HARNESSING DIGITAL TECHNOLOGIES FOR RESILIENT SUPPLY CHAINS IN POST-COVID-19 NIGERIA

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Abstract

The COVID-19 pandemic revealed several weaknesses in Nigeria's supply chains, including poor coordination, lack of digitalisation, and weak risk management frameworks. In the wake of the pandemic, there has been a growing need to invest in digital technologies to achieve resilient supply chains that enhance sustainable development. This paper seeks to discuss the role of digital technologies in improving supply chain resilience in post-COVID-19 Nigeria. The study employs an exploratory design to explore the effects of digital technologies on supply chain resilience in selected organisations. The research question is addressed using a mixed-methodology approach consisting of questionnaire surveys and key informant interviews. The target population for this study was supply chain and logistics organisations, and the sample size selected comprised manufacturing, retail, and logistics companies. Quantitative data collected from the survey were analysed using descriptive and inferential statistics. Thematic analysis was used to evaluate qualitative data obtained from key informant interviews. The study findings reveal that the use of digital technologies can improve supply chain visibility, coordination, collaboration, and risk management, which are integral to achieving supply chain resilience. The study also found that organisations that had invested in digital technologies were more competent and adaptable in responding to supply chain disruptions and crises like the COVID-19 pandemic. The study concludes that digital technologies are key to enhancing supply chain resilience in the Nigerian economy. The study recommends a need for government and relevant agencies to invest more in digital infrastructure, technologies, and capacity building to promote supply chain resilience in support of sustainable development.

Keywords: Digital technologies; Supply chain resilience; Post-Covid-19; Nigeria; Economic recovery

Introduction

The COVID-19 pandemic has caused significant disruptions to supply chains worldwide, revealing critical vulnerabilities in production, distribution, and logistics (World Bank, 2020). For instance, the pandemic has triggered delivery delays, shortages of production resources, increased operational costs, and decreased overall performance in critical sectors in Nigeria, including manufacturing, agriculture, retail, and healthcare (Adeleye et al., 2021; UNCTAD, 2021). In addition to the pandemic's impact, Nigerian supply chains faced challenges such as inadequate transport and digital infrastructure, limited information availability, and a heavy reliance on manual and fragmented processes (World Bank, 2020; Oyelaran-Oyeyinka & Lal, 2022). Therefore, there is a need to generate further insight into harnessing digital technologies to improve supply chains and promote economic development in post-COVID-19 Nigeria (Ivanov & Dolgui, 2021).

Against this background, the current study aims to establish how digital technologies can be leveraged to strengthen supply chain resilience in Nigeria. The paper focuses on the impact of digital technologies, with an emphasis on the ability of firms to anticipate, absorb, respond to, and recover from disruptions. Besides contributing to the growing body of literature on supply chain management, the current study attempts to fill a gap in research on the role of digital technologies in supply chains. While recent studies have demonstrated the potential of digital technologies to transform supply chains post-COVID-19, there is a need for more empirical studies to generate additional evidence for policymakers and industry players to consider (Aremu & Adeyemi, 2022). Although there is a wealth of literature on supply chain management, the extent to which digital technologies can promote organisational resilience is not fully understood. Therefore, the current study also aims to review the challenges that hinder the adoption of digital technologies and the implications of these shortcomings on supply chain resilience. Thus, the following research questions will be addressed:

i. What are the impacts of digital technologies on critical supply chain functions in Nigeria?
ii. How can digital technologies be used to bolster firms' capabilities to achieve supply chain resilience in post-COVID-19 Nigeria?
iii.

This study employs a mixed-methodology approach, including a questionnaire and semi-structured interviews to gather information from participants. The survey and interview questions were designed to obtain responses that will enable address the research questions. The study targets respondents from different industries to ensure that the findings are generalisable and informative to supply chain managers and policymakers in Nigeria who seek ways

to make their supply chains more resilient in the wake of the COVID-19 pandemic.

