

# Unlocking the Potential of Vietnamese Supply Chain with Digitalization: A Bibliometric Analysis and Systematic Literature Review

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## ABSTRACT

Unlocking the potential of digital transformation in emerging economies like Vietnam holds the key to revolutionizing supply chains for a brighter, more efficient future. This review paper explores digital transformation in emerging economies, with a focus on Vietnam, aiming to investigate strategic pathways for reshaping supply chains and enhancing efficiency. The study employs a rigorous methodology, combining bibliometric analysis and systematic literature review, to contribute significantly to the knowledge base. Findings empower businesses with comprehensive insights into the current state of supply chain management digitalization in Vietnam, revealing not only the existing landscape but also actionable recommendations for improvement. The research sheds light on innovative approaches, highlighting areas where businesses can strengthen their digitalization efforts. This original contribution enriches academic discourse, providing valuable insights for both academia and industry practitioners seeking sustainable growth and success in an ever-evolving market.

**Keywords:** *digital transformation, emerging economy, industry 4.0, logistics, supply chain management, vietnam*

## 1. INTRODUCTION

The supply chain management (SCM) industry in Vietnam has emerged as a crucial driver of the country's economy. The increasing significance of international trade and the need to enhance domestic production and distribution systems have made SCM a key component of Vietnam's economic growth (Agility, 2022; Israfilov *et al.*, 2023). In 2021, Vietnam's transportation and storage sector accounted for approximately 377.8 trillion Vietnamese Dong, accounting for around 4.5% of total GDP (General Statistics

Office of Vietnam, 2022). It has been among the fastest-expanding sectors in the country. SCM in Vietnam involves various activities, including procurement, transportation, warehousing, and distribution, with the primary aim of delivering goods and services to customers efficiently, cost-effectively, and in a timely manner. According to recent statistics, the warehousing and transportation sector in Vietnam employed approximately 1.9 million individuals in 2021. This figure represents a significant proportion of the employed population, with approximately 3.8% of workers in the country engaged in this sector, contributing to employment opportunities and overall economic growth (General Statistics Office of Vietnam, 2022). In addition, Vietnam's strategic location in Southeast Asia and its membership in various regional and global trade agreements have made it a popular destination for multinational companies seeking to establish or expand their supply chain operations, such as the case of Samsung Electronics. Vietnam's strategic location and membership in various trade agreements have enabled Samsung to establish a strong supply chain network, with efficient and cost-effective distribution of products throughout the region. In return, Samsung's investment has helped to boost Vietnam's economy, providing employment opportunities and contributing to the development of the country's infrastructure (Sheldon and Kwon, 2023). These companies have brought advanced technologies and management practices, as well as greater investment in logistics infrastructure, which has helped to improve the efficiency and effectiveness of the supply chain. Additionally, multinational companies have facilitated the transfer of skills and knowledge, helping to improve the overall competitiveness of the SCM industry in Vietnam.

In recent years, there has been an escalating focus on harnessing technology to enhance the efficiency and effectiveness of logistics operations within the context of SCM digitalization in Vietnam (Akbari and Hopkins, 2022). The digital transformation of SCM holds significant potential to revolutionize the way businesses operate and deliver value. One of the prominent drivers shaping Vietnam's SCM digitalization journey is the rapid rise of e-commerce. Online shopping has gained tremendous popularity among Vietnamese consumers, who are increasingly drawn to the convenience and speed offered by digital platforms. Notably, during the waves of the COVID-19 outbreak, when socio-economic activities were severely constrained, the number of online consumers witnessed a remarkable surge in both quantity and quality (VECOM, 2022). This surge in e-commerce and changing consumer behavior has exerted immense pressure on businesses to enhance their logistics operations to meet heightened customer demands. Digitalization, as expounded by Vial (2019), represents a transformative process that harnesses information, computing, communication, and connectivity technologies to elevate business entities. However, when it comes to supply chain management, digitalization introduces intricate challenges that businesses must navigate adeptly. Effectively addressing these challenges necessitates confronting four key changes: value propositions, value networks, digital channels, and enabling agility and ambidexterity, all of which are elucidated in Vial's inductive framework (2019). In the context of Vietnam, where SCM is rapidly developing, businesses stand to gain substantial advantages by comprehending the current state of digitalization within Vietnamese SCM. A deeper understanding of this landscape enables businesses to explore digitalization issues critical to maintaining satisfactory performance in Vietnam's evolving business environment. Consequently, the primary objective of this paper is to investigate how companies in Vietnam manage and implement SCM digitalization. To achieve this, a comprehensive literature review approach is employed, along with the analysis of successful cases within the country. As literature reviews play a crucial role in developing knowledge and informing policies and practices, we apply several scholars' guidance on conducting a systematic literature review (SLR) in the area of digitalising supply chain management (Akbari, 2023; Biedova and Mahdikhani, 2023; Denyer and Tranfield, 2009; Durach *et al.*, 2017; Luo *et al.*, 2023; Nguyen and Li, 2022; Thomé *et al.*, 2016) to address the research questions. This research employs a combination of bibliometric analysis and systematic review techniques, all within the framework provided by Vial.

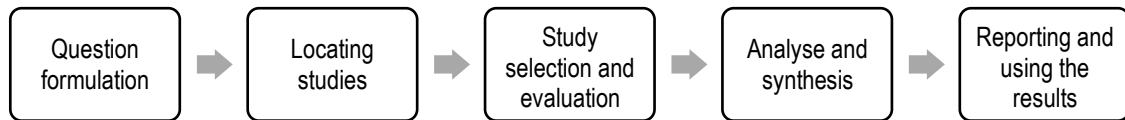
To that end, this review paper holds paramount significance within the context of Vietnam's evolving SCM landscape. As the SCM industry emerges as a cornerstone of the country's economic growth, the paper systematically examines the intricate dynamics of SCM digitalization, crucial for businesses navigating the challenges and opportunities inherent in this transformative process. With a meticulous focus on the unique nuances of the Vietnamese

market, the study investigates how companies manage and implement SCM digitalization, offering valuable insights through a comprehensive literature review, successful case analyses, and the application of a robust theoretical framework. The importance of this research lies in its potential to contribute significantly to the understanding of the current state of digitalization practices, enabling businesses to make informed decisions, enhance their SCM digitalization efforts, and ultimately thrive in the dynamic and competitive landscape of Vietnam. The structured organization of the paper, spanning theoretical foundations to practical implications, underscores its commitment to enriching the existing body of knowledge, providing stakeholders with actionable recommendations for sustainable growth within the Vietnamese market.

The paper is organized into five distinct sections, each serving a specific purpose. The next section establishes the theoretical and methodological framework that underpins this study, ensuring a rigorous research methodology. Subsequently, in the third section, the paper presents the findings derived from the application of Vial's framework, combining the identified themes found in the literature. The fourth section delves into in-depth discussions on managing uncertainty to enhance the maturity of Vietnamese supply chain digital transformation towards sustainability. Here, insights are gleaned from the research to shed light on practices that can drive businesses towards achieving a heightened level of maturity in their digital transformation journey, with a particular focus on sustainability in section four. The final section presents a comprehensive conclusion, offering managerial and policy implications, along with the acknowledgment of limitations and suggestions for future research directions. By utilizing a rigorous research methodology, this study aims to contribute significantly to the existing body of knowledge on SCM digitalization in Vietnam. The insights obtained from this investigation will illuminate the current state of digitalization practices and identify key areas for improvement, empowering businesses with valuable insights and actionable recommendations to enhance their SCM digitalization efforts within the context of Vietnam. Through these findings, businesses can adapt and thrive amidst the dynamic landscape of digitalization, ensuring their sustainable growth and success in the Vietnamese market.

## 2. RESEARCH METHODOLOGY

A systematic literature review involves using a methodical, replicable, and clear process to identify, choose, and critically evaluate pertinent research, and to gather and analyze information from the studies included in the review (Higgins and Green, 2011). The process centers on a well-defined question or inquiry. As literature reviews play a crucial role in developing knowledge and informing policies and practices, we apply several scholars' guidance on conducting a systematic literature review (SLR) in the area of digitalising supply chain management (Denyer and Tranfield, 2009; Durach *et al.*, 2017; Ha *et al.*, 2023; Nguyen and Li, 2022; Thomé *et al.*, 2016) to address the research questions as illustrated in **Figure 1**.



**Figure 1** SLR procedure  
(Adapted from Denyer and Tranfield, 2009; Durach *et al.*, 2017).

### 2.1 Question Formulation and Locating Studies

The initial step in conducting a thorough search strategy is to create a clearly defined research question that outlines the study's focus and criteria, according to Denyer and Tranfield (2009). In this study, the CIMO-logic (Context, Intervention, Mechanisms, and Outcomes) framework is utilized to identify research questions. This framework outlines four key areas that must be investigated: the problematic Contexts of interest, the Intervention type to be used, the generative Mechanism(s) that will be activated, and the desired Outcome(s) that will be achieved. Employing the aforementioned framework, the principal inquiry that this investigation aims to address is: how do businesses digitalize (I) their supply chains (M) in the context of an emerging economy - Vietnam (C), with the objective of enhancing operational efficiency and effectiveness in doing business (O)?

