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The Impact of Digital Transformation in Supply Chain on Firm Performance: An Empirical Research in Vietnam

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ABSTRACT

Purpose: The purpose of this study is to investigate how supply chain digital transformation (DT) affects firm performance, specifically with regard to industrial manufacturing companies in developing nations.

Design/Methodology/Approach: A mixed research approach was adopted. Qualitative methods helped develop the theoretical model and measurement scales. Quantitative data were collected through surveys distributed to 166 industrial manufacturing companies in Hanoi. The final dataset consisted of 159 valid responses. The assumptions were tested using structural equation modeling (SEM) with SPSS 25.0 and AMOS 24.0.

Findings: The results show that digital transformation enhances information exchange, coordination and responsiveness within supply chain. However, it does not directly improve firm performance. Coordination and responsiveness are two supply chain characteristics that have a good influence on firm performance, while information exchange has a negligible effect. Additionally, coordination plays a mediating role between digital transformation and firm performance, but the mediating role of information exchange is not supported.

Research limitations/Implications: The research is geographically limited to Hanoi and may not represent all industrial firms in Vietnam. Future research should expand the dataset across regions and industries.

Originality/value: This research fills a gap in the literature on digital supply chain transformation in developing economies. It also provides empirical evidence on how supply chain capabilities mediate the DT-firm performance relationship.

Keywords: Digital Transformation, Supply Chain Capability, Firm Performance, Information Exchange, Coordination, Responsiveness

INTRODUCTION

The dynamic nature of today's global economy - characterized by rapid technological advances, heightened competition, and unprecedented disruptions - has positioned supply chain management as a critical determinant of organizational success. In particular, the outbreak of the COVID-19 pandemic exposed significant vulnerabilities within traditional supply chains, prompting a shift in managerial priorities toward resilience, adaptability, and technological integration. According to a McKinsey report [1], 94% of global enterprises faced supply chain disruptions due to the pandemic, with 75% experiencing

substantial operational challenges. This scenario has accelerated the strategic imperative for digital transformation (DT) as a means of reconfiguring supply chains to enhance responsiveness, efficiency and competitive advantage.

Digital transformation within supply chains involves the combination of advanced digital technologies across supply chain activities to enable real-time decision-making, increase transparency and foster operational excellence [2] [3]. Numerous studies have documented the positive impact of DT on supply chain performance, citing improvements in cost efficiency, agility, and customer satisfaction [4] [5]. However, the current body of knowledge remains disproportionately centered on developed economies, with limited empirical evidence from developing countries, where the contextual challenges and readiness levels significantly differ.

In the context of Vietnam—a fast-growing, transitional economy—digital transformation in supply chains is still in its infancy. According to McKinsey [6], only 30% of Vietnamese enterprises have adopted digital technologies in supply chain operations while the rate of firms using digital technologies in developed economies is over 60%. In particular, the industrial manufacturing sector, despite being a pillar of national economic growth, exhibits low levels of digital integration, with most firms relying on conventional supply chain models [6]. This situation underscores a salient research gap in understanding the extent to which digital transformation affects firm performance in such environments and how supply chain capabilities mediate this relationship [7] [8].

This study seeks to provide empirical insights into how digital transformation initiatives influence firm performance, with a specific focus on industrial manufacturing enterprises operating in Hanoi, Vietnam. This study uses the Resource-Based View (RBV) to view digital transformation as a strategic resource that helps build supply chain capabilities, such as coordination, responsiveness, and information exchange, which improve firm performance. The study uses a mixed-method research methodology and uses Structural Equation Modeling (SEM) to assess the hypotheses based on survey data from manufacturing organizations and establish a conceptual framework.

The results clearly show that supply chain capabilities including responsiveness, coordination, and information exchange are key to improving firm performance through digital transformation. By expanding the application of RBV to digital supply chain scenarios in emerging economies, our findings add to the body of research. Furthermore, the research delivers significant practical implications by identifying critical areas where firms and policymakers can intervene to foster digital adoption and optimize supply chain operations. This research thus not only addresses an important gap in the current literature but also offers timely insights for advancing the digital agenda in Vietnam's manufacturing landscape.