Literature Review

Conceptual Review

Supply chain resilience is the ability to foresee, adapt to, recover from, and cope with interruptions and stresses while still being able to perform essential supply chain activities (Ponomarov & Holcomb, 2009). The COVID-19 pandemic has revealed the vulnerability of not only global supply chains but also local ones. In Nigeria, these shortcomings were aggravated by the absence of key infrastructural facilities, poor information management, and a high degree of exposure to ecological hazards, among other things, making supply chain resilience a priority after the COVID-19 pandemic (World Bank, 2020).

Digital technologies have been recognized as critical to enhancing supply chain resilience. These technologies include digital, information and communication technologies, and information technologies such as enterprise resource planning systems, analytics, and real-time communication software and hardware (Ivanov & Dolgui, 2021). From a theoretical framework, digital technologies have been associated with supply chain resilience because they provide a broader perspective of the supply chain, which then facilitates improved decision-making processes in managing and operating supply chains (Kache & Seuring, 2017). As a result, increased visibility is achieved, enabling firms to make better-informed judgments and preparations.

The relationship between digital technologies and supply chain resilience may be explained using four key aspects of supply chain resilience, which are preparation, response, recovery, and adaptation. Digital technologies improve readiness by providing essential risk assessment mechanisms and early warning systems. They also enhance the response to disruptions by facilitating rapid, efficient communication, collaboration, and overall response capability. In addition, digital technologies promote quick recovery and restore normal supply chain operations and performance in the wake of a disruption. Finally, these technologies enable adaptation and foster organizational innovation and transformation, allowing for enhanced supply chain resilience (Brusset & Teller, 2017). Collectively, this discussion demonstrates that digital technologies play a critical role in bolstering supply chain resilience, particularly when it comes to preparation and adaptation.

In the context of Nigeria, however, the ability of digital technologies to enhance supply chain resilience has been hampered by a variety of factors, including a lower level of technology adoption, insufficient digital skills, and inadequate infrastructural facilities. Thus, although the majority of firms in Nigeria are currently adopting digital technologies, they are doing so through a combination of automated and

manual processes rather than fully automated procedures (Oyelaran-Oyeyinka & Lal, 2022). As a result, the extent to which digital technologies can contribute to supply chain resilience in Nigeria is limited by a confluence of factors, one of which is the readiness and ability of firms to embrace these digital innovations. Overall, the extent to which digital technologies enhance supply chain resilience depends on various factors, including organizational infrastructure, capabilities, and environment. While the preceding discussion highlights the general relationship between digital technologies and supply chain resilience, there is a need to investigate how these technologies might be leveraged to improve supply chain resilience in a developing economy like Nigeria.

This conceptual paper therefore provides the basis for further studies investigating the role of digital technologies in bolstering supply chain resilience in post COVID-19 Nigeria. By focusing on how digital technologies can facilitate supply chain resilience, it provides the theoretical background and rationale for the study of interest. It demonstrates that while digital technologies have the potential to increase supply chain resilience, especially in the context of preparation and adaptation, their impact is dependent on multiple factors, including the organizational environment. While much of the literature reviewed here provides the relationship between the constructs of digital technologies and supply chain resilience, such studies have been conducted mainly in developed countries, leaving little understanding of the same in developing countries such as Nigeria. As such, this conceptual paper will be the impetus for an empirical study on the impact of digital technologies on supply chain resilience in the context of Nigeria.

Empirical Review

Empirical analyses evaluating the impact of digital technologies on supply chain resilience have generally demonstrated their positive influence in reducing disruptions and enhancing performance. Internationally, various studies have shown that the use of digital technologies such as data analytics, cloud-based systems, enterprise resource planning (ERP), and tracking systems facilitates supply chain management processes and improves firms' responsiveness to disruptions (Ivanov & Dolgui, 2021; Dubey et al., 2021). These include Ivanov's (2020) simulation study establishing a positive association between the extent of digital technologies utilization and organizational adaptation capacity during the COVID-19 pandemic.

