion of early-stage ecosystem activity. Venture capital investment and the number of investment deals, however, display notable fluctuations, reflecting both global market volatility and the ecosystem's vulnerability at the growth stage. Vietnam's Global Innovation Index (GII) ranking remains relatively stable, suggesting a maintained level of institutional capacity for innovation, while the StartupBlink ecosystem ranking shows only modest variation, highlighting challenges in translating policy efforts into greater ecosystem depth. The unchanged number of unicorn startups further indicates that ecosystem expansion has not yet been accompanied by significant breakthrough scaling outcomes. Overall, the indicators suggest that Vietnam's ecosystem has expanded in breadth, while structural constraints continue to limit its progression toward maturity.

#### ***4.2. Venture investment dynamics and ecosystem depth***

A closer examination of venture investment indicators in Table 1 reveals important implications for ecosystem sustainability. The sharp decline in total venture capital investment after 2021, together with a gradual reduction in the number of investment deals, points to a contraction in funding availability, particularly for later-stage startups. While early-stage ventures continue to emerge in large numbers, reduced capital flows constrain their capacity to scale, commercialize innovations, and expand into international markets.

The persistence of a relatively stable but modest StartupBlink ranking further suggests that ecosystem depth has not advanced at the same pace as startup formation. Despite improvements in institutional indicators such as the GII, the ecosystem has yet to generate a sufficient number of high-growth firms capable of strengthening its global position. This gap reflects limited domestic venture capital capacity, cautious investment behavior during periods of uncertainty, and relatively weak participation by large domestic enterprises in startup investment and innovation partnerships.

The unchanged number of unicorn startups provides additional evidence of these structural constraints. Although Vietnam has produced a small number of high-valuation firms, the absence of new unicorns over several years indicates persistent barriers in moving beyond early success

stages. These barriers are closely linked to capital availability, market access, and the limited integration of startups into broader industrial and value-chain networks.

Taken together, the investment-related indicators in Table 1 suggest that Vietnam's startup ecosystem remains exposed to external shocks and internal structural limitations. Without more effective mechanisms to mobilize long-term capital and support scale-up processes, continued ecosystem expansion may become increasingly disconnected from sustainable innovation and growth outcomes.

#### ***4.3. Private sector as the main driver of entrepreneurial activity***

Evidence from startup formation and venture capital flows indicates that the private sector plays a central role in driving entrepreneurial activity within Vietnam's innovation ecosystem. Most startup creation, innovation initiatives, and capital mobilization originate from private entrepreneurs, domestic firms, and foreign investors. The increasing participation of private capital in early-stage funding reflects growing market confidence and entrepreneurial dynamism.

However, private-sector contributions remain largely concentrated at early stages of development. Domestic venture capital funds are relatively limited in scale, and systematic engagement by large domestic corporations in startup investment and innovation partnerships is still emerging. As a result, many high-potential startups rely heavily on foreign capital for scaling. This dependence increases exposure to external shocks and constrains domestic value capture, a pattern commonly observed in emerging innovation ecosystems.

#### ***4.4. Gaps in research–industry linkages and innovation commercialization***

The results also highlight weak linkages between universities, research institutes, and startups as a persistent structural constraint. Despite recent improvements in entrepreneurship education and academic engagement, technology commercialization remains limited. Only a small share of startups originate from research institutions, and collaboration between academia and enterprises is often informal and project-based rather than institutionalized.

This finding is consistent with insights from the National Innovation System literature, which emphasizes that effective innovation depends on

strong knowledge transfer mechanisms. In Vietnam, institutional barriers, unclear intellectual property arrangements, and limited incentives for researchers continue to hinder the formation of research-based startups. Without stronger integration between research and business sectors, upgrading the ecosystem toward higher-value innovation will remain challenging.

#### **4.5. Human capital and entrepreneurial capabilities**

Human capital emerges as both a strength and a constraint within the ecosystem. Vietnam benefits from a young workforce and a growing pool of technically trained graduates, which supports startup formation, particularly in digital and service-oriented sectors. At the same time, the ecosystem faces shortages of experienced entrepreneurs, startup managers, and specialized technical experts required for scaling and deep-tech development.

These findings suggest that recent improvements in education and training have not yet translated into advanced entrepreneurial capabilities. Addressing this gap requires sustained investment in innovation-oriented human capital, including managerial skills, interdisciplinary training, and greater mobility between industry and academia.

#### **4.6. Discussion: role alignment and ecosystem sustainability**

Taken together, the results indicate that Vietnam's innovation and startup ecosystem is characterized by effective state-led initiation and increasing private-sector participation, but limited role alignment at the scale-up stage. Government policies have been effective in establishing early-stage conditions, while private actors have responded dynamically through startup creation and market experimentation. However, insufficient coordination between institutional support and private investment continues to constrain ecosystem sustainability.

This pattern supports the analytical framework adopted in this study, which emphasizes the interaction between government enabling functions and private-sector driving forces. Where these roles are complementary, ecosystem performance improves; where misalignment persists, growth remains fragile. Vietnam's experience highlights the need to move from policy-driven expansion toward a more balanced ecosystem model that strengthens private-sector leadership while refining institutional

frameworks.

### **5. Policy Implications**

The empirical findings presented in Sections 4.1 and 4.2 indicate that Vietnam's innovation and startup ecosystem has expanded rapidly in terms of startup formation, while remaining constrained by volatility in venture capital flows, limited ecosystem depth, and weak scaling outcomes. These patterns suggest that policy priorities should move beyond broad ecosystem activation toward more targeted interventions addressing the structural bottlenecks identified.