LITERATURE REVIEW

Related theories

This research develops a theoretical framework through the synthesis of theories from supply chain management, information systems, and strategic administration to explain the association between digital transformation, supply chain capabilities, and firm performance in industrial manufacturing companies. The key theories include: Resource-Based View (RBV), Transaction Cost Economics (TCE), Relational Exchange Theory (RET) and Contingency Theory.

The RBV posits that a firm's sustainable competitive advantage derives from resources and capabilities that are valuable, rare, costly to replicate, and non-substitutable (VRIN) [9] . Therefore, in this research, digital transformation is regarded as a strategic foundation that drives the development of supply chain capabilities such as information exchange, coordination,

and responsiveness. The RBV explains that firm performance is achieved only when firms develop the necessary organizational capabilities to effectively leverage digital resources, thereby creating added value and competitive advantage [10].

TCE focuses on optimizing transaction costs (search, negotiation, monitoring) through appropriate governance structures [11]. In the supply chain context, digital transformation reduces transaction costs by enhancing information and coordination among partners, minimizing information asymmetry, and operational expenses. TCE explains why digital transformation improves economic efficiency, particularly in emerging markets where transaction costs tend to be high [7].

RET emphasizes the importance of trust, collaboration, and information dissemination in long-term economic relationships [12]. Within supply chains, digital transformation fosters information exchange and coordination, increases transparency, and reduces conflicts among partners. RET explains why information exchange, coordination, supported by digital technologies, enhances firm performance—especially in contexts where social embeddedness is vital, such as emerging markets [13].

Contingency Theory posits that the effectiveness of a strategy depends on its alignment with environmental factors such as uncertainty, technology, and organizational scale [14]. In the context of digital transformation, the ability to respond quickly (RE) becomes critical in highly volatile environments, moderating the relationship between digital transformation and firm performance. This theory explains the varying impacts of digital transformation depending on the specific context of each firm [2].

Construct

Digital transformation

Digital transformation (DT) is defined as a series of value-creating activities based on technological advancement, utilizing data to restructure business processes and models in order to enhance user experience. At the organizational level, DT involves the adoption of new technologies, ecological positioning, business models and processes, organizational structure, corporate culture, leadership capabilities, and risk acceptance — all aimed at strengthening stakeholder relationships and competing effectively in the digital economy [15].

In supply chains, digital transformationbúi relates to a conversion information — and data-driven, customer-centric management approach, involving the recording and analysis of the entire process from procurement to delivery using digital technologies [16]. Through inheriting and further developing the research on the impact of DT from the perspective of Lianju Ning and Dan Yao [16], this research conceptualized DT as the strategic incorporation of digital technologies into all aspects of the supply chain — from planning, procurement, production, warehousing, and transportation to distribution and customer service — with the goal of optimizing performance, enhancing flexibility, improving collaboration, and creating sustainable added value.

Supply chain capability

Supply chain capability relates to an organizational ability to identify, acquire, and allocate both internal and external resources/information to facilitate the operations of the entire supply chain [17]. Previous research has shown that different dimensions of supply chain capability can impact various aspects of supply chain performance. Market sensing, flexibility, and the adaptability of the supply chain can have an impact on its dual agility [18]. Furthermore, the integration of supply chain capabilities, encompassing both internal processes and external partnerships, not only strengthens operational performance but also equips organizations with the capacity to respond proactively to market fluctuations and uncertainties [19]. Particularly, Chopra & Meindl [19] emphasized that during the

process of DT within the supply chain, organizations must not only adapt to volatile external environments but also undergo internal organizational restructuring to sustain competitiveness.

