

Digital Transformation and Process Integration in Global Supply Chain Management

Colin Ighedose Asuelime, Ph.D.¹, Christiana Favour Omohofe, Odidi Ph.D., Cna, Acti.²

¹Department of Computer Science, Faculty of Physical Science, University of Benin, Benin City, Edo State. Nigeria.

²Department of Accounting, Faculty of Management Science, Charisma University Turs Carcus Island.

ABSTRACT

This paper focused on digital transformation and process integration in global supply chain management through a review of existing literature. It focused on global supply chain practices, digital transformation, process integration, and the key factors driving digital change in international supply chains. The study relied on secondary information from journal articles, online sources, textbooks, seminar papers, and conference materials. Guided by the Resource-Based View (RBV), the study showed that organisational resources such as modern technologies are valuable, difficult for competitors to copy, and can provide strong competitive advantages. From the literature reviewed, the study found that digital transformation is now one of the major forces shaping competitive advantage in global supply chain management. New digital tools supporting process integration include artificial intelligence (AI), cloud computing, big data analytics, blockchain, the Internet of Things (IoT), and advanced automation. These technologies are changing how supply chain partners coordinate, share information, and carry out operations across different countries. Process integration aims to align both internal and external supply chain activities to improve collaboration, speed, and visibility. The study therefore recommended that organisations should adopt digital transformation in all areas of process integration and global supply chain management.

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1. INTRODUCTION

The fast growth of digital technologies and digital change has been driven largely by globalisation (Yu et al., 2021; Sodhi & Tang, 2021). According to Pengcheng et al. (2025), digital transformation and process integration in global supply chains mean using modern tools such as artificial intelligence (AI), the Internet of Things (IoT) and blockchain to link and smoothen operations. This helps organisations work more efficiently, see what is happening in real time and become more resilient. Lu et al. (2022) added that integration is not only about technology; it also involves aligning internal and external processes so that companies can share data instantly, improve forecasting and manage risks better.

Global supply chains today are more connected, more complex and more exposed to risks, especially due to issues like pandemics, political tensions and unstable global markets. These challenges showed that traditional supply chain systems are no longer enough and that digital transformation is needed to improve visibility, coordination and quick response (Vial, 2021). Digital tools help companies standardise and integrate processes among suppliers, manufacturers, logistics partners and customers across different countries. Process integration covers both internal activities (within a company) and external relationships (with partners), aiming to align workflows, information sharing and decision-making. Queiroz et al. (2022) explained that digital systems can help reduce costs, cut delays and improve performance by increasing agility, efficiency, and resilience. At the centre of these improvements is digital transformation, which involves using advanced digital technologies in all business processes to support innovation and better operations (Yu & Shao, 2024).

The digital age has brought major changes to global business, affecting how companies compete and survive (Dai et al., 2025). Although, digital transformation and process integration are often seen as ways to strengthen supply chain resilience, the exact ways they influence resilience are still not fully understood (Lu et al., 2023a). Existing studies recognised the importance of digital transformation and process integration in supply chain management, but limited studies have examined in detail how these

two factors work together in global supply chains. This paper specifically examines digital transformation and process integration as a driver of global supply chain management resilience

2. CONCEPTUAL REVIEW OF RELATED LITERATURE

Global Supply Chain Management

Supply Chain Management (SCM) according to Sodhi and Tang (2021), means carefully organising all the steps involved in making and delivering goods or services from getting raw materials to delivering finished products to customers. It brings together suppliers, manufacturers, transporters, warehouses, retailers and final consumers into one smooth and effective system that aims to create value at every stage. The main goal of SCM is to make sure the right product reaches the right place at the right time, at the lowest possible cost, while still maintaining good quality and customer satisfaction. SCM mainly deals with controlling the movement of materials, information and money throughout the whole supply chain. Nwankpa et al. (2022) stated that planning, buying materials, producing goods, managing stock, handling transport and providing customer service. Good supply chain management depends on clear communication and teamwork among all partners to prevent delays, cut waste, lower costs and improve overall efficiency.

Today's supply chains use advanced information systems and digital tools to monitor goods, predict demand and make processes faster and more efficient across different locations. Baiyere et al. (2020) stated that supply chain management has become more important because of globalisation, tougher competition and customers expecting better service. Many companies now work in complex global settings where products might be designed in one country, made in another, and sold in many different markets. This means organisations must coordinate suppliers around the world, manage cross-border transport and react quickly to sudden changes in demand or disruptions such as natural disasters, political issues or material shortages. A properly managed supply chain also helps support sustainability by encouraging responsible sourcing, reducing waste, and cutting carbon emissions through efficient production and transport. More companies are also expected to follow ethical practices and be opened about their supply chain activities to meet environmental and social standards.