Locating studies involves identifying and retrieving relevant literature that meets the criteria established in the research question. The search process involves selecting appropriate databases, such as Dimensions, Scopus, and Web of Science are all reputable citation databases that provide access to a vast array of scholarly literature. In this study, Dimensions is selected for the reason that a relatively new database offers a more comprehensive approach to research by incorporating traditional literature searches, grants, patents, clinical trials, and policy documents into one platform (Hook *et al.*, 2018). It covers a wider range of disciplines and sources than other databases, and it provides a range of advanced tools and metrics for researchers,

including article-level metrics and Altmetric attention scores (Adams *et al.*, 2018).

### 2.2 Study Selection and Evaluation

A set of relevant keywords is generated via a brainstorming process based on the research question posed. The search process initiates with an exploration of citation databases employing string keyword of “digital\* AND supply chain AND Vietnam” in full data on Dimensions resulting in 45988 publications. To narrow down them, we only extract articles in the research fields of Transportation, Logistics and Supply Chains within 10 years from 2014 to 2023 resulting in 424 papers. In order to evaluate the relevance of each study with respect to the review question, a well-organized extraction protocol is designed to capture the fundamental components of each study, such as purpose, design/methodology/approach, contribution, and paper type (Denyer and Tranfield, 2009). Following this extraction process, a total of 96 records are identified as pertinent to the research questions and require further scrutiny.

### 2.3 Analysis and Synthesis

During the analytical stage of a literature review, individual studies are broken down into their respective components and subsequently synthesized by establishing connections between these elements (Denyer and Tranfield, 2009). To mitigate the influence of researcher bias, VOSviewer, a software tool commonly used in bibliometric analysis and network visualization, has been employed to gain insights into the structure and dynamics of a range of identified papers.

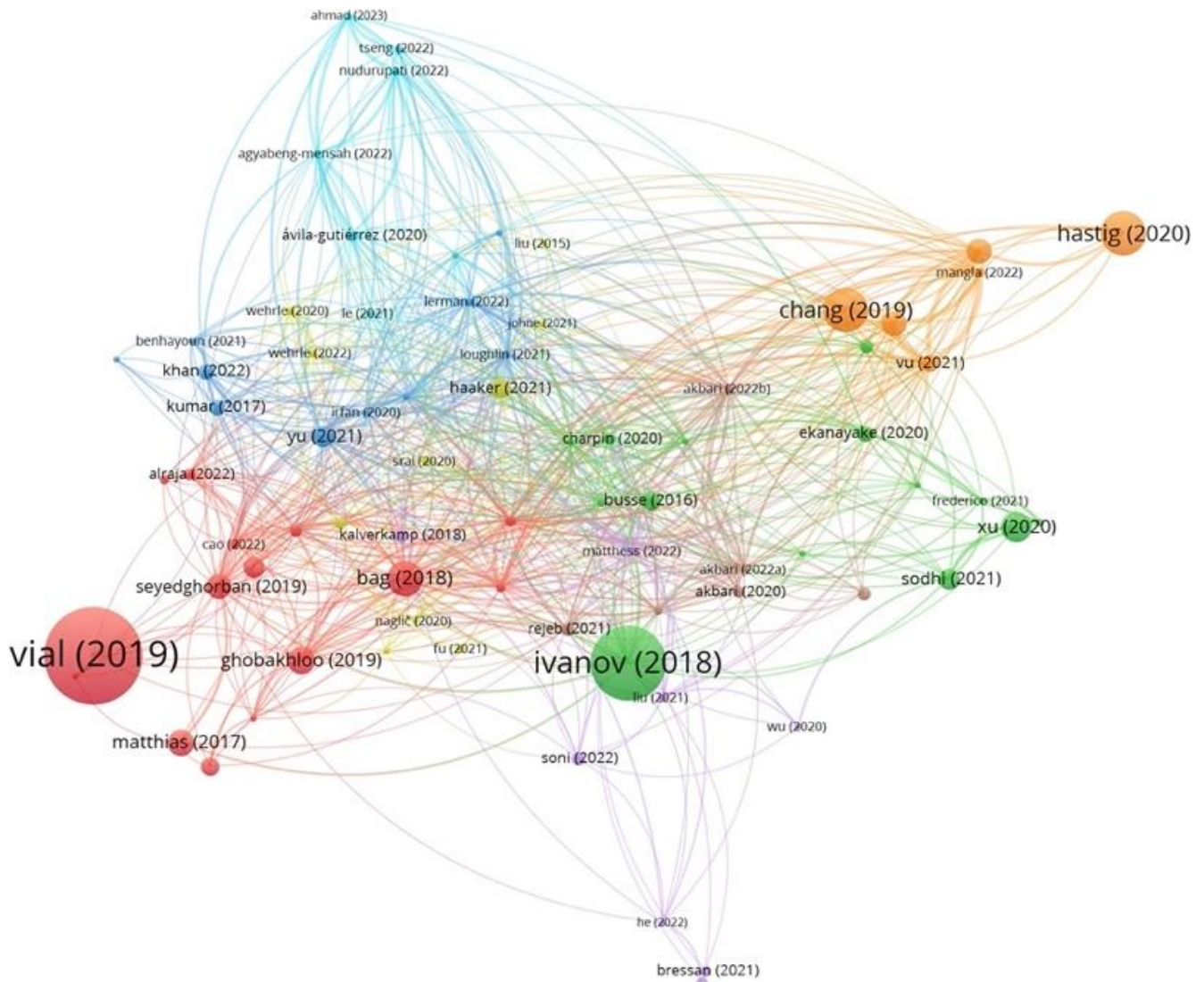


Figure 2 Bibliometric analysis

Specifically, bibliographic coupling analysis is utilized to graphically represent a network, where nodes represent individual documents and links between nodes signify at least two shared references. Bi-coupling analysis, a variation of bibliographic coupling analysis, focuses on the links between pairs of documents rather than all documents in a dataset, allowing for a more detailed analysis of specific intellectual connections. From the bi-coupling analysis, only 76 items showing connection with total link strength of more than five forming a network to extract, synthesize, and interpret the findings are illustrated in **Figure 2**. The red

nodes surrounding the strongest link of the paper from Vial (2019) indicating the relation between digital transformation and supply chain issues such as uncertainty, sustainability, green logistics, and omni-channel. The green nodes show the impact of COVID-19 on supply chain in the digitalising age. While the orange nodes focus on traceability such as blockchain, IoT, and AI technologies applied to supply chain, the blue ones reflect a greening supply chain based on digital transformation. The below table illustrates top 10 cited papers in this area.

Table 1 Top 10 cited papers

No	Title	Authors	Source title/Anthology title	Times cited	PubYear
1	Understanding digital transformation: A review and a research agenda	Vial, Gregory	The Journal of Strategic Information Systems	1301	2019
2	The impact of digital technology and Industry 4.0 on the ripple effect and supply chain risk analytics	Ivanov, Dmitry; Dolgui, Alexandre; Sokolov, Boris	International Journal of Production Research	780	2018



**Table 2** Top 10 cited papers (Con't)

No	Title	Authors	Source title/Anthology title	Times cited	PubYear
3	Blockchain for Supply Chain Traceability: Business Requirements and Critical Success Factors	Hastig, Gabriella M.; Sodhi, ManMohan S.	Production and Operations Management	284	2020
4	Blockchain in global supply chains and cross border trade: a critical synthesis of the state-of-the-art, challenges and opportunities	Chang, Yanling; Iakovou, Eleftherios; Shi, Weidong	International Journal of Production Research	271	2019
5	Industry 4.0 and supply chain sustainability: framework and future research directions	Bag, Surajit; Telukdarie, Arnesh; Pretorius, J.H.C.; Gupta, Shivam	Benchmarking An International Journal	173	2018
6	Impacts of COVID-19 on Global Supply Chains: Facts and Perspectives	Xu, Zhitao; Elomri, Adel; Kerbache, Laoucine; Omri, Abdelfatteh El	IEEE Engineering Management Review	130	2020
7	Determinants of information and digital technology implementation for smart manufacturing	Ghobakhloo, Morteza	International Journal of Production Research	112	2019
8	Making sense of Big Data ,AI can it transform operations management?	Matthias, Olga; Fouweather, Ian; Gregory, Ian; Vernon, Andy	International Journal of Operations & Production Management	98	2017
9	Supply chain digitalization: past, present and future	Seyedghorban, Zahra; Tahernejad, Hossein; Meriton, Royston; Graham, Gary	Production Planning & Control	92	2019
10	Supply network design to address United Nations Sustainable Development Goals: A case study of blockchain implementation in Thai fish industry	Tsolakis, Naoum; Niedenzu, Denis; Simonetto, Melissa; Dora, Manoj; Kumar, Mukesh	Journal of Business Research	92	2021

### 3. COMPREHENSIVE REVIEW OF RESEARCH THEMES

Drawing on the findings from a rigorous bibliometric analysis and leveraging Vial's inductive framework, **Figure 3** visually encapsulates five themes, with the first theme centered on the unique Vietnamese context, rife with uncertainties stemming from ever-changing regulations, infrastructure limitations, and market fluctuations. The second theme revolves around the prevalent technologies that have gained traction within Vietnamese supply chains. These cutting-edge technologies have facilitated

transformative changes in how businesses create value, forming the bedrock of the third theme: changes in value creation paths. However, the success of these changes in value creation is inextricably linked to the fourth theme: structural changes within organizations. This pertains to reevaluating the organizational structure, culture, leadership, and employee roles and skills to accommodate the demands of digital transformation effectively. Theme five assumes a vital role in this dynamic landscape, as it revolves around organizational barriers, such as inertia and resistance. Overcoming these barriers is pivotal to achieving seamless digital transformation within the Vietnamese supply chain. Hence, this section is organized following these themes.

