

Global Supply Chain Disruption During COVID 19

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ABSTRACT- The COVID-19 epidemic has seriously harmed a number of sectors worldwide. A variety of raw materials, intermediate products, and finished goods availability and supply were given considerable consideration. Becoming irritated. The global supply chain (GSC), which over the years has shown itself to be very powerful and durable in the face of various shocks, is actually compromised. This paper uses critical reading, event causal analysis, and data to examine how COVID-19 has affected the effectiveness and responsiveness of CSS and makes a number of management recommendations to reduce risk and foster resilience across a range of industrial sectors. the branch. According to research, the COVID-19 pandemic has caused the majority of CSS, including the pharmaceutical, food, agricultural, electronics, and automotive industries, to operate with hitherto unheard-of disruption. Contrary to prior severe interruptions, COVID-19 has negatively impacted GSC's operations at every level, causing considerable fluctuations in demand as well as significant volatility in the processes of manufacturing, processing, transportation, and logistics. According to the report, strengthening supply chain resilience is crucial for lowering vulnerability during disruptions. Additionally, the data demonstrates that the post-COVID-19 CSS will often be shorter as a result of enhanced tactics that place a greater emphasis on resettlement and back-shoring.

KEYWORDS- Supply Chain, Pandemic, Disruption of Supply Chain, Supply networks

I. INTRODUCTION

Production, distribution, and logistics have all been disrupted across industries and regions as a result of the COVID-19 pandemic. The important findings of recent studies on the effects of COVID-19 on international supply chains and the measures taken by businesses to minimise the disruption are outlined in this literature review.

A. Impact of covid-19 on global supply chains

Research shows that COVID-19 has caused unprecedented disruption to global supply chains, affecting both upstream and downstream activities. A study by IHS Markit found that 75% of firms surveyed reported supply chain disruptions due to COVID-19, with 80% experiencing delays in receiving orders and 64% facing increased costs. These disruptions were caused by

a range of factors, including factory shutdowns, transportation restrictions, and shortages of raw materials and labour. Among industries and regions, COVID-19's effects on global supply chains have been variable. According to research, sectors like healthcare and technology have been disproportionately impacted because they depend on parts from China and other Asian nations, which were the first to be afflicted by the epidemic. These sectors also depend heavily on components. While this is going on, local sourcing and distribution networks in sectors like the food and consumer products industries have made them less vulnerable.

B. Strategies for mitigating supply chain disruptions

Several solutions have been adopted by businesses to lessen the effect of COVID-19 on their supply networks. These tactics consist of:

- **Diversification:** By varying their supply chains, businesses have attempted to lessen their reliance on specific suppliers or regions. This entails finding substitute suppliers, forming alliances with local businesses, and creating backup plans in case the supply chain is disrupted. To increase supply chain visibility and resilience, businesses have increased the implementation of digital technologies like blockchain, artificial intelligence, and cloud computing. Additionally, businesses can benefit from digitalization by optimising their inventory levels, cutting lead times, and enhancing supplier and customer communication.
- **Inventory management:** To protect against supply chain interruptions, businesses have established more complex inventory management procedures. To do this, it is necessary to raise safety stock levels, lower order quantities, and enhance demand forecasts.
- **Collaboration:** Businesses have worked together to share information, resources, and best practises with their customers, suppliers, and other stakeholders. Establishing shared risk management plans, exchanging inventory information, and coordinating logistics are examples of this. The COVID-19 pandemic has paralysed the whole planet. The Lockdowns, quarantines, and travel restrictions brought forth by the epidemic have disrupted the global supply chain in a way that has never been seen before. The effects have been felt in a variety of

industries, including manufacturing, transportation, retail, and healthcare.

