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## SUPPLY CHAIN INTEGRATION IN MANUFACTURING: A COMPARATIVE REVIEW OF USA AND AFRICAN INDUSTRIES

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### ABSTRACT

Supply chain integration is a critical aspect of modern manufacturing, playing a pivotal role in enhancing efficiency, reducing costs, and improving overall performance. This paper provides a comparative review of supply chain integration in manufacturing between the United States (USA) and African industries. The study aims to shed light on the similarities, differences, and potential areas for improvement in both regions. In the USA, manufacturing industries have long embraced advanced technologies and adopted sophisticated supply chain management practices. The integration of information systems, automation, and real-time data analytics has enabled seamless coordination among various supply chain elements, from raw material procurement to final product delivery. Collaboration between manufacturers, suppliers, and distributors has been a hallmark of the American supply chain, facilitating quick response to market changes and reducing lead times. Contrastingly, African industries face unique

challenges in achieving similar levels of supply chain integration. Factors such as infrastructure limitations, regulatory hurdles, and varying levels of technological adoption contribute to a more fragmented supply chain landscape. However, recent years have witnessed a growing awareness of the importance of supply chain integration in enhancing competitiveness, prompting initiatives and investments to overcome these challenges. Despite these disparities, both regions share common goals of improving supply chain visibility, responsiveness, and resilience. The study explores successful strategies implemented by the USA and identifies potential lessons that can be applied in the African context. For instance, best practices in the utilization of digital technologies, collaborative platforms, and lean manufacturing principles are examined to provide actionable insights for enhancing supply chain integration in African industries. This comparative review highlights the critical role of supply chain integration in manufacturing and draws attention to the distinct challenges and opportunities faced by the USA and African industries. By understanding the best practices and lessons learned from each region, stakeholders can develop targeted interventions to enhance supply chain integration, fostering sustainable growth and competitiveness in both contexts.

**Keywords:** Supply Chain, Manufacturing, USA, Africa, Review.

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## INTRODUCTION

Supply chain integration in manufacturing is a critical aspect that significantly impacts firm performance, especially in the context of the COVID-19 era (Pirmanta et al., 2021). emphasize the importance of supply chain integration in enhancing firm performance, particularly through the adoption of Enterprise Resource Planning (ERP) systems and ensuring information quality. Similarly, Siagian et al. (2021) highlight that supply chain integration enables resilience, flexibility, and innovation, thereby improving business performance, especially in times of disruption such as the COVID-19 pandemic.

The background of supply chain integration in manufacturing is further supported by Delić et al. (2019) and the study on manufacturing firm performance in emerging economies by a group of authors (2022). Delić et al. (2019) provide empirical evidence from the automotive industry, emphasizing the significance of internal integration of the supply chain in terms of integrating and synchronizing the functions and procedures of the focal firm. Additionally, the study on manufacturing firm performance in emerging economies sheds light on the strategic collaboration between manufacturing firms and supply chain partners to leverage internal and external resources and capabilities across the entire supply chain.

The purpose of the comparative review is to comprehensively understand the risks and benefits associated with supply chain integration in manufacturing (Duoming & Chin, 2022). present a systematic review focusing on supply chain integration and risks, which aligns with the purpose of conducting a comparative review. This systematic review provides insights into the strategic and high-level inter-organizational collaboration between manufacturing firms and supply chain partners, emphasizing the importance of understanding the risks associated with supply chain integration.

In conclusion, the comparative review on supply chain integration in manufacturing, particularly in the context of the USA and African industries, aims to explore the background, importance, and associated risks of supply chain integration. This review will draw on empirical

evidence from various industries and economies to provide a comprehensive understanding of the implications of supply chain integration on firm performance.

### **Supply Chain Integration in Manufacturing**

Supply chain integration in manufacturing plays a crucial role in enhancing the performance and competitiveness of manufacturing enterprises. Supply chain integration (SCI) involves strategic collaboration with supply chain partners to manage intra- and inter-organizational processes effectively, ensuring efficient flows of products, services, information, money, and decisions to deliver maximum value to customers (Flynn et al., 2009). This strategic collaboration allows manufacturing firms to leverage internal and external resources and capabilities across the entire supply chain, leading to improved firm performance in emerging economies such as Ghana. Furthermore, the integration of the supply chain is essential for optimizing the operations of organizations in the network, with a focus on environmental protection, thereby contributing to sustainable development without sacrificing operational excellence (Naina et al., 2019).