Process integration

Process integration refers to close cooperation between buyers and suppliers, joint product development, shared systems and open exchange of information. Dennis and Kampton (2010) explained that running an integrated supply chain requires a smooth and continuous flow of processes, which helps organisations achieve the best possible movement of products. According to Lambert (2008), key supply chain processes include customer service management, procurement, product development and commercialisation, manufacturing flow management, physical distribution, outsourcing or partnership activities and performance measurement. However, not all processes apply to every industry; the specific processes used depend on the industry being studied.

Adrian (2011) stated that the customer service management process deals with how an organisation manages its relationship with customers. It provides customers with real-time information about delivery dates and product availability by linking customer service to production and distribution systems. Flynn et al., (2021) noted that process integration is crucial in procurement process and procurement process involves creating strategic plans with suppliers to support manufacturing, management, and new product development. Bejlegaard et al. (2021) explained that internal process integration connects procurement, production, warehousing and logistics within a company, improving workflow and reducing isolated operations. External integration, on the other hand, involves collaboration with suppliers, distributors, logistics providers, and customers. The aim is to build a mutually beneficial relationship that reduces design and product development time.

In the product development and commercialisation process, customers and suppliers must be involved early to reduce the time it takes to bring new products to market. Since competition is high, products need to be developed and launched quickly. Dennis and Kampton (2010) argued that managers involved in product development must work with customer service to understand customer needs, select materials and suppliers with the procurement team, and coordinate with manufacturing to develop production technology. All these actions help create an efficient supply chain that boosts profit and improves organisational performance. Adrian (2011) also noted that outsourcing and partnerships are part of process integration. Outsourcing does not only involve purchasing materials or components but also hiring external service providers for tasks that the company cannot perform efficiently in-house. This is common in logistics, warehousing, material handling, and inventory control. Managing this network of partners and suppliers requires a combination of central oversight and local involvement.

Digital Transformation as a Driver of Global Supply Chain Management Resilience

Digital transformation is a major factor that strengthens supply chain resilience because it improves how organisations gather, analyse and use information across their supply networks (Bejlegaard et al., 2021). Faruquee et al. (2021) explained that one of the biggest advantages of digitalisation is the ability to process information in real time. Tools such as Internet of things (IoT), sensors and cloud-based tracking systems give companies complete, real-time visibility of shipments, inventory levels and production activities. Kagermann (2014) noted that this up-to-date flow of information allows firms to spot problems or disruptions very

early. Sensors can immediately notify a manufacturer if a key delivery has been delayed or if a machine on the factory floor shows signs of failure. In traditional non-digital systems, such issues may only be discovered after they have become serious. Digital systems, however, provide immediate alerts. With timely information, firms can quickly activate backup plans for rerouting goods, contacting alternative suppliers or adjusting production thereby preventing small issues from turning into major disruptions.

Digital transformation also introduces predictive analytics into global supply chain management (Rane et al., 2024). With big data and AI, companies can study patterns such as weather reports, social media trends or the financial stability of suppliers to forecast disruptions before they happen (Wylde et al., 2022). Digital predictive capabilities help organisations take preventive action, such as increasing stock levels of risky items or planning new transport routes before a storm or crisis hits. Wang and Han (2024) observed that real-time visibility combined with strong data analytics improves a supply chain's ability to assess and anticipate risks, which supports its absorptive resilience which promote its ability to absorb shocks with minimal damage.

Beyond early warnings, digitalisation also boosts the agility and adaptability of supply chains during and after disruptions. Dai (2025) explained that advanced digital tools enable faster communication and decision-making within the supply chain network. When suppliers, manufacturers, logistics firms and retailers are linked through shared IT platforms, they can coordinate their actions instantly in response to unexpected events. For example, a digital platform may automatically report rising demand or low inventory levels, prompting partners to jointly respond, such as speeding up shipments or moving stock between regions (Willie, 2025). This level of coordination makes the supply chain operate as one connected system rather than separate, isolated units. Such agility is essential in reducing the impact of disruptions.