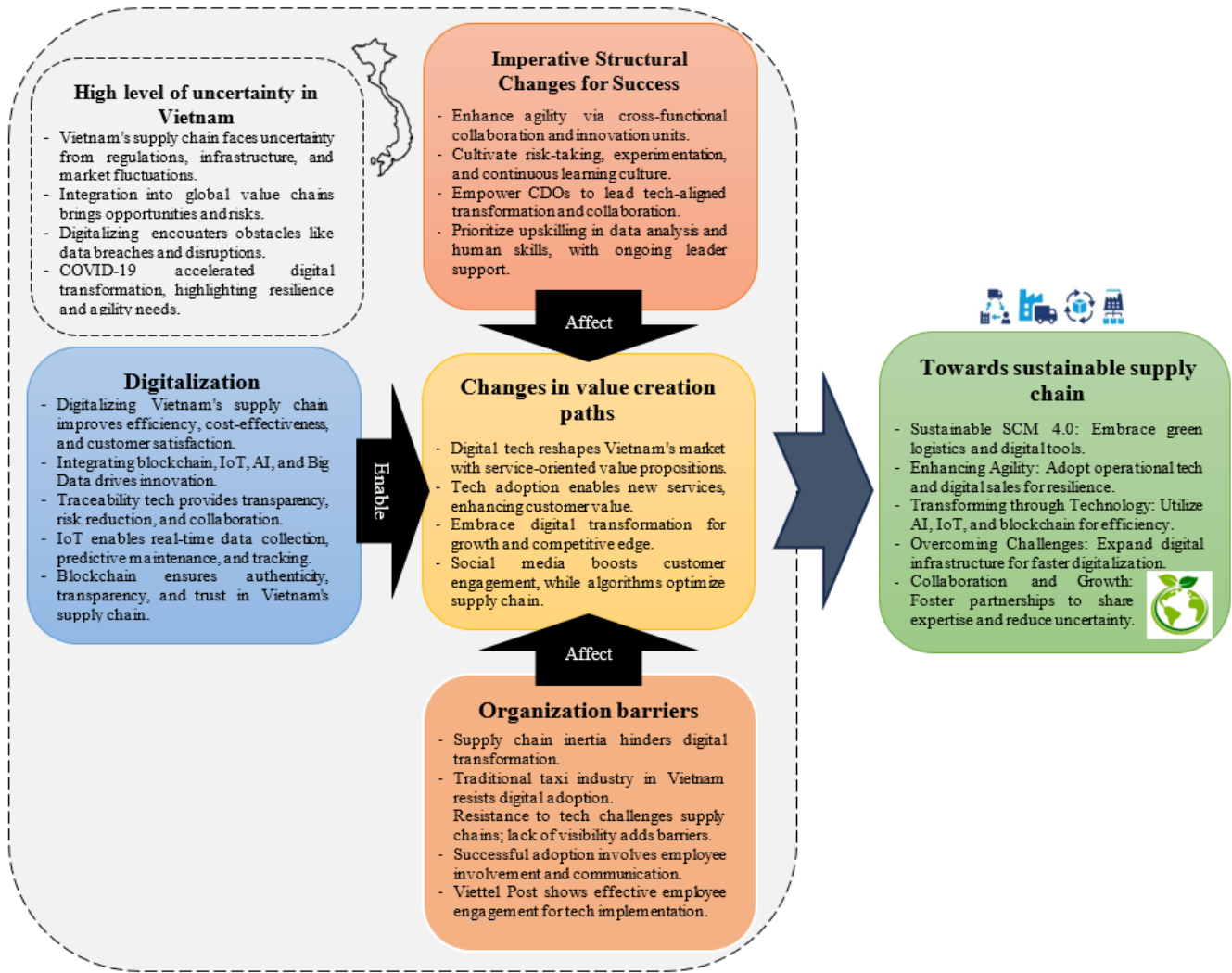


Figure 3 Research themes

### 3.1 Vietnamese Supply Chain Context: High Level of Uncertainty

The supply chain landscape in Vietnam is characterized by a significant degree of uncertainty, arising from various factors such as government regulations, infrastructure limitations, market fluctuations, geopolitical influences, and unforeseen disruptions (Le and Dang, 2023). These factors introduce complexities and challenges that businesses must navigate within the supply chain management process. Vietnam's rapid development as a country and its integration into global value chains present both opportunities and challenges for the supply chain. On one hand, integration opens doors to foreign investments and trade opportunities, enabling businesses to expand their reach and access larger markets (Sheldon and Kwon, 2023). On the other hand, it exposes the supply chain to global market dynamics, including economic uncertainties and disruptions that can impact overall stability and performance. The success of digitalizing the Vietnamese supply chain is heavily influenced by these factors, as they create obstacles that may hinder the integration of new technologies. These obstacles include data security breaches, supply chain disruptions, and unexpected operational expenses (Ivanov *et al.*, 2019). Effectively anticipating and managing uncertainty becomes

crucial to minimizing its negative impact and maximizing the benefits of digitalization.

The COVID-19 pandemic, for instance, has significantly impacted the digitalization of the Vietnamese supply chain. Changes in customer demand, supply chain disruptions, labor shortages, and travel restrictions have emerged as the pandemic spread globally (Bonadio *et al.*, 2021; Nguyen, 2021). These disruptions have emphasized the importance of a resilient and agile supply chain management system, highlighting the need for digital transformation to respond swiftly to market changes and customer needs. The pandemic has accelerated digital transformation in the Vietnamese supply chain (Samuel, 2020). The necessity of remote work and contactless transactions has propelled the adoption of digital technologies such as cloud-based platforms, digital payment systems, and e-commerce. These innovations have enabled businesses to continue operations while minimizing the risk of infection. The pandemic has introduced new uncertainties and risks that organizations must manage, including supply chain disruptions, logistical challenges, and increased demand for digital solutions (Akbari *et al.*, 2023). Hence, the Vietnamese supply chain context is marked by inherent uncertainty. While these challenges require careful navigation, they also present opportunities for growth and innovation through the adoption of digitalization strategies.

Understanding and effectively addressing these contextual factors are essential for businesses operating within the Vietnamese supply chain to enhance their resilience, competitiveness, and long-term success. Managing uncertainty becomes critical in ensuring that investments in digitalization deliver the expected outcomes. Organizations must identify best practices and strategies for implementing and integrating digital technologies into their supply chain management systems to thrive in this dynamic landscape.

### **3.2 The Key Role of Traceability Technologies in Vietnamese Supply Chain**

Digitalizing the Vietnamese supply chain involves the integration of digital technologies and processes into the entire supply chain management system (Akbari and Hopkins, 2022). The aim is to create a more efficient and streamlined system that can deliver goods and services to customers in a faster and more cost-effective way. Digitalization involves the adoption and integration of advanced technologies such as blockchain, Internet of Things (IoT), Artificial Intelligence (AI), and Big Data analytics (Akbari *et al.*, 2023; Akbari and Do, 2021; Akbari and Hopkins, 2022). Implementing these technologies requires innovation that refers to the development and implementation of new ideas, products, or processes that create value and improve performance (Göpfert and Wellbrock, 2013). It helps organizations identify new opportunities, improve performance, and create value. Digitalizing the Vietnamese supply chain requires innovation in various areas such as software development, hardware implementation, and organizational restructuring (Akbari *et al.*, 2023). The adoption of advanced technologies leads to innovation in business processes, supply chain management, and customer engagement. At the same time, innovation also requires a willingness to take risks, experiment with new ideas, and adapt to changing circumstances.

Among the various technologies applied in supply chain management, traceability holds significant importance, especially in emerging economies like Vietnam. Traceability offers a range of advantages to supply chain management, including enhanced efficiency, reduced risks, and improved transparency and collaboration among stakeholders (Wang *et al.*, 2019). By implementing traceability measures, organizations can effectively track and trace products and materials as they move through the supply chain. This capability enables them to quickly identify the source of problems or defects within the supply chain and take immediate corrective actions (Sarpong, 2014). The implementation of robust traceability systems reduces the risk of supply chain disruptions, strengthens quality control, and enhances overall customer satisfaction. By leveraging traceability technologies, organizations can gain real-time visibility into their supply chains, ensuring the integrity and authenticity of products throughout the entire journey. This visibility enables timely detection of issues such as counterfeit products, quality deviations, or delivery delays, allowing organizations to promptly address these concerns.

To enhance traceability, several technologies have been adopted in supply chain management. The Internet of Things (IoT) plays a crucial role by enabling the connection and exchange of data between various devices and objects within

the supply chain. IoT, as a transformative technology, enables the interconnection of physical devices and objects embedded with sensors, software, and network connectivity. In the Vietnamese supply chain context, IoT can facilitate real-time data collection and communication among different stakeholders, allowing for seamless tracking and monitoring of goods throughout the supply chain (Le *et al.*, 2019). For instance, IoT-enabled sensors can monitor temperature, humidity, and other environmental factors to ensure product quality and compliance with regulations during transportation and storage. Moreover, IoT devices can enable predictive maintenance by monitoring the condition of machinery and equipment, leading to increased operational efficiency and reduced downtime (Akbari *et al.*, 2023). This is particularly relevant in the context of Vietnam, where there may be challenges related to infrastructure and maintenance in certain areas. Implementing IoT technologies can help organizations proactively identify maintenance needs, schedule repairs, and prevent potential disruptions in the supply chain.