- Activities in the supply chain are disrupted : Worldwide supply chains have been impacted by the COVID-19 epidemic in a number of ways. The transportation industry has been the first and most notable area of influence. The suspension of air travel and limitations on ground transportation have hampered the flow of commodities across international boundaries. Long delays in the supply of goods and raw materials have been caused by the shutdown of seaports, airports, and border crossings. This has caused a lack of supplies and an increase in the price of items as a result. Closure of industrial facilities and disruptions in the availability of raw materials are two additional effects of the pandemic on the supply chain. Lockdowns and quarantines have been implemented by numerous nations, which have caused the closure of manufacturing enterprises. Due to a lack of personal protective equipment, this has caused a shortage of commodities, particularly in the healthcare industry. The retail industry has also been significantly impacted by the COVID-19 outbreak. The demand for goods has decreased as a result of consumer spending being down and retail stores closing. As a result, production has decreased as businesses adjust to the decline in demand (Kern et al., 2020). The COVID-19 pandemic has significantly impacted international trade, as well. Exports and imports have decreased as a result of the downturn in consumer demand for goods and the interruptions in the supply chains. Many nations' economies have suffered as a result of the reduction in global commerce, especially those that depend significantly on exports (Kern et al., 2020). In conclusion, the global supply chain has been significantly disrupted by the COVID-19 epidemic. Industries affected by the consequences include manufacturing, transportation, retail, and healthcare. The economies of several countries have been severely impacted by the supply chain disruptions and the decline in demand for commodities. Significant supply chain disruptions brought on by the COVID-19 pandemic have had an effect on a number of global sectors and businesses. Unprecedented organisational changes, such as a shift to remote work, supply chain interruptions, and changes in customer behaviour, have been brought about by the outbreak. This research summary will examine how COVID-19 has affected different industries and businesses as well as how it has disrupted the global supply chain. One of the primary disruptions brought on by COVID-19 is the interruption of the movement of products, including raw materials and finished goods, as a result of lockdowns, quarantines, and border closures. There are shortages of needs and higher prices for some products as a result of the pandemic's significant reduction in the flow of supplies. Particularly suffering from this upheaval are industries like healthcare, where a boom in demand for personal protective equipment (PPE) has led to shortages and price hikes. Another important COVID-19 disruption is the scarcity of workforce and personnel across several industries. The pandemic has caused several

workers to fall ill, which has decreased the labour pool and impacted consumer behaviour, which has changed demand for goods and services. The supply chain has been further affected by delays in the production and distribution of goods as a result of a labour shortage. Transport expenses have also dramatically increased as a result of the COVID-19 epidemic's reduction in the number of available trucks, ships, and aeroplanes. The cost to consumers has increased as a result of the increase in product pricing. Businesses that rely on just-in-time (JIT) inventory systems have also been impacted by the rise in transportation costs, which has resulted in a decrease in efficiency and an increase in expenses. The automotive sector is among those most negatively impacted by COVID-19's interruptions. Due to the epidemic, there is a lack of parts and components, which causes production delays and output cutbacks. Vehicle purchases are now more expensive for consumers as a result of the part shortage and cost increase. The raw material suppliers have been impacted by the interruptions in the automobile industry, which has caused more disruptions in the supply chain. The COVID-19 epidemic has also had an impact on the retail sector, altering consumer behaviour and causing supply chain disruptions. Due to a change in consumer behaviour brought on by the epidemic, more people are purchasing online, which has increased demand for online retail services. Problems with demand have been brought on by this change in customer behaviour.

II. OBJECTIVES

- The pandemic's effects on the world supply chain.
- To identify key strategies and solutions that companies can implement to mitigate the disruption in the future.

III. LITERATURE REVIEW

The study provides a framework for comprehending how the COVID-19 epidemic has affected supply chains. It talks on the difficulties experienced by those involved in the supply chain, such as the problems with international trade, the decline in demand, and the problems with the supply chain brought on by lockdowns and travel restrictions. The pandemic's potential, such the demand for digital transformation and the increase of local production, are also highlighted in the study. The paradigm suggested in the research offers a thorough method for examining and resolving the potential and problems presented by the COVID-19 pandemic in the context of supply chains [1]. It examines how COVID-19 has affected global supply networks and how businesses have adjusted to setbacks brought on by the epidemic.

It was discovered that the epidemic had revealed weaknesses in conventional supply chain models, prompting businesses to embrace more adaptable and flexible strategies. The report emphasises the significance of creating backup plans and the application of technology to improve supply chain visibility and cooperation. Furthermore, it demonstrates how businesses have turned to local sourcing and diversified their

supplier base to lessen reliance on a single source of supplies. The study suggests that the COVID-19 epidemic has sparked a change in how businesses operate their supply networks [3].

