

# MANAGING THE SUPPLY CHAIN RISKS CAUSED BY THE COVID-19 PANDEMIC

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## Abstract

*Pandemics like the one started at the beginning of 2020 can cause the plethora of challenges for businesses globally. Risks that can affect businesses are a very significant factor for operations of a company supply chain. The aim of this paper is to highlight the importance of risk awareness and knowledge for the adequate management of the companies' supply chain performance in the period of disruptions caused by the COVID-19 pandemic. Also, the COVID-19 pandemic emphasizes the meaning of supply chain operation flexibility. The results of the carried out analysis, based on secondary data sources, show that the consequences of risk mismanagement can be serious and cause the operations interruption. Basically, the whole supply chain can suffer if one business ends its operations. Thus, risk strategy and risk reduction determine whether a company will suffer seriously during the COVID-19 pandemic or not. The importance of a specific type of risk is defined by the industry and the market the business operates in. It can be concluded that among all businesses it is of paramount importance to be aware of consequences and to take into consideration all aspects of business surroundings.*

**Key words:** risk management, COVID-19 pandemic, supply chain operations, strategy.

## 1. INTRODUCTION

Nowadays, supply chains often consist of many suppliers, manufacturers, distributors, customers and many other stakeholders. Also, supply chains are spread across many countries and continents, thus exposed to many supply chain risks. Global economy is very connected and dependable on resources from all over the world. Therefore, their supply chains are extremely vulnerable to disruption risks that can negatively affect or shut down their businesses. Many factors can be the cause of disruption, ranging from human errors to pandemics. If a global pandemic hits the world almost every supply chain would face disruption more or less depending on the industry, with the influence being inevitable. Thus, since the outbreak, the COVID-19 pandemic has had severe effects on supply chains and the economy as a whole.

Managers of companies are trying to overcome the problems arising from the pandemic and to figure out how to save the companies' operation potential. Likewise, the position the company has in the supply chain is also important, so the company's management is devoted to retaining the position. Consequently, with the goal to ensure the survival of a company, different strategies have been created since the beginning of 2020.

## 2. LITERATURE REVIEW

In order to develop and achieve its business goals, enterprises must integrate into the big economic environment, which also leads to the increasingly complex supply chain of

enterprises, and enterprises are vulnerable to sudden risks (Huo et al., 2020). By spatial extension and number of members increase, supply chains became larger but dependable on situations in more than one region. Consequently, vulnerabilities of supply chains have amplified as they have become more complex, and the need for improving efficiency and delivery time has increased compared to the past (Bottani et al., 2019). Thus, today's globalized, leaner and just-in-time supply chains are more vulnerable to natural and human-made disasters (Soni & Jain, 2011).

Different events can threaten a supply chain, including internal sources (e.g., human errors, improper operations, communication problems) and external sources (e.g., natural disasters, terrorism, economic difficulties) (Lei & MacKenzie, 2019). The supply chain is inevitably fragile because it has a very convoluted structure with a complex relationship dependence among participants. A change in one element or component can induce changes in other components within the supply chain (Christopher, 2012). In 2020 the majority of supply chains all over the world faced one type of supply chain disruption caused by the COVID-19 pandemic. Despite the belief that future events need to be predicted, events like the COVID-19 pandemic cannot be predicted. Nobody can predict such a crisis scale and timing; neither can we specify the best response strategy for such an event (Ker & Cardwell, 2020). The only possible solution is to adapt to new circumstances by developing novel strategies and operational shifts on short notice, if it is feasible.

A supply chain disruption is defined as an event that disrupts the flow of goods or services in a supply chain system (Revilla & Saenz, 2017; Truong & Hara, 2018). Any problem in any link might endanger the normal operation of the whole supply chain, or even lead to the disintegration (Wang et al., 2021). Also, any serious stoppage in the functioning of supply chains has a very significant impact on the performance of the entire global economy. Generally, the epidemic outbreaks start small, but scale fast and disperse over many geographic regions creating a lot of unknowns which makes it difficult to fully determine the impact of the epidemic outbreak on the supply chain and the right measures to react (Ivanov, 2020). Particularly, the characteristic of these events is unpredictability and their lasting effects on supply chains.