In Nigeria, although the influence of digital technologies on supply chain management has not been studied extensively, the few research works conducted confirm the observed international trends. For instance, Adeleye, Osabuohien, and Asongu (2021) found that Nigerian manufacturers which invested in information and communication technology (ICT) platforms and digital technologies benefited from reduced lead

time and improved inventory management during the pandemic. Similarly, Aremu and Adeyemi (2022) revealed that logistics and supply chain companies which had integrated advanced digital technologies such as tracking systems, automated order processing, and digital collaboration tools were more resilient to disruptions and restored their supply chains faster than those without the technologies.

Various researchers have identified key factors which moderate the impact of digital technologies on supply chain resilience in Nigeria. According to Oyelaran-Oyeyinka and Lal (2022), the lack of adequate digital infrastructure, insufficient skilled digital talents, and uneven technological capabilities among firms account for the limitations of digital technologies in supply chain management. Moreover, the study found that the combination of digital technologies with organizational capabilities such as effective risk management and collaboration mechanisms improved firms' resilience to disruptions. These findings align with those of Adeleye et al. (2021) and Aremu and Adeyemi (2022) who emphasized the importance of complementary resources in bolstering supply chain resilience. Overall, the reviewed literature demonstrates that digital technologies have a considerable impact on firms' ability to withstand and bounce back from supply chain disruptions. However, there is a need for more studies clarifying the nuances of the relationship based on the peculiarities of the Nigerian context.

Research Framework/Model and Underpinning Theory

The paper discusses the role of digital technologies in enhancing supply chain resilience in the post-COVID-19 Nigeria. Digital technologies are regarded as the key independent variable that can improve supply chain resilience. The study conceptualized supply chain resilience in four key areas: preparedness which is about being in a proactive stance, ability to respond to disruptions, and the associated rapid recovery capacity to resume normal supply chain functions. In addition, the paper also highlights recovery and adaptability as integral aspects of supply chain resilience. The former refers to the ability of firms to learn and incorporate innovative solutions in order to improve their capabilities in light of disruptive supply chain outcomes.

Other areas in the conceptualization of supply chain resilience include the moderation and mediation aspects of supply chain capacities in the relationship between digital technologies and resilience. It is noted that organizational factors, digital factors, managerial factors, contextual factors, and sector-specific factors moderate and mediate the relationship between digital technologies and supply chain resilience in post COVID-19 Nigeria. In terms of methodology, the paper adopts a mixed-methods research design. This is evident by the fact that the study uses both questionnaires and interviews to elicit

information from supply chain and logistics managers and key informants respectively. The conceptualization underscores the fact that digital technologies are the independent variable that can improve supply chain resilience in post COVID-19 Nigeria. The study also indicates that organizational and contextual factors moderate the relationship between independent variables and supply chain resilience.

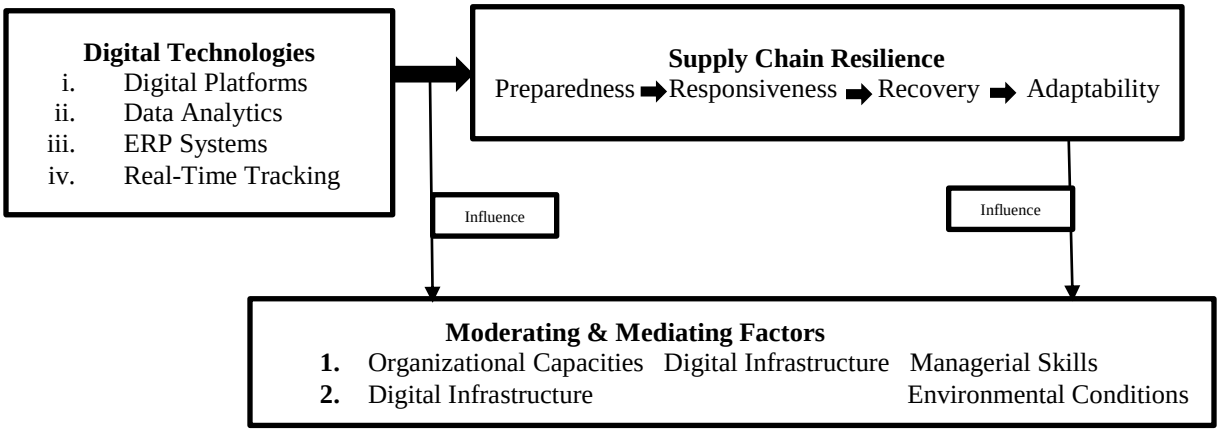

Figure 1: Research Framework for Harnessing Digital Technologies for Resilient Supply Chains in Post-Covid – 19 Nigeria