*First*, strengthening regulatory coherence is essential to consolidate early-stage ecosystem expansion. The sharp increase in the number of innovative startups shown in Table 1 indicates that entry barriers have been effectively reduced. However, the absence of corresponding improvements in ecosystem rankings and scaling indicators suggests that regulatory frameworks have not sufficiently supported growth beyond the initial stage. Policy efforts should therefore focus on improving consistency and predictability in regulations related to startup investment, venture capital operations, and intellectual property protection. Rather than expanding the number of support schemes, refining and harmonizing existing policies would better contribute to ecosystem deepening.

*Second*, addressing the decline and volatility of venture capital investment requires mechanisms to mobilize long-term capital. The significant reduction in total venture capital and investment deals after 2021 highlights the ecosystem's exposure to external shocks and its reliance on foreign funding. To mitigate these risks, policy measures should promote public-private investment mechanisms that leverage state resources to crowd in private capital. Co-investment arrangements or matching funds can help stabilize funding availability for growth-stage startups while maintaining market discipline. Expanding domestic sources of venture capital would also reduce dependence on external capital cycles.

*Third*, improving ecosystem depth requires targeted support for startup scaling and market integration. Despite sustained startup formation, the unchanged number of unicorn startups over the 2021–2024 period indicates persistent barriers to scaling. Policy interventions should therefore



emphasize support for startups' integration into domestic and international value chains, rather than focusing primarily on new venture creation. Measures such as facilitating partnerships between startups and large domestic enterprises, supporting access to export markets, and strengthening linkages with global innovation networks can directly address the gap between ecosystem breadth and depth identified in the results.

**Fourth**, enhancing the effectiveness of innovation policy depends on stronger alignment between institutional support and private-sector participation. Although Vietnam's Global Innovation Index ranking remains relatively stable, this has not translated into improved startup ecosystem rankings. This divergence suggests that institutional readiness alone is insufficient without active private-sector engagement. Policymakers should thus adopt a more facilitative role, enabling private investors, enterprises, and ecosystem intermediaries to lead innovation activities, while the state focuses on coordination, transparency, and performance monitoring.

**Finally**, policy evaluation frameworks should place greater emphasis on outcome-based indicators rather than input measures. The contrast between rapid startup growth and weaker investment and scaling indicators highlights the need to reassess how ecosystem success is measured. Greater attention should be given to indicators related to startup survival, scale-up performance, and investment sustainability, rather than the number of programs or supported projects. Aligning evaluation criteria with ecosystem depth would improve policy learning and long-term effectiveness.

Taken together, these policy implications directly respond to the structural patterns identified in Sections 4.1 and 4.2. By addressing capital volatility, regulatory coherence, and scaling constraints, policymakers can support the development of a more resilient and sustainable innovation and startup ecosystem in Vietnam.

### Conclusion

This study highlights the evolving nature of Vietnam's innovation and startup ecosystem as it moves from an initial expansion phase toward a more complex and sustainability-oriented stage. The analysis underscores that ecosystem performance depends not merely on the presence of policies or the number of startups, but on the quality of alignment between institutional frameworks and

market-driven dynamics. In this context, the balance between government facilitation and private-sector leadership emerges as a key determinant of long-term ecosystem viability.

From an academic perspective, the study contributes to the literature on innovation ecosystems in emerging economies by emphasizing the importance of role alignment rather than isolated policy instruments or firm-level outcomes. It reinforces the view that innovation ecosystems function as interdependent systems in which institutional coherence, capital mobilization, knowledge flows, and human capabilities must evolve in a coordinated manner. This perspective helps explain why rapid ecosystem expansion does not automatically lead to sustainable scaling or high-value innovation.

In practical terms, the findings suggest that the next phase of ecosystem development in Vietnam should prioritize institutional refinement, deeper private-sector engagement, and stronger integration between knowledge creation and market application. A shift from quantity-based expansion toward quality-oriented consolidation will be essential to enhance ecosystem resilience and competitiveness. At the same time, empowering private actors to assume greater leadership in innovation investment and governance can help reduce administrative dependence and improve market responsiveness.

This study is subject to certain limitations. It relies primarily on secondary data and qualitative synthesis, which may not fully capture firm-level dynamics or regional variation within the ecosystem. Future research could incorporate micro-level evidence, comparative case studies, or longitudinal analyses to better assess causal relationships and policy impacts. Despite these limitations, the study provides a coherent analytical basis for understanding and advancing Vietnam's innovation and startup ecosystem in the coming period.

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# FACTORS INFLUENCING YOUTH ENTREPRENEURIAL SPIRIT: EVIDENCE FROM LAO CAI PROVINCE

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**Abstract:** Youth entrepreneurship is vital for innovation and inclusive economic growth in developing areas. This study examines determinants of the entrepreneurial spirit among young people in Lao Cai province, a mountainous and ethnically diverse region of northern Vietnam. Based on the Theory of Planned Behavior (TPB), the model includes seven factor groups: family background, education, institutional support, personal capacity, technology–innovation, globalization, and socio-cultural context. Using survey data from 450 respondents, Exploratory Factor Analysis (EFA) and multiple regression identify family background, socio-cultural factors, and technology–innovation as the strongest positive predictors. Globalization slightly reduces entrepreneurial drive, while education exerts limited impact. The findings highlight the need for integrated support across families, communities, and institutions to nurture innovation-oriented youth entrepreneurship. This research provides new insights into entrepreneurial behavior in rural and underdeveloped settings, offering implications for policy design and entrepreneurship education.