Digital transformation also adds flexibility through automation and intelligent optimisation. Smart manufacturing systems powered by IoT and AI can quickly adjust production lines or switch sourcing options when materials become scarce. Machine learning systems can suggest new delivery routes or resource allocations during a crisis. Willie (2025) noted that these digital abilities speed up the recovery stage of resilience — allowing a company to rebuild its supply network within days, compared to weeks for a less digital firm. Studies showed that technologies like AI and blockchain helped supply chains become more adaptable and self-adjusting, automatically reorganising their structures to meet new challenges. Wang and Han (2024) observed that digital transformation strengthens resilience by improving how supply chains sense risks, react quickly and reorganise effectively. According to Tian et al. (2022), a digitally transformed supply chain is more flexible, responsive and intelligent, giving it better capacity to manage risk and maintain performance during difficult situations. Due to the benefits of digital transformation, it is now widely seen as an essential driver of resilient supply chain management.

3. REVIEW OF THEORIES

This study examines two theories and these include:

Network Theory

Network Theory was introduced by Jacob Moreno in the 1930s. It suggests that a firm's performance depends not only on how well it works with its direct partners, but also on how effectively those partners work with their own partners. According to Croom (2001), this theory helps explain how cooperation and reciprocity develop in business relationships. Haakansson and Ford (2002) added that a firm's ongoing interaction with other organisations plays a key role in creating new resources. When two organisations work together, they combine their resources to achieve greater benefits than they could individually.

The value of a resource depends on how well it can be combined with other resources, which means that relationships between organisations can be more important than simply owning resources. As a result, the structure of resources influences the structure of the supply chain and becomes the driving force behind it. Network theory also improves our understanding of how relationships between organisations develop over time. It highlights the importance of personal compatibility, trust built through long-term cooperation and mutual adjustment of routines and systems as partners exchange information and work together. Through direct communication, partners develop shared understanding and adaptation, which allows supply chains to be customised to meet specific customer needs.

Over time, trust grows through repeated social and business exchanges. Networks do not aim for a fixed or perfect state; instead, they are always changing and evolving. Johanson and Mattsson (1987) explained that links between firms in a network grow through two connected types of interactions: exchange processes (involving information, goods, services, and social interactions) and adaptation processes (involving personal, technical, legal, logistics, and administrative adjustments). Network Theory is mainly descriptive and is often used in supply chain management to map activities, actors, and resources. It focuses on building long-term, trust-based relationships between members of a supply chain. Examples include studies on buyer–supplier relationships (Gadde & Haakansson, 2001), third-party logistics (Halldorsson, 2002) and managerial roles within supply networks (Harland & Knight, 2001).

Resource Based View (RBV)

The Resource-Based View (RBV), first introduced by Birger Wernerfelt (1984) and later expanded by Barney (1991), explains that a firm can achieve competitive advantage by leveraging its unique resources and capabilities (Miller & Ross, 2003).

Resources can be tangible, like infrastructure and IT systems, or intangible, such as knowledge, skills, data analytics abilities and partnerships. In the context of global supply chain management, digital transformation technologies including artificial intelligence (AI), blockchain, IoT, cloud computing, big data analytics and automation can be considered strategic organisational resources under the RBV framework. Miller and Ross (2003) highlighted four factors that make resources hard for competitors to copy: durability, transparency, transferability and replicability, which can also apply to inter-organizational relationships

The dynamic aspect of RBV emphasises a firm's ability to quickly adapt to change and develop new capabilities, often referred to as dynamic capabilities (Eisenhardt & Martin, 2000). This means a company's competitiveness relies on how effectively it configures and updates its resources as markets evolve. Collaborations and partnerships with other organisations also support learning and improvement, making relationships a source of both results and knowledge. When digital transformation and process integration are combined, they create unique capability bundles that provide sustained competitive advantage, as RBV suggests. Therefore, this study is anchored on the Resource-Based View, since organisational resources like digital technologies are valuable, difficult for competitors to imitate and can deliver strong competitive advantages and improved performance in global supply chain management.

4 CONCLUSION

The issues of digital transformation and process integration are now indispensable in global supply chain management. Based on review of related studies, the study observed that digital transformation has become one of the most influential drivers of competitive advantage in global supply chain management. Also, Emerging digital transformation for process integration in global supply chain management includes artificial intelligence (AI), cloud computing, big data analytics, blockchain, Internet of Things (IoT), and advanced automation, among others. They are redefining the supply chain partners coordinate, share information, and execute operations across borders or international countries. Process integration, on the other hand, focuses on harmonising internal and external supply chain processes to enhance collaboration, responsiveness, and visibility. It therefore concludes that the adoption of digital transformation in all aspects of process integration can enhance global supply chain management in organization.

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