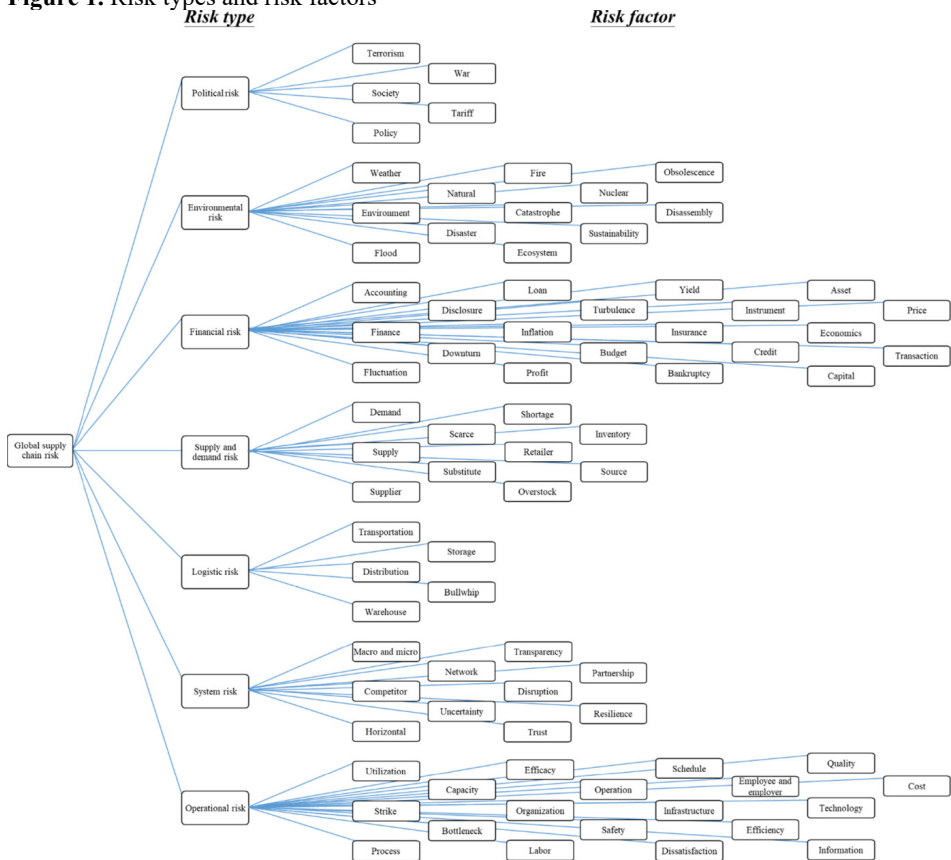
To provide safe and reliable products, every supply chain member must recognize risks both within and outside of their networks (Ali et al., 2019). So, it is essential for all members to build trust among them and strengthen cooperation. Also, the partners' acts in need should be understood and not be an obstacle to future cooperation. Supply chain risk is untimely supply which can lead to a decline in the quality of goods and services (Zsidisin et al., 2019). Effects of quality decline can transfer to all supply chain members and processes. As a result, the whole supply chain could lose the recognizable quality which leads to a market share decrease. It is worth mentioning that the companies suffer more from losing their market share to the competitors compared to the physical damages to the facilities after a disruption (Rezapour et al., 2017).

### **3. THE GLOBAL COVID-19 PANDEMIC SUPPLY CHAIN RISKS**

Supply chain risk is the potential occurrence of an incident or failure to seize opportunities in supply chain in which its outcomes result in a financial loss for the firm (Prakash et al., 2018). The COVID-19 pandemic has disrupted all business operations worldwide (Choi, 2020; Queiroz et al., 2020). The impact of the pandemic is so deep that no industry has been spared at least one imposed anti-pandemic measure. In an event of sudden disruption, the immediate impact on a material supply chain is experienced in both demand and supply (Guan et al., 2020; Sprecher et al., 2017), due to abrupt suspension of or changes