Based on the research [20], supply chain is defined as a capability as a two-tier structure, encompassing three key aspects: information exchange, coordination, and responsiveness of the supply chain. In this research, these three aspects, as proposed by Wu et al. [20] will serve as the foundation for analysis. Information exchange is understood as the process of sharing data, information, and intellectual assets among supply chain participants, with the aim of supporting decision-making and effectively coordinating operations [21]. This concept encompasses both strategic and operational communication, enabling stakeholders to respond swiftly to market fluctuations and optimize supply chain performance [22] . Coordination pertains to the extent to which businesses within the value chain share information, synchronize decision, and align incentives [23]. Responsiveness reflects a supply chain's ability to promptly detect and adapt to market dynamics, customer demand, or risks from the external environment [24].

Firm performance

Firm performance plays a fundamental role in determining a company's success or failure. It is an important benchmark for evaluating whether the organization has achieved its goals. Achieving the organization's objectives is closely linked to the effectiveness of operational processes [25]. Based on the studies by Ngo & O'Cass [26] and Ramaswami Rajiv et al. [27], firm performance can be measured through financial outcomes, operational efficiency, and market share, thereby reflecting the company's competitive capability. This concept not only encompasses traditional financial indicators but also extends to non-financial aspects such as social performance, reputation, and environmental impact. Specifically, Saryatmo et al. [28] and Muttakin et al. [29] emphasize that firm performance not only affects profitability but also enhances a firm's competitiveness and sustainability. Social performance, including corporate social responsibility (CSR) initiatives and community contributions, is increasingly recognized as a crucial factor in enhancing a firm's long-term value [30] [31]. Corporate reputation, shaped by stakeholders' perceptions of product quality, business ethics, and corporate social responsibility, also plays a vital role in attracting customers and partners [32]. Furthermore, environmental performance, such as reducing carbon emissions and utilizing resources sustainably, has become a key metric amid global pressures for sustainable development [33]. On the basis of the aforementioned theoretical foundations, this research develops a theoretical model to comprehensively analyze the nexus between digital transformation, supply chain capabilities, and firm performance.

Hypothesis development

Digital transformation and Firm performance

Xue et al. [34] highlight that digital transformation profoundly influences overcoming organizational barriers, integrity-related cultural challenges, human resource quality, and managerial capabilites in supply chain value administration. Belhadi et al. [35] highlight that digital transformation within supply chains improves transparency, supports agile restructuring in terms of organization and capacity, and boosts both product quality and firm performance. Furthermore, digital transformation has been recognized for its ability to promote better coordination of economic operations and improve firm performance [36]. As noted by [37], the adoption of digital transformation significantly enhances customer service effectiveness. Similarly, Zeng et al. [38] argue that digital transformation contributes to improved fiscal performance. Truant et al. [39] propose that organizations have the potential to create new value through digital

transformation. Collectively, these findings highlight that digital transformation not only reshapes the way supply chains operate but also provides a strategic foundation for innovation and adaptability in a volatile market environment. Therefore, it can be concluded that DT constitutes a fundamental component of boosting a firm's overall performance. Thus, we propose the following hypothesis:

H1. Digital transformation has a positive impact on Firm performance

Digital transformation and Supply chain capability

Digital transformation is considered a fundamental force in transforming how firms oversee and operate their supply chains. Through the integration of digital technologies such as cloud computing, advanced data processing, connected technologies, and machine learning, organizations can considerably enhance supply chain visibility, integration, and flexibility [24] [2]. Digital transformation goes beyond mere technological modernization; it fundamentally strengthens core operational capabilities across three primary dimensions: information exchange, coordination, and responsiveness.

Information exchange is one of the essential capabilities in modern supply chains. Digital transformation has significantly altered the way information is communicated and exchanged across supply chain networks. It facilitates the integration of information systems, enabling real-time data sharing and reducing inconsistencies throughout various stages of the supply chain [40] . The deployment of digital tools has led to substantial improvements in the accuracy and timeliness of shared information [40]. As noted by Dubey et al. [41] , the implementation of digital platforms including blockchain and artificial intelligence (AI) enables firms to enhance transparency, improve reliability, and shorten the time required for information transmission throughout the supply chain. These advancements facilitate more efficient coordination among supply chain partners. Thus, we propose the following hypothesis:

H2a. Digital transformation has a positive impact on Information exchange

Over the past few years, digital transformation has become a fundamental force behind coordination among firms across the supply chain by augmenting connectivity and coordination capabilities [42]. Within the scope of digital transformation, technological innovations, including shared information platforms, online coordination tools, and artificial intelligence, have enhanced transparency and enabled seamless interactions, coordination, and swift decision-making among supply chain actors [41].

