“Digital transformation, organizational agility, and firm performance in emerging markets: Evidence from Vietnam’s machinery sector”

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ARTICLE INFO	Nguyen Khanh Cuong, Nguyen Ngoc Long, Ho Tien Dung and Than Van Hai (2025). Digital transformation, organizational agility, and firm performance in emerging markets: Evidence from Vietnam’s machinery sector. *Problems and Perspectives in Management*, *23*(3), 342-357. doi:10.21511/ppm.23(3).2025.25
DOI	http://dx.doi.org/10.21511/ppm.23(3).2025.25
RELEASED ON	Tuesday, 26 August 2025
RECEIVED ON	Sunday, 23 February 2025
ACCEPTED ON	Saturday, 16 August 2025

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JOURNAL	"Problems and Perspectives in Management"
ISSN PRINT	1727-7051
ISSN ONLINE	1810-5467
PUBLISHER	LLC “Consulting Publishing Company “Business Perspectives”
FOUNDER	LLC “Consulting Publishing Company “Business Perspectives”

NUMBER OF REFERENCES	NUMBER OF FIGURES	NUMBER OF TABLES
54	2	5

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BUSINESS PERSPECTIVES

LLC "CPC "Business Perspectives"
Hryhorii Skovoroda lane, 10,
Sumy, 40022, Ukraine

www.businessperspectives.org

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DIGITAL TRANSFORMATION, ORGANIZATIONAL AGILITY, AND FIRM PERFORMANCE IN EMERGING MARKETS: EVIDENCE FROM VIETNAM'S MACHINERY SECTOR

Abstract

Firms in emerging markets are increasingly compelled to implement digital transformation strategies in response to rapid technological disruption and intensifying global competition. However, the impact of such transformation on organizational performance remains underexplored, particularly in resource-constrained contexts. This study aims to assess how digital orientation and digital capacity influence the implementation of digital transformation, and how digital transformation, in turn, affects organizational agility as well as financial and non-financial performance. Data were collected through a survey of senior managers – those directly responsible for leading digital transformation strategies – at 518 mechanical engineering enterprises in Vietnam, conducted between August and November 2024. The research model was tested using partial least squares structural equation modeling (PLS-SEM). The results reveal that digital orientation ($\beta = 0.585$, $p < 0.001$) and digital capacity ($\beta = 0.240$, $p < 0.001$) significantly promote the adoption of digital transformation. Subsequently, digital transformation exerts a strong positive influence on organizational agility ($\beta = 0.815$, $p < 0.001$). In turn, organizational agility significantly enhances financial performance ($\beta = 0.795$, $R^2 = 0.632$) and non-financial performance ($\beta = 0.536$, $R^2 = 0.287$). These findings provide empirical evidence that digital transformation efforts can create practical value when they are grounded in well-aligned internal capabilities. The study contributes to clarifying how enterprises in emerging economies can align digital investments with organizational strengths to improve performance amid volatile environments.

Keywords digitalization, transformation, agility, performance, competitiveness, innovation

JEL Classification O33, M15, L25

Type of the article: Research Article

Received on: 23rd of February, 2025
Accepted on: 16th of August, 2025
Published on: 26th of August, 2025

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Conflict of interest statement:
Author(s) reported no conflict of interest

INTRODUCTION

In the context of a rapidly digitizing global economy, the competitive dynamics of the international market are undergoing a profound transformation, compelling enterprises to adopt more technology-driven and agile strategies to maintain adaptability and survival. This is particularly true in emerging markets – such as Vietnam, Indonesia, Brazil, and India – where digital transformation is considered inevitable due to underdeveloped institutional infrastructure, limited innovation capabilities, and increasing global pressures (Nosike, 2024; AlYahya, 2024; White, 2024). Although these countries are developing rapidly, they simultaneously face digital divides, technological asymmetries, and fragmented policy environments, which render the outcomes of digital transformation highly uneven and unpredictable (Merín-Rodrigáñez et al., 2024).

http://dx.doi.org/10.21511/ppm.23(3).2025.25

In Vietnam, which is classified as an emerging economy by the World Bank (n.d.) and IMF (2024), the mechanical engineering industry serves as a foundational pillar in the country's industrialization and modernization efforts. However, the sector continues to encounter serious obstacles such as obsolete technologies, a shortage of digital-skilled labor, weak organizational capabilities, and intense competition from foreign firms with higher levels of digital maturity. Despite recognizing the strategic importance of digital transformation, Vietnamese mechanical firms often struggle with developing coherent digital strategies, allocating technological resources, and overcoming internal resistance to organizational innovation (Nguyen & Dang, 2025; Van Hoang et al., 2025). This represents a dual challenge: firms must simultaneously invest in technology under resource constraints and adapt organizational capabilities within an unstable institutional environment.

Previous studies – mostly conducted in more advanced economies (Chen et al., 2023; Wang & Shao, 2024; Bindeeba et al., 2025) – have shown that digital transformation can exert a positive impact on organizational performance. However, many works also report that over 70% of digital transformation initiatives fail to achieve strategic outcomes, largely due to the lack of organizational capabilities necessary to leverage digital investments effectively (Oludapo et al., 2024). Other key failure factors include the absence of holistic digital strategies, employee resistance, misaligned organizational cultures (Cao et al., 2025), insufficient digital capacity and skills (Wynn et al., 2021), and limited digital orientation and adaptability (AlNuaimi et al., 2022; Piccoli et al., 2024). In this context, an increasing number of scholars emphasize the role of organizational agility as a critical mediator or moderator in the relationship between digital transformation and performance (AlNuaimi et al., 2022), between digital leadership and digital transformation success (Alakaş, 2024), or even as a capability enhanced by digital transformation itself (Mangalaraj et al., 2023). Agility is broadly defined as the organization's ability to sense, respond quickly, and adapt effectively to changes in the technological and business environment. However, the mechanisms through which digital transformation fosters agility, and how this agility translates into financial or non-financial performance, remain underexplored – especially in resource-constrained emerging markets like Vietnam's mechanical engineering sector.