Another emerging technology that contributes to traceability is blockchain. Blockchain technology provides a decentralized and immutable ledger that records transactions and information across multiple participants (Kshetri, 2018). By utilizing blockchain in the supply chain, organizations can create transparent and tamper-proof records, ensuring the authenticity and traceability of products and transactions in the supply chain (Casey *et al.*, 2017). By providing a secure and transparent record of transactions, blockchain facilitates building trust and reducing the risk of fraud and counterfeiting (Casino *et al.*, 2020; Chang *et al.*, 2020). In the Vietnamese context, where there may be concerns about counterfeit products and trust among stakeholders, blockchain can play a crucial role in ensuring the integrity of the supply chain. By leveraging blockchain technology, organizations can create a transparent and tamper-proof record of transactions, including the movement of goods, ownership transfers, and quality certifications. This creates a reliable and auditable history of each transaction, enhancing trust and reducing the risk of fraud or manipulation. Additionally, blockchain enables secure and efficient data sharing among supply chain participants, streamlining processes such as supplier verification, product provenance, and compliance documentation such as in the study of Nguyen *et al.* (2023). The authors introduce the INNSA platform, an innovative and smart agriculture solution to elevate Vietnam's coffee industry through improved collaboration and information sharing among stakeholders. In reality, Masan Group, a diversified conglomerate in Vietnam, has embraced blockchain technology as a good example to deploy their new retailing models and customer service, fostering trust and confidence in the supply chain (VietnamNet, 2019).

Furthermore, a higher level of traceability requires advanced data analytics techniques to analyze the vast amounts of data generated within the supply chain. These analytics capabilities enable organizations to gain valuable insights, identify patterns, and make informed decisions to optimize processes, mitigate risks, and enhance traceability (Akbari *et al.*, 2023). Advanced data analytics involves the systematic analysis of large volumes of data to uncover patterns, correlations, and insights that can inform strategic and operational decision-making. In the Vietnamese supply

chain context, where complexities and uncertainties are present, harnessing the power of data analytics can provide organizations with a competitive edge. One key area where data analytics can make a substantial impact is demand forecasting. By analyzing historical sales data, market trends, and external factors such as economic indicators or seasonal patterns, organizations can generate accurate demand forecasts to optimize inventory management, reduce stockouts or overstocking, and improve overall supply chain efficiency. Additionally, data analytics can contribute to optimizing logistics and transportation operations. By analyzing real-time data from sensors, GPS devices, and telematics systems, organizations can gain insights into route optimization, load planning, and delivery scheduling. Furthermore, data analytics can help identify and mitigate supply chain risks. By analyzing data from various sources, including suppliers, production processes, and external events, organizations can proactively identify potential disruptions, such as supply shortages, quality issues, or geopolitical risks (Wang *et al.*, 2016). This practice allows for timely risk mitigation strategies, such as alternative sourcing, contingency planning, or proactive communication with stakeholders. Another valuable application of data analytics in the Vietnamese supply chain is optimizing supplier management (Akbari *et al.*, 2023). By analyzing supplier performance data, organizations can evaluate factors such as delivery timeliness, quality consistency, and pricing competitiveness to enable data-driven decision-making in supplier selection, contract negotiation, and relationship management, ultimately leading to improved supplier relationships and cost savings. Moreover, data analytics can enhance overall visibility and transparency in the supply chain (Belaud *et al.*, 2019). By integrating data from different sources, such as suppliers, logistics providers, and internal systems, organizations can gain a holistic view of the entire supply chain to monitor key performance indicators, identify bottlenecks or inefficiencies, and proactively address issues to improve overall supply chain performance (Nguyen *et al.*, 2018). Like the cases of e-commerce platforms in Vietnam, they have leveraged advanced data analytics techniques to optimize their logistics operations. By analyzing vast amounts of data on customer behavior, order patterns, and transportation routes, these platforms can optimize their delivery routes, reduce delivery times, and enhance customer satisfaction (Le and Huh, 2021). This data-driven approach has contributed to increased operational efficiency and improved last-mile delivery performance.

### 3.3 Changes in Value Creation Paths of Vietnamese Companies

#### 3.3.1 Value Propositions

Digital technologies have brought about significant transformations in the Vietnamese market, revolutionizing value propositions and shifting towards service-oriented offerings. The literature emphasizes the disruptive potential of digital technologies in reshaping value propositions across industries (Akbari *et al.*, 2023). The adoption of digital technologies allows organizations in the Vietnamese supply chain to redefine their offerings, introduce new services, and provide enhanced value to customers. These technologies enable businesses to gather and analyze data, driving

innovation and improving customer experiences. By embracing digital transformation, organizations can unlock opportunities for growth and competitive advantage in an increasingly digital marketplace. One notable example of this shift is Grab, a prominent ride-hailing platform that has expanded its value proposition beyond transportation services. Originally launched as a ride-hailing service, Grab quickly recognized the potential for digital technologies to enhance their offerings and cater to the evolving needs of customers in Vietnam (Huynh *et al.*, 2020). Leveraging their robust digital platform, Grab expanded their services to include food delivery, grocery delivery, package delivery, and even financial services (Grab, n.d). By embracing digital technologies, Grab has created a comprehensive ecosystem that goes beyond transportation, providing customers with convenient access to various essential services. The digital platform enables seamless ordering, real-time tracking, and secure payment options, enhancing the overall customer experience.

Furthermore, Grab harnesses data collected from customer interactions and service usage to improve their offerings. They analyze customer preferences, delivery patterns, and user feedback to optimize service efficiency and tailor experiences to individual needs (Nguyen and Ha, 2022). This data-driven approach enables Grab to continuously refine and innovate their value proposition, keeping them at the forefront of the market. The success of Grab in the Vietnamese market exemplifies the disruptive potential of digital technologies in reshaping value propositions. By leveraging their digital platform and data-driven insights, Grab has not only transformed the ride-hailing industry but also expanded into various service sectors, meeting the diverse needs of customers in Vietnam. Grab's evolution from a ride-hailing service to a comprehensive digital platform offering multiple services highlights the transformative power of digital technologies in the Vietnamese market. The success of Grab demonstrates how digital innovations can enable organizations to redefine value propositions, enhance customer experiences, and stay competitive in a rapidly evolving market landscape. Embracing digital transformation is crucial for businesses in the Vietnamese market to unlock growth opportunities, deliver innovative solutions, and meet the ever-changing expectations of their customers.

#### 3.3.2 Value Networks

Digital technologies have brought about significant transformations in the Vietnamese supply chain, including the redefinition of value networks. These technologies enable firms to implement various mediation strategies that reshape the relationships among participants in the value network (Tapscott and Tapscott, 2017). One such strategy is disintermediation, where digital technologies bypass intermediaries and facilitate direct exchanges between participants in the value network, such as customers (Hansen and Sia, 2015). By leveraging digital platforms and online channels, firms can establish direct connections with customers, allowing for personalized interactions and customized offerings. This direct engagement empowers firms to understand customer preferences and needs more effectively, enabling them to deliver tailored value propositions. For example, Tiki.vn has successfully



implemented a disintermediation strategy by connecting customers directly with sellers, bypassing traditional intermediaries. This direct engagement enables Tiki.vn to offer a wide range of products at competitive prices, while also gathering valuable customer data to personalize the shopping experience and tailor value propositions accordingly (Giao, 2020).

Another strategy is remediation, where digital technologies strengthen the couplings between participants in the value network, promoting collaboration and coordination (Kumar *et al.*, 2020). Platforms and digital tools can be utilized to streamline communication and information sharing among supply chain partners, facilitating efficient exchanges and enhancing overall network performance. This closer collaboration enables participants to leverage each other's capabilities, resources, and expertise, resulting in improved operational efficiency and value creation (Akbari *et al.*, 2023). Furthermore, digital technologies have enabled the emergence of network-based mediation, where complex relationships are formed among multiple stakeholders with potentially competing interests to benefit customers. In this context, digital platforms serve as intermediaries, orchestrating interactions, and transactions among participants like Grab, Tiki, Shopee, or Viettel Post (Wang *et al.*, 2021). By fostering cooperation and alignment among diverse stakeholders, firms can create value networks that cater to customer needs, integrate different services, and deliver comprehensive solutions.

Digital technologies have also empowered customers to become active co-creators of value within the value network (Lucas *et al.*, 2013). Online communities and social media platforms rely heavily on user contributions and engagement, allowing customers to participate in the creation and enhancement of offerings. Firms recognize the importance of incentivizing customer engagement with digital technologies to drive value co-creation (Tuan, 2017). By involving customers in the design, customization, and feedback processes, firms can foster stronger customer relationships and deliver tailored solutions that meet evolving market demands (Tran and Vu, 2021). For instance, leading e-commerce platforms in Vietnam, such as Shopee and Lazada, actively encourage customer reviews and ratings to provide valuable feedback on products and services. This feedback not only helps other customers make informed purchasing decisions but also enables sellers and brands to improve their offerings based on customer preferences and suggestions. Another example, many companies in the food and beverage industry have embraced digital platforms to enable customers to customize their orders and provide real-time feedback. For example, food delivery platforms like GrabFood, ShopeeFood and Beamin offer options for customers to personalize their meals, select ingredients, specify dietary preferences, and participate in sustainable activities like recycling and donating to communities. This level of customization not only enhances the customer experience but also allows companies to gather valuable data on individual preferences and tailor their offerings accordingly, reflecting customer-centric philosophy in emerging markets (Phan and Le, 2023).

