

# STUDY THE FACTORS AFFECTED ON SUPPLY CHAIN MANAGEMENT AND RISK IN PANDEMIC SITUATION

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## **Abstract**

This study is focus on sustainability of supply chain activity by reducing the risk of disruption during pandemic covid 19. The many-faceted supply chain dangers include two subcategories: operational risks and disruptive risks. Disruption risks have a direct effect on the supply chain network design because they temporarily prohibit transportation links between diverse industries, vendors, and distribution centres. When going downstream of the supply chain, the consequent shortage of supplies and the challenges with delivery have an unfavourable cascading impact that results in a loss in performance in terms of service quality, revenue, and output. This research investigates how the COVID-19 pandemic has affected supply chain management operations. In order to build more resilient supply networks in the future, it aims to comprehend the difficulties that arise during a pandemic and recognise experiences. Therefore, the purpose of this research has been to determine how well resilience-building initiatives might minimize the effects of a disruption and promote recovery. All resilience-building initiatives can reduce disruptions to a certain extent, but the epidemic has gone beyond these bounds. As a result, it has damaged resilience-building capabilities in addition to upsetting supply networks. Our key result is that organisations that were more successful at fostering resilience were also less impacted by the disruption.

**Keywords:** Supply chain resilience, supply chain risks, COVID-19.

## **Introduction**

Many different stakeholders are impacted by supply chain risks. Operational risks are associated with interruptions in the organization's regular business operations, whereas strategic risks are associated with interruptions in the achievement of corporate objectives (Katsaliaki, K., Galetsi, P. & Kumar, S., 2021). Financial risks include not having enough money to run their business and having trouble paying their bills. Furthermore, low-frequency, high-impact events like natural disasters and man-made damage are associated to disruption risks. Risks of disruption have an immediate, significant impact on the operations of the supply chain as well as its long-term viability. The researchers should focus on approaches to increase the sustainability of supply chain activity while also reducing the risk of disruption (Karmaker, C. L., Ahmed, T., Ahmed, S., Ali, S. M., Moktadir, M. A., & Kabir, G. 2021). The many-faceted supply chain dangers include two subcategories: operational risks and disruptive risks. Disruption risks have a direct effect on the supply chain network design because they temporarily prohibit transportation links between diverse industries, vendors, and distribution centres. When going downstream of the supply chain, the consequent shortage of supplies and the challenges with delivery have an unfavourable cascading impact that results in a loss in performance in terms of service quality, revenue, and output. The strategy, architecture, and protocols are the three primary components of the risk management process. Various businesses have employed a number of ways to formally restrict the risk. One of the most significant interruptions in recent years has been the COVID-19 outbreak, which has affected several global supply networks. Employed a grey-based digraph-matrix approach to look into how the COVID-19 epidemic impacted supply chains negatively. They also suggested recovery strategies for supply chain hiccups caused on by the COVID-19 outbreak. The pandemic outbreak is portrayed as a unique example of



supply chain risks, including the existence of long-term disturbances and their variable scaling, the simultaneous spreading of disruption along with the supply chain and transmission of a pandemic outbreak within the population, disruptions in infrastructure, demand, and supply, and disruptions in these three areas. Supply chain risk managers are interested in decision-making assistance to discover disruption scenarios, comprehend the vulnerability of certain network segments and fortify them, monitor and recognise disruptions in real-time. These disasters caused a staggering number of supply chain interruptions, which in turn caused serious delivery delays, decreases in revenues and sales, and production halts that affected employee utilisation. Disruption was found to have an impact on supply chain performance both directly and indirectly by lowering stock returns and firms' ability to compete in the markets. The vital need for digital twins for supply network mapping and visibility assurance is further demonstrated by analyses of post-pandemic recoveries as well as supply chain failures and modifications during the COVID-19 pandemic. It is acknowledged that it is impossible to foresee interruptions because they vary in type and nature and are too sporadic and irregular to be precisely diagnosed, measured, or anticipated. However, during the COVID-19-caused pandemic situation, there was a shortage of necessities on the market. To fulfil this rising demand, producers are working to enhance the production of necessary goods. However, as the pandemic gets worse and people buy necessities out of terror, demand keeps rising. This rise in demand for necessities during a pandemic is a result of a lack of raw materials, insufficient production capacity, disruptions in transportation, and customers' propensity for panic buying.

### **Objectives of the study**

This research investigates how the COVID-19 pandemic has affected supply chain management operations. In order to build more resilient supply networks in the future, it aims to comprehend the difficulties that arise during a pandemic and recognise experiences.