to mining, processing, and manufacturing activities (Dente and Hashimoto, 2020). Furthermore, the risk aversion of the buyer matters for purchasing decisions (Di Mauro et al., 2020). According to Cannella et al. (2019) risk averse buyers display a hoarding behavior when replenishing purchased items, in order to reduce the risk of running out of stock. In the same way, the herd mechanism affects every individual and group that blindly follows the trend (Huo et al., 2019). For those reasons, some companies started building an inventory of both finished goods and raw materials during COVID-19 pandemic. This can lower supply chains' risk of stock-out of important goods both for themselves and their customers. The opposite is also happening, where customers are not allowed to go shopping which creates a goods surplus that induces financial consequences. Additionally, the COVID-19 pandemic has highlighted problem areas in supply chains regarding labor practices and a lack of health and safety.

**Figure 1.** Risk types and risk factors



Source: Chu, Ch., Park, K., Kremer, G. (2020).

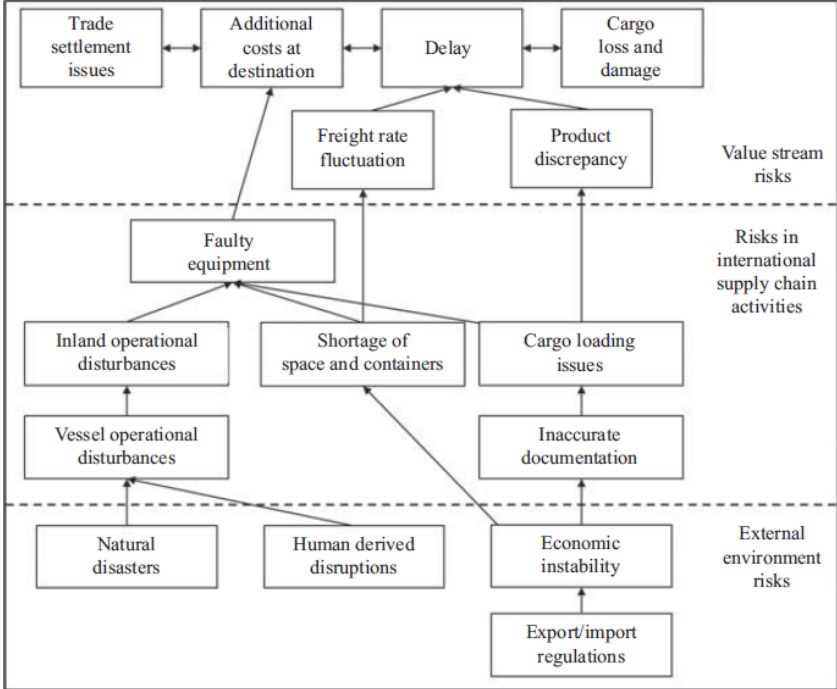
In supply chain risk management, the first and most significant step is the identification of risk factors (Hou & Zhao, 2021). Figure 1 shows risk types and risk factors. After implementing frequency and correlation analysis and topic modeling on a total of 911 journal articles related to global supply chain risk, a holistic risk categorization of seven risk types

and 81 risk factor terms was developed (Chu et al., 2020). By identifying risk factors, companies can recognize risk types more accurately. Therefore, the reaction could be in a more adequate and timely manner.

Supply chains are becoming more vulnerable due to an increase in disruptive events from man-made and natural causes (Ali et al., 2018; Govindan, 2017). Incidents such as pandemics, epidemics, natural disasters (such as earthquakes), socio-political instability, economic downturns and terrorist attacks are examples of environmental disruption (Parast, 2020; Gunessee and Subramanian, 2020). Environmental disruptions, like COVID-19, have short-term and long-term impacts on global supply chains and disrupt economic activities across the globe (Parast & Subramanian, 2021), which can determine the approach when creating a business strategy. Also, to respond to these risk drivers, supply chains should develop strategic response capabilities to assess and mitigate disruptions (Singh & Singh, 2019). Healthcare supply chain managers daily deal with the dilemma of mitigating risks costs versus costs and losses caused by the risks (Senna et al., 2021).