### 3.3.3 Digital Channels

Vietnamese supply chain has witnessed notable changes in distribution and sales channels, driven by the

adoption of digital technologies. Organizations have embraced two primary approaches to leverage these technologies effectively. Firstly, companies in Vietnam are creating new customer-facing channels to connect and engage with consumers. Social media platforms have emerged as powerful tools for reaching a wider audience and fostering dialogue with customers (Hansen and Sia, 2015). By leveraging social media, businesses can promote their products, offer personalized recommendations, and respond to customer inquiries, thereby enhancing the overall customer experience. Secondly, the emergence of algorithmic decision-making, facilitated by digital technologies, has revolutionized supply chain coordination (Günther *et al.*, 2017; Vial, 2019). Advanced algorithms and artificial intelligence enable organizations to automate and optimize various processes, enhancing efficiency and reducing operational complexities. For instance, smart procurement systems powered by algorithms can predict demand patterns, streamline inventory management, and optimize purchasing decisions. This data-driven approach allows organizations in Vietnam to make well-informed decisions that align with market trends and customer preferences (Akbari and Do, 2021; Akbari and Hopkins, 2022; Nayak *et al.*, 2019).

Furthermore, digital technologies have enabled the implementation of omni-channel strategies, which seamlessly integrate various sales and distribution channels (Günther *et al.*, 2017). This approach ensures a consistent and cohesive customer experience across both online and offline touchpoints. Retailers in Vietnam have adopted omni-channel strategies to allow customers to switch effortlessly between digital and physical shopping experiences. For instance, customers can browse products online, make purchases through mobile apps, and pick up items at physical stores, all in a seamless and connected manner. A realistic example of these changes in the Vietnamese supply chain is the transformation of the retail sector. Retail giants in Vietnam, such as Thegioididong.com, have successfully implemented social media marketing strategies such as SEO and content marketing to reach and engage with their target customers. By leveraging popular platforms like Facebook and Instagram, these companies promote their products, run interactive campaigns, and respond to customer inquiries promptly (Khoa, 2022). This direct engagement with customers has enabled them to build brand loyalty and gain valuable insights into customer preferences (Tran and Vu, 2021). Additionally, the implementation of algorithmic decision-making has revolutionized inventory management and supply chain coordination for retailers in Vietnam. By analyzing historical sales data and market trends, companies can optimize inventory levels, reducing carrying costs and stockouts. Moreover, smart or e-procurement systems enable retailers to negotiate better deals with suppliers and ensure timely delivery of products to meet customer demands. The utilization of e-procurement has significant growth within the EVN (Electricity of Vietnam) system, a stated-owner company, as the number of EVN contracts bid through the e-procurement system had exhibited a remarkable upward trend, increasing from 200 contracts in 2012 to 4,000 contracts in 2017, and further reaching 4,500 contracts in 2018 (Vietnamnews, 2018). The advantages of electronic procurement have not been limited to EVN alone but have

also been observed in various other localities and firms across Vietnam.

#### 3.3.4 Enabling Agility and Ambidexterity

Vietnamese supply chains can benefit significantly from the adoption of digital technologies, particularly in terms of enhancing agility and achieving ambidexterity. Agility, defined as a firm's ability to swiftly detect opportunities for innovation and capitalize on competitive market prospects by assembling essential assets, knowledge, and relationships rapidly and unexpectedly, can be facilitated through the integration of analytics and the Internet of Things (IoT) (Günther *et al.*, 2017; Vial, 2019). Leveraging these technologies allows organizations to optimize their existing business processes, eliminating slack resources and streamlining operations (Du *et al.*, 2016). Moreover, they can provide valuable insights into untapped market opportunities and foster closer customer relationships (Hansen and Sia, 2015). Furthermore, the literature reveals that digital technologies enable firms to achieve ambidexterity, the ability to simultaneously explore digital innovation and exploit existing resources (Li *et al.*, 2017). This concept is also referred to as bimodality in the practitioner literature (Haffke *et al.*, 2017).

In the context of Vietnam, numerous opportunities exist for firms to embrace digital technologies to enhance agility and achieve ambidexterity in the supply chain. By leveraging data analytics and IoT applications, businesses can quickly respond to changing market conditions, optimize processes, and gain deeper insights into customer needs (Akbari and Hopkins, 2022; Nayak *et al.*, 2019; Nguyen and Truong, 2023). Simultaneously, firms can capitalize on their existing capabilities while exploring innovative digital solutions to create a robust and future-ready supply chain. As a practical example, e-commerce companies in Vietnam, such as Tiki.vn and Shopee, have effectively integrated analytics and customer data to tailor their product offerings to the applications and delivery services, thereby enhancing customer satisfaction and market responsiveness (Giao, 2020; Khoa, 2022). These companies maintain their operational backbone while continuously innovating their digital platforms to deliver a seamless and personalized shopping experience.

### 3.4 Revamping Vietnamese Supply Chain: Imperative Structural Changes for Success

#### 3.4.1 Organizational Structures

In the context of the Vietnamese supply chain, organizational structure plays a crucial role in fostering agility and ambidexterity as necessary capabilities to thrive in the digital era. The literature emphasizes the significance of cross-functional collaboration in digital transformation initiatives (Dinter, 2013; Jimenez-Jimenez *et al.*, 2019). While the idea of breaking functional silos and encouraging collaboration across business units is not new in digital transformation research, the reality is that in many cases, there exists a substantial gap that must be bridged to achieve effective collaboration and align organizational and technological strategies (Akbari *et al.*, 2023; Vial, 2019). Two predominant approaches have been identified to foster collaboration in Vietnamese supply chain. One approach involves creating a separate unit with a certain degree of independence from the rest of the organization (Akbari *et al.*,

2023; Akbari and Hopkins, 2022; H. Nguyen *et al.*, 2022). This separate unit is granted relative flexibility to innovate while still having access to existing resources. This structure allows for the exploration of new digital opportunities without being hindered by the traditional organizational hierarchy. The other approach involves establishing cross-functional teams within the existing organizational framework (Vial, 2019). These multidisciplinary teams transcend traditional organizational boundaries and enable diverse expertise from various business units to collaborate on digital initiatives.

For instance, in the case of U&I Investment Corporation - a Vietnamese logistics company - create cross-functional teams comprising representatives from operations, ICT, and customer service on their inhouse WMS and TMS to implement an advanced tracking system that uses IoT technology to monitor cargo, and shipments in real-time. This collaborative approach enables the company to optimize logistics processes, increase efficiency, and enhance customer satisfaction through improved transparency and timely delivery updates (U&I, n.d). One notable example is the digital transformation journey of VinGroup, one of Vietnam's leading conglomerates. VinGroup recognized the importance of embracing digital technologies to stay ahead in a competitive market. To achieve this, the company established a separate innovation unit called "VinTech" that operates independently from its traditional business units. VinTech's primary focus is on exploring emerging digital technologies, including artificial intelligence, big data analytics, and IoT, to drive innovation across various sectors, including retail, real estate, education and healthcare through funding and service providers (Ha, 2019).

#### 3.4.2 Organizational Culture

The advent of digital transformation in the Vietnamese supply chain landscape necessitates a profound shift in organizational culture. Incumbent firms often find their traditional separation between IT and business functions deeply ingrained into the very fabric of their organizational values (Helfat and Raubitschek, 2018). Analyzing 180 Vietnamese enterprises' digital transformation, Thuy (2021) revealed four influential factors: IT capability, digital business strategy, human resource capability, and organizational culture. The research findings confirm that digital transformation directly affects innovation and firm performance. This leads to a crucial question - what does a "digital culture" truly entail? Additionally, various studies in the literature point to the significance of cultivating a culture that embraces risk-taking and experimentation (Fehér and Varga, 2017). Successful digital adoption often starts with small-scale experiments that allow firms to test and refine digital technologies before scaling them up to the entire organization (Dremel *et al.*, 2017). This approach aligns well with principles of agility inspired by software development practices. By introducing changes incrementally and iteratively, firms can promote a culture of continuous learning, enabling them to adapt long-term plans based on experiment outcomes and evolving environmental dynamics.

#### 3.4.3 Leadership

In the context of digital transformation within the Vietnamese supply chain, organizational leaders play a

crucial role in fostering a digital mindset and effectively responding to the disruptions brought about by digital technologies (Loewe and Dominiquini, 2006; Vial, 2019). One notable approach highlighted in the literature is the creation of new leadership roles to drive and oversee the digital transformation process. An example of such a leadership role is the Chief Digital Officer (CDO), whose appointment signals the strategic importance of digital transformation for the entire organization (Vial, 2019). The CDO assumes the responsibility of ensuring that digital technologies are appropriately leveraged and aligned with the organization's objectives (Horlacher *et al.*, 2016; Singh and Hess, 2017). As boundary spanners, CDOs facilitate the implementation of digital business strategies into actionable plans that influence the firm's organizing logic (Sambamurthy and Zmud, 2000). They also foster close collaboration between business and IT functions, essential for seamless integration of digital technologies. Interestingly, some cases view the CDO position as temporary yet vital (Singh and Hess, 2017), suggesting that there may be an eventual end state to the digital transformation process, aligning with the concept of a digital transformation strategy (Matt *et al.*, 2015). This observation underscores the dynamic nature of digital transformation, where leaders continuously adapt to the changing digital landscape to remain competitive and innovative in the Vietnamese supply chain industry (Akbari *et al.*, 2023). Embracing such strategic leadership roles can catalyze the adoption and success of digital transformation initiatives, enabling Vietnamese organizations to thrive in the evolving digital era.