Numerous studies have confirmed that digital transformation can foster higher levels of supply chain coordination, thereby improving strategic alignment and coordination [43]. Thus, we propose the following hypothesis:

H2b. Digital transformation has a positive impact on Coordination.

The supply chain responsiveness is understood as the proficiency to promptly and efficiently adapt to alterations in the business environment, economic demand, or uncertain factors [44]. In a rapidly changing business landscape—especially following disruptions such as the coronavirus outbreak—responsiveness has strengthened as a critical capability for maintaining competitiveness.

Digital transformation greatly improves supply chain responsiveness by integrating technologies like the Internet of Things (IoT), Artificial Intelligence (AI), and Big Data analytics and real-time Enterprise Resource Planning (ERP) systems [41]. These digital platforms empower companies to gather, process, and analyze data instantaneously, thereby allowing them to make fast and accurate decisions in response to market shifts or customer needs [45].

Moreover, digital platforms also improve connectivity and forecasting capabilities

across the entire supply chain, enabling more agile responses to unexpected risks or disruptions [3] Digital transformation positively influences the responsiveness of businesses by allowing them to adjust swiftly to disruptions and transforming the market landscape [46]. Thus, we propose the following hypothesis:

H2c. Digital transformation has a positive impact on responsiveness.

Supply chain capability and Firm performance

Against the backdrop of globalization and rapid technological advancements, information exchange has become a crucial factor in improving firm performance. The swift and accurate sharing of information between departments within an organization and with supply chain partners not only optimizes production processes but also enhances decision-making capabilities and flexibility in responding to market changes [40].

This capability is increasingly recognized as a new structural capability and a critical factor for achieving a strategic edge in the digital age [47].

Bejlegaard et al. [48] asserted that the integration of digital technologies facilitates more efficient information exchange within the supply chain, enabling better coordination and flexible adaptation in a dynamic business environment. AlMahri et al. [49] also demonstrated that high-quality Information exchange can reduce inventory levels and improve market responsiveness, ultimately enhancing a firm's financial performance. Timely access to information allows firms to adjust production plans accordingly, minimize unnecessary stock, and reduce lead times and logistics costs.

The research by AlMahri et al. [49] indicates that information exchange within the supply chain not only enhances operational efficiency and improves coordination flexibility but also fosters innovation and enables more accurate decision-making, thereby improving overall firm performance. Considering these insights, we hypothesize the following:

H3a. Information exchange in the supply chain has a positive impact on firm performance.

Systematic coordination among supply chain stakeholders has been shown to significantly enhance firm performance [50]. The investigation by Uwamahoro et al. [51] points out that a considerable level of coordination within the supply chain positively influences the firm performance of manufacturing SMEs. According to the authors, SMEs in Rwanda have experienced notable improvements in on-time delivery, reduced inventory costs, and enhanced responsiveness to market fluctuations as a result of strengthened cooperation with suppliers and customers [51].

Supply chain coordination has been recognized not only for providing collaborative advantages—such as cost savings and resource sharing—but also for significantly enhancing firm performance in both operational and financial aspects [52]. Coordinated activities such as joint planning, demand forecasting, and synchronized product development have enabled businesses to minimize order discrepancies, shorten delivery lead times, and improve labor productivity.

Wang et al. [53] argue that firms with a significant degree of coordination, partnering with supply chain stakeholders are better able to adapt to risks and market volatility, such as raw material disruptions, shifts in customer demand, or unexpected events like pandemics. Based on these insights, the following hypothesis is proposed:

H3b. Coordination in the supply chain has a positive impact on firm performance.

