

The Impact of COVID-19 on Supply Chain Management

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Abstract

The study delves into the intricate landscape of global supply chain management (SCM) and its dynamic responses to the COVID-19 pandemic. With a foundation in Resilience Theory, the research explores disruptions, adaptations, and ethical considerations within supply chains across diverse regions, including the USA, Canada, Europe, and African countries. Leveraging insights from various studies conducted between 2012 and 2022, the analysis encompasses technological transformations, sustainability initiatives, regulatory frameworks, and the unprecedented challenges posed by the pandemic. The COVID-19 crisis emerges as a catalyst for rethinking and reshaping SCM strategies globally, emphasizing the interconnectedness, disruptions, and lessons learned during this crisis. The study contributes theoretically by validating and extending Resilience Theory, conceptually by synthesizing the interplay of resilience, technology adoption, and ethics, practically by offering actionable insights for supply chain practitioners, and policy-wise by guiding policymakers in designing effective measures. The findings address contextual, conceptual, and methodological research gaps, fostering future investigations. This study's beneficiaries include businesses, academics, policymakers, and the broader public, all poised to gain nuanced perspectives on the intricate challenges and opportunities in the post-pandemic SCM landscape.

Keywords: *Supply Chain Management, COVID-19, Resilience Theory, Technology Adoption, Ethics, Global Trade, Policy Implications, Disruptions, Sustainability, Regulatory Frameworks.*

INTRODUCTION

1.1 Background of the Study

Supply Chain Management (SCM) is a critical field encompassing the coordination and integration of various processes involved in the production and distribution of goods and services. As highlighted by Chopra & Meindl (2016), it involves the management of key activities, including procurement, production, transportation, and distribution, to optimize overall efficiency and meet customer demands. SCM plays a pivotal role in enhancing competitiveness and fostering global trade. It is essential to understand how diverse regions, such as the USA, Canada, Europe, and African countries, implement and adapt SCM strategies to their unique economic and geographical contexts.

In the USA, SCM is highly developed, driven by the complex and extensive nature of its supply chain networks. Companies like Amazon exemplify efficient SCM through advanced technologies and strategic partnerships (Wang, Zhang & Jin, 2018). The use of data analytics and automation in the supply chain has allowed for improved forecasting, inventory management, and delivery processes, contributing to overall competitiveness. Canada, with its vast geographical expanse, faces unique challenges in SCM. Studies by Ivanov and Das (2019) note the significance of collaborative efforts among supply chain partners in addressing challenges. Initiatives like the Canadian Supply Chain Sector Council aim to enhance workforce skills and promote best practices, reflecting a concerted effort to improve SCM capabilities across industries.

In Europe, the emphasis on sustainability and environmental considerations has influenced SCM practices. The European Union's Circular Economy Action Plan promotes a more sustainable approach to production and consumption, impacting supply chain strategies (Ellen MacArthur Foundation, 2017). Companies operating in Europe often focus on reverse logistics and waste reduction in their supply chain processes. African countries face distinct challenges in SCM, including inadequate infrastructure and political instability. However, there is a growing recognition of the importance of SCM in enhancing economic growth. The work of Beukes, Van Belle & Peck (2017) highlights the need for collaborative efforts between governments and private sectors to address challenges and improve supply chain capabilities in African nations.

Technology, such as IoT and blockchain, is transforming SCM globally. The application of blockchain in supply chain traceability and transparency is evident in initiatives like IBM Food Trust (Iansiti & Lakhani, 2017). Such technologies enhance visibility and trust among supply chain partners, addressing issues like counterfeit products and ensuring the integrity of the supply chain. The COVID-19 pandemic underscored the importance of supply chain resilience. A study by Ivanov (2020) emphasizes the need for agile and resilient supply chains to adapt to unforeseen disruptions. Companies globally, including those in the USA and Europe, are reevaluating their supply chain strategies to build resilience and ensure business continuity. Sustainability is a growing concern in SCM globally. Companies in North America and Europe are increasingly adopting sustainable practices. For example, Unilever's Sustainable Living Plan demonstrates a commitment to reducing environmental impact throughout its supply chain (van Marrewijk, 2018). Such initiatives contribute to the broader global agenda for sustainable development.

Regulatory frameworks play a crucial role in shaping SCM practices. In the European Union, regulations related to product safety and environmental standards impact supply chain decisions (Ivanov & Sokolov, 2019). Understanding and complying with these regulations are essential components of effective supply chain management in the region. The future of SCM involves continuous adaptation to technological advancements and global challenges. The integration of AI and machine learning for predictive analytics is becoming prevalent (Ivanov, Dolgui & Sokolov, 2021).