Currently, no quantitative research in Vietnam has empirically examined the relationship between digital orientation, digital capacity, digital transformation, organizational agility, and organizational performance (both financial and non-financial). Recent studies have only explored the direct effects of digital transformation on business outcomes, without analyzing the structural relationships among the key constructs (Mangalaraj et al., 2023). International literature has also yet to propose a comprehensive model specifically tailored for the mechanical engineering sector in emerging markets. Therefore, there exists a significant research gap in both theory and practice:

1) a lack of understanding of how digital orientation and capacity influence digital transformation in foundational industries;

2) an absence of empirical validation for the mediating role of agility in translating digital transformation into performance; and

3) no comprehensive empirical model contextualized to resource-constrained and infrastructure-limited environments.

To address this gap, the current study aims to develop and empirically test a model that evaluates the interrelationships between digital orientation, digital capacity, digital transformation, organizational agility, and organizational performance (both financial and non-financial) within Vietnamese mechanical enterprises.

1. LITERATURE REVIEW

Understanding how organizations respond to digital disruption and achieve superior performance requires a robust theoretical foundation. To explore the relationship between digital transformation, organizational agility, and performance, this study draws upon three key theoretical perspectives – namely the resource-based view (RBV), the dynamic capabilities theory (DCT), and the technology-organization-environment (TOE) framework. When considered together, these perspectives provide a comprehensive and multidimensional understanding of how internal resources, adaptive capacities, and external contextual factors jointly influence the operational effectiveness of firms (Tornatzky et al., 1990; Barney, 1991; Teece et al., 1997). The resource-based view (RBV) posits that firms can gain sustainable competitive advantage by identifying, developing, and deploying resources that are valuable, rare, inimitable, and non-substitutable (VRIN) (Barney, 1991; Priem & Butler, 2001). These resources may include tangible assets such as IT infrastructure, equipment, and production facilities, or intangible assets such as digital expertise, organizational knowledge, and a culture of innovation (Chatterjee et al., 2024). RBV helps explain variations in performance across firms (Mahoney & Pandian, 1992). However, its static and inward-looking nature – focused solely on internal capabilities – limits its explanatory power in dynamic environments, particularly in response to digital disruption. To address these limitations, the dynamic capabilities theory (DCT) extends RBV by emphasizing a firm's ability to integrate, build, and reconfigure internal and external competencies in response to rapidly changing environments (Teece et al., 1997; Eisenhardt & Martin, 2000). DCT identifies three core capabilities: sensing opportunities and threats, seizing those opportunities through strategic investments, and transforming organizational structures and assets (Teece, 2007; Helfat & Peteraf, 2015). This framework is useful for understanding how firms can reconfigure digital resources and adapt strategies to foster organizational agility. Although the resource-based view (RBV) and dynamic capabilities theory (DCT) have long served as foundational frameworks for explaining how firms leverage and reconfigure internal resources to navigate dynamic environments, both remain limited when applied to the context of digital transformation – an inherently externally-driven phenomenon.

Specifically, RBV emphasizes the accumulation and exploitation of firm-specific resources such as digital infrastructure, organizational knowledge, and innovation culture to achieve sustained competitive advantage (Wernerfelt, 1984; Barney, 1991; Jain et al., 2024). In contrast, DCT adds a dynamic perspective by focusing on a firm's ability to sense opportunities and threats, seize new resources, and transform existing capabilities to maintain adaptability in turbulent environments (Teece et al., 1997; Eisenhardt & Martin, 2000; Helfat & Peteraf, 2015). However, both perspectives are predominantly endogenous and fall short in addressing how external contingencies – such as competitive intensity, shifting customer expectations, and the pace of technological change – shape the digital transformation process (Aboelmaged, 2018; Vial, 2019; Saeedikiya et al., 2024).

To bridge this theoretical gap, the technology-organization-environment (TOE) framework, introduced by Tornatzky et al. (1990), has gained broad acceptance as a comprehensive lens for analyzing the contextual determinants of technology adoption and digital innovation. This framework delineates three contextual dimensions: the technological context (e.g., readiness, compatibility, and maturity of technologies), the organizational context (e.g., firm size, structure, culture, and transformation readiness), and the environmental context (e.g., market competition, evolving customer demands, and institutional regulations) (Tornatzky et al., 1990; Oliveira & Martins, 2011). By encompassing both internal and external influences, the TOE framework complements and extends RBV and DCT, enabling a more holistic understanding of firms' digital transformation behavior. This integrative approach is particularly relevant in emerging markets, where institutional voids, technological underdevelopment, and digital skill shortages present formidable challenges to transformation efforts (Andrews & Luiz, 2024; Sumbal et al., 2024). Recent studies emphasize that environmental factors – especially pressures from global competitors, shifts in consumer behavior, and regulatory reforms – often act as critical catalysts for strategic digital initiatives and business model reconfiguration.

http://dx.doi.org/10.21511/ppm.23(3).2025.25

For instance, Tuyen et al. (2025) demonstrate that high-stakes compliance pressures and institutional constraints significantly influence top management decisions to adopt digital transformation measures, particularly in turbulent business ecosystems. Similarly, research on digital platforms in developing economies illustrates how regulatory intervention – especially addressing competition-related risks – shapes the pace and direction of digital innovation and business model redesign (Gawer & Bonina, 2024). Accordingly, integrating TOE with RBV and DCT provides a multidimensional theoretical scaffold that moves beyond resource-centric explanations to incorporate the external contingencies shaping digital transformation.