Source: Author's Conceptualisation, 2026

The study is anchored on the basis of Resource-Based View (RBV) and Dynamic Capabilities Theories. Resource-Based View (RBV) is one of the most respected theories in modern management studies. This theory postulates that organisations can achieve long-term competitive advantage over its rivals by harnessing valuable, rare, imitable and non-substitutable resources (Barney, 1991). In this study, the resources of consideration are digital technologies that when effectively leveraged by the firms will promote supply chain resilience and organisational performance. On the other hand, Dynamic Capabilities theory asserts that there is need for firms to be able to perform continuous scanning for threats and opportunities, taking advantage of the threats and opportunities as they arise and readjusting their methods or strategies so as to continuously meet the changing demands in the market (Teece et.al 1997).

Taken together, these theories can be used to argue that digital technologies can support supply chain resilience of firms operating in Nigeria.

Method

This study employed the descriptive qualitative research design that was based on an interpretative paradigm to ascertain how digital technologies facilitate supply chain resilience in Nigeria after COVID-19. The research focused on the commercial hubs of

Lagos, Abuja, Kano, and Port Harcourt. The study considered agriculture, pharmaceutical, and retail industries as critical to Nigeria's economic growth after COVID-19. The population of this study comprised supply chain managers, information and communication technology (ICT) providers, government officials, and small and medium enterprise (SME) owners. The researchers adopted a purposeful sampling strategy to select twenty-five participants from these populations. The sample was made of senior managers (ten), middle managers (nine), ICT providers (four), and government officials (two). The participants were selected based on their expertise in supply chain management and digital technologies.

Both primary and secondary data were used to generate the study findings. Primary data were collected from interviews conducted with the participants, while secondary data were sourced from existing literature published in scholarly databases and journals. The primary data were gathered using a semi-structured interview guide devised based on the research objectives. The interviews were conducted between January and March 2025. Each interview was held face-to-face or virtually and lasted thirty minutes to an hour. The interviews were recorded with the participants' consent and later transcribed and anonymised for confidentiality and ethical reasons. The secondary data collected from UNCTAD, World Bank, and Nigerian Shippers' Council reports were used to complement the primary data.

The thematic analysis technique was used to analyse the primary data. The analysis process followed Braun and Clarke's six-phase data analysis procedure. The procedure consisted of data familiarisation, generating initial codes, identifying themes, theme review and refinement, data synthesis and rapporteur, and finalising the report. Additionally, triangulation was done to establish the reliability and validity of the findings. The data were analysed using NVivo 15 qualitative analysis software. The conceptual model below was developed to guide the study. It postulates that digital technologies are the key factors that influence supply chain resilience in the post-COVID Nigerian economy. Organisational and contextual variables mediate the relationship between digital technologies and supply chain resilience.

(R_i) depends on digital technology adoption (DT_i), contextual factors (C_i), and stakeholder engagement (S_i):

$$R_i = f(DT_i, C_i, S_i) \quad (1)$$

where $DT_i = \alpha_1 \cdot T_{adoption} + \alpha_2 \cdot IT_{integration}$(2), $S_i = \beta_1 \cdot M_{coordination} + \beta_2 \cdot C_{communication}$(3), and $C_i = \gamma_1 \cdot Sector + \gamma_2 \cdot Location + \gamma_3 \cdot Infrastructure$(4).

This framework guided the coding and thematic analysis to reveal the factors related to process level and strategic level

supply chain activities. Moreover, the data obtained from primary and secondary sources helped in cross-verifying the initial findings and adding contextual nuances to support the claim that digital technologies could make the supply chain system more resilient in the post-COVID-19 period in Nigeria.

