



# Global Supply Chain in Covid-19 Crisis: Moving from Efficiency to Resilience

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**ABSTRACT:** Amid the Covid-19 crisis, one of the biggest challenges that developing and even developed countries faced was the disruption in the global supply chain. In past decades, there has been an over-reliance on China, the largest manufacturing hub. But when the pandemic hit the world, subsequent lockdowns were imposed. This greatly affected the efficiency of supply chain management. The paper discusses the importance of the global supply chain and how Covid-19 affected the chain. Also, the difference between the pre-Covid era and the post-Covid era has been studied so to understand the necessity of moving from efficiency to resilience.

**KEYWORDS:** Global supply chain; Covid-19; Efficiency; Resilience; Crisis management

## 1. INTRODUCTION

Global supply chains play a vital role in helping organizations manufacture products in a shorter period of time. For the global supply chain to be efficient, liberalization, foreign direct investment (FDI), and deregulation of international trade have been introduced (Golgeci et al., 2020). Defining efficiency in the supply chain reflects an increase in the overall value creation system and various associated activities.

The pre-Covid era witnessed that global supply chains were concerned with economic practices, driving growth, and standardization processes. There was more focus on outsourcing rather than internalizing the operations, thereby being geographically dispersed, they were managed strategically. The organizations also preferred the “just-in-time” approach, specifically in manufacturing decisions (McKenna, 2020). The system of carrying and procuring raw materials or finished products to the end consumer, thus, was opened to vulnerabilities and disruptions in the uncertain time of crisis. So, when the Covid-19 crisis spread over the world, the organizations realized to shift from an efficiency mindset to a resilient mindset (Bryan, 2020; McKenna, 2020).

The Covid-19 crisis hit the global economy to the core because of the massive reduction in commercial activities under worldwide lockdown. The closely-related “global supply chains” felt disruptions due to the rapid dip in the global economy. Thus, the post-Covid era made supply chain leaders focus on resilience and efficiency to help them secure and manage networks. The organizations felt that if resilience collaborates with global supply chains, there would be excellent visibility and agility for shifting all the business operations rapidly (Hippold, 2020).

Organizations have started focusing on the resources available to them to avoid or minimize vulnerabilities and risks in the global supply chain in light of the Covid-19 crisis. Further, there has been a rapid adaptation of the hybrid approach in talent management practices (Bryan, 2020). Equivalent to inventory management, the global supply chain leaders plan to collaborate a multi-sourcing approach with a near-shoring approach. So, along with the diversification of suppliers, there has been a reduction in geographical dependence on global networks (Hippold, 2020).

Moving from efficiency to resilience, organizations may face an increase in the cost incurred to categorize suppliers, but the time to manufacture finished products is considerably shortened (McKenna, 2020). The



organizations understand that with a reduction in geographical diversification, the products can move closer to the end consumer. Further, with the workforce maintaining the operations remotely, an ecosystem partnership is focused upon where strategic raw material suppliers collaborate with external service partners (Hippold, 2020). Along with this, these disruptions have compelled organizations to adopt coding algorithms and cloud-based integration platforms. Also, the application of artificial intelligence (AI), Software-as-a-Service (SaaS), the Internet of Things (IoT), and Robotic Process Automation (RPA) can help organizations deal with crisis management. (Vardi, 2020). Thus, the post-Covid crisis era has come as a wake-up call for the supply chain leaders to either move from efficiency to resilience or balance both of them effectively.

## 2. GLOBAL SUPPLY CHAIN PRE-COVID-19 ERA

The global supply chain refers to distributing products and services from one country to another by following a particular orderly network. The concept might look easy and profitable, but it is difficult and complex to manage. Supply chain management is responsible for value-creation activities, thereby enhancing global connectivity. These value-creation activities contribute to the efficiency of the global supply chain. (Golgeci et al., 2020) Efficiency refers to the “ratio of outputs to inputs in a value-creation system”. For increasing efficiency, there has been a specific focus on outsourcing activities to improve coordination between countries. (Dong et al., 2017)

Over the few decades, with the introduction of liberalization, deregulation of trade practices, and foreign direct investment (FDI), there has been a rising over-dependence of developed and developing countries on China and various South-East Asian countries. (Birkinshaw, 2020; Golgeci et al., 2020) The inter-related trade practices have offered over-reliance on China as a “global factory” for even the basic and cheapest product. (Jha & Sharma, 2020; Golgeci et al., 2020)

The countries have been outsourcing various activities to improve and retain efficiency while managing the global configuration of activities. In the globalized era, firms have managed to optimize their value-added activities and re-arranging their operations. (Kano et al., 2020) So, value-creating activities including manufacturing, branding, product or service designing, distribution, and after-sales services have been modelled into geographically dispersed and fragmented business activities. (Clarke & Boersma, 2017) This has further brought a sense of intense competition between supply chains in local and international markets, compelling them to function more efficiently.