Another line of the literature is about the role of support from top-level management as they should actively support and advocate for a culture that encourages risk-taking and experimentation. Leaders should lead by example and demonstrate their willingness to take calculated risks in pursuing digital initiatives. According to Loewe and Dominiquini (2006), leadership's support fosters innovation efforts. Leaders must actively endorse and advocate for a culture that embraces calculated risks and experimentation. Also, by leading by example and demonstrating their own willingness to take risks in pursuing digital endeavors, top-level management can create an environment where employees feel empowered to explore new ideas and embrace innovation. Moreover, in the high collectivism culture prevalent in Vietnamese companies (Tran *et al.*, 2017), strong leadership support can significantly impact employees' confidence and motivation to participate in digital transformation efforts. When employees perceive that their leaders value and encourage risk-taking, they are more likely to engage in experimentation and explore novel approaches to enhance the supply chain's digital capabilities (Akbari *et al.*, 2023; Akbari and Do, 2021; Akbari and Hopkins, 2022).

#### 3.4.4 Employee Roles and Skills

Digital transformation (necessitates substantial changes in both organizational structure and culture, leading to a redefinition of employee roles and responsibilities. The literature emphasizes that digital transformation creates opportunities for employees outside the IT function to take the lead on technology-intensive projects, while members of the IT function are expected to actively participate in the

realization of these projects with a deeper understanding of business objectives. For instance, consider a Vietnamese manufacturing company looking to implement an advanced data analytics system to optimize its supply chain operations. In this scenario, employees from various departments, such as operations, marketing, and finance, actively collaborate to identify data-driven insights that can enhance supply chain efficiency. Concurrently, IT professionals work closely with other teams to align the analytics solution with the company's strategic goals, ensuring that the system is integrated seamlessly into the broader organizational structure.

Digital technologies introduce new forms of automation and decision-making processes, raising questions about the skills needed for both current and future workers (Akbari *et al.*, 2023). While some may fear that technology will replace human involvement, the reality is that digital transformation demands a stronger reliance on human analytical skills to address complex business challenges effectively. Existing employees must undergo upskilling to develop proficiency in data analysis and interpretation, enabling them to leverage digital tools for decision-making (Vial, 2019). This transformation journey, however, presents significant challenges that extend beyond the domain of human resources. It involves reshaping the organizational culture to embrace continuous learning and foster an environment where employees feel empowered to experiment with new technologies and innovative practices (Göpfert and Wellbrock, 2013). Leaders must provide ongoing support and resources to enable employees to navigate the complexities of digital transformation successfully because of the lack of digital skills and knowledge among employees due to requirement for a new set of skills and expertise that current employees may not possess (Francisco and Swanson, 2018).

### 3.5 Organization Barriers

#### 3.5.1 Inertia

In the supply chain context, one of the most prominent barriers to digital transformation is inertia, which is evidenced by a substantial number of sources in the literature (e.g., Akbari *et al.*, 2023; Hackius and Petersen, 2017; Kouhizadeh *et al.*, 2021; Le and Dang, 2023). Inertia refers to the resistance to change, where existing resources and capabilities act as significant obstacles to disruptive innovation through digital technologies (Vial, 2019). This highlights the relevance of path dependence, wherein previous choices and investments constrain the ability to explore new avenues. In Vietnam, one notable case that exemplifies the impact of inertia on digital transformation is the traditional taxi industry. Many taxi service providers in the country have long-established relationships with customers and drivers and have optimized their management processes over the years. However, this structural embeddedness often results in resistance to change when it comes to adopting digital technologies to enhance their operations. One such example is the story of a well-established Vietnamese taxi company that hesitated to invest in digital platforms, despite the growing popularity of ride-hailing services among consumers. The company's management was cautious about disrupting their existing operations, fearing that integrating digital solutions might lead to inefficiencies and potential revenue loss. However,



they had to deal with the booming of prearranged transportation services on a commercial basis using an IT-enabled application to connect riders with drivers using a personal vehicle for more reasonable and convenient needs (Nguyen and Ha, 2022). This real-world example highlights how inertia can pose challenges to traditional businesses in adopting digital technologies. However, it also demonstrates the importance of recognizing digital trends and actively embracing change to remain competitive and relevant in the evolving market landscape. Interestingly, top management in these organizations often recognizes the potential benefits of digital technologies. However, the deeply embedded structural components, whether tangible (e.g., means of production) or intangible (e.g., organizational culture), hinder the innovative and disruptive potential of digital technologies, creating a challenge for successful implementation (Akbari *et al.*, 2023).

### 3.5.2 Resistance

In the context of Vietnamese supply chain, the resistance of employees to the introduction of disruptive technologies poses a significant barrier to digital transformation. Various studies have shed light on this issue, highlighting the challenges organizations face when implementing technological changes (Akbari and Hopkins, 2022; Huynh *et al.*, 2020; Le and Dang, 2023; Nguyen and Doan, 2019). This resistance raises important questions about the effective ways and pace of technology implementation and how it aligns with the organizational culture to ensure employee acceptance. One approach suggested by Singh and Hess (2020) is to leverage the CDO position to facilitate seamless integration of digital technologies while respecting the existing organizational culture so that employees can adapt to the changes with greater ease and willingness. On the other hand, Schmid *et al.* (2017) argue that resistance stems from ingrained inertia in daily work processes, which cannot be addressed solely by altering employee behavior. Instead, organizations must focus on adapting processes to foster flexibility in the face of change, allowing employees to embrace and accommodate digital transformations more effectively.

Additionally, a lack of visibility regarding the potential benefits of digital technologies contributes to resistance. Upgrading existing systems and infrastructure, investing in new technologies, and hiring experts to manage the process can be expensive. Smaller businesses may struggle to afford these costs, which can make it challenging to compete with larger companies that have more resources to invest in digitalization. The lack of interoperability and compatibility between different systems and technologies is also a significant barrier to digitalization. Businesses may have existing systems that are not compatible with new technologies, making it difficult to integrate them seamlessly into their operations. This can result in data silos, inefficiencies, and delays in processing information. Svahn *et al.* (2017) propose that conducting workshops involving key organizational actors who will be affected by digital transformation can help prevent resistance and foster improved cross-functional collaboration. These workshops provide a platform for transparent communication, enabling employees to understand the value and positive impact of digital technologies on their work processes and the organization as a whole.

Realistically, in the Vietnamese supply chain context, companies that manage to address employee resistance by involving them in the decision-making process and communicating the benefits of digital transformation tend to experience smoother adoption of disruptive technologies. For instance, Viettel Post - a leading Vietnamese logistics company introduced a new smart logistics system designed to optimize route planning and enhance efficiency in their delivery operations. As the postal sector's fastest-growing enterprise, they remain at the forefront of adopting cutting-edge technology in the era of Industry 4.0. Embracing a long-term vision and an unwavering commitment to sustainable development, Viettel Post directs significant attention to technology investments within the delivery sector. The company usually organizes workshops with the delivery drivers and warehouse staff, demonstrating how the system could streamline their tasks and ultimately lead to faster and more accurate deliveries. By involving employees in the early stages and addressing their concerns, the company managed to successfully implement the smart logistics system, leading to increased productivity and customer satisfaction, aiming to become a leading high-tech logistics company, ranking among the top five enterprises in Vietnam by the year 2025.

## 4. MANAGING UNCERTAINTY TO ENHANCE MATURITY OF VIETNAMESE SUPPLY CHAIN DIGITAL TRANSFORMATION TOWARDS SUSTAINABILITY

Building upon the comprehensive review conducted within the framework of Vial's inductive approach, this section discusses practices found in the literature to facilitate businesses attaining a higher level of maturity in Vietnamese supply chain digital transformation, with a keen emphasis on sustainability.

### 4.1 Managing Uncertainty

Managing uncertainty in digitalizing Vietnam's supply chain is undoubtedly a complex task, but there are several strategies that can help mitigate risks and ensure successful implementation. One effective approach is fostering collaboration among different stakeholders, including government agencies, industry associations, and private companies (HakemZadeh and Baba, 2016). By fostering collaboration, valuable information, expertise, and resources can be shared, ultimately reducing uncertainty in the digital transformation process. Furthermore, building flexibility into the digital supply chain is paramount to accommodating changes in market demand, disruptions in logistics operations, and other uncertainties. This can be achieved by adopting agile supply chain practices, implementing real-time monitoring, and leveraging predictive analytics. Utilizing digital tools for dynamic inventory management can further enhance flexibility and responsiveness to fluctuating conditions (Akbari *et al.*, 2023; Akbari and Hopkins, 2022; Nayak *et al.*, 2019).