In order to better understand supply chain risk, it is important to perceive the interaction between different types of risks. Interpretive structural modelling (ISM), shown in figure 2, is used to develop a better understanding of supply chain logistics risks and interactions. The ISM-based model demonstrates the hierarchical structure of risks in international logistics and highlights their interrelationships with the dependence and driving power of risk elements (Kwak et al., 2018). Since the risks are banded, one risk can lead to another and trigger a chain reaction.

**Figure 2.** The ISM-based model of 16 risk elements



Source: Kwak, D.W., Rodrigues, V.S., Mason, R., Pettit, S., Beresford, A. (2018).

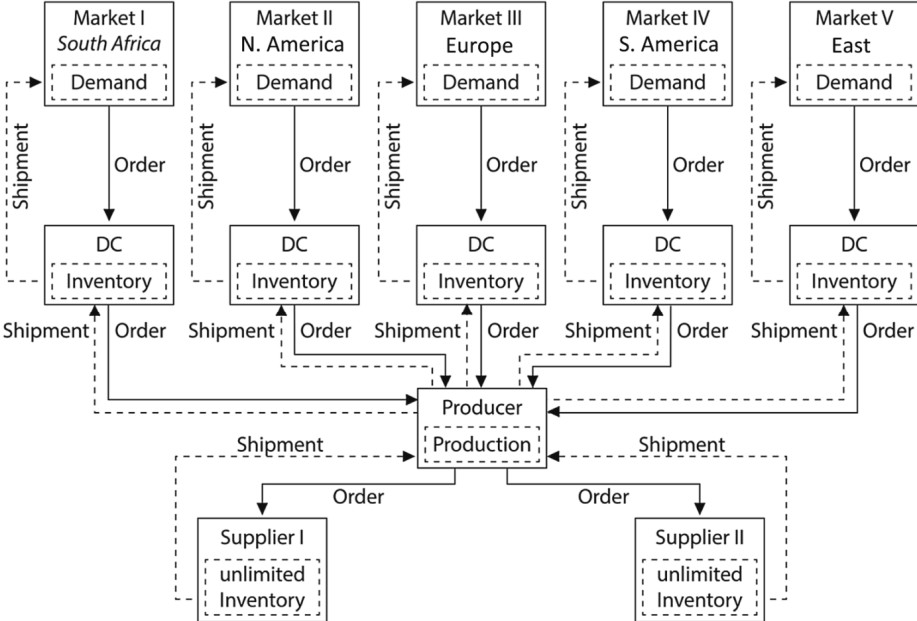
The problem for supply chains could also be a lack of skilled workforce due to COVID-19 measures. The findings from one study for food industries showed that the lack of skilled personnel has the highest influence on the risks (Ali et al., 2019). Moreover, the absence of employees due to illness limits the companies' ability to function adequately and respond properly. Other restrictions (WHO, 2020) like the limitation of the number of employees at the workplace and work from home also lower the ability of a company to react properly.

**4. STRATEGIES AS A RESPONSE TO THE GLOBAL PANDEMIC CRISIS**

The current situation in the world is very complex for businesses. Every region has its own pandemic measures and health politics. Uncertain regional factors regarding global business and logistics such as government stability, insufficient infrastructure in a country, and trade barriers may make it difficult to have successful supply chain management (Park et al., 2018). That determines what strategy should be applied and in what manner. Thus, the struggle for survival forces the market subjects to respond adequately to the given circumstances and consequently new business models could be developed. A lot of information and knowledge is required for strategy creation and implementation which emphasizes the importance of a reliable information system in the supply chain (Modgil et al., 2021; Nayal et al., 2021). Furthermore, besides information systems, the skilled workforce is of paramount importance when distribution sources and channels are changing constantly.

The importance of material and information flow in a supply chain is depicted in figure 3. Firstly, through the information system orders need to be made. Secondly, the flow of physical goods is engaged to fulfill those orders. In general, the material flow can be seriously disrupted by the anti-pandemic measures imposed by many governments, and thus the fragility of the global supply chain is exposed.