It examines the outcomes of the pandemic as well as how COVID-19 affected global supply networks. The analysis found that the pandemic severely disrupted supply chains, leading to supply chain failures and considerable financial losses for many enterprises. The report also underlines how important it is for companies to have a solid risk management plan in place and how technology can be used to enhance supply chain visibility and communication. The study also found that many companies have turned to local sourcing and diversified their supplier base in order to reduce dependency on a single supplier of goods. The study's conclusions indicate that COVID-19 has prompted companies to review and modify their supply chain strategy [3]. The COVID-19 pandemic has highlighted the need for more sustainable supply networks to absorb disruptions and reduce socioeconomic shocks. Businesses have turned to local sourcing and diversified their supplier base [4].

Small-scale fisheries are particularly vulnerable to pandemic-related disruptions due to their lack of infrastructure and resources. They have experienced decreased demand for fish, transportation and logistics issues, and difficulty gaining access to financial assistance and relief programmes [5]. The article highlights the difficulties experienced by the global supply chain during the COVID-19 outbreak and suggests further research to build more robust supply networks and prepare for future crises [6]. This study investigates how COVID-19 interruptions affect supply chain efficiency and economic expansion. It implies that the epidemic exposed flaws and vulnerabilities in international supply systems, causing interruptions that hampered economic expansion in a number of nations. The study also emphasises the significance of resilient and adaptable supply chains in limiting the consequences of such disruptions and promoting future economic growth. The study also offers some policy proposals for boosting economic resilience and strengthening supply chains in the post-COVID-19 environment [7].

Covid-19 has highlighted the need for more resilient and flexible supply channels, and businesses should diversify their supplier base and invest in digital technology to lessen its influence [8].

COVID-19 has caused major supply chain disruptions, leading to shortages of raw materials, higher transportation costs, and delays in shipping and delivery. To reduce the effects of potential disruptions, collaboration and coordination between public and private sector parties is needed [9].

The COVID-19 epidemic has caused disruptions and elevated risks, and the article offers recommendations for mitigating these risks [10]. Demand shocks, supply-side shocks, and logistical shocks are the primary causes of supply chain disruptions, and resilience is essential to ensure future supply chains are resilient [11]. The COVID-19 pandemic's effects on global supply chains and inflation are covered in this essay. It draws attention to the interruptions brought on by lockdowns, decreased output, and transportation limitations. The pandemic's impact on inflation rates is also covered in the article.

Many nations have seen higher inflation rates as a result of supply chain disruptions, a rise in demand for specific items, and government stimulus programmes, among other factors.

The authors advise that during the post-pandemic recovery phase, governments should concentrate on diversifying supply chains and putting these policies into practise [12]. It makes the case that Supply Chain Finance (SCF) can lessen the damage that Covid-19 will do to the financial system. SCF is a financial solution that enables businesses to improve their supply chain finance in order to maximise their working capital and liquidity. It enables businesses to take advantage of early payment discounts and boost cash flow, both of which are crucial during trying times. SCF can aid businesses in reducing the chance of supply chain interruptions and boosting their resistance to shocks like the Covid-19 epidemic. According to the paper's conclusion, SCF is a useful tool for businesses trying to lessen the financial disruption caused by Covid-19. The COVID-19 pandemic has had a significant impact on global supply chains, and firms must take proactive steps to ensure their stability and sustainability [13].

The study says that Due to the COVID-19 epidemic, flaws in the global food supply networks have come to light, creating a workforce scarcity, transportation problems, and infrastructural problems [14]. The report highlights the need for enhanced adaptability, cooperation, and resilience to manage the effects of the COVID-19 pandemic [15]. Companies must have resilient supply chain strategies and be prepared for unforeseen interruptions to reduce the effects of the COVID-19 outbreak [16]. In a case study, it is shown how a business in India reduced supply chain risks during the COVID-19 epidemic. To identify and evaluate risks, create mitigation plans, put those strategies into practise, and assess their efficacy, the organisation used a four-step process. The study also emphasises how crucial cooperation and communication with clients and suppliers are to controlling supply chain risks in times of emergency. The case study offers helpful advice for other businesses dealing with comparable supply chain issues [17]. Reorganising global supply chain networks with a focus on localization, digital technology, and supplier diversity through public-private partnership [18]. The paper proposes a plan of action to make the Trans-Pacific Partnership (TPP) supply chain network more resilient and flexible to unanticipated disruptions. It also looks at the effects of the pandemic on the hog market in China, including higher prices and a smaller supply [19]. The COVID-19 pandemic has exposed gaps in the global network of medicinal supply, leading to shortages of ventilators, PPE, and other essential medical supplies. Recommendations for correcting the issues and strengthening the medical supply chain are needed to better prepare for potential pandemics [20]. The COVID-19 pandemic has had a significant impact on global supply chains, and firms must take proactive steps to ensure their stability and sustainability [21] Merchants must be prepared for unanticipated situations and have plans to react to them, such as strengthening supply chain resilience and working with suppliers. [22]. Local food supply networks have shown a higher level of resilience during the pandemic due to their smaller scale, variety of