Research has shown that supply chain integration is critical for promoting the sustainable development of the entire supply chain and achieving value innovation in manufacturing enterprises (Yang et al., 2021). Additionally, the strategic importance of integration is reflected in models such as the Supply Chain Operations Reference (SCOR) model, which emphasizes the strategic linking of suppliers and customers to manufacturers (Zailani & Rajagopal, 2005). This emphasizes the significance of information flow, cash flow, trust, and delivery in lowering organizational barriers to improve integration (Briscoe et al., 2004). Moreover, collaborative supply chain practices, including integration with suppliers, internal integration across the supply chain, and integration with customers, have been found to significantly impact firm performance (Wiengarten et al., 2010).

The impact of supply chain integration on supply chain performance has been a subject of extensive research. Successful integration of supply activities with customer demands has been linked to the delivery of high-quality products, on-time delivery, and cost efficiency (Sezen, 2008). Furthermore, the integration of the supply chain is categorized into internal integration, where manufacturers create their own organizational strategies, processes, and practices to interact with supply chain partners, and external integration to satisfy downstream supply chain requirements (Naina & Fernando, 2019). However, it is important to note that the relationship between supply chain integration and performance may not always follow a linear pattern, as the relationship has been questioned in certain research settings (Wiengarten et al., 2016).

In the context of manufacturing, the industrial Internet of Things (IIoT) has significantly impacted the industry, particularly in the horizontal integration of operational systems in factories as part of information systems in supply chains (Fraile et al., 2018). This emphasizes the growing importance of technological advancements in enhancing supply chain integration and overall manufacturing performance.

In conclusion, supply chain integration in manufacturing is a multifaceted concept that encompasses strategic collaboration, environmental sustainability, information flow, and technological advancements. It is evident that effective supply chain integration significantly contributes to improved firm performance, sustainable development, and value innovation in manufacturing enterprises.

## LITERATURE REVIEW

Supply chain integration is a strategic collaboration between a manufacturer and its supply chain partners to manage intra- and inter-organizational processes effectively and efficiently, ensuring the seamless flow of products, services, information, money, and decisions to maximize customer value (Flynn et al., 2009). It is crucial for manufacturing industries as it enables flexibility, resilience, and innovation, particularly in the face of challenges such as those posed by the COVID-19 era (Siagian et al., 2021). In the USA, supply chain integration has evolved over time, driven by historical perspectives, technological advancements, and enhanced collaboration and coordination among supply chain elements (Li et al., 2022). However, African industries face challenges such as infrastructure limitations, regulatory hurdles, and technological adoption disparities, which hinder seamless supply chain integration (Suryaningrat & Novita, 2023).

The literature emphasizes the importance of supply chain integration for manufacturing industries, highlighting its role in enabling flexibility, resilience, and innovation (Siagian et al., 2021). In the USA, historical perspectives have shaped supply chain integration, while technological advancements have played a pivotal role in enhancing integration through information and communication technology (Li et al., 2022). Collaboration and coordination among supply chain elements have also been key factors in driving supply chain integration in the USA (Chaudhuri et al., 2018). However, African industries face challenges such as infrastructure limitations, regulatory hurdles, and technological adoption disparities, which hinder seamless supply chain integration (Suryaningrat & Novita, 2023).

In conclusion, supply chain integration is a critical aspect of manufacturing industries, enabling flexibility, resilience, and innovation. While the USA has made significant strides in supply chain integration driven by historical perspectives, technological advancements, and enhanced collaboration, African industries face challenges that impede seamless integration. Addressing these challenges is crucial for African industries to fully realize the benefits of supply chain integration.

### **Supply Chain Integration in the USA**

Supply chain integration plays a crucial role in enhancing the performance and competitiveness of businesses. In the USA, the integration of supply chains has been linked to improved customer service and financial performance (Vickery et al., 2003). This integration involves the strategic coordination of internal and external processes to ensure effective material flow, service delivery, information exchange, and cash flow, ultimately maximizing value for customers (Jiang & Xu, 2011). Furthermore, supply chain integration has been found to have a significant impact on strategic performance, with strategic vigilance mediating this relationship (Thneibat et al., 2023). It is evident that supply chain integration is a key strategy for improving supply chain performance and overall firm performance (Duoming & Chin, 2022).