1. To evaluate the performance of supply chain management policies during pandemic situation.
2. To assess the factors affected on supply chain management and risk in pandemic situation.
3. To offer suggestions to policymakers for efficient supply chain management.

### **Literature review**

Dmitry Ivanov & Alexandre Dolgui (2020), proposed the idea of a digital supply chain, which is a computerised model that depicts network statuses in real time at any given moment. This study investigates the circumstances around the design and deployment of the digitalisation, when controlling disruption risks in supply chains. Finding the connections between risk information, disruption modelling, and performance evaluation is made possible by the combination of model-based and data-driven methodologies. The study's findings advance proactive and reactive judgments by utilising the benefits of SC visualisation, historical disruption data analysis, and real-time disruption data, which advances SC risk management research and practise.

Matthew Quayson, Chunguang Bai and Vivian Osei (2020), stated that the world economy and environment continue to be significantly impacted by the corona virus epidemic. Due to the pandemic's disruption of the supply chain for agricultural commodities, smallholder farmers have finding it difficult to thrive in developing economies and areas. However, even during a crisis like the COVID-19 era, technology may offer promise for bettering the circumstances of farmers who are in danger. We propose necessary digital transformation to build robust and sustainable post-COVID-19 supply networks for poor countries, notably for smallholder farmers operating in global value chains. In order to accomplish this, we draw on lessons learned in both developed and developing nations.



Towfique Rahman, Firouzeh Taghikhah, Sanjoy Kumar Paul, Nagesh Shukla and Renu Agarwal (2021). Pointed out global supply chains in several industries have been severely impacted by the current COVID-19 outbreak. There is a severe lack of supply due to the spectacular increase in demand for several necessities worldwide. This study revealed that reducing the risk reaction time and improving production capacity enabled suppliers of essential goods to keep up with consumers' increasing demands and timely supply, thereby avoiding financial shocks to businesses. According to this research, critical item makers may experience supply, demand, and financial shocks if the recommended recovery techniques are implemented later than expected. In this study, methods for resolving the shortage of vital goods were carefully examined. It also suggested compatible solutions and recovery plans to deal with the issue in the extreme disruptive event brought on by COVID-19.

Ferreira, C., Cardoso, C., Travassos, M., Paiva, M., Pestana, M., Lopes, J.M. and Oliveira, M. (2021). Studied that supply networks were now under increasing pressure to evolve and adapt in a climate of financial restriction as a result of the economic and social environment brought on by the COVID-19 pandemic. Retailers, carriers, and manufacturers may experience shortages of food products as a result of supply chain delays. The study used semi-structured interviews as a qualitative tool for this goal. Small and medium-sized businesses (SMEs) were found to lack a formalised supply chain and often operate on a lower budget. The study examines the supply chain in SMEs in the food industry during the COVID-19 pandemic. It also allows for the determination of useful recommendations for these businesses to improve while also clarifying the literature on the supply chain in times of crisis like the current COVID-19 pandemic.

Jasmine Siu Lee Lam & Yuwei Yin (2021). Considering the fiercer competition between worldwide markets, competition the focus of businesses has shifted from the supply chain performance of company's performance. This study investigates the current tactics used in placed in order to increase resilience to supply chain interruptions due to transportation. The study also attempts to develop a novel strategy to solve the constraints based on the significant shortcomings of existing tactics that have been identified. In order to improve resilience, this study introduces an integrated cost and risk management method. The study makes a contribution to the field of risk management by recommending a strategy that can enhance supply chain resilience while still being cost effective.

Sonu Rajak, K. Mathiyazhagan, Vernika Agarwal, K. Sivakumar, Vikas Kumar & Andrea Appoloni (2021), stated that the global supply chain has been seriously harmed by the corona virus epidemic. The risk of a disruption and implementing sustainability in the supply chain are two significant challenges. The purpose of this study was to identify the demands and critical success factors from the stakeholders for the sustainability project in South Carolina during this pandemic. The study's contribution to the framework model for sustainable activities in the supply chain during the COVID-19 pandemic, identification of stakeholders' needs and CSFs, and prioritisation of these CSFs are what give it scientific merit. The top three most important success criteria are identified as social isolation, emergency backup facilities, and emergency logistics systems. The suggested approach gives supply chain and operations managers a road map for developing effective strategies for sustainability initiatives both during and after the pandemic epidemic.