production techniques, and close ties between farmers and customers. During the pandemic, local food systems experienced difficulties such as the closure of farmers' markets and interruptions in the distribution and transportation networks. Authorities should place a higher priority on assisting local food systems and enhancing their capacity to withstand future shocks [23]. COVID-19 has provided businesses with a chance to reconsider their supply chain policies and adopt new models for improved adaptability and resilience [24]. The study highlights the need for the food supply chain to be more resilient and adaptable to handle any disruptions caused by the COVID-19 pandemic. [25]. The COVID-19 pandemic has disrupted Zimbabwe's food supply chain, leading to food shortages, increased costs, and lower agricultural profitability [26]. The COVID-19 epidemic has had a major impact on the global health supply chain, with shortages of PPE, medications, and medical gadgets, as well as logistics and transportation problems [27]. The COVID-19 pandemic has disrupted supply chains, affecting businesses and sectors, leading to economic disruption [28]. Local value chains fared better in the face of the Covid-19 pandemic due to their adaptability and flexibility, as well as market variety, institutional support, and social networks [29]. The COVID-19 pandemic has highlighted the need for more environmentally friendly manufacturing and consumption methods, such as cutting waste, increasing transparency, and encouraging local sourcing. It also highlights the need for stakeholder participation and cooperation. [30]. Governments should focus on reducing the effects of supply chain disruptions by offering economic stimulus packages, encouraging local manufacturing, and creating alternative supply chains [31]. Direct marketing has become increasingly popular as a way to reach consumers during the Covid-19 outbreak, offering higher revenues and better market access, but also requiring marketing and technical assistance [32]. Businesses must diversify suppliers, improve partner communication and collaboration, and use digital technology to address COVID-19's effects on supply chain management and guarantee long-term viability [33]. Companies with varied supply chains had lower levels of interruption and recovered more quickly during the COVID-19 crisis [34]. Collaboration and coordination among supply chain players are essential to

secure food security during COVID-19, with increased risk management and resilience [35]. Businesses need to reassess their supply chain strategy and adopt new risk management techniques to reduce future disruptions, and regionalization and localization have been accelerated by the epidemic [36]. The authors emphasize the importance of monitoring food price fluctuations, availability, access, food safety, and dietary pattern changes to reduce the effects of the COVID-19 pandemic [37]. The report highlights the need for more resilience, agility, and collaboration in supply-chain management in the post-pandemic era [38]. The study highlights the need for more stakeholder engagement and innovation to secure a robust and sustainable agri-food supply chain [39]. Proactive initiatives such as diversifying suppliers, creating robust supply chains, and enhancing ties with important suppliers are essential for preserving shareholder value [40].

IV. RESEARCH METHODOLOGY

The research design entails a literature review of academic and industry publications on global supply chain disruption during COVID-19. Secondary data will be collected from electronic databases such as Google Scholar, Scopus, and Web of Science using relevant keywords such as "COVID-19", "coronavirus", "global supply chain", "disruption", "impact" and "risk management." The inclusion criteria for studies will be strictly adhered to, while studies that do not meet the criteria will be excluded. Data analysis will be done using a content analysis approach, with relevant information extracted from the articles and categorised into themes and sub-themes for a narrative synthesis.