• Keywords: youth entrepreneurship; entrepreneurial spirit; Lao Cai province; factor analysis.

Date of receipt: 10<sup>th</sup> Nov., 2025

Date of delivery revision: 28<sup>th</sup> Feb., 2026

DOI:

Date of receipt revision: 24<sup>th</sup> Mar., 2026

Date of approval: 04<sup>th</sup> Apr., 2026

## 1. Introduction

In the context of a global economy increasingly reliant on innovation and workforce autonomy, entrepreneurship has emerged as a critical pathway for promoting inclusive and sustainable growth (OECD, 2022). Both developed and developing nations regard the development of small and medium-sized enterprises (SMEs)-particularly youth-led ventures-as a strategic solution to job creation, income generation, and the mobilization of internal resources (European Commission, 2003; GEM, 2023). In Vietnam, entrepreneurship is recognized as a core driver of the knowledge economy, contributing to employment generation and social welfare, especially given the rapid growth of the young labor force (VCCI, (2022).

The entrepreneurial tendency among Vietnamese youth has grown markedly in recent years, as reflected in the rising number of youth-founded enterprises and increased youth participation in national startup initiatives (VCCI., 2022). Notably, rural and ethnic minority youth are also engaging in entrepreneurship through models tailored to local conditions (UNDP Vietnam, 2021). According to the Global Entrepreneurship Monitor (2023), over 35% of Vietnamese youth

aged 18–35 intend to start a business within three years-higher than the global average-indicating a strong entrepreneurial spirit.

However, alongside quantitative growth, youth entrepreneurship in Vietnam faces significant limitations. Chief among them is a lack of foundational business knowledge, including financial planning, human resource management, marketing, and legal compliance (GEM, 2023; VCCI, 2022). A UNDP (2021) survey in eight northern mountainous provinces revealed that over 70% of ethnic minority youth entrepreneurs had never received formal business training. Similarly, the 2022 National Startup Report by the Ministry of Science and Technology showed that 42% of youth-led startups faced major challenges in financial and market management, resulting in a high failure rate within the first two years.

International studies have also confirmed that the lack of business knowledge and entrepreneurial skills is one of the leading causes of startup failure among young entrepreneurs (Brixiová et al., 2020; Premand et al., 2016). In addition to technical gaps, psychological barriers such as low confidence, fear of failure, lack of mentorship, and weak local ecosystem support also impede youth

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entrepreneurship (Shinnar et al., 2014; Martínez-Gregorio et al., 2021). Financial constraints are particularly severe: according to the World Bank (2021), only about 9% of Vietnamese youth can access formal financing when launching a business, while 68% rely on informal loans from family or friends without clear credit agreements.

Theoretically, numerous studies have identified various factors influencing youth entrepreneurial spirit, including: (1) education and entrepreneurship training (Fayolle & Gailly, 2015); (2) family background and parental influence (Kickul et al., 2008); (3) personal financial resources and access to capital (Brixiová et al., 2020); (4) peer and community influence (Farrukh et al., 2019); (5) behavioral perceptions such as attitudes, subjective norms, and perceived behavioral control (Ajzen, 1991); and (6) the level of entrepreneurial culture and institutional environment (Hofstede et al., 2004; GEM, 2023).

However, most studies in Vietnam remain limited to assessing entrepreneurial spirit or descriptive characteristics of youth entrepreneurship. Few have comprehensively examined the determinants of entrepreneurial spirit—particularly among youth in ethnic minority areas (Vu et al., 2023)—which reflect their readiness, intrinsic motivation, and long-term commitment to business ventures (Luthje & Franke, 2003). Moreover, distinctions among youth subgroups (e.g., rural youth, ethnic minorities, unskilled youth) have not been clearly addressed in large-scale quantitative research.

From this perspective, a critical research question emerges: how can youth entrepreneurial spirit be enhanced by identifying key influencing factors and tailoring policies to specific groups? Addressing this question not only advances the theoretical framework of entrepreneurial behavior but also offers practical value for designing youth entrepreneurship support policies in Vietnam in the coming years.

## 2. Literature Review and Hypothesis Development

### 2.1. Concept and Role of Entrepreneurial Spirit

Entrepreneurial spirit denotes the intrinsic motivation that drives individuals to identify opportunities, take calculated risks, and innovate under uncertainty (Luthje & Franke, 2003). It reflects persistence and proactive behavior,

essential for entrepreneurial success (Zhao et al., 2005). In Vietnam, youth entrepreneurial spirit is increasingly recognized as a key driver of sustainable growth, digital transformation, and poverty reduction (UNDP, 2021). Particularly in Lao Cai a province with 66.2% ethnic minority population entrepreneurship provides an effective means for young people to enhance livelihoods and foster local economic development (Vu et al., 2023).