Result and Discussion

Industry Situation for other Sectors of the Economy

The COVID-19 pandemic has created numerous challenges for Nigeria's economy, including disruption of supply chains and the associated need to adopt more digital technologies to make them more resilient. The agricultural, manufacturing, health, and retail, and fast-moving consumer goods (FMCG) sectors were all severely impacted by the pandemic, with implications for their supply chains. At the same time, the pandemic has also accelerated the adoption of digital technologies in various areas, including the use of online platforms, artificial intelligence, drones, and so on. This paper explores the impact of the COVID-19 pandemic on supply chains in various sectors of Nigeria's economy, as well as the digital technologies that have been adopted to make them more resilient.

The agricultural sector's supply chains were severely disrupted by the pandemic, and the need for digital technologies that could make them more reliable became evident. Restrictions on free movement reduced the flow of agricultural products and critical supplies, prompting the adoption of such digital technologies as mobile devices, drones, and online marketplaces. Farmcrowdy and Thrive Agric are just some of the online platforms that have facilitated the buying and selling of farm products. At the same time, various technologies have been adopted to ensure a steady supply of agricultural inputs. The manufacturing sector was also significantly impacted by the pandemic. With free movement of people and goods restricted, manufacturers faced shortages of raw materials and had to adopt more digital technologies to make their supply chains more reliable. Many manufacturers are now relying on inventory management systems and enterprise resource planning software to make their supply chains more efficient. However, the overall impact of the pandemic on the sector has been mixed due to challenges with digital infrastructure and a lack of digital skills. The healthcare sector was also severely impacted by the pandemic, necessitating the need to make its supply chains more resilient. Shortages of critical medical supplies and equipment hampered the response to the pandemic, which prompted the adoption of more digital technologies to monitor and manage supplies more effectively. E-pharmacies, telemedicine, and other digital technologies such as DrugStoc and Helium Health have been increasingly used to make healthcare supply chains more reliable.

The retail and FMCG sectors were significantly disrupted by the pandemic, which led to an increase in e-commerce and

contactless delivery services. Larger companies responded more quickly to the need for digital technologies to ensure business continuity, while smaller enterprises struggled with limited access to finance and digital technologies. The overall impact of the pandemic on this sector was also mixed. The information and communication technology (ICT) sector plays a critical role in supporting the resilience of other sectors' supply chains by providing the much-needed digital infrastructure. Cloud computing platforms, big data analytics, and mobile technologies have all been increasingly used to support supply chains in various sectors. However, challenges with digital infrastructure, affordability, cybersecurity, and digital literacy present significant challenges to making supply chains more resilient. The COVID-19 pandemic has undoubtedly accelerated the rate at which various sectors embrace digital technologies. However, the impact of the pandemic has been mixed, with some sectors and businesses being more resilient than others. As a result, there is a need for stronger public-private partnerships and policies that encourage the use of more digital technologies to ensure supply chain resilience and promote economic growth.

Impact of COVID-19 on the Supply Chains in Nigeria

The COVID-19 pandemic revealed many weaknesses in Nigeria's supply chains, including the interruption of goods and services, as well as the insufficiency of the manual and road-dependent logistics system. The lockdowns, restrictions, lack of manpower, and closures of borders led to disruptions in the flow of food, fuel, medical supplies, and other necessities. Moreover, the congestion of the country's ports reduced the inflow of goods, hampering both local and international trade. In addition, the traditional paper-based and reactive supply chains were inadequate in responding to the new realities, creating the need for digitized and cloud-based solutions. As such, many organisations started using cloud technologies, AI, IoT, and e-procurement systems to make supply chains agile and responsive while ensuring proper inventory management and demand forecasting. Furthermore, small and medium-sized enterprises (SMEs) that form the backbone of Nigeria's economy were especially hard-hit by the pandemic, as they often lacked the financial and technological capabilities to cope with lockdowns and trade restrictions. However, during the pandemic, many SMEs adopted e-commerce platforms and new digital tools for deliveries and procurement, thus acquiring new competencies for future challenges.