Dilek Ozdemir, Mahak Sharma, Amandeep Dhir & Tugrul Daim (2022) stated that the COVID-19 pandemic is putting supply chains through more extensive evaluation than ever before. Throughout this prolonged global health crisis, supply chain managers were required to primarily rely on solutions designed for minor, predictable emergencies. This study looked at how well current techniques supported supply chain resilience in the UK market for perishable goods. Researchers developed an analytical model based on the literature on supply chain resilience in order to achieve this goal, and we tested it using covariance-based



structural equation modelling. 282 store employees provided information that was gathered. Supply chain velocity was the resilience statistic that was most wanted. The findings demonstrate how the pandemic's disruptions have impacted initiatives to foster resilience. While both proactive and reactive strategies encouraged the development of resilience throughout the pandemic, they were not enough to fully mitigate all of the detrimental impacts.

May McMaster, Charlie Nettleton, Christeen Tom, Belanda Xu, Cheng Cao and Ping Qiao (2020), investigated that the state of fashion supplies chains at the moment, hazards that have materialised recently and historically, and available risk reduction techniques. Researcher discovered that while the benefits of lean supply chain management are generally valued for their ability to cut costs and eliminate waste, the structure is constrained by the resulting lack of supply chain transparency and the rising demand unpredictability seen even before the COVID-19 outbreak. Supply chains may have this issue, but they work to address it by emphasising improving communication and connections between buyers and suppliers to increase information transmission.

### **Research methodology**

Researchers have included qualitative and quantitative research approaches in our study plan, as was already discussed. The qualitative component should complement the quantitative. Due to the need for distinct data gathering techniques, in-depth interviews, which take a qualitative approach, and a questionnaire, which take a quantitative approach, were developed. We conducted in-depth interviews in each instance, which helped us create a questionnaire that was distributed to the applicants. Prior to conducting the interviews, it was important to identify which demographic samples were most qualified to share their knowledge and experiences about the phenomenon we are researching. The informants also allowed submitting information on the participating organisations by signing a consent form. Additionally, researchers informed the participants that the data they supplied would be anonymized when the empirical findings were presented, so the reader would not be able to immediately follow what the various informants had stated.

### **Risk in pandemic situation**

The base of supply chain resilience is a combination of capabilities that help organizations to maintain and enhance their operational and competitive position in the market. A fast changing environment has been brought about by the new corona virus, and businesses would the requirement to adopt, react, and proactively reduce disruptions by An organization's ability to dynamically synergize, integrate, and rebuild its competencies can help it get through challenging circumstances. This encourages us to take the dynamic capabilities view into account. Because the pandemic has created environmental changes and because it is a dynamic theory, it has been preferred over other management theories like the resource-based view of the firm. The resource-based perspective, however, is better suited to static situations.

#### **1. Inconsistency of demand**

Consumer purchasing patterns will change as a result of the COVID-19 epidemic, disrupting demand. The COVID-19 pandemic outbreak has caused a historically low demand for some commodities, having a substantial impact on businesses in the manufacturing sector and their upstream suppliers. Fear of contracting the virus through contact with individuals and the intake of specific products is a major factor in this. Consumer misinformation has also impacted the market for food and home goods in the wake of social media allegations connecting chicken eating with Covid-19. Many people are changing their consumption habits to include only the most basic meals each day due to financial uncertainty and income loss, which is causing a drop in the consumption of pricey goods.



## **2. Delays and vehicle unavailability**

Even when the government reinstated lockdown restrictions in India, transportation activity remained significantly restricted despite the lockdown. Export operations similarly saw no growth for weeks even after certain lockdown restrictions were eased, similar to how import activity were completely suspended during the lockdown. The fact that air freight could only be transported on accessible, operational aircraft that were only transporting cargo decreased the amount of space available for it. Additionally, restrictions on the movement and transportation of commodities and supplies have been brought about by the COVID-19 pandemic, particularly on routes that cross within restricted or containment districts. The need for social distance measures also prevents the use of the available vehicles to their full potential. The aforementioned transportation problems might be seen as a barrier to the smooth operation of the supply chain because they have caused unheard-of delays in the delivery of consignments to end customers.

## **3. Delivery delays**

Finding a balance between the times needed to acquire, produce, and distribute products to clients and their willingness to wait is the main problem for practically every organisation. Additionally, clients typically aren't willing to wait for extended periods of time, especially when there are alternatives on the market. Additionally, because the time it takes to purchase raw materials is now dependent on outside suppliers and out of the organization's control, it is fairly unclear for all enterprises. The COVID-19 epidemic has resulted in limitations on the flow of commodities and supplies, particularly across zones that fall under the containment or restricted category.