### 2.2. Theoretical Background

Entrepreneurial spirit is a form of intentional behavior grounded in individual cognition and motivation (Krueger et al., 2000). The Theory of Planned Behavior (TPB) proposed by Ajzen (1991) explains entrepreneurial intention through three core dimensions: (1) *attitude toward entrepreneurship*, or the perceived desirability of starting a business; (2) *subjective norms*, or perceived social expectations; and (3) *perceived behavioral control* (PBC), referring to confidence in one's entrepreneurial capability. Building on TPB, scholars have extended the model to include contextual and environmental factors such as family influence, education, culture, and institutional conditions (Schlaegel & Koenig, 2014; Fayolle & Gailly, 2015). Given Lao Cai's socio-economic disparities and ethnic diversity, this study applies an Extended TPB (ETPB) framework to capture both psychological and contextual determinants of youth entrepreneurial spirit.

### 2.3. Hypothesis Development

H1: Family background positively influences youth entrepreneurial spirit (Kickul et al., 2008).

H2: Educational environment positively influences youth entrepreneurial spirit (Huang & Cheng, 2021).

H3: Institutional environment positively influences youth entrepreneurial spirit (OECD, 2022; Ali et al., 2020; Huang et al., 2021).

H4: Personal competence positively influences youth entrepreneurial spirit (Shinnar et al., 2014; Vu et al., 2023).

H5: Technology and innovation positively influence youth entrepreneurial spirit (GEM, 2023; Zang et al., 2023; UNDP, 2021).

H6: Globalization and international integration influence youth entrepreneurial spirit (Fernhaber



& Zou, 2022; Slesman et al., 2021; Vu et al., 2023).

H7: Socio-cultural factors positively influence youth entrepreneurial spirit (Hofstede et al., 2004; Ali et al., 2020; UNDP, 2021).

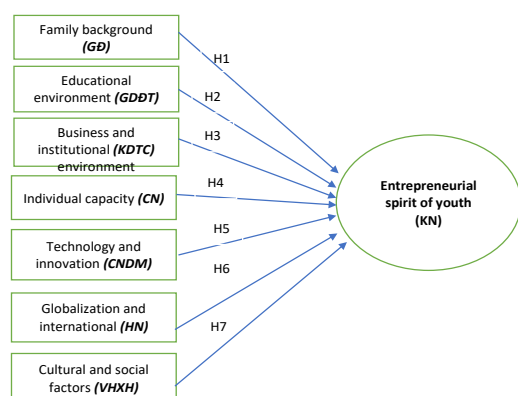
### 3. Materials and Methods

#### 3.1. Sample and Data Collection

The study surveyed youth aged 18–35 living, studying, and working in Lao Cai province representing diverse ethnicities, education levels, and occupations. The questionnaire, developed from the Theory of Planned Behavior and prior studies, comprised three parts: (i) demographics; (ii) measures of influencing factors (attitude, subjective norms, perceived behavioral control, and contextual factors); and (iii) entrepreneurial spirit.

A pilot test ensured linguistic clarity and reliability. Data were collected from March to June 2024 with assistance from youth unions, schools, and community groups. Of 500 distributed questionnaires, 450 were valid (90% response rate). Participation was voluntary, with informed consent and confidentiality maintained throughout.

Figure 1. Proposed Research Model



#### 3.2. Data Analysis

Data were analyzed using SPSS 22. Descriptive statistics summarized demographic characteristics. Exploratory Factor Analysis (EFA) using Principal Component Analysis with Varimax rotation validated the measurement structure. The Kaiser-Meyer-Olkin (KMO) test and Bartlett's Test of Sphericity confirmed sample adequacy. Factors with eigenvalues >1 and loadings >0.5 were retained; reliability was assessed via Cronbach's Alpha.

Subsequently, multiple linear regression examined the influence of independent variables (derived from EFA) on entrepreneurial spirit, controlling for gender, education, and residence. Diagnostic checks for multicollinearity and residual independence were conducted. All statistical tests were performed at  $p < 0.05$  to evaluate the proposed hypotheses and the applicability of the extended TPB model to Lao Cai's youth context.

### 4. Results

#### 4.1. Respondents' profile

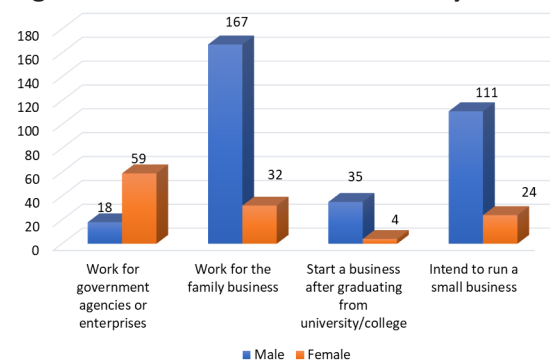
Table 1. Demographic Characteristics of Surveyed Youth

| Criteria             |                            | Number (people) | Proportion (%) |
|----------------------|----------------------------|-----------------|----------------|
| Gender               | Male                       | 331             | 73.56          |
|                      | Female                     | 119             | 26.44          |
| Ethnic composition   | Kinh                       | 287             | 63.78          |
|                      | Ethnic minorities          | 163             | 36.22          |
| Education attainment | Secondary school and below | 20              | 4.44           |
|                      | High school                | 69              | 15.33          |
|                      | University/college         | 360             | 80.00          |
|                      | Post-graduate              | 1               | 0.22           |

The survey of 450 youths reveals a clear gender imbalance, with males representing 73.56% of respondents. Ethnic diversity is notable, comprising 63.78% Kinh and 36.22% ethnic minorities, consistent with the demographic structure of mountainous areas such as Lao Cai. Most respondents (80%) hold a university or college degree, indicating a relatively well-educated youth workforce. However, gender and ethnic disparities remain, highlighting the need to promote inclusion and equal access to entrepreneurial opportunities.