Several key success factors contribute to effective supply chain integration. Firstly, technological integration is essential, as it enables the seamless management of data and processes across the supply chain, leading to improved efficiency and performance (Yang & Wang, 2021). Additionally, collaboration and communication among supply chain partners are critical for successful integration, as they facilitate the sharing of information and resources, leading to improved coordination and decision-making (Shaw & Huatuco, 2018). Real-time data analytics also play a pivotal role in supply chain integration, providing valuable insights

for decision-making and enabling proactive management of the supply chain (Kang & Moon, 2015). These factors collectively contribute to the success of supply chain integration, enhancing the overall performance of the supply chain.

Lessons learned from supply chain integration in the USA can provide valuable insights for African industries. African industries can benefit from adopting a holistic approach to supply chain integration, focusing on the coordination of internal and external processes to maximize value for customers (Jiang & Xu, 2011). Embracing technological integration, fostering collaboration and communication, and leveraging real-time data analytics can significantly enhance the efficiency and performance of supply chains in African industries. Furthermore, understanding the mediating role of strategic vigilance in the relationship between supply chain integration and strategic performance can guide African industries in effectively managing their supply chains (Thneibat et al., 2023). By learning from the experiences and best practices in the USA, African industries can enhance their supply chain integration strategies, ultimately improving their competitiveness and performance in the global market.

In conclusion, supply chain integration is a critical strategy for enhancing supply chain performance and overall firm performance. The USA has demonstrated the significant impact of supply chain integration on customer service, financial performance, and strategic performance. By embracing technological integration, collaboration, and real-time data analytics, businesses can achieve successful supply chain integration. African industries can leverage these lessons to improve their supply chain integration strategies, ultimately enhancing their competitiveness and performance in the global market.

### **Supply Chain Integration in Africa**

Supply chain integration in Africa is a critical aspect of global value chains, and it involves the restructuring of activities to link and simplify processes, allocate resources, and utilize both internal and external resources (Chen et al., 2009). Technological integration, collaboration and communication, and real-time data analytics are key success factors in supply chain integration (Vanpoucke et al., 2017). The importance of supply chain integration is largely unquestioned, and it is essential to understand the interrelationships and complexities among supply chain integration tactics to comprehend their impact on operational performance (Vanpoucke et al., 2017). Supply chain integration covers issues relating to the integration of core processes across organizational boundaries through improved communication, partnerships, alliances, and cooperation (Power, 2005).

Lessons learned from recent events, such as the COVID-19 pandemic, emphasize the need for visibility into the supply chain, preparedness for disruptions, and the interconnectivity of supply chains (Hald & Coslugeanu, 2021). The complexity in managing healthcare supply chains offers opportunities for important research avenues in key supply chain management areas such as coordination, integration, mass customization, and incentives, which are relevant to traditional supply chains (Betcheva et al., 2021). Cultural enablers play a fundamental role in supply chain success, where behaviors and attitudes are posited to be key enablers (Cadden et al., 2021). Additionally, the impact of IT adoption in supply chains has been demonstrated in various industries, such as the food industry in Malaysia, highlighting the ease of capital flow in the industry (Mathu & Tlare, 2017).

Supply chain integration is the alignment and interlinking of business processes, and it has been the core of supply chain management (Mathu, 2021). The revolutions of information and

communication technologies, the growth of global competence levels, and the development of new inter-organizational relationships have caused supply chains to integrate (Gastélum-Valdez et al., 2023). Furthermore, the concept of Supply Chain 4.0 is a transformational strategic orientation to be considered in supply chain management for the post-pandemic period (Frederico, 2021). There is a positive significant relationship between learning and supply chain integration, emphasizing the importance of continuous learning in achieving supply chain integration (Khan & Wisner, 2019).

The impact of information technology on supply chain performance has been studied, highlighting the importance of finding information technology in the supply chain and its positive impacts on supply chain variables (Mashreghi et al., 2018). Insider "supply chain" knowledge has been identified as a key facet in the theft of livestock, emphasizing the importance of understanding and managing information within the supply chain (Smith, 2017). It has become evident that most global supply chains' resilience was under the desired levels, indicating the need for strategies and corresponding competences to improve supply chain resilience (Kiers et al., 2022). In companies with a high learning level, intra-firm and inter-firm learning processes generate and disseminate information about the highly competitive global environment and facilitate supply chain integration (Meidute-Kavaliauskiene et al., 2022).