This integrated view enables the present study to examine how digital orientation and digital capacity – strategic resources under RBV – are restructured through dynamic capabilities (DCT) and conditioned by external technological and institutional contexts (TOE). In doing so, the model offers a more comprehensive explanation of how firms initiate and implement digital transformation, build digital agility, and ultimately enhance both financial and non-financial performance, especially in the context of mechanical engineering enterprises in emerging economies like Vietnam. In the current era of digital acceleration, organizational performance has long been recognized as a central theme in management research, reflecting the degree to which a firm achieves its strategic objectives. In the era of digital transformation and rapid technological disruption, evaluating performance must go beyond traditional financial indicators to encompass non-financial dimensions such as innovation capability, customer satisfaction, employee engagement, and sustainable development. Recent studies have reinforced the notion that performance is a multidimensional construct influenced not only by internal operations but also by a firm's capacity to adapt to external environmental changes (Dossi & Patelli, 2010; Naguib et al., 2024; Russ-Eft et al., 2024).

Within this context, organizational agility has emerged as a core strategic capability that enables firms to reallocate resources, reconfigure operational models, and leverage technological opportunities to enhance overall performance (Weber & Tarba, 2014; Saebi et al., 2017). Agility serves not only as an outcome of digital transformation but also as a key mediating mechanism connecting internal capabilities with performance outcomes – particularly in uncertain and digitally dynamic environments. However, prior empirical research has often examined these relationships in isolation, lacking a comprehensive conceptual framework capable of explaining their complex interdependencies.

A critical antecedent to performance lies in the degree of digital transformation achieved by a firm. Existing literature suggests that successful digital transformation is contingent upon both a clear strategic orientation toward digitalization and the possession of robust internal capabilities, including technological infrastructure, data analytics, and digital skills (Khin & Ho, 2019; Karadağ et al., 2024). Yet most studies have focused on these components individually, without integrating them into a cohesive theoretical model grounded in interrelated perspectives. This reveals a significant gap in understanding the combined effects of digital orientation and digital capacity on performance via agility.

This gap is particularly salient in emerging markets such as Vietnam, where firms face the dual challenges of limited digital talent, inadequate technology infrastructure, and institutional instability (Truong & Van My, 2023). In the machinery manufacturing sector – a strategic pillar of Vietnam's industrialization agenda – local enterprises are under increasing pressure from multinational corporations with superior resources, advanced technologies, and globally integrated management systems. In such contexts, understanding how digital transformation influences performance through organizational agility and how contextual factors constrain this process is both theoretically significant and practically urgent.

Despite its importance, several research gaps remain. First, very few studies have simultaneously examined digital orientation and digital capacity within a unified theoretical framework. Although each factor is acknowledged as critical,

the lack of integrated modeling has led to fragmented and shallow interpretations. Second, empirical studies on digital transformation in manufacturing sectors within emerging markets remain scarce – particularly those that account for contextual constraints such as institutional voids, technological backwardness, and workforce limitations. Third, despite increasing attention to organizational agility in digital transformation research, few empirical studies have examined its role in driving firm performance in resource-constrained and institutionally weak environments. Finally, most prior studies adopt only one or two theoretical lenses, failing to integrate RBV, DCT, and TOE – three perspectives that together offer a holistic understanding of internal, adaptive, and contextual factors.

To bridge these gaps, this study develops and empirically tests an integrated model that draws on the combined explanatory power of the resource-based view (RBV), dynamic capabilities theory (DCT), and the technology-organization-environment (TOE) framework. The model posits that digital orientation and digital capacity jointly determine the extent of digital transformation; digital transformation enhances organizational agility; and agility, in turn, drives both financial and non-financial performance. Grounded in this multi-theoretical framework and contextualized within Vietnam's machinery manufacturing sector, the study advances a series of testable hypotheses to clarify the mechanisms linking digital initiatives to organizational outcomes under conditions of institutional and resource constraints. Specifically:

H1a: Digital orientation has a positive effect on the extent of digital transformation.

H1b: Digital capacity has a positive effect on the extent of digital transformation.

H2: Digital transformation has a positive effect on organizational agility.

H3a: Organizational agility has a positive effect on financial performance.

H3b: Organizational agility has a positive effect on non-financial performance.

These hypotheses collectively form the basis for the proposed conceptual model, which reflects the dynamic interplay between strategic intent, digital capabilities, adaptive mechanisms, and multi-dimensional performance outcomes in emerging-market firms undergoing digital transformation.

2. METHODOLOGY

2.1. Sample, data collection, and analysis approach

The primary objective of this study is to examine how firms' digital orientation and digital capacity influence digital transformation initiatives, which in turn enhance organizational agility and improve both financial and non-financial performance among mechanical engineering enterprises in Vietnam. Based on the research questions and the explanatory nature of the proposed model, a deductive approach with a quantitative research design was employed. Data were collected from senior executives (directors, deputy directors, and heads of technical and strategic departments) currently working in mechanical engineering firms. These enterprises were selected from both the official members of the Vietnam Association of Mechanical Industry (VAMI) and reputable non-member firms listed in the national mechanical engineering business registry. The mechanical engineering sector was chosen as the research context due to its strategic importance in Vietnam's industrialization process and its high exposure to ongoing digital transformation initiatives.