The competition of supply chains at the global level indicates the supremacy of the firms while integrating value-creation activities with the global economy. (Gereffi & Lee, 2016) The underlying gist of this competition has made the countries realize that to conduct value-created activities efficiently, more than a single firm is required, and

the network has to be expanded to collaborate with the required resources. (Golgeci et al., 2020)

Global supply chains are considered “strategic assets” and hold a competitive advantage. (Min et al., 2019) In view of this, the supply managers are compelled to review, re-arrange, re-frame, and deploy supply chain activities in a manner to measure the efficiency of the supply chain. Each supply firm has positioned itself in a way to combat the challenges that otherwise may arise in the process of maximizing profits and delivering activities at a cost-efficient level. (Clarke & Boersma, 2017)

With a rise in digitalization and sustainability issues, supply chains are readily adapting to digitalizing to attain sustainability. Advancing technologies such as Artificial Intelligence (AI), Blockchain, Big Data, Machine Learning, Data Analytics, Mobile Analytics, Distributed Manufacturing, and Embedded Devices have helped to maximize profits and minimize waste. (Hagberg et al., 2016; Frazzon et al., 2018) The data-driven technologies and software-led supply chains have promoted efficiency in global value-creation activities. (Dubey et al., 2018; Sanders et al., 2019) The growth in the Internet and digital platforms has helped bridge the communication gap between suppliers and firms. Since digitalization has made supply chains sustainable, supply chains tend to shift focus from delivery to becoming customer-centric. (Min et al., 2019)

When countries, instead of internalizing functions into vertically integrated structures, started outsourcing activities, the global demand management was effectively met. (Golgeci et al., 2020) But when factors of digitalization and sustainability embed with supply chains, demand management was handled not only effectively but also efficiently. There are three reasons why the digitalization of supply chains has been efficient. Firstly, large datasets of customers are available from which suppliers can get new insights. Secondly, there are possibilities for exploring and experimenting with supply chains. Thirdly, large-scale problems can be solved efficiently. (Sanders et al., 2019) Thus, these technological trends have made global supply chains efficient and transparent. Though this efficiency has given a boost to manufacturing-focused countries, it has resulted in underestimating the potential of domestic and regional resources.

The blend of globalization and information communication technologies (ICTs) over the last four decades has helped multinational firms to expand their value-chain activities across borders. (Golgeci et al., 2020) It has helped to realize the ability of the firms to operate with multiple products through a proper supply chain in different parts of the world. This has further contributed to amplifying the dependence of different countries on specific regions for importing products to meet domestic demand. (Dong et al., 2017)

Amid the benefits of the global supply chain, various challenges and risks are involved. These risks are of two types: “operational risks” and “disruption risks”. Operational risks refer to those involved in day-to-day operations, such as demand mismanagement and lead time. Disruption risks are usually related to “low-frequency-high-impact” events such as earthquakes, tsunamis, legal

disputes, manmade catastrophes, or strikes. (Ivanov, 2020) Though disruption risks have a strong adverse impact on the supply chain, they are either confined to a particular geographic area or are time-bound. (Xu et al., 2020) There might be a halt in production, delayed deliveries, or material shortages, causing a ripple effect and degrading the performance and productivity of the global supply chain.

In the pre-Covid-19 era, there was a significant focus on strategically making global supply chains efficient by overlooking the risks and disruptions that may arise due to uncertainty. (Gereffi & Lee, 2016)

### **3. GLOBAL SUPPLY CHAIN POST-COVID-19 ERA**

Covid-19 started in Wuhan in China and widely spread across the world rapidly. With an exponential increase in Covid-19 cases, World Health Organization (WHO) announced it as the worst pandemic that humankind has ever faced. (Ivanov, 2020) After this announcement, government authorities worldwide imposed lockdowns with travel and transport restrictions. (Xu et al., 2020) Due to these restrictions, there was a major adverse effect on the global supply chain.

China, the world's manufacturing hub, has been the base of the global supply chain. Along with different products, the world relied on China for health-related products such as masks, medicines, and Personal Protective Equipment (PPE) kits. But due to the lockdown, the rising demand for health products across the globe exceeded the supply from China. Moreover, various countries, including the USA, India, and European countries, reported receiving defective PPE kits and testing equipment from China. (Jha & Sharma, 2020) All these circumstances led supply chain management to face a huge setback.