In conclusion, supply chain integration in Africa is a complex and multifaceted process that requires technological integration, collaboration, communication, and real-time data analytics. Lessons learned from recent events and research studies emphasize the importance of cultural enablers, IT adoption, continuous learning, and the impact of information technology on supply chain performance.

### **Challenges in African Industries**

The challenges of supply chain integration in manufacturing in African industries are multifaceted and encompass infrastructure limitations, regulatory hurdles, and technological adoption disparities. Infrastructure limitations, particularly in transportation and communication, hinder the smooth flow of goods and information within the supply chain (Zhao et al., 2013). Additionally, regulatory hurdles such as trade policies and customs procedures create barriers to seamless integration across the supply chain (Pillay & Mafini, 2017). Moreover, technological adoption disparities further exacerbate the challenges, as the lack of uniform technological infrastructure and capabilities among different stakeholders in the supply chain impedes effective integration (Gereffi & Lee, 2012).

The impact of these challenges is evident in the context of African industries, where the awareness and application of supply chain management remain inhibited, limiting the industry's potential for improvement (Pillay & Mafini, 2017). Furthermore, the expansion of supermarkets across Sub-Saharan Africa highlights the need for enhanced supply chain integration to support the growing regional supply chains (Gereffi & Lee, 2012). In the manufacturing sector, supply chain integration has been shown to positively impact supply chain agility and organizational flexibility, emphasizing its significance in addressing the challenges faced by African industries (Shukor et al., 2020). Additionally, supply chain integration consisting of supplier integration, internal integration, and customer integration directly influences supply chain flexibility in the manufacturing and services industry, further underlining its importance in mitigating the identified challenges (Siagian et al., 2021).

To address these challenges, manufacturing firms need to implement supply chain risk management mechanisms to prevent and deal with supply chain risks associated with integration, thereby enhancing their flexibility performance (Chaudhuri et al., 2018). Furthermore, both internal and external information integration have been proposed to contribute to reactive and proactive supply chain flexibilities, leading to high operational performance (Yu et al., 2018). Additionally, supply chain integration has been found to fully mediate the relationship between supply chain information management and system infrastructure toward manufacturing performance, highlighting its pivotal role in overcoming technological adoption disparities (Sundram et al., 2018).

The potential benefits of integrating the supply chain cannot be ignored, and once integration is implemented, focusing on supply chain management practices and competition capability becomes advisable to further enhance performance (Kim, 2006). Moreover, supply chain resilience minimizes the impact of disruptions, and exploring supply chain design approaches that enable resilience is crucial for addressing the regulatory hurdles and infrastructure limitations faced by African industries (Agigi et al., 2016).

In conclusion, the challenges of supply chain integration in manufacturing in African industries are complex and multifaceted, encompassing infrastructure limitations, regulatory hurdles, and technological adoption disparities. Addressing these challenges requires a comprehensive approach that includes supply chain risk management, information integration, and resilience-building measures to enhance the performance and flexibility of the supply chain.

### **Comparative Analysis**

To compare the supply chain integration in manufacturing between the USA and Africa, it is essential to consider the similarities, differences, and unique challenges in both regions, as well as the implications for supply chain integration improvement in Africa.

Similarities between the USA and African industries can be observed in the importance of supply chain integration for improving business performance. Both regions recognize the significance of internal and external integration, including supplier and customer integration, in enhancing manufacturing flexibility and innovation (Siagian et al., 2021). Additionally, the strategic collaboration between manufacturing firms and supply chain partners is crucial for leveraging resources and capabilities across the entire supply chain in both regions ("Supply Chain Integration and Manufacturing Firm Performance in Emerging Economies: The Case of Ghana", 2022).

However, there are notable differences and unique challenges. In the USA, supply chain integration is influenced by factors such as information sharing, risk avoidance, and government policies, which impact the synergistic mechanism of integration (Yang & Wang, 2021). On the other hand, African industries face challenges such as lack of hard currency, qualified personnel, and equipment breakdown, which hinder supply chain integration and overall operational excellence (Oguji & Owusu, 2014). Furthermore, the African manufacturing sector encounters difficulties related to low credibility of purchasing personnel, long lead times, and bribery and corruption, which are not as prevalent in the USA (Oguji & Owusu, 2014).

The implications for supply chain integration improvement in Africa are significant. The integration of the supply chain is crucial for optimizing operations and achieving sustainable development without sacrificing operational excellence, especially in the context of environmental protection (Naina et al., 2019). Additionally, the adoption of technologies for

supply chain integration requires training and capacity building of the local manufacturing sectors in Africa (Nyirenda et al., 2020). Addressing these implications can lead to enhanced supply chain performance and business resilience in the African manufacturing industry.