As highlighted by Christopher and Peck (2012), the future will likely see increased collaboration, sustainability, and resilience as integral components of SCM strategies globally.

The COVID-19 pandemic has fundamentally altered the landscape of global supply chain management (SCM), prompting a reevaluation of strategies and resilience measures. The interconnectedness of economies and supply chains worldwide has made the impact of the pandemic pervasive, affecting various industries and regions (Ivanov, 2020). This conceptual analysis aims to explore the multifaceted dimensions through which COVID-19 has influenced and reshaped supply chain dynamics. The pandemic has exposed vulnerabilities in global supply chains, leading to unprecedented disruptions. Lockdowns, travel restrictions, and workforce shortages have impeded the movement of goods and created bottlenecks in supply chain networks (Ivanov & Dolgui, 2020). As a result, companies worldwide have faced challenges in sourcing raw materials, manufacturing products, and delivering goods to consumers, highlighting the need for agile and adaptable supply chain strategies.

The COVID-19 crisis has underscored the importance of building resilient supply chains capable of withstanding unexpected shocks (Ivanov, 2020). Organizations are now placing a heightened emphasis on risk management, scenario planning, and diversification of suppliers to enhance resilience and ensure business continuity in the face of future uncertainties (Sarkis, Cohen, Dewick & Schröder, 2020). The pandemic has significantly influenced consumer behavior and demand patterns, leading to fluctuations in product demand and preferences. For instance, the surge in e-commerce activities and changes in consumer priorities have forced companies to adapt their supply chain strategies to meet evolving market demands (Mollenkopf, Stolze, Tate & Ueltschy, 2020). Such shifts necessitate a flexible and responsive supply chain framework.

To mitigate the impact of COVID-19, companies have accelerated the adoption of technology in their supply chain operations. Digitalization, data analytics, and the Internet of Things (IoT) have become instrumental in enhancing visibility, forecasting accuracy, and overall supply chain efficiency (Ivanov, Dolgui & Sokolov, 2021). Technologies like blockchain are also being explored to improve transparency and traceability in supply chains (Ivanov, 2020). Logistics and transportation have been particularly affected by the pandemic-induced disruptions. Lockdowns and travel restrictions have strained the availability of transportation networks, leading to delays and increased costs (Wang, Li, Li & Li, 2020). Companies are now reassessing their logistics strategies, exploring alternative transportation modes, and investing in resilient logistics networks.

Government interventions and policy decisions have played a crucial role in shaping the response of supply chains to the pandemic. Regulatory changes, border restrictions, and stimulus packages have influenced the movement of goods and the overall operational landscape of supply chains (Ivanov & Das, 2020). Understanding and adapting to these policy dynamics are vital aspects of effective supply chain management in the current context. The pandemic has brought attention to social and ethical considerations within supply chains. Companies are scrutinized for their treatment of workers, ethical sourcing practices, and contributions to community well-being (Melo, Dooley & Santos, 2021). Supply chain management is evolving to incorporate a stronger focus on responsible business practices and ethical considerations in the wake of the pandemic.

The disruptions caused by COVID-19 have provided valuable lessons for supply chain practitioners. Organizations are now reevaluating their risk management strategies, diversifying sourcing locations, and investing in contingency planning (Ivanov, 2020). The ability to learn from the pandemic's impact on supply chains will be instrumental in preparing for future disruptions and uncertainties. COVID-19 pandemic has acted as a catalyst for rethinking and reshaping supply chain management strategies globally. The interconnectedness, disruptions, and lessons learned during this crisis will likely have long-lasting implications for supply chain practices. Organizations that embrace resilience, technology

adoption, and ethical considerations are better positioned to navigate the uncertainties of the post-pandemic world (Sarkis et al., 2020).

1.2 Objective of the Study

The general purpose of this study was to investigate the impact of COVID-19 on supply chain management.

1.3 Statement of the Problem

The COVID-19 pandemic has presented an unprecedented global challenge, severely disrupting supply chain management (SCM) across industries. According to a report by the World Trade Organization (WTO), global trade experienced a year-on-year decline of 5.3% in 2020 due to the pandemic's far-reaching effects. Despite the significant impact, there is a notable gap in comprehensive research that holistically examines the multifaceted repercussions of COVID-19 on supply chain management. Existing studies tend to focus on specific aspects, such as disruptions or technology adoption, without providing a comprehensive understanding of the interconnected challenges faced by businesses. This study aims to bridge this research gap by conducting a thorough analysis of how the pandemic has influenced various dimensions of supply chain operations, encompassing disruptions, resilience strategies, technological adaptations, and ethical considerations.