Responsiveness in the supply chain relates to the competence of the firm to meet market demands, especially in the face of unpredictable fluctuations in demand and increasingly shortened product life cycles. This capability focuses on the potential of the supply chain to swiftly adapt to sudden

fluctuations in customer expectations, personalize products for specific standards, and guarantee punctual delivery [54]. According to Nenavani and Jain [55], a high supply chain responsiveness is often characterized by the implementation of real-time information systems, enabling firms to quickly detect shifts in demand and immediately adjust production and delivery schedules. When firms can promptly react to demand fluctuations, they are able to modify order volumes, production plans, and distribution schedules with flexibility, thereby minimizing excess inventory, preventing stockouts, and reducing warehousing costs as well as opportunity losses.

In the digital era—where customers increasingly demand rapid, flexible service and highly personalized products—supply chain responsiveness functions as a critical mechanism for delivering value at the right time and in accordance with customer expectations. Harifi [56] highlights that, among manufacturing SMEs, the integration of supply chain responsiveness into production and distribution planning has improved order accuracy and shortened delivery times. This, in turn, enhances the customer experience and minimizes the risk of lost sales opportunities.

Furthermore, responsiveness is not limited to operational aspects but also extends to the strategic level. It involves restructuring supply networks to be more agile, leveraging multiple sourcing options, and developing scenario-based risk response plans. According to Yu et al. [57], firms that design supply chains with a high degree of responsiveness often establish early-warning systems and utilize big data to simulate uncertain scenarios, enabling faster decision-making in conditions of incomplete information. Although such decisions are sometimes provisional, they play a critical role in maintaining cash flow, customer service capabilities, and overall firm performance amidst high environmental volatility.

Building on these points, we suggest the following hypothesis:

H3c. Responsiveness in the supply chain has a positive impact on firm performance.

The mediating role of Supply chain capability

Previous reports have demonstrated that supply chain capabilities enhanced through digital technologies are highly tailored to each organization and challenging to duplicate across various firms. These capabilities serve as drivers that enable firms to transform digital resources into a valuable advantage [58]. Moreover, factors influencing supply chain capabilites also contribute significantly to improving a firm [59]. Accordingly, it can be inferred that supply chain capabilites constitute a critical link in the connection between digital transformation and firm performance. Building upon this perspective, the present study argues that digital transformation can potentially elevate information exchange, coordination, and responsiveness within the supply chain, thereby contributing to improved firm performance.

Digital transformation enhances firms' capabilities in information exchange within the supply chain through integrated platforms. These technologies enable the fast, accurate, and transparent flow of information among stakeholders, thereby strengthening coordination and supporting real-time decision-making. Recent studies highlight that efficient information flow is a fundamental condition for optimizing firm performance and increasing firm agility [41]. Furthermore, digital transformation serves an essential function in fostering coordination among supply chain partners by deploying real-time information sharing platforms and digital connectivity tools. Technological solutions including blockchain, integrated supply chain planning systems, and open data platforms, contribute to trust-building, transparency, and coordination among firms, suppliers, and customers. Research by Queiroz et al. [24] indicates that higher levels of supply chain coordination lead to

improved firm performance and greater resilience to disruptions.

Finally, digital transformation facilitates greater supply chain responsiveness to dynamic business environments by utilizing large-scale data analytics, artificial intelligence (AI), and advanced forecasting models. These technologies empower firms to detect risks—such as supply disruptions or sudden demand shifts—at an early stage and enable timely strategic adjustments to mitigate negative impacts and seize emerging opportunities. Ivanov and Dolgui [39] emphasize that highly digitized supply chains possess superior responsiveness, ensuring continuity and efficiency even under uncertainty, thus significantly enhancing firm performance.

Thus, we propose the following hypothesis:

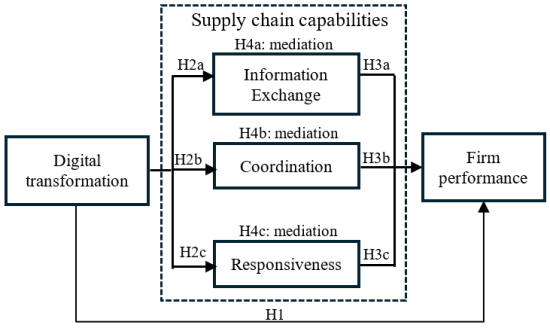
H4a. Information exchange mediates the relationship between digital transformation and firm performance.