The survey was conducted between August and November 2024, applying a dual-mode data collection approach. First, a self-administered questionnaire was distributed online via personalized emails and the Zalo platform, one of the most widely used communication tools in Vietnam, allowing participants to complete the survey at their convenience. In parallel, trained interviewers were made available to provide clarifications on any ambiguous or technical questions, either through dedicated Zalo group discussions or online meetings via Zoom. This combined approach ensured that participants fully understood the questionnaire, minimized

http://dx.doi.org/10.21511/ppm.23(3).2025.25

potential response biases caused by misinterpretation, increased the response rate, and reduced missing data. Each firm was asked to nominate a single executive respondent to provide information, thereby ensuring data consistency at the organizational level and avoiding duplicate responses. The study strictly adhered to international research ethics standards. All participants were fully informed about the study objectives, their right to decline or withdraw at any time, and the assurance of complete anonymity. Data were collected exclusively for academic purposes, stored securely, and not shared outside the research team. The original questionnaire in English was professionally translated into Vietnamese and reviewed by bilingual experts to ensure linguistic accuracy and cultural appropriateness. Data were analyzed using SmartPLS 3.2.9 (Ringle et al., 2015), following the two-step approach of Anderson and Gerbing (1988), which involved first assessing the measurement model before testing the structural model.

2.2. Measures of the study

Following an extensive literature review, six first-order constructs were identified and incorporated into the research model: digital orientation, digital capabilities, digital transformation, organizational agility, financial performance, and non-financial performance. The items were adapted from well-established prior studies to ensure strong theoretical grounding and empirical reliability. All constructs were measured using a 5-point Likert scale, ranging from 1 ("strongly disagree") to 5 ("strongly agree"). A pilot test with 40 senior managers was conducted to refine item wording and ensure clarity and reliability; items with low stability or ambiguity were revised or removed accordingly. The constructs were defined as follows:

1. Digital orientation: Four items capturing the firm's commitment and proactive stance toward adopting digital technologies (Khin & Ho, 2019).

2. Digital capacity: Five items assessing the ability to acquire, deploy, and leverage digital resources for innovation and opportunity recognition (Khin & Ho, 2019).

3. Digital transformation: Four items evaluating the extent of business process reconfiguration and enhanced customer understanding through digital solutions (Abdurrahman et al., 2024).

4. Organizational agility: Six items reflecting the firm's flexibility and responsiveness to market and operational changes enabled by digital tools (Irfan et al., 2019).

5. Financial performance: Three items comparing profitability growth, return on assets, and value added per employee relative to industry benchmarks (Khin & Ho, 2019).

6. Non-financial performance: Three items assessing customer satisfaction, market share, and employee turnover compared to competitors (Khin & Ho, 2019).

The full questionnaire, including all measurement items, is provided in detail alongside the reported results on the reliability and validity of the measurement scales. The list of variables and their respective indicators is presented in Table 2.

2.3. Conceptual model

Based on the research hypotheses developed in the literature review, the proposed model delineates a sequential relationship among digital orientation, digital capacity, digital transformation, organizational agility, and firm performance (both financial and non-financial). Digital orientation and digital capacity are conceptualized as critical antecedents that enable effective digital transformation. In turn, digital transformation enhances organizational agility, an essential adaptive capability in volatile environments. This agility subsequently contributes to improved performance outcomes, including financial metrics and non-financial indicators. The theoretical model is designed to empirically test the hypothesized relationships and clarify the mediating roles of digital transformation and organizational agility in linking digital resources to organizational effectiveness.

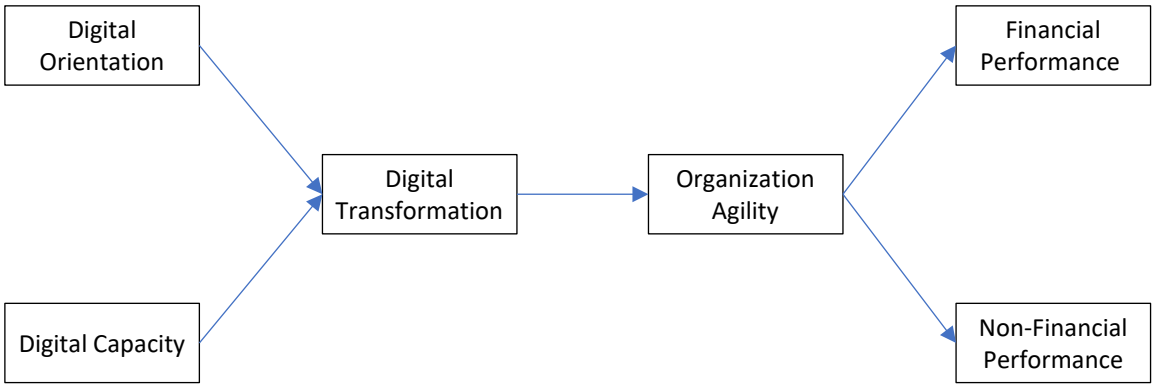

Figure 1. Proposed research model

3. RESULTS

3.1. Descriptive statistics

Reporting the characteristics of the research sample is essential to ensure transparency, representativeness, and reliability of the collected data while providing the necessary context for interpreting the study's findings. In research on organizational-level digital transformation, attributes such as firm size, financial capacity, ownership structure, geographical distribution, and the level of digital transformation maturity are critical determinants shaping how firms develop digital orientation, build digital capabilities, implement transformation initiatives, and achieve superior financial and non-financial performance. Presenting these characteristics allows for an assessment of whether the sample adequately reflects the broader mechanical engineering industry in Vietnam and supports controlling for potential contextual variables that may influence the proposed model. The final validated sample comprises 518 mechanical engineering enterprises, selected from both the official members of the Vietnam Association of Mechanical Industry (VAMI) and reputable non-member firms listed in the national mechanical engineering business registry.