The global supply chain faced massive disruptions because of the disruption in supply, demand, and logistics. Because of the unpredictable pandemic, the supply chain faced significant ripple effects. (Li & Zobel, 2020) In fact, the supply chain of various companies faced severe losses because most of them had direct or indirect suppliers originating from Wuhan, China. In a report foreseeing the supply chain disruptions caused due to Covid-19, it was stated that 94 percent of the Fortune 1000 companies faced huge losses. (Fortune, 2020) According to a report by Dun & Bradstreet, a corporate data analytic firm, "51,000 companies around the world have one or more direct suppliers in Wuhan and at least 5 million companies around the world have one or more tier-two suppliers in the Wuhan region, Covid-19's origin. Moreover, 938 of the Fortune 1000 companies have tier-one or tier-two suppliers in the Wuhan region." (Dun & Bradstreet, 2020) Thus, Covid-19 disrupted both supply and demand in the supply chain.

Even when the lockdown was lifted and restrictions relaxed, the manufacturing velocity did not come out as reliable and effective. This is because of preventive measures like a 50 per cent workforce, shortage of raw materials, and active ingredients. There were delayed deliveries and doubled lead time. (Kissler et al., 2020) Thus, amid the global crisis, there were disruptions in international trade practices, human

rights violations, and low political coordination among countries. (Jha & Sharma, 2020)

Covid-19 impacted the global supply chain adversely in four forms: "supply shock", "demand shock", "bullwhip effect", and "transportation requirements and costs". (Zhu et al., 2020) It, further, revealed vulnerabilities of firms in terms of the global supply chain (Jha & Sharma, 2020) Here, vulnerability may be related to the over-dependence of countries on China and the underestimation of the potential of their domestic resources. Due to disruptions in the global supply chain at all stages, from suppliers to customers, firms realized that if the supply chain had been well-diversified, risks would have been comparatively less felt. (Leonard, 2020; Ivanov et al., 2019) To combat the difficulties in the Covid-19 era, the countries started looking out for alternate sources to meet the rising domestic demand. (Jha & Sharma, 2020)

### **4. MOVING FROM EFFICIENCY TO RESILIENCE**

The countries have always been focusing on improving efficiencies of the global supply chain. With the advancement of technology, supply chains digitized and became more enabled and sustainable. The value-creation activities gained great momentum, leading not only to economic value but also to increasing the psychological and physical well-being of society. (Birkinshaw, 2020) Over the last few decades, manufacturing firms have focused on retaining efficiency in the supply chain. (Xu et al., 2020) By outsourcing the manufacturing process, supply management over-emphasizes the lower costs of even the basic product.

The post-Covid-19 era unveiled disruptions in the global supply chain, reducing its efficiency. Earlier, the efficiency in the global supply chain was so focused that disruption risks were overshadowed. Though innovation is an essential part of the long survival of the firm, it has been usually overlooked by supply firms. Thus, the firm's resilience has been compromised for achieving efficiency in the supply chain. Further, with Covid-19 taking over the world, it became important to move "from efficiency to resilience" in supply chains. (Galston, 2020)

The supply chain disruptions, post-Covid, eroded the resilience of the global supply chain. They were majorly felt by those firms involved in procuring raw materials or finished products. The dominant role of China and South-East Asian countries in the manufacturing and supplier industry adversely affected the economies of all the countries that are directly or indirectly dependent on the Chinese economy. (Zhang et al., 2018) The subsequent lockdowns with travel and transport restrictions delayed shipments and increased lead time. These conditions deteriorated the condition of supply chains, making them less reliable.

To fight against the challenges of the Covid-19 outbreak, an emphasis on increasing the firm's resilience has been made. Thus, supply chain resilience can be understood as "the adaptive capability of a supply chain to reduce the probability of facing sudden disturbances, resist the spread of disturbances by maintaining control over structures and



functions, and recover and respond by immediate and effective reactive plans to transcend the disturbance and restore the supply chain to a robust state of operations.” (Kamalahmadi & Parast, 2016)

Since supply chain disruption had “ripple effects,” it was felt that global value creation activities needed to move away from efficiency explicitly and adapt to resilience imperative. (Dolgui et al., 2018; Queiroz et al., 2020) If suppliers, who are more prone and exposed to disruptions, are well-known in advance, demand forecasting can be appropriately performed. This is because an unexpected rise in consumer demand can lead to a lack of confidence in supply firms. To combat this, the product portfolio and customer database need to be reviewed and re-evaluated. Thus, managing the resources by keeping up the innovation of the firm promises the firm to become self-resilient.