H4b. Coordination mediates the relationship between digital transformation and firm performance.

H4c. Responsiveness mediates the relationship between digital transformation and firm performance.

Based on these Hypotheses, we propose the theoretical model as shown in Figure.1

Figure 1: Theoretical model



MATERIALS & METHODS

Measurement model

In the supply chain, digital transformation application inherits the observed variable of digital transformation variable from [19] and [56] with three variable scales. Information exchange has three scales: the items from [20] [60] [61] [44] [20] Cooperation uses four scales from [57] [20] [62]. Responsiveness is also used three scales inherited from the research of [63] Finally, firm performance used 3 variable scales inherited from the study of Wei Wang et al., [64].

Data

Research subjects: The research is developed on a questionnaire survey, and the respondent is the manager of the firm responsible for supply chain management, who is responsible for developing the strategy of firm performance.

RESULT

This research applied the general approach of structural equation modeling (SEM). Quantitative analysis was conducted using SPSS 25 and AMOS 24 statistical software. After collecting all the issued and returned forms, through checking and screening, 159 survey forms with complete information were collected.

Statistic result

The author analyzed the characteristics of the survey subjects according to the size of the workforce, operational period of the organization, annual revenue and total assets of the enterprise. Table I presents descriptive statistical results.

	Characteristics	Frequency	(%)
Employees	0-50	54	33,96
	51-100	34	21,4
	101-300	47	29,6
	301-500	7	4,4
	> 500	17	10,7
Operational period of the organization (in year)	< 5	57	35,9
	5-10	43	27,0
	> 10	59	37,1
Annual revenue (unit: Billion VND)	< 10	45	28,3
	10-50	32	20,1
	50-100	35	22,0
	100-300	26	16,4
	> 300	21	13,2
Total assets (unit: Billion VND)	<3	47	29,6
	3-10	23	14,5
	10-50	36	22,6
	50-100	31	19,5
	> 100	22	13,8

Measurement model testing

Cronbach's Alpha

Based on the Cronbach's alpha findings, all variables were found to have achieved valid reliability (Table II)

Exploratory factor analysis

All items have a loading factor >0.5. The result of EFA analysis has KMO of 0.886, sig of 0.000, Chi-square of 1637.093. The results demonstrate a general correlation among the observed variables and show that the 16 items align with the five initially identified groups.

Confirmatory Factor Analysis

The results of Cronbach's alpha, Composite Reliability (CR), and Average Variance Extracted (AVE) analysis show that all factors have Cronbach's alpha and CR values exceeding the 0.7 threshold, indicating good reliability of the scales. The AVE values are all greater than 0.5, demonstrating convergent validity of the model. This confirms that the measurement factors have high reliability and validity in this study. (Table II)

Structural equation modeling

Structural Equation Modeling (SEM) was employed to test the proposed hypotheses. The analysis reveals that the model demonstrates a good fit, with Chi-square = 130.413, Chi-square/df = 1.344 < 3; RMSEA = 0.047 < 0.08; CFI = 0.979 > 0.9; TLI = 0.974 > 0.9; GFI = 0.915 > 0.9. The SEM results are summarized in Table III.

The analysis shows that digital transformation has a positive and statistically significant effect on the components of supply chain capabilities, including information exchange ($\beta = 0.656$; $p < 0.001$), coordination ($\beta = 0.754$; $p < 0.001$), and responsiveness ($\beta = 0.610$; $p < 0.001$). Moreover, coordination and responsiveness have a positive impact on firm performance ($\beta = 0.263$; $p = 0.015$ and $\beta = 0.233$; $p = 0.014$, respectively). Therefore, hypotheses H2a, H2b, H2c, H3b, and H3c are all accepted.