Lastly, the pandemic-induced demand for e-commerce and innovations in digital logistics created new opportunities for local businesses. For a start, the popularity of contactless payments and online shopping increased, enabling companies like Jumia, Gokada, Max.ng, and others to provide critical supply chain solutions in Nigeria's urban centers. Moreover, the government

and private entities recognise the importance of digitisation for making supply chains more resilient and were willing to invest heavily in the development of the digital economy. As such, Nigeria's National Digital Economy Policy and Strategy 2020 – 2030 and other private and public initiatives will play an important role in driving digital supply chains and logistics transformation in the years to come.

Post-COVID Strategic Outlook

As Nigeria progresses towards post-pandemic recovery, supply chain resilience has emerged as a critical indicator of organisational performance and long-term competitiveness. Increasingly, organisations are investing in advanced digital technologies, including predictive analytics, blockchain for enhanced supply chain transparency, digital twins for scenario modelling, and geospatial intelligence to support real-time decision-making (Adigun et al, 2026). The adoption of these technologies is enabling firms to transition from reactive supply chain management to more proactive, data-driven, and resilient operational strategies.

Despite these advances, significant challenges continue to impede the widespread adoption and scalability of digital technologies across Nigeria's supply chain ecosystem. Persistent infrastructural deficiencies, cybersecurity threats, inadequate broadband penetration, and a continuing shortage of digital skills remain major barriers to the effective implementation of digital solutions. These constraints are particularly pronounced among small and medium-sized enterprises (SMEs) and organisations operating in underserved regions, where limited access to digital infrastructure further restricts technological transformation.

The COVID-19 pandemic served both as a major disruptor and as a catalyst for digital transformation. While it exposed longstanding structural weaknesses within Nigeria's supply chains, it also accelerated the adoption of innovative digital technologies capable of improving visibility, agility, and resilience. Sustaining this momentum will require a coordinated and collaborative approach involving government, industry, academia, and civil society. Strategic investments in digital infrastructure, supportive regulatory frameworks, capacity development, and technological innovation will be essential to establish an inclusive, adaptive, and resilient supply chain ecosystem capable of withstanding future disruptions and supporting sustainable economic development in Nigeria.

Application of ICT in Building Resilient Supply Chains in Post-COVID-19 Nigeria

The COVID-19 pandemic revealed weaknesses in Nigeria's supply chains and spurred the need to embrace information and communication technology (ICT) to enhance supply chain capabilities and resiliency. ICT offers benefits such as improved inventory visibility, integrated information management, and agility in supply chain

management (SCM). For example, enterprise resource planning, warehouse management systems, radio-frequency identification, and position-global satellite systems enable logistics managers to identify areas of improvement in their supply chains. In addition, e-procurement and electronic order management systems help reduce costs and support business operations, especially in pharmaceutical and food supplies. The cloud helps small and medium-sized enterprises manage their inventories and connect with other supply chain partners online.

Moreover, automation, internet of things, robotics, artificial intelligence, and predictive analytics have been pivotal in improving warehousing, inventory management, and dispatch activities. Finally, through integrated communication systems, ICT supports improved collaboration among supply chain partners and provides end-to-end visibility in decision-support systems while enabling effective SCM processes in Nigeria.

However, there are challenges hindering the extensive use of ICT in supply chains. These include weak infrastructure, insufficient electricity supply, poor broadband penetration, cybersecurity challenges, insufficient skills, and high costs of adopting new technologies. Thus, there is a need to invest in the development of robust digital infrastructure, appropriate regulatory frameworks, and promote digital literacy to achieve higher supply chain resiliency, agility, and organizational competitiveness in Nigeria.

Conclusion

This study contributes by providing empirical evidence and theoretical framework on the importance of digital technologies for supply chain resilience in post-COVID-19 Nigeria. The study discovers that with the help of information and communication technology solutions, like enterprise resource planning systems or cloud computing, artificial intelligence, the Internet of Things, and e-procurement, supply chain management in various industries may become more adaptive and agile to improve organisational performance. It also reveals that technology supports small and medium-sized enterprises to be more competitive and innovative, thus building their supply chain resilience in the face of disruptions.