V. INTERPRETATION

The term "global supply chain disruption during COVID 19" could allude to the previously unheard-of difficulties and disruptions the COVID-19 epidemic has brought about in the worldwide supply chain. There have been shortages, delays, and price increases as a result of this disruption, which has impacted many different industries and sectors, including manufacturing, transportation, logistics, and retail.

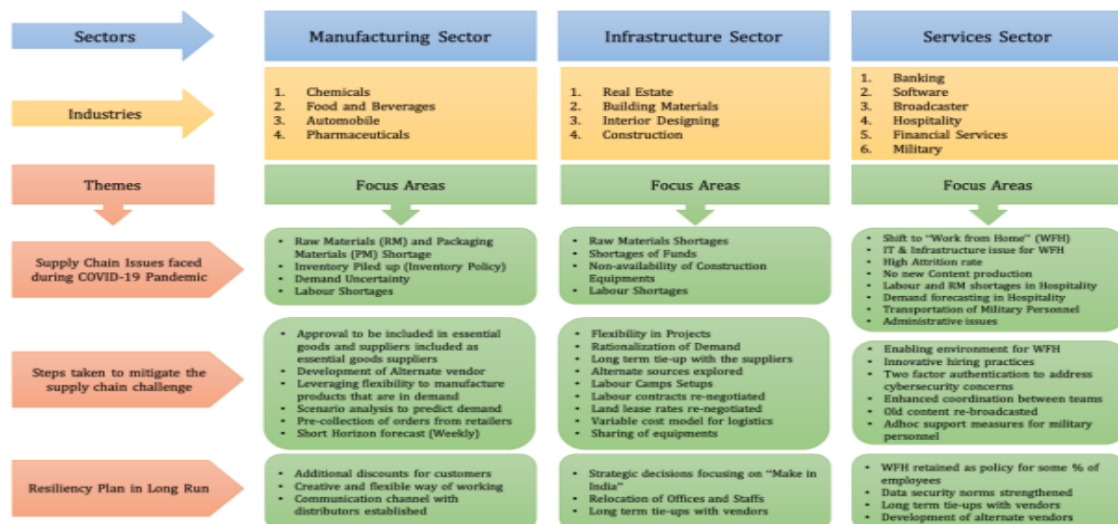


Figure 1: Focus areas in different sectors under different themes (Source: IIMA paper)

Multiple causes, such as lockdowns, border closures, labour shortages, and increased demand for specific items, are to blame for the disturbance. Because of this, businesses have had to modify their supply chain strategy in order to maintain business continuity and satisfy client demand. Diversifying suppliers, building up inventories, streamlining logistics, and implementing digital technologies to increase visibility and agility have all been part of this.

The interpretation of this topic as a whole emphasises the significance of comprehending how the COVID-19 epidemic has affected international supply chains as well as the methods businesses have used to control the disruption. It also emphasises the need for additional study and analysis to pinpoint the best methods and lessons discovered for long-term supply chain resilience. The COVID-19 pandemic has drastically impacted the world's supply chain, with effects seen in numerous sectors and businesses. The following information will help demonstrate how the epidemic has affected international supply chains. *Reports from WHO, IATA, McKinsey & Company and Bloomberg explore that:*

A. PRE-COVID-19

The top three exporting nations in 2019 were China, the United States, and Germany, with global commerce valued at \$19.48 trillion USD. The forecasted growth rate for the global goods sector is 4.8% between 2019 and

2023. From 2020 to 2025, the automobile sector was expected to expand at a compound annual growth rate (CAGR) of 3.1%.

B. DURING COVID-19

Global supply networks were disrupted by the pandemic, leading to delays, shortages, and price rises. Global commerce decreased by 9.2% in 2020 compared to 2019. Due to port closures, limited capacity, and blank sailings (voyages that were cancelled), the maritime industry was severely disrupted. Due to the pandemic, there were fewer shipping containers available, which increased shipping costs and created delays. The car sector was severely impacted, with sales and production expected to drop by 20% in 2020.

C. POST-COVID-19

The expected growth rate for global commerce in 2021, when compared to 2020, is 8.4%. The shipping sector is still dealing with some delays and port congestion brought on by worker breakouts of COVID-19. The production and sales of the automobile industry are progressively expanding, but there are still certain problems, such as an absence of semiconductors and other raw resources. Businesses are reviewing their supply chain tactics, with some looking towards restoring or near shoring as a way to boost resilience and decrease reliance on far-off suppliers.