**Figure 3.** The material and information flows in the supply chain



Source: Ivanov, D. (2020).

Disruptions like COVID-19 pandemic require proactive, as well as reactive planning for mitigation and preparation (Yao et al., 2018). Efficient performance of the supply chain is hampered unless risks are properly managed (Raghuram et al., 2021). In practical life, managers face enormous difficulties in improving appropriate risk mitigation strategies because of continuous escalating risks (Chang et al., 2015; Kurniawan et al., 2017). Ivanov (2019) expresses that proactive and reactive strategies are the two main policies that can lead from resilient supply chains to disruptions and ensure effective actions will be taken in case of disruption occurrence.

It is crucial to understand the pandemic scenarios to be able to manage risk properly and to establish the right strategy. A baseline scenario is created to represent normal risks while the remaining five scenarios reflect different types of risks that could be created by sudden disruptions like the COVID-19 pandemic (Althaf & Babbitt, 2021). Those scenarios are shown in table 1.

**Table 1.** Disruption scenario descriptions

Scenario	Description
Baseline	Supply, demand, sociopolitical and environmental factors represent equal risks to sustainability in electronics sector.
1	<i>Supply cannot meet increased demand.</i> Pandemic mitigation measures (lockdowns) result in increased demand for electronics and decreased production of needed materials due to closure of mining sites and metal processing units.
2	<i>Demand fluctuation leads to economic volatility.</i> Pandemic lockdowns lead to economic downturns followed by material surges as economies open back again, causing price hikes.
3	<i>Pandemic gives governments ability to overreach.</i> Government overreaches cause domestic conflicts in countries with political instability and governance issues, leading to social risks especially from forced labor, layoffs, poor working conditions, and worker illness.
4	<i>Pandemic causes geopolitical tensions.</i> Lockdowns, border closures and travel bans impact trade relations among global economies and associated metal flows.
5	<i>Environmental concerns take a back seat during pandemic.</i> As countries struggle to keep their economies stable, environmental regulations become low priority, exacerbating environmental risks from material production.

Source: Althaf, S., Babbitt, C.W. (2021).

The results of one study conducted by Kumar et al., (2021) show “Collaborative Management”, “Proactive Business Continuity Planning” and “Financial Sustainability” to be the best three strategies followed by “Digital and Technological Transformation”, “Central Response Team”, “Enhance Transparency”, “Information Management”, “Flexible Business Model” and “Training and Communication“. Firstly, “Collaborative Management” improves operational capabilities and processes of organizations by making cooperation among partners horizontally and vertically. Secondly, “Proactive Business Continuity Planning” means that constant assessing and planning on operational level makes the whole process go smooth, as much as possible. Finally, “Financial Sustainability” implies that organizations should be able to handle financial shocks. Another study shows that both supply chain resilience and supply chain responsiveness have a significant positive effect on the supply chain risk management performance, while no significant effect of flexibility, which is another independent variable, on supply chain risk management performance could be found (Saglam et al., 2021).

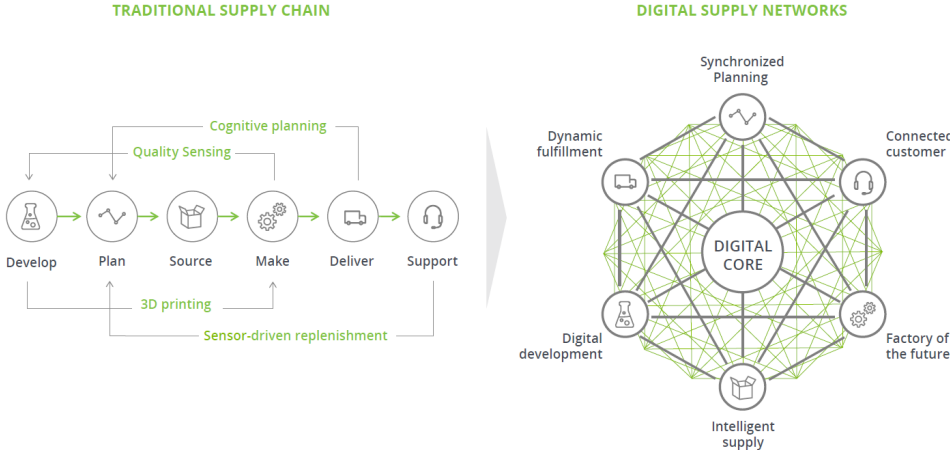
Risk is very important factor in every business. Thus, it is of paramount importance to treat risks properly (Lahane & Kant, 2021). As firms endeavor to reduce supply chain risk by employing various risk mitigation strategies, it becomes important for researchers to re-