Both theoretically and practically, the study contributes significantly to closing the gap between the need for digital technologies in different industries and their current level of adoption. These technologies make it possible to ensure cost-efficiency, save time, and optimise resources to make several key sectors, including agriculture, manufacturing, health, and retail, more competitive. One of the paper's strengths is that it identifies areas where digital technologies can be integrated to make the supply chain more responsive. This discovery extends the understanding of how to implement these solutions in different

industries to build supply chain resilience in post-COVID-19 Nigeria.

However, the study has a few weaknesses, including its reliance on secondary data, and the fact that the dataset includes only a small proportion of small and medium-sized enterprises. Therefore, the findings may not be generalised to a larger population of businesses, as they only represent a small portion of the overall market. The study's limitations are connected to the data collection methods and availability and are not related to its research design. To address the limitation, future studies should attempt to involve a broader range of participants in the research to obtain more reliable results. Another direction of future research could be exploring ways to support sustainable financing of supply chains, as well as how specific policies could help different industries build their resilience with the help of technology.

Implications/Recommendations

Based on the findings of this study on the critical role of information and communication technology (ICT) in strengthening supply chain resilience in post-COVID-19 Nigeria, the following recommendations are proposed to address existing challenges and maximise the benefits of digital transformation:

1. The Nigerian Government, in partnership with the private sector, should prioritise substantial investment in broadband infrastructure, cloud computing facilities, and data centres. Expanding reliable digital connectivity, particularly within rural communities and industrial clusters, is essential for ensuring equitable access to digital technologies and facilitating their effective integration into supply chain operations.
2. Targeted training and capacity-building programmes should be implemented for supply chain professionals, logistics operators, and small and medium-sized enterprises (SMEs) to address existing digital skills shortages. Universities, polytechnics, and other tertiary institutions should incorporate supply chain digitalisation into their curricula, while government agencies should provide professional certification and continuous upskilling initiatives to strengthen technical competencies.
3. Supply chain stakeholders should be encouraged to adopt innovative technologies such as blockchain to enhance transparency, the Internet of Things (IoT) for real-time monitoring and tracking, artificial intelligence (AI) for predictive analytics, and robotics to improve warehouse automation and operational efficiency. Pilot projects and innovation hubs should be established to evaluate and scale these technologies within the Nigerian context.

4. The Nigerian Government should develop and implement supportive policies that encourage digital transformation across supply chains. Such measures should include fiscal incentives for ICT investment, robust cybersecurity legislation, comprehensive e-commerce regulations, and nationally recognised standards for data sharing, interoperability, and digital governance among supply chain stakeholders.
5. Effective collaboration among government agencies, private sector organisations, development partners, and academic institutions is essential for accelerating digital transformation within supply chains. Public-private partnerships should be strengthened to mobilise financial resources, facilitate technology transfer, promote innovation, and encourage knowledge sharing across sectors.
6. As SMEs constitute a vital component of Nigeria's supply chain ecosystem, targeted interventions should be introduced to facilitate their digital transformation. These should include subsidised access to digital technologies, low-interest financing for ICT investments, and the development of digital marketplaces capable of integrating informal enterprises into formal supply chain networks.
7. A comprehensive national strategy should be formulated to guide the digital transformation of Nigeria's supply chains. The strategy should establish clear short-, medium-, and long-term objectives, define institutional responsibilities, and incorporate measurable performance indicators to monitor implementation and evaluate progress.
8. ICT should be deployed not only to improve operational efficiency but also to strengthen systemic supply chain resilience. This can be achieved through the application of advanced data analytics for risk forecasting, digital dashboards for real-time crisis monitoring, and resilient communication platforms that support supply chain continuity during future disruptions.

Collectively, these recommendations provide a strategic framework for enhancing the resilience, agility, and competitiveness of Nigeria's supply chains. Their effective implementation would not only strengthen the country's capacity to withstand future disruptions but also position Nigeria as a leading regional hub for smart logistics, digital trade, and sustainable economic development in the post-pandemic era.

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