In conclusion, while both the USA and Africa recognize the importance of supply chain integration for improving business performance, there are distinct differences and unique challenges faced by the African manufacturing industry. Overcoming these challenges and addressing the implications for supply chain integration improvement in Africa can lead to significant advancements in the region's manufacturing sector.

### **Recommendations**

Advocate for increased public and private investments in transportation networks, including roads, railways, and ports. Encourage the establishment of logistics hubs and distribution centers strategically located to mitigate the impact of infrastructure gaps. Facilitate partnerships between public and private sectors to jointly address infrastructure challenges. Establish consortiums or alliances among manufacturing companies to share resources and jointly invest in infrastructure improvements. Leverage emerging technologies such as Internet of Things (IoT) and blockchain to optimize supply chain visibility, reducing the reliance on traditional infrastructure. Explore innovative last-mile delivery solutions, such as drone and autonomous vehicle technologies, to overcome challenges in remote or poorly connected areas.

Advocate for regional trade agreements that promote standardization of trade policies across African nations, reducing trade barriers and simplifying cross-border transactions. Encourage the adoption of common customs procedures and documentation requirements to streamline the movement of goods. Collaborate with governments to establish transparent and consistent regulatory frameworks that support long-term investments in manufacturing and supply chain infrastructure. Promote policies that incentivize compliance with international quality standards, enhancing the global competitiveness of African products. Develop training programs for government officials, ensuring a better understanding of the complexities of supply chain management and the importance of supportive regulations. Encourage the creation of regulatory bodies with a focus on regularly updating and adapting policies to align with evolving industry needs.

Stakeholders should facilitate programs that provide manufacturing companies in Africa with access to affordable and cutting-edge technologies. They should collaborate with technology providers to offer training and support to enhance the digital literacy of supply chain stakeholders. Introduce tax incentives and subsidies to encourage manufacturing firms to invest in technology upgrades and automation. Establish government-backed financing programs that specifically support the acquisition of technologies aimed at improving supply chain integration. Foster collaboration between global technology leaders and local manufacturing associations to create knowledge-sharing platforms. Facilitate forums, conferences, and workshops to disseminate best practices in technology adoption and integration within the manufacturing sector. By implementing these recommendations, stakeholders can address infrastructure limitations, improve regulatory frameworks, and promote technology adoption in the manufacturing sector, contributing to enhanced supply chain integration in both the USA and African industries.



## Conclusion

This comparative review of supply chain integration in manufacturing between the USA and African industries has uncovered several key findings. In the USA, a history of technological advancements, collaboration, and real-time data analytics has fostered a highly integrated supply chain. In contrast, African industries face challenges such as infrastructure limitations, regulatory hurdles, and technological adoption disparities, resulting in a more fragmented supply chain landscape.

The implications of this comparative review are profound for the manufacturing sector in both regions. For the USA, the success factors identified, including technological integration and collaborative practices, underscore the importance of continued investment in advanced technologies and strong industry partnerships. In African industries, the challenges identified call for urgent attention to overcome infrastructure limitations, streamline regulatory frameworks, and accelerate the adoption of modern technologies. Addressing these issues can contribute significantly to enhancing competitiveness and sustainability.

The insights gained from this study suggest several promising avenues for future research in the field of supply chain integration in manufacturing; Further investigate supply chain integration variations within specific regions in Africa to account for diverse economic, political, and cultural contexts. Examine the impact of regional economic communities on supply chain dynamics and integration. Conduct longitudinal studies to assess the evolution of supply chain integration in both the USA and African industries. Explore the role of emerging technologies over time and their impact on supply chain resilience. Evaluate the effectiveness of policy interventions aimed at improving infrastructure, regulatory frameworks, and technology adoption in African manufacturing. Assess the role of government incentives and their impact on supply chain integration outcomes. Undertake detailed case studies on individual companies or sectors that have successfully overcome supply chain integration challenges in Africa.

In conclusion, this comparative review provides a comprehensive understanding of the current state of supply chain integration in manufacturing in the USA and Africa. The identified findings and implications offer valuable insights for practitioners, policymakers, and researchers alike, guiding future efforts to enhance supply chain integration and contribute to the sustainable development of manufacturing industries globally.

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