Supply chain resilience “measures the ability to prepare for and provide essential functions during a disruption, and then to recover from and adapt post-disruption into a form that is better suited to the new ‘present’” (Golan et al., 2020), stating that “a resilient system can withstand a disruption” (Mena et al., 2022). According to the systematic literature review, resilience has been defined as “many of the (definitions in literature) focus on the capability of a system to ‘absorb’ and ‘adapt’ to disruptive events, and ‘recovery’ is considered as the critical part of resilience” (Hosseini et al., 2016). Therefore, the most comprehensive definition of supply chain resilience is: “Resilience is the ability of a system to detect, adapt, and react to disturbances to restore its original structure and functions”. (Fertier et al., 2021)

The elements of resilience include agility, collaboration, flexibility, information sharing, leadership, redundancy, visibility, velocity, trust, and risk management culture. These help the firms to develop their resilience as well as enhance their performance. (Liu et al., 2018) The firm’s resilience and performance prepare it to face any disruption of the uncertain business environment. With capabilities to use regional resources, the firms can adopt best practices for becoming more responsive to these disruptions in the global supply chain. (Parast et al., 2019)

Post-Covid, the disruptions in the supply chain led to a loss of revenues and decreased sales of products or services. (Elluru et al., 2019) The firms, thus, are going to be innovative which further helps them to be more resilient to disruption. Along with innovation, firms have started focusing on information-sharing capabilities and supportive leadership capabilities. The firms, which were once dependent on physical labour across warehousing, logistics, and transportation, are readily accepting digital technologies. The emerging technologies of Industry 4.0 are being embedded that help determine rule-based demand forecasting and adjustable stock allocations. (Golgeci et al., 2020) Further, cloud computing, big data analytics, IoT, automation, blockchain, and 3D printing have contributed to the competitive edge and increased resilience of the supply chain. (Munien & Telukdarie, 2021) This significantly will enhance user experiences and optimize processes intelligently to maintain demand management. Thus, from

being efficient, supply chains are becoming resilient to handle crisis management.

Some possible strategies to improve the resilience of the supply chain might include:

### **#1. Diversification**

Senior management employees compelled supply chain managers to seek out alternatives to China. Investors and governments cautioned businesses against over-reliance on a single supplier and diversification of the risk. (Zhu et al., 2020) In addition, supply shocks can be mitigated by collaborating closely with existing suppliers and diversification of the supplier base. Companies are encouraged to discover several suppliers as opposed to relying on a few. (Magableh, 2021)

### **#2. Localizing supply chains**

For enhancing resilience, “it will be a wise decision to localize some of the parts of the supply chain if not all”. (Zhu et al., 2020) Stabilizing supply chains require adjacent local or regional sources, and lead time is a crucial aspect of the pandemic response. Localizing supply chains would reduce lead time because the distance that must be covered will be diminished. Moreover, reliance on local as well as regional sources increases reactivity to disruptions. (Magableh, 2021) Localizing supply chains is consistent with the consumer trend of becoming more conscious of the ecological and ethical elements of the supply chain and lowering the number of supply management tiers can speed up corporate procedures. (Zhu et al., 2020; Magableh, 2021)

### **#3. Emphasizing supply chain visibility**

Supply chain visibility is attained by depicting the complete supply chain and implementing a data-sharing procedure (among other inventory levels). It will aid both enterprises and suppliers in predicting and preparing for interruptions on the supply and demand side, respectively. Also, the “bullwhip effect” might occur during or after a disruption that can be mitigated by boosting visibility, since a lack of visibility is one of the primary causes of the bullwhip effect. (Zhu et al., 2020; Magableh, 2021)

## **5. CONCLUSION**

The global supply chain has always been a mode of linking different countries in the globalization era. It helped countries to expand their markets and connect with each other to attain a win-win position. The pre-Covid era saw the digitalization of the global supply chain which increased its efficiency. This efficiency demanded over-reliance on one or two countries only with respect to the manufacturing of products.

When a severe pandemic Covid-19 crisis hit the world, everything came to a sudden halt. Many disruptions were witnessed in the global supply chain, reducing its efficiency in the globalized world (Xu et al., 2020). The subsequent lockdowns compelled every country to manufacture their own products using domestic resources. At the same time, it has been realized that only focusing on efficiency will not work. Though post-covid self-resilience became prominent, resilience is in the long run and is necessary for combating

crisis management. Thus, there has been a greater sense of balancing efficiency and resilience in the global supply chain (Golgeci et al., 2020).

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