Moreover, conducting a thorough risk assessment and implementing a comprehensive risk management plan is another critical step to managing uncertainty. By diligently



identifying potential sources of uncertainty, businesses can develop proactive strategies to mitigate risks (Duong *et al.*, 2019; Truong and Hara, 2018; Truong and Hara, 2019). Such strategies may include robust contingency planning, establishing alternative sourcing and logistics options, and ensuring robust cybersecurity and data privacy measures.

Finally, education and training are vital aspects to consider when managing uncertainty in digital transformation. Providing comprehensive education and training programs to workers and stakeholders involved in the digital supply chain can significantly contribute to building awareness and understanding of the benefits and challenges of digitalization (Le and Huh, 2021). Moreover, such programs can equip individuals with the necessary skills and knowledge required for effective implementation of digital strategies (Akbari and Hopkins, 2022; Francisco and Swanson, 2018; Göpfert and Wellbrock, 2013). For instance, firms should focus on upskilling their workforce in digital technologies and supply chain analytics. By empowering their employees with the necessary knowledge and skills, these companies are better equipped to navigate the challenges of digital transformation and leverage its full potential.

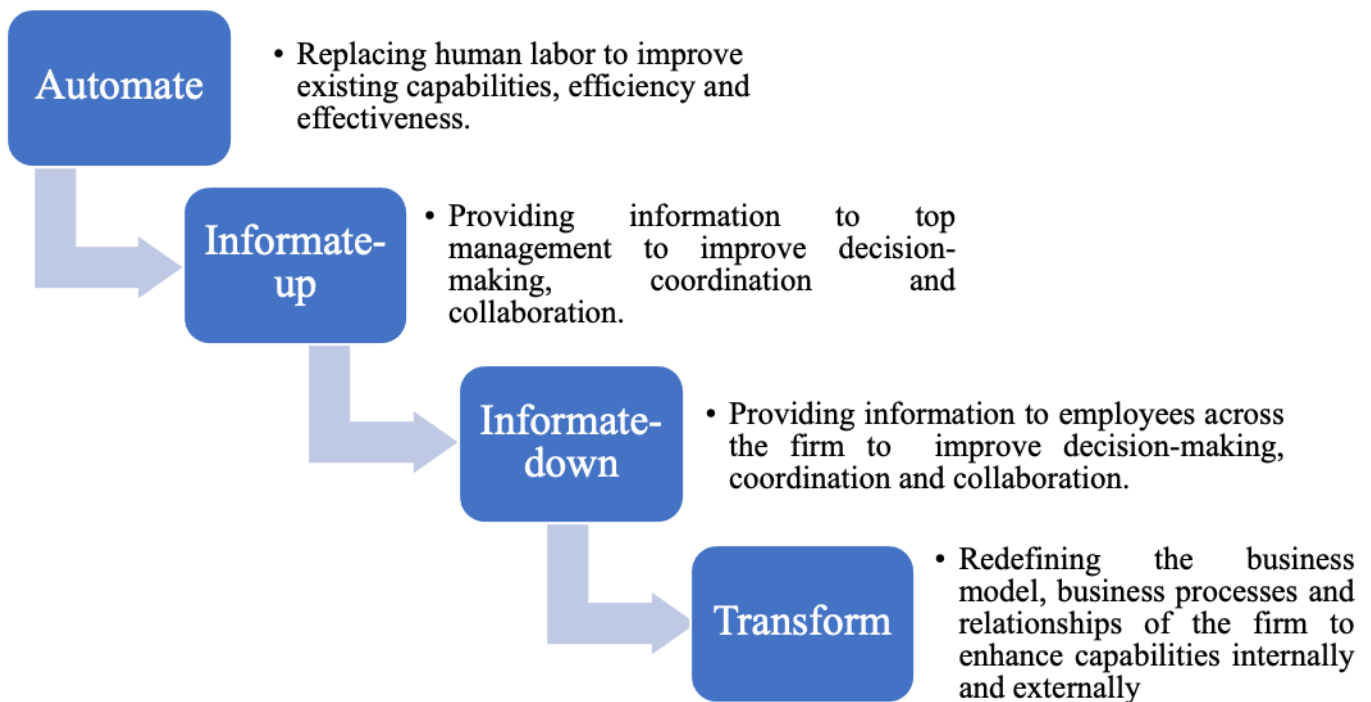
#### **4.2 Digital Maturity Level of Vietnamese Supply Chain Transformation**

Globally, the integration of cloud computing and storage technologies into company operations has gained significant traction within the supply chain industry, with 40 percent of professionals already adopting these advancements as revealed in a 2021 survey. Furthermore, supply chain companies are increasingly inclined towards embracing inventory and network optimization tools, which rank high on the adoption list for the next five years (MHI, 2021). Moreover, according to a comprehensive global survey conducted in 2022, a substantial 60 percent of organizations across diverse industries anticipate that big data analytics and digitalization of the supply chain will wield a significant or moderate impact on supply chains by the year 2025 (APQC, 2022). This optimistic outlook underscores the growing recognition of transformative potential in optimizing supply chain operations.

Understanding the global trends in supply chain digitalization can offer valuable insights to Vietnamese enterprises seeking to strengthen their digital capabilities and drive innovation across their supply chain operations. As the journey of digital transformation continues, it is essential for companies in Vietnam to seize the opportunities presented by emerging technologies to achieve sustainable growth and success in the ever-evolving global supply chain landscape. However, in the context of Vietnam, the level of maturity in digitalizing the supply chain remains relatively low, although there are positive signs of progress. In 2020, a noteworthy trend emerged in Vietnam, where accounting and finance software dominated as the leading management software category, endorsed by a staggering 88 percent of respondents. Additionally, human resource management software was utilized by nearly 56 percent of surveyed enterprises, making it the second most popular software category for Vietnamese businesses. In comparison, supply chain management (SCM) software accounted for only 27 percent and was employed by a mere 15 percent of the

questioned firms, while Enterprise Resource Planning (ERP) software was the least utilized category (iDea, 2022). Despite the lower adoption rates of SCM and ERP software, the digitalization efforts in the Vietnamese supply chain are gradually gaining momentum. As businesses increasingly recognize the advantages of advanced technologies and optimized management systems, the landscape of the Vietnamese supply chain is likely to witness further improvements in the coming years. Embracing digital innovations and leveraging cloud computing potential can elevate supply chain efficiency, enhance decision-making processes, and position companies more competitively in the Vietnamese market.

To effectively address the digitalization needs of the Vietnamese supply chain, firms are urged to strategically leverage the transformative potential of information technology (IT) in their business processes as seen in **Figure 4**. This entails moving beyond mere automation, as exemplified by the deployment of smart lockers by e-commerce platforms, as demonstrated in the case study conducted by Quan *et al.* (2022). Instead, businesses are encouraged to embrace a higher level of informatics, which involves augmenting the utilization of data analytics within supply chain management. By extracting actionable insights from vast amounts of data, firms can optimize their decision-making processes, enhance operational efficiency, and gain a competitive edge. Moreover, the final stage of transformation involves redefining and adapting business models to align with the evolving digital landscape. An example of such innovation can be observed in the emergence of subscription-based product and service providers, like Viettel Post, who have successfully transformed their capabilities to meet changing customer preferences using innovative technologies to support Vietnamese SMEs (Viettel Post, 2022). By embracing a subscription-based model, companies can foster stronger customer loyalty, promote recurring revenue streams, and create more personalized experiences. Furthermore, the growing interest in emerging technologies like IoT, blockchain, and AI presents significant opportunities for transforming supply chain operations in Vietnam. These cutting-edge technologies offer the potential to enhance visibility, traceability, and efficiency throughout the supply chain ecosystem. For instance, IBM (2022) reports businesses utilizing AI experience 95% efficiency in resolving challenges, 44% better access utilization, 40% more accurate demand forecasts, and 10% reduced structural costs. This transformation optimizes operations, enhances decision-making, and increases overall profitability, offering companies a competitive edge in a dynamic market environment. These technological advancements offer promising opportunities to streamline supply chain operations, reduce costs, and enhance overall efficiency. By adopting and implementing these innovative solutions, businesses operating within Vietnam's SCM landscape can potentially achieve substantial improvements in their logistics processes. It is imperative for organizations to proactively embrace digitalization, invest in robust IT infrastructure, and foster a culture of continuous learning and adaptation to thrive in an increasingly competitive market.



**Figure 4** Strategic roles of IT  
(Adopted from Dehning *et al.*, 2003)

### 4.3 Towards Sustainable SCM 4.0

Sustainable practices hold significant importance for supply chains in Vietnam, especially amid the country's rapid industrialization and mounting environmental challenges. Embracing sustainable practices can enable businesses to foster sustainable development, enhance their reputation, and mitigate their environmental impact. In the context of the Vietnamese supply chain, the integration of green logistics and sustainability through digital transformation plays a pivotal role in curbing the negative effects of logistics activities on the environment.