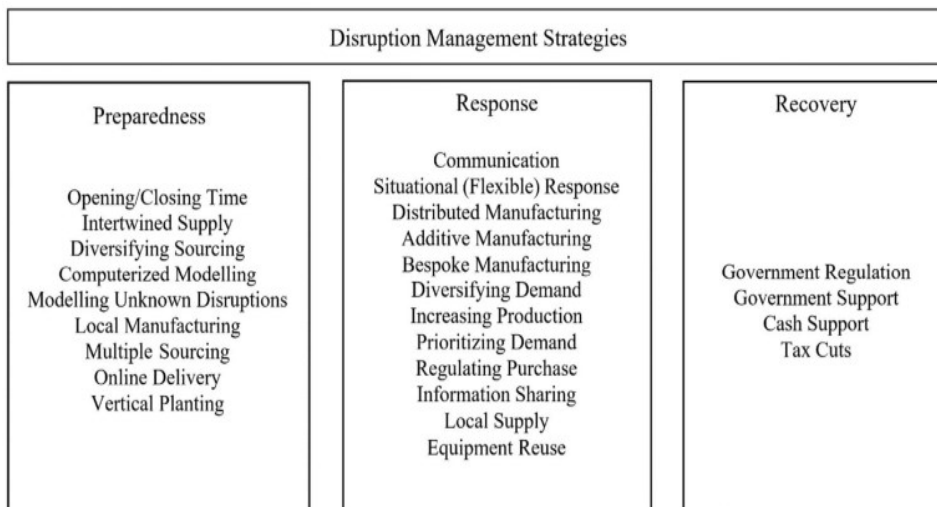


Figure 2: Supply chain disruption during the COVID-19 pandemic: Recognizing potential disruption management strategy

VII. RECOMMENDATION

Here are some suggestions for the future to lessen the effects of the COVID-19-related disruptions to the global supply chain:

A. Diversify suppliers and production site

To lessen dependence on a single source, one of the key lessons learned from the COVID-19 pandemic is the significance of diversified suppliers and production sites. Companies should assess their supply networks to find any vulnerabilities or potential threats.

B. Invest in digitization and automation

The COVID-19 epidemic has brought attention to the supply chain's need for automation and digitalization, which will reduce human interaction and enable more effective and adaptable operations. To improve supply chain visibility and resilience, businesses should think about investing in technological solutions like IoT sensors, blockchain, and artificial intelligence.

C. Improve teamwork and communication

Cooperation and communication, particularly during times of disruption, are essential for efficient supply chain management. To exchange information and coordinate

reaction activities, businesses should maintain close contact with their vendors, clients, and logistics partners.

D. Adopt a risk control strategy

Companies should implement a supply chain management strategy that entails locating, evaluating, and reducing potential hazards. This can involve carrying out routine risk assessments, creating backup plans, and simulating supply chain resilience. The COVID-19 epidemic has brought attention to the significance of sustainability and social accountability in supply chain management.

E. Prioritise sustainability and social accountability

Companies should give environmental and social considerations, such as ethical sourcing, lowering their carbon footprint, and adhering to social regulations, priority in their supply chain decision-making. By following these suggestions, businesses can improve their ability to anticipate, react to, and create more resilient and environmentally friendly supply chains in the future.

VII. CONCLUSION

Through this research it is very evident that the COVID-19 pandemic has significantly impacted international and national supply chains. Depending on elements including the degree of globalisation, the type of the goods and services, and the level of government action, the pandemic's disruptions have had varying effects on different industries and geographical areas. The pandemic has brought to light the weaknesses in international supply networks and the requirement for companies to increase their operational resilience and agility. A greater emphasis has been placed on localising and regionalizing supply chains as a result of the disruptions, and new technologies like automation and digitalization have also been adopted to raise productivity and decrease reliance on human labour. As time goes on, it will be crucial for businesses to keep an eye on the situation and adjust their plans as necessary to deal with the continued difficulties and uncertainties brought on by the pandemic. Building more robust and sustainable supply networks for the future also requires cooperation and communication among supply chain participants, such as manufacturers, distributors, suppliers, and customers.

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