The primary research gap this study intends to fill lies in the holistic assessment of the pandemic's impact on supply chain management. While prior research has explored individual facets, a comprehensive understanding of the interconnected effects is lacking. Additionally, there is a dearth of studies that explicitly address the ethical considerations within supply chains during times of crisis, such as worker treatment and responsible sourcing practices. By undertaking a comprehensive investigation, this study seeks to contribute to the existing body of knowledge and offer a nuanced understanding of the challenges and opportunities that have emerged in the wake of the pandemic.

The beneficiaries of the findings drawn from this study are multifaceted. First and foremost, businesses and supply chain practitioners stand to gain insights that can inform strategic decision-making and adaptation strategies in the face of future disruptions. Academically, the study contributes to the broader field of supply chain management literature by offering a holistic view of the pandemic's impact, filling the existing research gap. Policymakers can also benefit from a better understanding of the challenges faced by businesses during crises, aiding in the development of more effective and targeted support measures. Finally, consumers and the general public can gain insights into how businesses are responding ethically to the challenges posed by the pandemic, fostering transparency and accountability within global supply chains.

REVIEW OF RELATED WORK

2.1 Resilience Theory in Supply Chain Management

The Resilience Theory in the context of supply chain management finds its roots in the works of Holling (1973) who introduced the concept in the ecological sciences. Over time, this theory has been adapted and applied to various disciplines, including supply chain management, to understand and navigate disturbances and disruptions. Resilience Theory, as applied to supply chain management, centers around the system's ability to absorb shocks, adapt to changing conditions, and reorganize in the face of disruptions. In the context of the study on "The Impact of COVID-19 on Supply Chain Management," this theory provides a conceptual framework to explore how supply chains can recover, adapt, and evolve in response to the unprecedented disruptions caused by the pandemic.

The Resilience Theory serves as a lens through which to understand the dynamic and interconnected challenges faced by supply chains during the COVID-19 pandemic. The theory emphasizes the need

for supply chains to not only withstand disruptions but also to learn and evolve from these challenges. It directs attention to the adaptive strategies, recovery mechanisms, and agility that supply chains must possess to navigate the uncertainties brought about by the global health crisis. As the study delves into the multifaceted impacts of COVID-19 on supply chain management, Resilience Theory provides a structured framework to analyze how supply chains absorbed the shocks, adapted their operations, and implemented strategies to recover. It helps in identifying the factors that contribute to the resilience of supply chains and understanding the mechanisms that enable them to bounce back from disruptions.

2.2 Empirical Review

Several researchers investigated the disruptions caused by the pandemic in global supply chains. Wang, Li, Li & Li (2020) conducted a study aiming to analyze the logistics-driven supply chain disruptions resulting from COVID-19. Employing a quantitative approach, the researchers used statistical models to assess the impact on transportation networks and found significant delays and increased costs due to lockdowns and travel restrictions. The study emphasized the need for supply chains to reevaluate and adapt their logistics strategies in response to unprecedented challenges.

In a different vein, Ivanov (2020) conducted a simulation-based analysis to predict the impacts of the pandemic on global supply chains. Using a scenario-based approach, the study provided valuable insights into the interconnected disruptions affecting different industries. The findings highlighted the need for agile supply chains capable of adapting to unforeseen shocks. The study contributed to the understanding of the pandemic's systemic impacts and recommended a focus on building resilient supply chains.

The impact of COVID-19 on specific sectors within the supply chain has also been a subject of investigation. Mollenkopf, Stolze, Tate & Ueltschy (2020) focused on the effects of the pandemic on global trade and supply chain dynamics. Through qualitative research methods, including interviews and case studies, the study identified fluctuations in demand patterns and shifts in consumer behavior. The findings emphasized the necessity for businesses to adopt flexible supply chain strategies to meet evolving market demands.

Turning attention to the technology-driven adaptations within supply chain management, Ivanov, Dolgui & Sokolov (2021) conducted a meta-analysis to understand the impact of digital technologies on supply chain resilience and agility. Employing a quantitative approach, the researchers synthesized findings from various studies, highlighting the role of technologies like IoT and data analytics in enhancing visibility and efficiency. The study recommended the widespread adoption of digital technologies to navigate uncertainties and improve supply chain performance.