examine the choice of strategies and their implementation in the context of a specific business setting. Some of supply chain risk mitigation strategies are (Woong & Goh, 2021):

- *Increasing Capacity* - The most direct way to support a demand surge would be to increase production capacity during the risk event.
- *Diversifying Single-Product Categories* - During the COVID-19 pandemic, single-product companies expanded their product lines, to offset losses from products with low demand with the gains from those in higher demand.
- *Local Sourcing* - To support their operations, companies turned to local businesses and suppliers.
- *Prioritizing Critical Categories* - Companies with a mix of poor-performing and well-performing segments during the pandemic tended to focus on fulfilling outperforming products/categories.
- *Repurposing Assets* - Many companies redeployed assets from poor-performing segments to support the overwhelming demand at better-performing segments.
- *Establishing Partnerships* - The pandemic prompted many businesses to work together, leveraging each other's functions and capabilities to enhance their operations.
- *Leveraging Social Media Influence* - Leveraging a global surge in consumption of online content during COVID-19, companies such as in the agriculture industry took to social media to shape demand during the pandemic to raise awareness on the issues they faced.

Leveraging advanced technologies such as the Internet of Things, artificial intelligence, robotics, and 5G, digital supply networks are designed to anticipate and meet future challenges (Deloitte, 2020).

**Figure 4.** The switch from traditional supply chains to digital supply networks



Source: Kilpatrick, J. (2021). COVID-19: Managing supply chain risk and disruption, available at: <https://www2.deloitte.com/global/en/pages/risk/cyber-strategic-risk/articles/covid-19-managing-supply-chain-risk-and-disruption.html> (accessed August 30, 2021)

From a risk management perspective, the key will be to build a “resilient” supply chain that not only seeks to reduce risks but also is prepared to quickly adjust and recover from any unanticipated supply chain disruptions that occur. By the swift to the novel way of processes, numerous risk types can be reduced, which would prepare companies for the future. The difference among approaches is shown in figure 4.

Managing risk in supply chains is a demanding job. Many strategies are developed and many novel are about to be created. Thus, the good decision-making model is required (Fagundes et al., 2020). Circumstances in which the strategy is created reflect specifics of the industry and the region of business operations. Not all the strategies can be utilized for every supply chain worldwide. Hence, the most important part of strategy developing and implementation is comprehensive consideration of the surroundings and the current circumstances affecting the supply chain.

## 5. CONCLUSION

The global market has felt the strong impact of the COVID-19 pandemic. Supply chains of all industries face similar anti-pandemic measures, but the impact on their functioning can be different to some extent. This pandemic disrupts both sides of the global supply chains simultaneously, the supply side and the demand side. At the same time, companies struggle to sell their products and to procure required inputs for the production process. The risks that can endanger supply chains are: political, environmental, financial, supply and demand, logistic, system, and operational risk. In other words, different events can threaten a supply chain, internally or externally. Generally, supply chains are fragile due to a complex relationship structure among participants where the change in one element or member can induce a chain reaction the supply chain. Primarily, the reason lays in the specifics of different industries, for instance fashion and health industry.

Supply chains are a very complex system to manage, especially in the wake of a pandemic like the COVID-19 pandemic. To address the problems and obstacles toward sustainable and profitable supply chains proper strategies need to be developed and implemented. It requires skilled employees and management. With the right strategy followed by the constant process of learning and accepting innovations, supply chains can survive and progress in new highly risked circumstances.

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