#### Survey results on young people's career intentions:

Figure 2. Career Intentions of Surveyed Youth



Survey results show diverse post-graduation intentions. The largest group (44.22%) plan

to engage in family businesses, while 17.11% prefer stable employment in government or private sectors, particularly among females. About 30% intend to start small-scale businesses independently, and 8.67% aspire to establish formal enterprises. These findings reflect both the persistence of traditional family-based livelihoods and a growing entrepreneurial spirit among youth, suggesting the importance of targeted support in skills, finance, and business environment development.

#### 4.2. Common Variance and Reliability

*Test for the reliability of the scales (factors):*

**Table 2: Cronbach's alpha and corrected item-total correlations**

|                                                                      | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item Total Correlation | Cronbach's Alpha if Item Deleted |
|----------------------------------------------------------------------|----------------------------|--------------------------------|----------------------------------|----------------------------------|
| <b>Family background (GB)</b> Cronbach's Alpha = 0.846               |                            |                                |                                  |                                  |
| GB1                                                                  | 15.683                     | 9.416                          | .641                             | .819                             |
| GB2                                                                  | 15.464                     | 9.444                          | .650                             | .816                             |
| GB3                                                                  | 15.431                     | 9.015                          | .725                             | .795                             |
| GB4                                                                  | 15.321                     | 8.639                          | .784                             | .778                             |
| GB5                                                                  | 15.029                     | 10.762                         | .477                             | .858                             |
| <b>Educational environment (GDDT)</b> Cronbach's Alpha = 0.730       |                            |                                |                                  |                                  |
| GDDT1                                                                | 10.492                     | 7.079                          | .450                             | .714                             |
| GDDT2                                                                | 10.553                     | 6.716                          | .511                             | .686                             |
| GDDT3                                                                | 11.245                     | 4.555                          | .633                             | .600                             |
| GDDT4                                                                | 11.557                     | 4.887                          | .565                             | .650                             |
| <b>Business and institutional (KDTIC)</b> Cronbach's Alpha = 0.839   |                            |                                |                                  |                                  |
| KDTIC1                                                               | 12.051                     | 5.158                          | .754                             | .762                             |
| KDTIC2                                                               | 12.093                     | 4.815                          | .800                             | .738                             |
| KDTIC3                                                               | 12.231                     | 4.962                          | .677                             | .796                             |
| KDTIC4                                                               | 12.098                     | 6.160                          | .479                             | .873                             |
| <b>Individual capacity (CN)</b> Cronbach's Alpha = 0.793             |                            |                                |                                  |                                  |
| CN1                                                                  | 8.207                      | 2.594                          | .568                             | .786                             |
| CN2                                                                  | 8.173                      | 2.135                          | .765                             | .577                             |
| CN3                                                                  | 8.286                      | 2.236                          | .588                             | .775                             |
| <b>Technology and innovation (CNDM)</b> Cronbach's Alpha = 0.902     |                            |                                |                                  |                                  |
| CNDM1                                                                | 17.077                     | 19.326                         | .724                             | .887                             |
| CNDM2                                                                | 17.203                     | 19.819                         | .707                             | .889                             |
| CNDM3                                                                | 17.047                     | 20.140                         | .796                             | .876                             |
| CNDM4                                                                | 17.016                     | 20.250                         | .771                             | .879                             |
| CNDM5                                                                | 17.047                     | 20.257                         | .735                             | .884                             |
| CNDM6                                                                | 16.986                     | 21.047                         | .677                             | .893                             |
| <b>Globalization and international (HN)</b> Cronbach's Alpha = 0.897 |                            |                                |                                  |                                  |
| HN1                                                                  | 24.184                     | 20.271                         | .536                             | .899                             |
| HN2                                                                  | 24.176                     | 19.031                         | .697                             | .881                             |
| HN3                                                                  | 24.213                     | 18.110                         | .805                             | .869                             |
| HN4                                                                  | 24.140                     | 18.299                         | .808                             | .869                             |
| HN5                                                                  | 24.256                     | 17.652                         | .799                             | .869                             |
| HN6                                                                  | 24.044                     | 19.138                         | .651                             | .887                             |
| HN7                                                                  | 24.013                     | 19.554                         | .602                             | .892                             |
| <b>Cultural and social factors (VHXH)</b> Cronbach's Alpha = 0.897   |                            |                                |                                  |                                  |
| VHXH1                                                                | 20.084                     | 13.458                         | .472                             | .902                             |
| VHXH2                                                                | 19.993                     | 12.791                         | .601                             | .882                             |
| VHXH3                                                                | 19.920                     | 11.989                         | .735                             | .860                             |
| VHXH4                                                                | 19.893                     | 11.797                         | .820                             | .846                             |
| VHXH5                                                                | 19.920                     | 11.927                         | .805                             | .849                             |
| VHXH6                                                                | 19.878                     | 11.983                         | .791                             | .851                             |

The reliability test results indicate that all measurement scales meet the required standards, with Cronbach's Alpha coefficients ranging

from 0.730 to 0.902. Among them, the scales for "Technology and Innovation," "Globalization and International Integration," and "Cultural and Social Factors" demonstrate very high reliability (Cronbach's Alpha > 0.89). Some observed variables, such as GB5, KDTIC4, and VHXH1, have item-total correlation coefficients below 0.5; however, they are retained due to their theoretical relevance

*Explanatory factor analysis (EFA):*

**Table 3. KMO and Bartlett's Test**

|                                                  |                    |          |
|--------------------------------------------------|--------------------|----------|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. |                    | .925     |
| Bartlett's Test of Sphericity                    | Approx. Chi-Square | 9252.944 |
|                                                  | df                 | 406      |
|                                                  | Sig.               | .000     |

The KMO test result is 0.925 and Bartlett's Test shows a Chi-Square value of 9252.944, df = 406, with Sig. = 0.000, indicating that the data is suitable for conducting Exploratory Factor Analysis (EFA). This confirms that there are sufficient linear relationships among the variables and that the scale demonstrates acceptable convergent validity.