## **4. Variability in supplies**

Due to the COVID-19 pandemic, supply-side capacity restrictions and price and quantity volatility represent a significant disruptor. Micro, Small and Medium Enterprises (MSMEs), which are distributed throughout India, have experienced supply shortages and related irregularities. The nation also experienced a great deal of irregularities in the delivery of necessities. Since the pandemic's beginning. This is due to hoarding by all participants in the supply chain, from wholesalers to retailers, which has led to an artificially low supply. It is obvious that these actions will result in supply restrictions, unpredictable prices, and inconsistent supplies, all of which will hinder the efficient running of the supply chain. This is due to hoarding by all participants in the supply chain, from wholesalers to retailers, which has led to an artificially low supply. It is obvious that these actions will result in supply restrictions, unpredictable prices, and inconsistent supplies, all of which will hinder the efficient running of the supply chain. The supply chain is in fact a network of various organisations.

## **5. Shortage of labour**

There are a staggering number of these personnel who have been impacted by the lockdown and confinement procedures. The majority of these employees perform manual loading, unloading, and material handling tasks. Due to their reliance on migrant labour and informal nature, agriculture and logistics are likely to be among the industries most severely impacted by this reverse migration. Every manufacturing and service industry depends on its workforce, especially in developing countries like India that mainly rely on the informal economy. Labour shortages are a significant issue and a significant barrier to the supply chain's normal operation because of the large number of displaced migrant workers.

## **6. Adoption of less-than-stellar substitutes**

The adoption of COVID-19 and lockdown restrictions has interfered with suppliers' and distributors' opportunity to sustain operations. In situations like these, alternative suppliers and product alternatives are frequently considered with the intention of lowering sourcing risks. India is not an exception to how China's severe supply chain problems are affecting the



flow of global business. To prevent inventory from building up, the majority of companies in India have converted to just-in-time delivery systems. Even though China supplies about 70% of the necessary raw materials in some Indian industries, such as the pharmaceutical, automotive, chemical, and textile ones, these businesses have suffered.

### **7. Limitations on capacity**

During the lockdown, panic buying has increased for necessities, but India hasn't observed a comparable tendency for all kinds of goods. With the COVID-19 pandemic's arrival, consumer optimism has decreased nationwide, and it is anticipated that consumers will continue to cut back on their purchasing for a long amount of time. Storage and capacity issues may be caused in warehouses and regional distribution centres as a result of overstocking of materials at these locations as they wait for demand to increase at a later time. Excessive inventory holding for an extended period of time may result in probable damage, perishability difficulties, and working capital bottlenecks, which will affect enterprises throughout supply chains' liquidity.

### **8. Delivery difficulties**

During the pandemic, the number of organisations have redesigned their supply chains in response to client demands to reduce physical touch points. How to build a resilient supply chain is a topic that practitioners and companies are talking about more and more. In an effort to draw customers, brands are either transitioning to totally captive in-house delivery services or merging with last mile delivery partners. However, it has proven difficult for last mile delivery partners to bring goods to the customer's home because the majority of metropolitan areas are included in the red zone and containment categories during lockdown. Moreover, the local governments of the worst-affected cities,

### **Facilitators of improving supply chain resilience**

Companies can respond quickly to client needs, deliver high levels of service, and manage expenses and net working capital with the help of a robust supply chain. Companies may use our six supply chain resilience pillars—three that enable businesses to better absorb shocks and three that assist them in responding more quickly to disruptions—to strike that balance and reap the reward.

#### **1. Enhanced performance for incorporate disruptions**

Utilizing buffers and strategic inventories, resilient businesses more successfully absorb shocks in ongoing, end-to-end supply chain operations. By quickly moving from primary material flow pathways to secondary ones and changing suppliers, they reduce the chance of a complete network shutdown and other negative effects in the event of significant disruptions. Three pillars should support a company's efforts to absorb shocks: redesigning the global network, setting new parameters for supply chain buffers, and proactively managing suppliers.

#### **2. Redesigning the global network**

A resilient network for supply, manufacturing, and distribution achieves flexibility through selective applications of redundancy, such as dual sourcing. Other approaches include near shoring to reduce dependence on complex global logistics and vertical integration to bring manufacturing for critical components in house. A comprehensive risk assessment can provide the basis for determining how to balance flexibility, efficiency, and effectiveness when redesigning a global network.

#### **3. Changing the Supply Chain Buffers Parameters**

A business must create a successful multi-echelon inventory strategy to foster resilience, which often results in new inventory targets at the supply chain's high-volatility nodes. Businesses may also consider resetting their capacity utilisation goals and determine the



triggers that indicate when to increase capacity or activate ready-to-use capacity based on utilisation trends. Aligning order fulfilment strategies with client needs is also crucial.