Regarding firm size (Table 1), 38.0% of enterprises employ fewer than 100 staff, 44.2% have between 100 and 500 employees, and 17.8% employ more than 500 staff. In terms of annual revenue, 42.1% of firms report less than 50 billion VND, 36.9% fall within the 50–200 billion VND range, and 21.0% earn above 200 billion VND

Table 1. Structure of research sample

Variable	Category	Frequency (n)	Percentage (%)
Firm Size (Number of employees)	< 100	197	38
	100-500	229	44.2
	> 500	92	17.8
Annual Revenue (VND billion)	< 50	218	42.1
	50-200	191	36.9
	> 200	109	21
Firm Age (mean)	–	–	15.8 years
Ownership Type	State-owned	132	25.5
	Private	284	54.8
	FDI / Joint Venture	102	19.7
Geographical Location	North	171	33
	Central	106	20.5
	South	241	46.5
DT Stage	Initial	149	28.8
	Ongoing	262	50.6
	Fully Integrated	107	20.6

Note: n = 518.

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annually. The average age of firms in the sample is approximately 15.8 years, capturing a mix of long-established companies and relatively younger enterprises. Concerning ownership type, privately owned firms represent the largest proportion (54.8%), followed by state-owned enterprises (25.5%) and foreign direct investment (FDI) or joint venture firms (19.7%). The geographical distribution of firms shows that 33.0% are located in Northern Vietnam, 20.5% in the Central region, and 46.5% in the Southern region, reflecting the nationwide spread of the mechanical engineering sector. Regarding digital transformation maturity, 28.8% of firms are at the initial stage of digitalization, 50.6% are in the ongoing implementation phase, while 20.6% have achieved fully integrated digital operations.

These descriptive statistics provide a comprehensive overview of the surveyed firms and enhance the robustness of the subsequent analysis. The diversity in organizational size, resources, ownership, geographical context, and digital maturity allows this study to derive meaningful insights into how these contextual factors may influence the relationships among digital orientation, digital capabilities, digital transformation, organizational agility, and both financial and non-financial performance.

3.2. Evaluation of the measurement model

In accordance with Hair et al. (2017), the measurement model's validity and reliability were confirmed by evaluating its internal consistency, convergent validity, and discriminant validity. More specifically, the evaluation criteria required that the average variance extracted (AVE) be larger than 0.5 and that outer loadings, Cronbach's alpha, composite reliability (CR), and rho_A all surpass 0.7. All assessed constructs meet or exceed the set thresholds, as shown in Table 2, demonstrating that they all meet these requirements. In accordance with the methodological guidelines provided by Hair et al. (2017), these results demonstrate that the measurement model has good levels of internal reliability and convergent validity.

This study used two complimentary methods – the heterotrait-monotrait (HTMT) ratio and the Fornell-Larcker criterion – to assess the discrim-

Table 2. Construct reliability and validity

Research construct	Items	Outer Loadings	α	C.R	rhoA	AVE
Digital Orientation (Khin & Ho, 2019)	DOR1: Commitment to the use digital technologies	0.711	0.846	0.898	0.85	0.688
	DOR2: Possession of superior digital technologies in solutions	0.850	–	–	–	–
	DOR3: Readiness to adopt new digital technologies within the organization	0.852	–	–	–	–
	DOR4: Proactiveness in seeking opportunities to apply digital technologies in innovation	0.894	–	–	–	–
Digital Capacity (Khin & Ho, 2019)	DCA1: Acquiring important digital technologies	0.88	0.922	0.945	0.924	0.811
	DCA2: Identifying new digital opportunities	0.881	–	–	–	–
	DCA3: Responding to digital transformation	0.852	–	–	–	–
	DCA4: Mastering the state-of-the-art digital technologies	0.677*	–	–	–	–
	DCA5: Developing innovative products/ service/process using digital technology	0.887	–	–	–	–
Digital Transformation (Abdurrahman et al., 2024)	DTR1: Creation of new business processes through digital technologies	0.85	0.867	0.91	0.867	0.716
	DTR2: Shifting corporate processes toward digital technologies	0.875	–	–	–	–
	DTR3: Integration of operational procedures across work units	0.887	–	–	–	–
	DTR4: Enhancing client understanding and product/service quality through digital transformation	0.769	–	–	–	–

Table 2 (cont.). Construct reliability and validity

Research construct	Items	Outer Loadings	α	C.R	rhoA	AVE
Organizational Agility (Irfan et al., 2019)	OAG1: Responsiveness to fluctuations in demand	0.723	0.882	0.911	0.883	0.63
	OAG2: Balanced management of product mix	0.805	–	–	–	–
	OAG3: Internal management of supply disruptions	0.775	–	–	–	–
	OAG4: Flexibility in production volume.	0.823	–	–	–	–
	OAG5: Reduction of lead times	0.824	–	–	–	–
	OAG6: Acceleration of delivery speed	0.808	–	–	–	–
Financial Performance (Khin & Ho, 2019)	FIP1: Faster profitability growth compared to industry average	0.931	0.936	0.959	0.936	0.886
	FIP2: Higher return on assets (ROA) than industry average	0.953	–	–	–	–
	FIP3: Higher value added per employee compared to industry average	0.941	–	–	–	–
Non-Financial Performance (Khin & Ho, 2019)	NFIP1: Customer satisfaction	0.827	0.83	0.898	0.837	0.747
	NFIP2: Market share	0.906	–	–	–	–
	NFIP3: Employee turnover	0.858	–	–	–	–

Note: *: The observed variable DCA4 was removed; α: Cronbach's alpha; C.R: Composite Reliability; AVE: Average Variance Extracted.

inant validity of the items in the model. When the square root of the average variance extracted (AVE) for each construct is greater than the correlation coefficients between that construct and every other construct, discriminant validity is proven, according to the methodology of Fornell and Larcker (1981). According to the recognized Fornell-Larcker guideline, the constructs have good discriminant validity as this criterion is met for all variables, as Table 3 illustrates.

