

Bibliometric Approach of COVID-19 and Supply Chain Management

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The supply chain and its management are the hidden engines that drive the economy. The COVID-19 pandemic has precipitated an unprecedented sustained challenge to supply chain management around the world, which has highlighted the importance of research on the effects of COVID-19 on supply chain management.

Keywords: bibliometric ; supply chain management ; COVID-19 ; review

1. Introduction

Supply chains are a critical aspect of how the economy works, but they are not often highly visible. These networks of buyers and suppliers are ultimately tasked with delivering raw materials, intermediate goods, and, eventually, end products to consumers and businesses around the world. For the most part, supply chains operate efficiently in the background, out of the sight of end consumers. However, this quiet efficiency began to break down during the COVID-19 pandemic, as cascading supply chain problems resulting from widespread labor shortages began to take hold. Lockdowns, including closing businesses and remote working, in countries around the world, have hindered the flow of raw materials, people, and finished products in the supply chain. The COVID-19 pandemic highlighted unseen vulnerabilities, and many firms have suffered capacity shortages and losses ^[1]. According to the Institute of Shipping Economics and Logistics (ISL), the container throughput index, which is used to measure the volume of goods moving through shipping ports each day, fell from 113.3 in January 2020 to 107.7 in September 2020, down 9.5% ^[2]. In addition, The United Nations Organization (UN) estimated that global demand and distribution through global supply chains decreased sharply, by nearly 15%, in 2020 due to the COVID-19 pandemic ^[3]. The COVID-19 pandemic has therefore had a significant negative impact on the operational performance of the entire supply chain. Suddenly, supply chains became visible in the forefront of commerce, but not in a positive way, as both consumers and businesses suffered intermittent shortages of basic goods. Academics responded to the growing concern surrounding supply chains by producing a large and still growing, volume of research on the impacts of COVID-19 on the world's supply chains.

There are several key reasons for the impacts of COVID-19 on supply chain performance, such as the sensitivity of the supply chain to its inability to respond swiftly enough to rapidly changing demands. The spread of COVID-19 has also significantly increased demand in many areas of the economy due to these unexpected disruptions. This has created widespread shortages and put pressure on the related supply chains. Disruptions at one, or a few, agencies can affect almost all of the supply chain ^[4]. Nearly every supply chain has faced a multitude of problems due to the COVID-19 pandemic, such as supply disruptions ^[5], production disruptions ^[6], or changes in demand ^[7]. Consequently, there is a vital need to design flexible supply chains that are able to effectively cope with the disruptions rising from the COVID-19 pandemic ^[8]. This means that improving firms' resilience and ability to absorb the shockwaves from these negative disturbances is crucial to their survival during the crisis. Some of the initiatives involved the area of improving supply chain resilience and, at some point, the concept shifted toward supply chain viability, which focuses more on adaptability, rather than recovery ^{[9][10][11][12]}. Similarly, some studies focused on supply chain resilience, a time-delayed COVID-19 propagation model, and artificial intelligence (AI) technologies ^{[10][13]}, while some outlined the lessons learned from COVID-19, including disruptions in agriculture and food supply chains, supply chain risk, and the associated effects of COVID-19 ^{[14][15][16]}.

An increasing number of scholars have been conducting research related to systematic literature reviews looking at the impacts of the COVID-19 pandemic on supply chain management from many perspectives, such as supply chain sustainability, supply chain disruption, and recovery plans ^{[6][17][18][19][20]}. For example, Industry 4.0 supports holistic pre-disruption resilience measures to enable more effective proactive risk management in the face of COVID-19 ^[20], as well as the four broad recurring themes which were revealed in the published work investigating the impacts of the COVID-19

pandemic, including resilience strategies, technology for resilience strategies, and supply chain sustainability ^[18]. Most of the articles that were reviewed mainly focused only on content analysis to discuss aspects of the research which were related to COVID-19 and supply chain management. However, literature reviews exploring supply chain management in the context of the COVID-19 pandemic using the bibliometric method are still scarce ^[21]. In particular, many of the studies have not addressed a wider and more holistic perspective that evaluates COVID-19's effect on the supply chain and what is known about it overall. The literature is still emerging and fragmented, making it challenging to understand from these previously published reviews what is happening in academic practice.

2. Impact of the COVID-19 Pandemic on Supply Chains

The most prominent issue for future research in Cluster 1 is the long-term effect of COVID-19 on sustainability and what the pandemic implies for supply chain sustainability. Several of the studies reviewed have addressed the most immediately obvious impacts of the pandemic in terms of supply chain sustainability, including social, environmental, and economic sustainability impacts. Overall, these studies have shown a negative impact on sustainability and raised the possibility of losing progress on long-term sustainability initiatives and movements. Furthermore, the studies have revealed that there could also be negative effects on economic performance that persist across entire supply chains, not just in individual firms. Thus, firms require a monitoring system for following the long-term impacts of systemic shocks to supply chain environmental and social sustainability, along with financial performance.

3. Improving Supply Chain Resilience for Viability

Research into resilience to the shocks and disruptions caused by the COVID-19 pandemic has determined that the supply chain management literature was significantly underdeveloped, only considering the effects of pandemics in very limited situations. The research into supply chain resilience during COVID-19 has shown that this limited perspective was entirely inadequate to deal with the scale and scope of the challenges that a pandemic poses for supply chains, especially globalized supply chains, perishable supply chains, and those that are still developing. This calls for much more robust research into supply chain resilience from a broader and more global perspective, to understand both supply chain needs and how to navigate the problems that have become apparent. Thus, the integration of supply chain resilience with systemic risk is a central concern for supply chain management moving forward. Furthermore, the interrelated and similar concepts of supply chain resilience and supply chain viability require differentiation. Recovery to an original state is highly connected with resilience, but not with viability. With viability, adaptation to the new situation is the greater concern. In a world of more frequent disruptions, recovery might not always be the best option.

Based on the rich and impactful research into this area found, viable supply chains could be a better option and might be the only option to survive. Mainstream research has therefore now shifted from supply chain resilience to the more adaptable concept of supply chain viability. Bridging the gap between supply chain resilience and supply chain viability is still an evolving process. The underlying capabilities of supply chain viability and the strategies underlying this concept that are used to deal with disruptions are still in the realm of the unknown and waiting for scholars to explore them.

4. Technology and Innovation for Supply Chain Sustainability

Much of the research on digital technology had been focused on technologies like additive manufacturing, AI, 3D printing, and big data analytics, all of which have possible applicability to enhancing supply chain management practices. However, what is far less clear is the extent to which firms are actually ready to implement these technologies for supply chain management practices. This raises questions such as: How expensive is it to implement these technologies? What resources and capabilities are required to implement them? To what extent do they actually improve the performance of a supply chain, both under and outside normal operations? Thus, technologies and innovations should be assessed to determine their capacity for implementation over both the short term and long term and to evaluate whether they can be considered a feasible solution to systemic threats to supply chain resilience and stability.

5. Supply Chain Risk Management in COVID-19

In the final cluster, it was revealed that there are likely to be some long-term implications of the COVID-19 pandemic for supply chain resilience and risk management, which could have significant impacts on how firms manage risk. However, suggestions for improving risk management, such as reshoring and supplier collaboration, are very limited. Thus, an opportunity exists for further research into the development of better strategies for supply chain risk management to deal with pandemic risks or other systemic risks that have not yet been anticipated. Risk management is central to the study and practice of supply chain management and sustainable, resilient supply chains. It should therefore be explored both in

the short term and in the long term to develop new tools, strategies, and approaches to promote its active and effective use.

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