Digital technologies offer a wide array of advanced tools that can yield sustainability benefits for Vietnamese supply chain firms. Agility (2021) reports that logistics professionals are actively considering the adoption of operational technologies (15.9 percent) and transitioning to more digital and direct sales approaches (14.5 percent) to bolster supply chain resilience. These strategic shifts are geared towards improving operational efficiency, fortifying supply chains, and effectively adapting to dynamic market demands, empowering businesses to remain agile and competitive, even amid challenging circumstances. Akbari and Hopkins (2022) emphasize that these technologies facilitate waste reduction, energy efficiency, recycling opportunities, and the establishment of industrial symbiosis. By leveraging digital technologies, businesses can optimize their logistics operations and reduce their carbon footprint. For instance, companies can utilize data analytics and optimization algorithms to enhance route planning, minimizing empty truckloads and thereby reducing transportation emissions such as in the cases of U&I, and Viettel Post. This approach significantly reduced transportation distances, resulting in lower emissions and energy consumption. Moreover, blockchain technology is

very essential in enhancing transparency and traceability throughout its supply chain. By leveraging a digital platform that enabled real-time monitoring of product movements, firms in supply chains could ensure ethical sourcing practices and demonstrate a commitment to sustainable supply chain management (Kouhizadeh *et al.*, 2021; Roy, 2022). For example, agricultural businesses have integrated digital technologies into their supply chain operations to optimize resource allocation and minimize environmental impact following the study of Kamble *et al.* (2020). Through sensor-based monitoring systems, these firms gain valuable insights into soil moisture levels, crop health, and weather conditions. Such data-driven approaches enable efficient irrigation, reducing water waste and promoting sustainable farming practices. Hence, the adoption of green logistics and sustainability through digital transformation in the Vietnamese supply chain is essential for creating environmentally friendly logistics operations. Businesses that implement these practices not only reduce their carbon footprint and waste generation but also enhance their reputation and competitiveness in the market (Akbari and Hopkins, 2022).

## 5. CONCLUSION

### 5.1 Managerial Implications

The digitalization of supply chains represents a multifaceted and intricate process that demands meticulous planning and execution. For successful implementation, supply chain firms, particularly managers, must adopt a holistic approach that encompasses collaboration, technology adoption, talent management, and risk management. By embracing this comprehensive strategy, businesses can realize their digitalization objectives and pave

the way for long-term growth and success in the Vietnamese supply chain.

First, *collaboration* emerges as a key cornerstone in the successful digitalization of the supply chain. Firms must foster strong partnerships with their stakeholders and partners, ensuring alignment on the objectives and benefits of digital transformation, thus enhancing collective efforts in achieving desired outcomes. Second, embracing appropriate *technology solutions* stands out as a critical driver in the digital transformation of supply chains. Careful investment in the right technology ensures that businesses can effectively steer their digitalization journey, optimizing operations, and creating value in the process. Third, *a well-prepared and skilled workforce* forms an indispensable asset in the digital supply chain transformation. Managers must prioritize workforce training and upskilling, empowering their employees to navigate the complexities of a digital-driven environment with efficiency and effectiveness. Moreover, digital transformation introduces a new set of risks, including cyber threats and supply chain disruptions. Firms must employ robust *risk management strategies* to mitigate these uncertainties, safeguarding their digital ecosystem and overall supply chain operations.

Ultimately, digital transformation offers numerous benefits for supply chains in Vietnam, encompassing heightened efficiency, cost reduction, and enhanced customer satisfaction. Furthermore, it empowers firms to respond nimbly to changes in demand and market dynamics, augmenting their competitive advantage. However, this transformative journey requires substantial investments in technology, infrastructure, and human resources, accompanied by prudent risk management strategies to navigate uncertainties effectively. By addressing these managerial implications proactively, businesses can optimize their digitalization endeavors, positioning themselves for success in the ever-evolving landscape of the Vietnamese supply chain.

## 5.2 Theoretical Implications

The supply chain industry plays a pivotal role in driving economic growth across various countries, including Vietnam, and is currently undergoing a notable shift towards digitalization. Our study aims to delve into the intricacies of the Vietnamese market, providing comprehensive theoretical insights into supply chain management and digital transformation.

Firstly, our findings shed light on the prevalent technologies employed within Vietnamese supply chains, enriching our understanding of technology's impact on business operations. This exploration contributes to a deeper understanding of how technology shapes various aspects of business processes.

Secondly, we concentrate on the shifts in value creation pathways, advancing theoretical discussions on the transformative potential of digital technologies. By identifying fundamental changes in value creation, our study elucidates how businesses leverage technology to create and deliver value in the digital era, transcending geographical boundaries.

Thirdly, our emphasis on structural changes within organizations aligns with broader discussions in organizational theory. The imperative for a comprehensive

reassessment of organizational structure, culture, leadership, and employee roles reflects the evolving nature of organizations responding to digital transformation imperatives. These insights resonate not only within emerging markets like Vietnam but also resonate globally with organizational dynamics.

Moreover, our study addresses organizational barriers such as inertia and resistance, offering theoretical insights into the challenges organizations face during digital transformation initiatives. Understanding and overcoming these barriers are critical components of organizational change theory, with implications applicable to diverse global settings.

Finally, the research methodology employed in this study – SLR combined with bibliometric analysis – demonstrates its efficacy in portraying the digitization of Vietnamese supply chains and in addressing insights and research gaps for scholars in this field.

## 5.3 Implications for Policy Makers

Digital transformation in the Vietnamese supply chain holds immense potential for reshaping the industry landscape and driving sustainable growth. Policymakers and the Vietnamese government wield significant influence in expediting this transformation by providing the right ecosystem and support mechanisms to fuel innovation, enhance efficiency, and promote sustainability.

To foster digitalization, policymakers should introduce policies that incentivize businesses to adopt cutting-edge digital technologies. For instance, tax incentives should be offered to companies investing in digital infrastructure and equipment, encouraging a widespread adoption of advanced supply chain management solutions. Additionally, addressing regulatory and legal challenges is very essential as that might impede the adoption of digital technologies. Updating existing regulations to accommodate digital transformation, and ensuring data privacy and security while promoting interoperability between various digital platforms are necessary in this digital age. By doing so, businesses have the confidence to embrace digital solutions without facing unnecessary bureaucratic hurdles. Moreover, sustainable practices should garner increasing attention in the Vietnamese supply chain, with the government playing a key role in supporting their adoption. Through a combination of policies and programs, they could incentivize businesses to integrate sustainable materials and energy-efficient technologies into their operations. For example, they should provide tax credits to companies using eco-friendly packaging materials and renewable energy sources, thereby fostering a more environmentally conscious supply chain.

Collaboration between the government and stakeholders is pivotal in promoting digital transformation. Policymakers should engage with businesses, academia, and civil society organizations to create knowledge-sharing platforms and facilitate public-private partnerships. This collaborative approach could result in policies and programs that cater to the unique needs and challenges of different industries and supply chain participants. Moreover, the government's support for startups and innovative ventures is a must to foster a thriving ecosystem of tech-driven supply chain solutions. This practice will encourage local entrepreneurs to develop homegrown digital platforms for



logistics management, empowering domestic businesses to leverage cutting-edge technologies to optimize their supply chain operations. Hence, the role of policymakers and the Vietnamese government in propelling the digital transformation of the supply chain cannot be overstated. Through targeted policies, infrastructure investments, support for sustainable practices, and collaborative efforts with stakeholders, they could create an enabling environment for businesses to embrace digital technologies to secure a sustainable and prosperous future.

Moreover, the identification of five distinct characteristics within the Vietnamese supply chain serves as a focal point for our analysis. While adeptly capturing the intricacies of this specific context, we recognize the potential for generalization beyond Vietnam's borders. This acknowledgment represents an opportunity to strengthen the paper's theoretical implications, aligning with the scholarly objective of offering insights that transcend regional boundaries. Our examination of the unique Vietnamese context contributes to ongoing debates on the impact of contextual factors on digital transformation strategies. The uncertainties tied to regulatory changes, infrastructure limitations, and market fluctuations underscore the need for adaptable and context-specific approaches. This not only enriches our understanding of Vietnam's digital landscape but also holds broader implications for navigating similar challenges in other countries that share similar characteristics with our country like Thailand, Indonesia, etc.

### 5.4 Limitations and Future Directions

While this study provides valuable insights into the digitalization of the Vietnamese supply chain and its implications for emerging economies, there are some limitations that future researchers should consider. Firstly, the study focuses on the context of Vietnam, and the findings may not directly translate to other emerging economies with different socio-economic and regulatory landscapes. Future research should explore the applicability of these insights in diverse emerging market settings to develop a more comprehensive understanding. Secondly, the study primarily discusses the benefits and managerial implications of digitalization, but it does not extensively delve into the potential challenges and barriers faced during implementation. Future researchers should investigate the specific obstacles and constraints that organizations encounter while adopting digital technologies in the supply chain within the Vietnamese context.

Additionally, the study mainly centers on the integration of technology and digital tools in the supply chain, but it may benefit from further analysis of the human and organizational aspects of digital transformation. Understanding the role of organizational culture, change management, and leadership in facilitating successful digitalization initiatives is crucial for future research.

Future research directions for digital supply chain transformation in emerging economies like Vietnam include conducting comparative studies, investigating long-term impacts, exploring risk management strategies, focusing on the human element of digital transformation, assessing sustainability effects, and evaluating policy interventions. These studies aim to provide insights into unique challenges and opportunities, understand the transformative potential of

digital technologies, mitigate risks, maximize benefits, and foster sustainable and efficient supply chains. Addressing these areas can enrich knowledge and guide policymakers in refining approaches for resilient supply chains in emerging economies.

## DECLARE OF INTEREST

The authors report there are no competing interests to declare.

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