In accordance with the heterotrait-monotrait ratio (HTMT) approach – regarded as a more reliable technique for assessing discriminant validity across constructs – all computed coefficient values fall well below the recommended threshold of 0.9 (Henseler et al., 2015). This outcome confirms that discriminant validity is satisfactorily established for all constructs, as detailed in Table 4.

3.3. Evaluation of the structural model

In addition to validating the measurement model's reliability and construct validity, the structural model was examined through a five-step analytical framework, as outlined by Hair et al. (2017). The initial step involved checking for mul-

Table 3. Fornell-Larcker criterion

Research constructs	1	2	3	4	5	6
1. Digital Capacity	0.90	–	–	–	–	–
2. Digital Orientation	0.683	0.829	–	–	–	–
3. Digital Transformation	0.639	0.749	0.846	–	–	–
4. Financial Performance	0.693	0.708	0.732	0.941	–	–
5. Non-Financial Performance	0.496	0.48	0.516	0.522	0.864	–
6. Organization Agility	0.63	0.721	0.815	0.795	0.536	0.794

Table 4. Heterotrait-monotrait ratio (HTMT)

Research constructs	1	2	3	4	5	6
1. Digital Capacity	–	–	–	–	–	–
2. Digital Orientation	0.772	–	–	–	–	–
3. Digital Transformation	0.713	0.875	–	–	–	–
4. Financial Performance	0.745	0.795	0.812	–	–	–
5. Non-Financial Performance	0.567	0.575	0.605	0.593	–	–
6. Organization Agility	0.700	0.835	0.830	0.875	0.627	–

http://dx.doi.org/10.21511/ppm.23(3).2025.25

Table 5. Hypothesis testing results

Relationship	Path Coefficient	t-value	p-value	Supported
H_{1a}: Digital Orientation → Digital Transformation	0.585	7.925	0.000	Yes
H_{1b}: Digital Capacity → Digital Transformation	0.24	2.946	0.003	Yes
H_2: DT → Organization Agility	0.815	23.208	0.000	Yes
H_{3a}: Organization Agility → Financial Performance	0.795	23.843	0.000	Yes
H_{3b}: Organization Agility → Non-Financial Performance	0.536	7.917	0.000	Yes
R^2 DT = 0.591	Q^2 DT = 0.414			
R^2 Organization Agility = 0.664	Q^2 Organization Agility = 0.412			
R^2 Financial Performance = 0.632	Q^2 Financial Performance = 0.554			
R^2 Non-Financial Performance = 0.287	Q^2 Non-Financial Performance = 0.208			

ticollinearity to ensure that the independent variables did not exhibit excessive intercorrelation. To do this, the research model was segmented into four distinct sub-models, each comprising a single endogenous construct, consistent with the recommendations of Hair et al. (2017). The analysis revealed that the Variance Inflation Factor (VIF) values across all latent variables ranged from 1.000 to 1.873, remaining well below the commonly accepted cutoff value of 5. These findings confirm the absence of multicollinearity issues within the structural model (Hair et al., 2017).

In the second analytical stage, the study evaluated the statistical relevance of the proposed hypotheses by employing a bootstrapping approach using 5,000 resamples. This resampling method enabled a robust estimation of the significance levels associated with each structural path coefficient. The outcomes affirm that all five hypothesized relationships reached statistical significance. Both digital orientation and digital capacity were found to significantly influence digital transformation; notably, the effect of digital orientation (*H1a*: $\beta = 0.585$, $p < 0.01$) was more pronounced than that of digital capacity (*H1b*: $\beta = 0.240$, $p < 0.01$). Furthermore, the analysis revealed a strong and positive association between digital transformation and organizational agility (H2: $\beta = 0.815$, $p < 0.01$). Organizational agility, in turn, demonstrated significant positive effects on both financial performance (*H3a*: $\beta = 0.795$, $p < 0.01$) and non-financial performance (*H3b:* $\beta = 0.536$, $p < 0.01$). A summary of these results is illustrated in Table 5 and Figure 2.

In the third stage of the structural model assessment, the explanatory capacity of the independent constructs was evaluated using the coefficient of determination (R^2). As illustrated in Table 5, digital orientation and digital capacity together account for 59.1% of the variance in digital transformation ($R^2 = 0.591$), indicating a moderate explanatory effect. In parallel, the R^2 value for organizational agility stands at 0.664, suggesting that digital transformation serves as a robust predictor, explaining 66.4% of the variance. Regarding firm outcomes, organizational agility explains 63.2% of the variance in financial performance ($R^2 = 0.632$), while its influence on non-financial performance is more modest, accounting for 28.7% of the variance. These values collectively demonstrate the model's substantial explanatory strength, consistent with the evaluation standards outlined by Hair et al. (2017).