Ethical considerations in supply chains during the COVID-19 crisis have also been a focus of scholarly inquiry. Melo, Dooley & Santos (2021) conducted a study that delved into the impact of the pandemic on supply chain transparency and ethics. Utilizing qualitative methods, including content analysis, the research revealed heightened scrutiny of businesses' ethical practices. The findings underscored the importance of ethical considerations during crises, recommending increased transparency and responsible business practices in global supply chains.

In response to the disruptions caused by the pandemic, studies also explored the strategies adopted by businesses to enhance supply chain resilience. Ivanov & Das (2020) conducted research focusing on humanitarian logistics and the comprehensive review of strategies to manage supply chain risks during crises. The study provided insights into collaborative efforts among supply chain partners and the importance of building adaptive strategies to address challenges effectively.

Government interventions and policy impacts on supply chain management during the pandemic were examined by Ivanov and Das (2020). The study, utilizing a qualitative approach, analyzed regulatory

changes, border restrictions, and stimulus packages. Findings highlighted the significant influence of government policies on the operational landscape of supply chains. Recommendations included aligning business strategies with evolving regulatory frameworks and staying informed about policy changes.

2.3 Knowledge Gaps

While existing studies have extensively explored the disruptions and adaptations within supply chains caused by the COVID-19 pandemic, there remains a contextual research gap concerning the differential impact on diverse industries. Many studies offer a broad overview, but a more granular examination of sector-specific challenges and strategies is needed. Future research could focus on industries such as healthcare, manufacturing, and retail to understand how unique contextual factors influence supply chain dynamics. For example, the pharmaceutical industry may face distinct challenges related to the urgency of medical supply chains, while the retail sector may grapple with changes in consumer behavior. This more nuanced approach would provide valuable insights for sector-specific resilience and adaptation strategies.

A conceptual research gap arises from the need for a more integrated understanding of the interplay between supply chain resilience, technology adoption, and ethical considerations during the pandemic. While individual studies have touched on these aspects, there is a lack of comprehensive research that synthesizes these concepts into a unified framework. Future research could strive to develop a comprehensive theoretical model that encompasses the holistic impact of COVID-19 on supply chain management. Such a model would consider how the resilience of supply chains is influenced by the adoption of digital technologies and the ethical dimensions of business practices. This conceptual integration would provide a more holistic understanding for practitioners and policymakers seeking to build adaptable and ethical supply chains.

The methodologies employed in existing studies exhibit diversity, ranging from quantitative analyses to qualitative investigations. However, there is a methodological research gap regarding the development of standardized metrics for assessing supply chain resilience and the effectiveness of adaptation strategies. Future research could focus on establishing a common set of indicators and measurement tools to evaluate the resilience of supply chains consistently across different industries. This standardization would facilitate comparative analyses and enable researchers and practitioners to benchmark resilience strategies effectively. Additionally, there is a need for longitudinal studies to track the long-term impacts and adaptations within supply chains beyond the immediate aftermath of the pandemic, offering a more comprehensive understanding of the enduring effects and strategies implemented by businesses.

RESEARCH DESIGN

The study conducted a comprehensive examination and synthesis of existing scholarly works related to the role of agroecology in sustainable livestock practices. This multifaceted process entailed reviewing a diverse range of academic sources, including books, journal articles, and other relevant publications, to acquire a thorough understanding of the current state of knowledge within the field. Through a systematic exploration of the literature, researchers gain insights into key theories, methodologies, findings, and gaps in the existing body of knowledge, which subsequently informs the development of the research framework and questions.

FINDINGS

The study unveiled a myriad of interconnected challenges and adaptations within global supply chains in response to the pandemic. The research elucidated the significant disruptions experienced by supply chains, ranging from logistics-driven delays and increased costs to fluctuations in demand patterns and

shifts in consumer behavior. Notably, the study emphasized the imperative for supply chains to exhibit resilience, adaptability, and agility to navigate the unprecedented shocks induced by the global health crisis. Technology adoption emerged as a pivotal factor, with digital technologies such as the Internet of Things (IoT) and data analytics playing a crucial role in enhancing visibility, efficiency, and overall supply chain performance. Ethical considerations within supply chains during the crisis were underscored, shedding light on the heightened scrutiny of responsible business practices, worker treatment, and sourcing ethics. Furthermore, the study highlighted the influence of government interventions and policies on supply chain dynamics, emphasizing the need for businesses to align their strategies with evolving regulatory frameworks. Collectively, the findings contribute to a comprehensive understanding of how supply chains coped with the challenges posed by COVID-19, providing insights for businesses, policymakers, and researchers to shape future strategies and enhance the resilience of global supply chains.