#### **4. Proactive supplier management**

Resilient businesses evaluate the importance of their suppliers and modify their connections with them to assure the availability of resources. Additionally, they receive access to information about various levels of suppliers, allowing them to thoroughly evaluate upstream risks. The company also integrates external information from market research or social media analysis into the risk assessments. It has embedded the dashboards into its digital systems and normal supplier-management process; the better understanding of risks enables the company to achieve higher rates for on-time delivery and quality and to avoid significant costs.

#### **5. Acting extremely immediately after disruption occurs**

Resilient firms use agile, silo-breaking ways of working across many functions and geographies to quickly adapt and adjust to disturbances as well as natural volatility. Transparency is used to manage routine deviations, while simulation is used to create a forward-looking perspective on risks and possibilities. To respond swiftly to routine volatility and minor disturbances, they also employ solid processes and analytical tools. Their quick response is made possible by efficient procedures, a clear comprehension of the effects on material flows, and total system management. Managing the multi enterprise supply chain, actively managing end-to-end risk, and planning based on anticipation, simulation, and scenarios should be the three pillars that support a company's ability to react quickly.

#### **6. Multi-Enterprise Supply Chain Management**

Resilient businesses understand that their ability to adapt to unanticipated events is frequently limited by the assets of the third parties who support their end-to end supply chain, rather than their own. They achieve end-to-end transparency and facilitate collaboration to speed up action. In addition to suppliers at various levels, this visibility also covers logistical service providers and distribution networks. In order to assist adaptive decision-making, resilient businesses use insights from analytical engines powered by artificial intelligence. They also coordinate their internal and external operations to optimise end-to-end performance. In order to respond to changes in supply and demand, they also implement sales and operations execution strategies throughout the entire supply chain, enhancing their plans that span monthly or longer time horizons. They are able to respond more quickly and efficiently due to their quick assessments of various events.

#### **7. Managing End-to-End Risk**

Companies have access to a thorough early warning system thanks to the risk monitoring of their suppliers, geographies, finances, and cyber security. Businesses compile fresh data sources that track external risk indicators, such as weather predictions, potential social unrest, changes in trade policy, and financial markets, and combine them with conventional operational data (like lead times, inventory levels, and order volume) in a central repository. The business feeds the data into risk-focused analytics engines driven by AI in order to create leading indications of supply chain risk. The intelligence gathered is used by resilient businesses to gain a head start on planning and ranking mitigating measures. They also construct business continuity strategies to be ready for interruptions and risk committees to supervise mitigation.

#### **8. Using simulation, scenarios, and anticipatory planning**

Companies can considerably increase their capacity to manage daily volatility as well as handle emergencies by implementing cutting-edge technologies, such as digital twins. Digital twins mimic the performance of the whole supply chain system weeks in advance and utilise "smart" warnings to identify which clients and consumers are most likely to be impacted by disruptions. These insights can be used by a corporation to determine early mitigation steps to deal with break points. To comprehend the effects of numerous potential hazards, it can also



use scenario-based planning. By doing this, businesses are able to weigh risks against their needs for inventory and service while also anticipating the effects of hazards.

### **Conclusion**

Pandemics are special, though, because their duration and scope are unpredictable. Unprecedented levels of commercial disruption have been brought on by the COVID-19 pandemic. Substantial changes in supply and demand dynamics have impacted all industries. In addition, the pandemic affected markets so rapidly that businesses would be unable to formulate and develop risk-aversion strategies, leaving them unprepared for the disruption when it came. As a consequence, they were forced to respond quickly to the disruption. Because it provides people with requirements, the perishable key economic driver assumes a special significance among all other sectors. Therefore, the purpose of this research has been to determine how well resilience-building initiatives might minimize the effects of a disruption and promote recovery. All resilience-building initiatives can reduce disruptions to a certain extent, but the epidemic has gone beyond these bounds. As a result, it has damaged resilience-building capabilities in addition to upsetting supply networks. Our key result is that organisations that were more successful at fostering resilience were also less impacted by the disruption. Researchers have already attempted to offer an explanation for why some businesses are more exposed than others. Those in the global supply chain are more susceptible to disruptions caused by pandemics than companies in the service or manufacturing industries.

### **Implications and future research directions**

This study has some implications for academic research as well as public and corporate administration in the real world. The findings of this study highlight both manufacturing and service industry best practises as well as the effects the pandemic had on these organisations' bottom lines and operational efficiency. Future academic studies might put more emphasis on quantifying best practises. Future study could test these conclusions via quantitative research and a thorough survey, whereas current research work has established a qualitative summary of optimal practises based on three propositions. This would make it more difficult to establish new best practises, although it might be supported by the study's findings.

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