The fourth analytical step involved calculating the effect size (f^2) for each exogenous construct in relation to its corresponding endogenous variable. Based on the classification by Cohen (2013), where f^2 values of 0.02, 0.15, and 0.35 denote small, medium, and large effects respectively, the findings reveal that digital capacity exerts a small effect ($f^2 = 0.075$), whereas the remaining predictors demonstrate medium to large effect sizes, underscoring their substantial influence within the model structure.

To conclude the model evaluation, this study examined its predictive relevance using the Q^2 statistic, as recommended by Hair et al. (2017). According to their criteria, a Q^2 value exceeding 0.02 signifies that the model possesses meaningful out-of-sample predictive ability. As illustrated in Table 5, the computed Q^2 values are 0.414 for digital transformation, 0.412 for organizational agility, 0.554 for financial performance, and 0.208 for non-financial performance. These findings suggest that, although non-financial performance shows a moderate predictive effect, the remaining constructs display robust levels of predictive accuracy beyond the estimation sample.

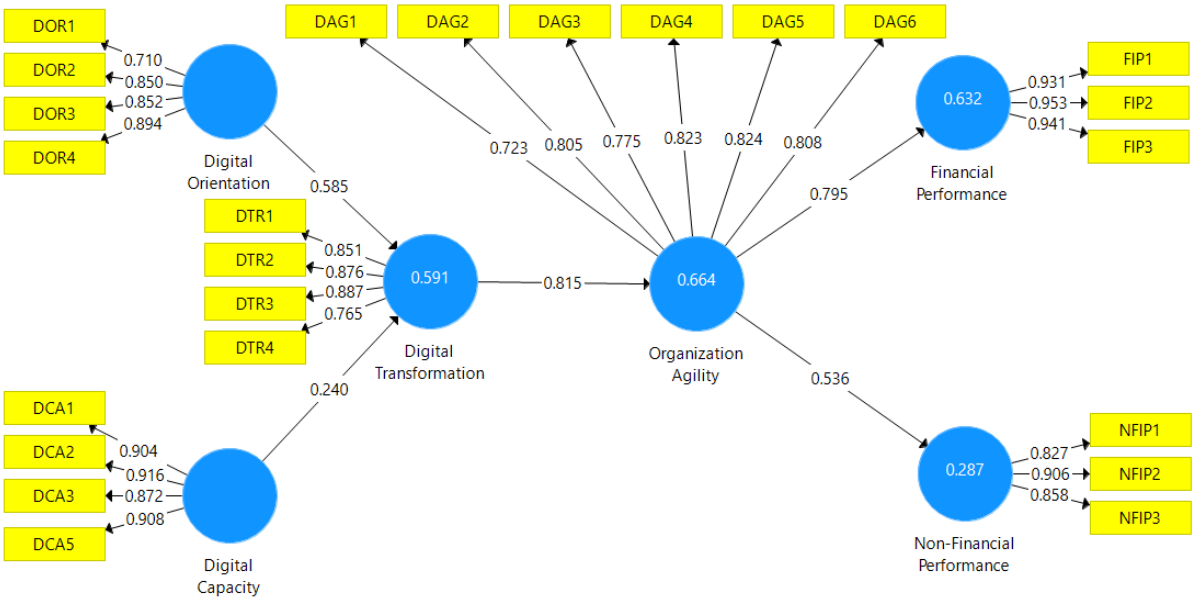

Figure 2. Analysis results of the theoretical model using PLS-SEM

4. DISCUSSION

The structural model analysis reveals three prominent findings. First, digital orientation exerts a strong influence on digital transformation, with a path coefficient of β = 0.585, significantly higher than that of digital capacity, which registers at β = 0.240. This result underscores the critical role of digital strategic orientation – manifested through leadership vision, commitment, and long-term direction – in driving digital transformation within the context of Vietnamese industrial enterprises. This strategic orientation appears to be more instrumental than the organization's technological readiness or internal skills. Such an insight is particularly relevant in unstable or resource-constrained environments, where strategic renewal thinking may substitute for limited technological assets.

Second, digital transformation exhibits a strong relationship with organizational agility, with a coefficient of β = 0.815, affirming that the implementation of digital initiatives significantly enhances an enterprise's ability to adapt and reconfigure. Organizational agility in this context reflects the firm's responsiveness to change, adaptability to environmental fluctuations, and effectiveness in internal restructuring. Therefore, digital transformation extends beyond technological upgrades; it entails fundamental changes in organizational structures, processes, and mindsets. Third, organizational agility is significantly associated with both financial performance (β = 0.795) and non-financial performance (β = 0.536). This indicates that within transforming enterprises, organizational agility is a key contributor to overall performance. Agility allows firms to better seize market opportunities, maintain operational continuity, and enhance employee and customer satisfaction – factors that, while not reflected in traditional financial indicators, are increasingly vital in a digital economy. Collectively, these findings suggest that digital transformation can become a driver of organizational development, but only when anchored in a clear strategic orientation and accompanied by enhanced organizational capabilities. For firms in emerging economies like Vietnam, this presents a critical managerial implication: investment in technology must be coupled with the development of organizational agility in order to translate digital potential into tangible outcomes.

The current findings selectively contribute to the expanding academic discourse on digital transformation, particularly by emphasizing the roles of digital orientation and organizational agility in enhancing organizational performance. This aligns with the findings of AlNuaimi et al. (2022), who assert that the integration of digital strategy and organizational agility is a prerequisite for successful digital transformation. However, whereas AlNuaimi et al. (2022) emphasize the moderat-

http://dx.doi.org/10.21511/ppm.23(3).2025.25

ing role of digital strategy, this study highlights digital orientation as a primary enabler of digital transformation, exhibiting a stronger effect than technical capacity and extending the discussion toward a more strategic perspective.