*Test for the explanation degree of observable variables to the variation of the factors:*

**Table 4. Total Variance Explained**

| Component | Initial Eigenvalues |               |              | Extraction Sums of Squared Loadings |               |              | Rotation Sums of Squared Loadings |               |              |
|-----------|---------------------|---------------|--------------|-------------------------------------|---------------|--------------|-----------------------------------|---------------|--------------|
|           | Total               | % of Variance | Cumulative % | Total                               | % of Variance | Cumulative % | Total                             | % of Variance | Cumulative % |
| 1         | 15.282              | 43.662        | 43.662       | 15.282                              | 43.662        | 43.662       | 5.078                             | 14.509        | 14.509       |
| 2         | 3.195               | 9.129         | 52.790       | 3.195                               | 9.129         | 52.790       | 5.058                             | 14.452        | 28.962       |
| 3         | 1.873               | 5.351         | 58.142       | 1.873                               | 5.351         | 58.142       | 4.358                             | 12.451        | 41.413       |
| 4         | 1.532               | 4.376         | 62.518       | 1.532                               | 4.376         | 62.518       | 4.275                             | 12.215        | 53.628       |
| 5         | 1.260               | 3.599         | 66.117       | 1.260                               | 3.599         | 66.117       | 2.446                             | 6.988         | 60.616       |
| 6         | 1.095               | 3.127         | 69.244       | 1.095                               | 3.127         | 69.244       | 2.170                             | 6.199         | 66.815       |
| 7         | 1.056               | 3.016         | 72.260       | 1.056                               | 3.016         | 72.260       | 1.906                             | 5.444         | 72.260       |
| 8         | .792                | 2.263         | 74.523       |                                     |               |              |                                   |               |              |
| 9         | .778                | 2.224         | 76.746       |                                     |               |              |                                   |               |              |
| 10        | .688                | 1.965         | 78.711       |                                     |               |              |                                   |               |              |
| 11        | .635                | 1.814         | 80.525       |                                     |               |              |                                   |               |              |
| 12        | .614                | 1.754         | 82.279       |                                     |               |              |                                   |               |              |
| 13        | .577                | 1.649         | 83.928       |                                     |               |              |                                   |               |              |
| 14        | .514                | 1.469         | 85.397       |                                     |               |              |                                   |               |              |
| 15        | .473                | 1.351         | 86.748       |                                     |               |              |                                   |               |              |
| 16        | .423                | 1.209         | 87.957       |                                     |               |              |                                   |               |              |
| 17        | .400                | 1.143         | 89.100       |                                     |               |              |                                   |               |              |
| 18        | .362                | 1.035         | 90.135       |                                     |               |              |                                   |               |              |
| 19        | .339                | .968          | 91.104       |                                     |               |              |                                   |               |              |
| 20        | .313                | .894          | 91.998       |                                     |               |              |                                   |               |              |
| 21        | .294                | .841          | 92.838       |                                     |               |              |                                   |               |              |
| 22        | .280                | .801          | 93.639       |                                     |               |              |                                   |               |              |
| 23        | .263                | .752          | 94.391       |                                     |               |              |                                   |               |              |
| 24        | .243                | .693          | 95.084       |                                     |               |              |                                   |               |              |
| 25        | .229                | .654          | 95.739       |                                     |               |              |                                   |               |              |
| 26        | .213                | .608          | 96.346       |                                     |               |              |                                   |               |              |
| 27        | .203                | .580          | 96.926       |                                     |               |              |                                   |               |              |
| 28        | .193                | .550          | 97.476       |                                     |               |              |                                   |               |              |
| 29        | .175                | .501          | 97.977       |                                     |               |              |                                   |               |              |
| 30        | .165                | .471          | 98.449       |                                     |               |              |                                   |               |              |
| 31        | .158                | .452          | 98.900       |                                     |               |              |                                   |               |              |

| Component | Initial Eigenvalues |               |              | Extraction Sums of Squared Loadings |               |              | Rotation Sums of Squared Loadings |               |              |
|-----------|---------------------|---------------|--------------|-------------------------------------|---------------|--------------|-----------------------------------|---------------|--------------|
|           | Total               | % of Variance | Cumulative % | Total                               | % of Variance | Cumulative % | Total                             | % of Variance | Cumulative % |
| 32        | .142                | .406          | 99.307       |                                     |               |              |                                   |               |              |
| 33        | .133                | .381          | 99.688       |                                     |               |              |                                   |               |              |
| 34        | .109                | .312          | 100.000      |                                     |               |              |                                   |               |              |

*Extraction Method: Principal Component Analysis.*

The results of the exploratory factor analysis, using Principal Component Analysis and the criterion of Eigenvalue > 1, revealed that 7 factors were extracted, explaining 72.26% of the total variance in the dataset. Among them, the first factor (family background) accounted for the highest proportion of variance (43.662%), while the remaining factors contributed between 3–9% each. After applying the Varimax rotation, the variance became more evenly distributed among the factors, with the family background factor contributing only 14.509%, indicating that the dominance of the first factor was mitigated. The cumulative variance explained after rotation reached 72.26%, demonstrating that the extracted factors adequately account for the data structure and meet the requirement for explanatory power in quantitative research within the social sciences.