In contrast, the results show that the correlation between information exchange and firm performance has a significance level of P= 0.604 > 0.05, so the information exchange variable has no impact on firm performance; the correlation between digital transformation and firm performance has a significance level of P= 0.110 > 0.05, so the digital transformation variable has no effect on firm performance Therefore, H3a and H1 are rejected.

The results of the SEM analysis indicate that the direct effect of digital transformation on firm performance is not significant ($p = 0.110$). However, it has an indirect impact through two mediating variables: coordination and responsiveness. The indirect impact of digital transformation on firm performance via responsiveness is 0.181, and via coordination is 0.130, both statistically significant. The total indirect effect is 0.311, indicating that digital transformation significantly contributes to enhancing firm performance by promoting responsiveness and coordination within the supply chain. Thus, H4b, H4c are accepted.

In contrast, the mediating path through information exchange (IE) is not statistically significant ($p > 0.05$), and therefore does not contribute to the indirect effect. This suggests that digital transformation efforts should focus on strengthening responsiveness and coordination, rather than solely emphasizing information sharing. Therefore, H4a is rejected.

Table II: Reliability and Validity Analysis of the Measurement Model

Constructs	Item	Factor loading	Cronbach's Alpha	CR	AVE
Digital Transformation (DT)	DT1	0,763	0.874	0,875	0,702
	DT2	0,877			
	DT3	0,868			
Information Exchange (IE)	IE1	0,850	0.866	0,867	0,684
	IE2	0,824			

	IE3	0,807			
Coordination (CO)	CO1	0,822	0.908	0,909	0,715
	CO2	0,889			
	CO3	0,876			
	CO4	0,790			
Responsiveness (RP)	RP1	0,876	0.853	0,858	0,670
	RP2	0,828			
	RP3	0,746			
Firm performance (FP)	FP1	0,850	0.869	0,869	0,689
	FP2	0,826			
	FP3	0,815			

Table III: Path coefficients and Hypotheses decision

Hypothese	**Estimate**	**P-value**	**Decision**
Direct path			
H1. Digital transformation → Firm performance	0,255	0,110	Rejected
H2a. Digital transformation → Information exchange	0,656	***	Accepted
H2b. Digital transformation → Coordination	0,754	***	Accepted
H2c. Digital transformation → Responsiveness	0,610	***	Accepted
H3a. Information sharing → Firm performance	0,051	0,604	Rejected
H3b. Coordination → Firm performance	0,263	0,015	Accepted
H3c. Responsiveness → Firm performance	0,233	0,014	Accepted
Indirect			
H4a. Digital transformation → Information exchange → Firm performance	0,031	0,652	Rejected
H4b. Digital transformation Coordination→ Firm performance	0,181	0,034	Accepted
H4c. Digital transformation → Responsiveness → Firm performance	0,130	0,016	Accepted

DISCUSSION

Discussion of Result

This study's findings offer important insights into the impact of digital transformation (DT) on enhancing firm performance in the realm of supply chain management. The direct path results reveal that while digital transformation significantly impacts key dimensions such as information exchange, coordination, and responsiveness, its direct effect on firm performance is not statistically significant. Specifically, hypotheses H2a, H2b, and H2c, which propose that digital transformation enhances information exchange, coordination, and responsiveness, were all supported with strong coefficients (Est = 0.656, 0.754, and 0.610, respectively). This underscores the fundamental role of digital technologies in facilitating communication and collaboration within the supply chain, consistent with the assertions of Eisenhardt [57], Dinh Khoa & Mai Anh [65] and Williamson [11], who emphasize that digital tools are pivotal for enhancing coordination and responsiveness across supply chain partners.

On the flip side, the direct effect of information exchange (H3a) on firm performance was not significant (Est = 0.051, p = 0.604), which implies that while information exchange is crucial for improving operational transparency, it may not directly translate into enhanced performance outcomes. This aligns with the work of Elkington et al., [33] and Mai Anh et al., [66], who suggested that although information exchange is vital, its impact on performance is often indirect, mediated by more tangible aspects such as coordination and responsiveness.