Similarly, Alakaş (2024) finds that digital leadership and digital culture significantly moderate the relationship between digital transformation and organizational agility. Although the current study does not test moderation effects, it reinforces the assertion that the digitalization process is inherently tied to organizational capabilities. The strong linkage between digital transformation and organizational agility ($\beta = 0.815$) offers a novel contribution in the context of Vietnamese industrial enterprises undergoing operational restructuring through digital means. The study also builds upon the work of Ghosh et al. (2022) and Irfan et al. (2019), who emphasize that dynamic capabilities and IT infrastructure underpin supply chain agility and organizational structure. Here, organizational agility is shown to have a direct and pronounced effect on both financial and non-financial performance, which aligns with the findings of Bindeeba et al. (2025), whose quantitative synthesis outlines the multifaceted impact of digital transformation on business outcomes. However, unlike Merín-Rodrigáñez et al. (2024), who examine the mediating role of business model innovation, this study treats organizational agility not as a mediator but as a directly linked capability, thereby reinforcing the sequential chain of governance and operational impacts.

Additionally, the finding that digital orientation exerts a greater effect than digital capacity on digital transformation ($\beta = 0.585$ vs. 0.240) resonates with the theoretical positions of Barney (1991) and Teece (2007), who argue that sustainable competitive advantage is derived not only from tangible assets but also from intangible strategic capabilities such as vision, cognitive framing, and decision-making. This insight is particularly pertinent to firms in emerging markets like Vietnam, where digital infrastructure remains limited but leadership commitment to transformation serves as a primary catalyst, as affirmed by Nguyen and Dang (2025). Ultimately, the study underscores the vital role of organizational capabilities in the digital transformation process, proposing a more contextually appropriate approach for developing economies such as Vietnam. In contrast with findings from more mature digital ecosystems like China (Chen et al., 2023), this difference highlights the necessity of localizing digital transformation theories to better reflect the institutional settings, organizational cultures, and resource configurations typical of Southeast Asia.

The research offers several important implications for managers of manufacturing firms in emerging economies, particularly Vietnam, where digital transformation remains uneven in both speed and maturity across enterprises. First, digital transformation should not be perceived as an immediate solution to enhance financial performance. Investing in technology without adequate organizational preparation may yield unclear outcomes or even negative short-term effects. Managers should therefore shift their focus from technology acquisition to cultivating an agile organizational ecosystem – where processes, structures, and cultures are primed for rapid adaptation driven by technological change.

Second, the findings suggest that digital transformation plays a vital role in enhancing organizational agility. In the initial phase of transformation, firms should prioritize intermediary goals such as accelerating decision-making, increasing the speed of operational restructuring, and improving internal coordination. These goals can be achieved through process digitalization projects, workforce retraining, and experimentation with flexible work models.

Third, organizational capability serves as the bridge between digital investment and performance outcomes. Performance improvements do not arise directly from digital initiatives but rather from the organization's ability to leverage these technologies strategically and flexibly. Accordingly, leaders should re-evaluate existing governance structures, promote decentralized decision-making, facilitate cross-functional communication, and redesign workflows to be more adaptive and agile.

Finally, firms must recognize that digital orientation plays a more significant role than technical capacity in initiating digital transformation. Leadership should therefore demonstrate clear

commitment, articulate a long-term digital vision, and engage in active internal communication to ensure organizational alignment. In summary, the central implication is that digital transformation will not yield immediate performance gains without sufficient organizational agility. Success in the digital age requires investment not only in technology but also in the organizational foundation that unlocks the true value of digitalization.

This study has limitations that warrant acknowledgment. First, the research model focuses on manufacturing enterprises in the mechanical engineering sector in Vietnam, which limits the generalizability of the findings to other industries and national contexts. Second, the use of a cross-sectional quantitative approach does not permit the evaluation of long-term causal relationships between variables, particularly given that digital transformation is an ongoing and evolving process. Third, the model excludes potentially relevant mediating variables such as innovation, digital skills, or digital strategy, which may limit the comprehensiveness of the analysis. To address these limitations, future studies should expand the industry and geographic scope, incorporate longitudinal data, and explore additional mediating or moderating models to provide deeper insights into how digital transformation impacts organizational performance under varying conditions.

CONCLUSION

This study contributes to a deeper understanding of the foundational drivers of digital transformation within industrial enterprises in emerging economies. The findings reveal that digital orientation has a significantly stronger impact than digital capacity in promoting the implementation of digital transformation. This underscores the critical role of strategic vision, leadership commitment, and long-term direction in initiating and shaping digital transformation efforts. Moreover, the analysis shows that digital transformation positively and strongly influences organizational agility. As organizations advance their digitalization processes, their ability to adapt, restructure, and respond flexibly to changing environments also improves accordingly. Additionally, organizational agility is found to have a significant impact on both financial and non-financial performance, highlighting its central role in enhancing organizational outcomes in the digital age. Overall, the study confirms that digital transformation cannot be separated from internal organizational capabilities. Technology investments generate value only when accompanied by clear strategic thinking and the concurrent development of managerial, structural, and procedural capabilities. This provides a crucial message for business leaders in Vietnam: successful digital transformation must begin with building a flexible organizational foundation and fostering decisive, forward-looking leadership.

AUTHOR CONTRIBUTIONS

Conceptualization: Nguyen Khanh Cuong, Nguyen Ngoc-Long, Ho Tien Dung.
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Software: Than Van Hai.
Supervision: Ho Tien Dung.
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Visualization: Ho Tien Dung.
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http://dx.doi.org/10.21511/ppm.23(3).2025.25

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