*Regression analysis:*

**Table 5: Rotated component matrix for the dependent factor**

| Observable Variable | Factor Loading |
|---------------------|----------------|
| KN1                 | .847           |
| KN2                 | .816           |
| KN3                 | .743           |
| KN4                 | .788           |
| KN5                 | .865           |

The results of the Rotated Component Matrix indicate that all five observed variables measuring “youth entrepreneurial spirit” have high factor loadings, ranging from 0.743 to 0.865, exceeding the standard threshold of 0.5. Among them, the variable KN5 has the highest loading (0.865), indicating a strong contribution to the overall factor structure. These findings confirm the convergent validity of the scale, demonstrating that the observed variables effectively reflect the intended construct.

**Table 6: Regression model summary**

| Model | R                 | R Square | Adjusted R Square | Std. Error of the Estimate | Durbin-Watson |
|-------|-------------------|----------|-------------------|----------------------------|---------------|
| 1     | .828 <sup>a</sup> | .685     | .680              | .46296                     | 1.626         |

a. Predictors: (Constant), VHXX, CNDM, GDDT, HN, GD, KDTC, CN

b. Dependent Variable: KN

The regression results indicate that the model has a high degree of fit, with an  $R^2$  value of 0.685, meaning that approximately 68.5% of the variance in youth entrepreneurial spirit (KN) is explained by seven independent variables: family background (GD), educational environment (GDDT), business and institutional environment (KDTC), personal capacity (CN), technology and innovation (CNDM), globalization and integration (HN), and socio-cultural factors (VHXX). The adjusted  $R^2$  of 0.680 confirms the model's good generalizability. The standard error of the estimate is 0.46296, which is within an acceptable range. The Durbin-Watson statistic is 1.626, indicating no significant autocorrelation among the residuals in the model.

**Table 7. ANOVA<sup>a</sup>**

| Model        | Sum of Squares | df  | Mean Square | F       | Sig.              |
|--------------|----------------|-----|-------------|---------|-------------------|
| 1 Regression | 205.967        | 7   | 29.424      | 137.284 | .000 <sup>b</sup> |
| Residual     | 94.733         | 442 | .214        |         |                   |
| Total        | 300.699        | 449 |             |         |                   |

a. Dependent Variable: KN

b. Predictors: (Constant), VHXX, CNDM, GDDT, HN, GD, KDTC, CN

The analysis of variance (ANOVA) results for the regression model show an F-value of 137.284 with a significance level of Sig. = 0.000, indicating that the regression model is statistically significant ( $p < 0.01$ ). This confirms that the set of independent variables—including family background (GD), educational environment (GDDT), business–institutional environment (KDTC), personal capacity (CN), technology and innovation (CNDM), globalization and integration (HN), and socio-cultural factors (VHXX)—has a collectively significant impact on youth entrepreneurial spirit (KN). The total variance explained by the model is 205.967, which accounts for the majority of the total variance (300.699), while the residual variance is only 94.733. These findings further support the model's goodness of fit and strong explanatory power.

**Table 8: Regression coefficients**

| Model |            | Unstandardized Coefficients |            | Standardized Coefficients | t      | Sig. |
|-------|------------|-----------------------------|------------|---------------------------|--------|------|
|       |            | B                           | Std. Error | Beta                      |        |      |
| 1     | (Constant) | -.374                       | .148       |                           | -2.525 | .012 |
|       | GD         | 2.349                       | .048       | .321                      | 7.255  | .000 |
|       | KDTC       | .691                        | .058       | .174                      | 3.299  | .001 |
|       | CN         | 1.116                       | .070       | .094                      | 1.655  | .039 |
|       | CNDM       | 1.150                       | .034       | .163                      | 4.374  | .000 |
|       | HN         | -.666                       | .047       | -.058                     | -0.405 | .016 |
|       | GDDT       | 2.207                       | .037       | .306                      | 1.181  | .046 |
|       | VHXX       | 1.309                       | .061       | .262                      | 5.080  | .000 |

a. Dependent Variable: KN



The results in Table 8 show that all seven research hypotheses (H1–H7) are accepted with statistical significance at  $p < 0.05$ . Among them, the strongest influences come from family background (H1), socio-cultural factors (H7), and educational environment (H2). Notably, international integration (H6) has a negative impact on youth entrepreneurial spirit.