Furthermore, the indirect paths explored in hypotheses H4a and H4b, which test the mediating role of information exchange and coordination, were rejected. However, hypothesis H4c, which investigates the mediating effect of responsiveness, was supported, indicating that responsiveness acts as a significant intermediary between digital transformation and firm performance.

This suggests that firms with high digital responsiveness are better positioned to leverage digital transformation for improving their overall performance, confirming the views of scholars like Eisenhardt et al [62] and Mai Anh et al [67] who emphasize the importance of responsiveness in fast-changing business environments.

Theoretical Implications

This study enriches the theoretical framework of digital transformation within supply chain management by building upon the Resource-Based View (RBV) and Transaction Cost Economics (TCE). The findings reinforce the notion that digital transformation strengthens supply chain capabilities, including coordination and responsiveness, which are critical for achieving superior performance. This aligns with RBV's assertion that firms with unique and valuable resources (like digital capabilities) can gain competitive advantages. Moreover, the rejection of the direct path between information exchange and firm performance suggests that traditional models of information sharing may need to be revisited in light of digital technologies, emphasizing the need for further refinement of the TCE framework in digital contexts.

The results also emphasize the critical role of adaptability in organizational processes, especially concerning responsiveness. Given that responsiveness mediates the link between digital transformation and firm performance, this further underscores the idea that firms must be able to adapt to evolving market conditions in order to successfully harness the benefits of digital transformation.

Managerial Implications

From a managerial perspective, the results of this study provide useful recommendations for organizations aiming to optimize their supply chain performance through digital transformation. Managers should understand that digital transformation is key to enhancing information exchange, coordination, and responsiveness in the supply chain. However, to directly impact firm performance, it is crucial to focus on improving coordination and responsiveness rather than relying solely on information exchange.

In particular, using digital tools and technologies to boost organizational responsiveness can give firms a competitive advantage in ever-changing market conditions. Managers should prioritize the development of capabilities that enable quick decision-making, flexibility, and the ability to adapt to market dynamics, as responsiveness significantly influences performance outcomes. This aligns with the work of Eisenhardt [68], who emphasized the strategic value of responsiveness in competitive industries.

Additionally, while information exchange is important for transparency and collaboration, its direct impact on performance may not be as pronounced as the ability to respond to changing circumstances. Therefore, firms should balance their efforts between improving information exchange and enhancing the agility of their supply chain processes to better respond to external pressures.

Limitations and Future Research Directions

Although this study makes valuable contributions, it has several limitations that suggest directions for future research. Firstly, the cross-sectional design restricts causal inference, so future studies should consider using longitudinal methods. Second, the sample focuses only on manufacturing firms in Hanoi, which may restrict generalizability. Comparative studies across regions or countries are encouraged.

Third, the model includes only three supply chain capabilities: information exchange, coordination, and responsiveness, while others like flexibility or innovation are also relevant. Expanding future models could provide a more holistic view.

Fourth, reliance on self-reported data may introduce biases. Triangulating with objective or secondary data sources could enhance validity. Lastly, the study did not differentiate between types of digital technologies. Future work could explore how specific technologies uniquely influence supply chain capabilities and performance.

CONCLUSION

In conclusion, this study demonstrates the critical role of digital transformation in enhancing supply chain capabilities such as coordination and responsiveness. While digital transformation does not directly influence firm performance through information exchange, it significantly affects firm performance through its impact on responsiveness. These findings contribute to both academic theory and practical management by emphasizing the need for firms to focus on digital transformation strategies that enhance responsiveness within their supply chains.

The theoretical implications underscore the need for revisiting traditional models in the context of digital transformation, particularly in terms of understanding how digital tools impact performance. The managerial implications suggest that firms should prioritize improving their supply chain's responsiveness to gain a competitive edge in a rapidly evolving business environment. Future research could explore additional mediators or moderators in this relationship, such as the role of emerging technologies like AI or blockchain, to provide further insights into how digital transformation can be leveraged for enhanced firm performance.

Declaration by Authors

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