CONCLUSION AND CONTRIBUTION TO THEORY, PRACTICE AND POLICY

5.1 Conclusion

The study concludes with several key findings that provide valuable insights into the complex and interconnected repercussions of the pandemic on global supply chains. One of the primary conclusions drawn from the study is the profound and widespread disruption experienced by supply chain networks across various industries. The disruptions, as highlighted by Wang et al. (2020) and Ivanov (2020), were not confined to a specific sector but reverberated throughout the entire supply chain, from procurement and production to transportation and distribution. The extent of these disruptions necessitates a critical reevaluation of supply chain strategies to build resilience and enhance adaptive capabilities in the face of unforeseen global crises.

A significant takeaway from the study is the imperative for supply chains to prioritize resilience and agility. The findings, in alignment with the Resilience Theory (Holling, 1973), underscore the importance of supply chains not only withstanding shocks but also adapting and evolving in response to disruptions. The studies by Ivanov (2020) and Ivanov et al. (2021) particularly emphasize the need for businesses to invest in digital technologies, such as IoT and data analytics, to enhance visibility and responsiveness. These technologies act as pivotal components in building resilient supply chains capable of navigating uncertainties. The conclusion drawn is that a forward-looking approach involves embracing digital transformations and cultivating a culture of adaptability within supply chain management.

Ethical considerations emerge as a critical aspect in the aftermath of the pandemic, as emphasized by Melo et al. (2021). The study concludes that the heightened scrutiny of ethical practices during crises necessitates a paradigm shift in the way businesses approach transparency, responsible sourcing, and worker treatment. The findings suggest that businesses integrating ethical considerations into their supply chain strategies are better positioned to not only weather disruptions but also to foster trust and sustainability. In conclusion, the study highlights that the post-COVID-19 era demands a paradigm shift in supply chain management, urging businesses to prioritize resilience, embrace digital transformations, and adopt ethical considerations to navigate the evolving landscape successfully.

5.2 Contributions to Theory, Practice and Policy

The study contributes to the theoretical understanding of supply chain management by applying and extending the Resilience Theory. By adopting a theoretical lens that emphasizes the ability of supply chains to absorb shocks, adapt to changing conditions, and reorganize in the face of disruptions, the study enriches the existing theoretical frameworks in supply chain management. It not only validates

the relevance of Resilience Theory in the context of a global pandemic but also provides nuanced insights into the specific strategies and mechanisms that contribute to supply chain resilience. Moreover, the study advances the conceptual understanding of the interconnectedness of various factors influencing supply chain resilience. It goes beyond isolated examinations of disruptions, technology adoption, and ethical considerations, synthesizing these aspects into a more holistic framework. This conceptual integration enhances our understanding of the complexities inherent in managing supply chains during crises and provides a foundation for future theoretical developments in the field.

From a practical perspective, the study offers valuable insights that can guide supply chain practitioners in navigating the challenges posed by the COVID-19 pandemic. The identification of disruptions in logistics and transportation, shifts in consumer behavior, and the adoption of digital technologies as key practical considerations provides actionable intelligence for businesses. Supply chain professionals can draw on the study's findings to reassess and adapt their strategies, focusing on building agile and resilient supply chains that can withstand future disruptions. The study's emphasis on the ethical dimensions of supply chain management during crises is particularly relevant for practitioners seeking to align their operations with responsible and sustainable business practices. The insights into increased scrutiny of ethical considerations and the need for transparency offer practical guidance for businesses aiming to foster trust and resilience in their supply chain networks.

The study also makes noteworthy contributions to the development of policy recommendations for governments and regulatory bodies. By investigating the impact of government interventions and policy changes on supply chain operations, the study provides insights that can inform future policymaking. Policymakers can draw on the findings to design effective support measures that align with the needs and challenges faced by businesses during crises. The study's recommendations regarding the alignment of business strategies with evolving regulatory frameworks serve as a practical guide for policymakers aiming to create an enabling environment for supply chain resilience.

Additionally, the study contributes to the broader discourse on global trade and policy implications by examining the effects of the pandemic on the international supply chain landscape. Policymakers can leverage this understanding to develop collaborative strategies and frameworks that facilitate the smooth flow of goods across borders, mitigating the negative impacts of disruptions on international trade. In conclusion, the study on the impact of COVID-19 on supply chain management stands as a comprehensive and insightful contribution to both theoretical understanding and practical application in the field. Its findings have implications for businesses, policymakers, and researchers alike, offering a multifaceted perspective that enriches the discourse on supply chain resilience during times of crisis.

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