Table 8 presents the results of the multiple linear regression analysis between the independent variables and the dependent variable “Youth Entrepreneurial Spirit” (KN). All regression coefficients are statistically significant at the 5% level, indicating a high level of model reliability. The multiple linear regression model was constructed to assess the extent to which various factors influence youth entrepreneurial spirit in Lao Cai province. The model includes seven independent variables: family background (GD), educational environment (GDĐT), business–institutional environment (KDTC), personal capacity (CN), technology and innovation (CNDM), globalization and integration (HN), and socio-cultural factors (VHXH).

$$KN = -0.374 + 2.349*GD + 0.691*KDTC + 1.116*CN + 1.150*CNDM - 0.666*HN + 2.207*GDĐT + 1.309*VHXH$$

The model is statistically significant overall, with an F-value of 137.284 (Sig. = 0.000). The coefficient of determination  $R^2 = 0.685$  indicates that approximately 68.5% of the variance in youth entrepreneurial spirit is explained by the included independent variables. This level of explanatory power is considered highly satisfactory for research in the social sciences. A detailed interpretation of the unstandardized coefficients (B) is as follows:

Family background (GD) has the largest positive effect, with  $B = 2.349$  and Sig. = 0.000. This suggests that favorable family conditions—including financial support, emotional encouragement, and career guidance—play a crucial role in nurturing entrepreneurial spirit and behaviors among youth.

Socio-cultural factors (VHXH) also exert a significant influence ( $B = 1.309$ , Sig. = 0.000), indicating that social recognition, community expectations, and cultural norms contribute meaningfully to entrepreneurial motivation.

Educational environment (GDĐT) shows a high unstandardized coefficient ( $B = 2.207$ , Sig.

= 0.046), though its standardized coefficient (Beta = 0.006) is relatively low. This may imply that the impact of education, while present, is inconsistent or dependent on specific contextual conditions, requiring further investigation.

Technology and innovation (CNDM) have a statistically significant positive effect ( $B = 1.150$ , Sig. = 0.000), highlighting the importance of access to digital tools, innovation resources, and technological awareness in fostering an entrepreneurial mindset.

Personal capacity (CN) also positively affects entrepreneurial spirit ( $B = 1.116$ , Sig. = 0.039), reflecting the role of self-efficacy, creativity, and adaptability in entrepreneurial endeavors.

Business–institutional environment (KDTC) contributes positively ( $B = 0.691$ , Sig. = 0.001), emphasizing the relevance of supportive regulations, administrative procedures, and institutional incentives in encouraging entrepreneurship.

Globalization and integration (HN) is the only factor with a negative effect ( $B = -0.666$ , Sig. = 0.016). This result suggests that exposure to global competition and integration may generate concerns or perceived risks that discourage some youth from pursuing entrepreneurial activities.

Overall, the analysis reveals that youth entrepreneurial spirit is shaped by a combination of subjective factors (personal capacity, education, technology) and external influences (family, culture, institutions). Notably, family support and socio-cultural dynamics emerge as the most influential drivers, underscoring the importance of contextual and community-based enablers. These findings imply that policies to support youth entrepreneurship should not only focus on financial aid or skills training, but also prioritize building a strong entrepreneurial culture within families and communities, while enhancing youth adaptability to the demands of global integration.

## 5. Discussion and conclusions

### 5.1. Discussion

The empirical findings indicate that youth entrepreneurial spirit in Lao Cai province is determined by an interplay of family, educational, socio-cultural, technological, institutional, individual, and global factors. Family background exerts the strongest positive influence ( $B = 2.349$ ;  $p$

$< 0.001$ ), reaffirming the role of familial financial, emotional, and directional support in fostering early entrepreneurial motivation and confidence (Kickul et al., 2008).

The educational environment ( $B = 2.207$ ;  $p = 0.046$ ) also plays a meaningful role, suggesting that practice-oriented, entrepreneurship-focused curricula can nurture positive attitudes toward business creation. However, inconsistencies between standardized and unstandardized coefficients imply that educational impact may vary depending on quality, relevance, and implementation methods.

Socio-cultural factors ( $B = 1.309$ ;  $p < 0.001$ ) highlight the importance of cultural norms, community expectations, and social recognition in shaping youth behavior, consistent with findings from Hofstede et al. (2004) and GEM (2023). Technology and innovation ( $B = 1.150$ ;  $p < 0.001$ ) further strengthen entrepreneurial potential by enhancing access to digital tools and innovation resources, enabling young people to overcome structural barriers.

Personal capacity ( $B = 1.116$ ;  $p = 0.039$ ) and institutional environment ( $B = 0.691$ ;  $p = 0.001$ ) have positive yet modest effects, indicating that internal traits and policy frameworks must operate alongside strong social and familial foundations. In contrast, globalization ( $B = -0.666$ ;  $p = 0.016$ ) negatively affects entrepreneurial spirit, possibly due to perceived competition and uncertainty in global markets, particularly for youth in less developed regions.

Overall, the results establish a clear hierarchy of influences, with family, education, and socio-cultural context emerging as primary determinants, while institutional, personal, and technological factors serve as enabling conditions. Globalization presents both opportunities and challenges, requiring careful policy attention.

### 5.2. Policy Implications

The findings suggest that enhancing youth entrepreneurial spirit in mountainous and ethnically diverse regions requires a holistic and context-sensitive approach. First, strengthening family and community engagement in entrepreneurship programs can build foundational support for young entrepreneurs. Second, educational institutions should integrate experiential and project-based

entrepreneurship education to translate theoretical knowledge into practice. Third, policies should promote access to technology, digital literacy, and innovation platforms to help youth adapt to the digital economy.

Moreover, institutional support mechanisms—such as simplified administrative procedures, credit facilitation, and mentoring programs—should be tailored to local realities. Policymakers must also address the psychological and competitive pressures posed by globalization by developing capacity-building programs that enhance resilience and adaptability among young entrepreneurs.

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