



Research on the Impact of COVID-19 on Global Supply Chains and Policy Responses

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Abstract. In 2020, as COVID-19 broke out in many places around the world, countries began implementing different lockdown or isolation policies. Working online from home or shutting down your business is becoming a part of life. However, in the face of the surging demand from people in all aspects, supply has become one of the difficulties faced by enterprises or countries. People's needs are not being met because of supply chain disruptions caused by COVID-19. This is a challenge for the industry as well as manufacturers of the most basic commodities. On the other hand, due to the limitation of production capacity, the supply of raw materials is greatly reduced. These disruptions can suddenly affect the production process, which can collapse if appropriate changes are not made immediately. The research aims to summarize the impact of COVID-19 on supply chains by reviewing studies and reports. Through the analysis of the causes of the negative impact, the government and enterprises alleviate the supply chain problems of policy suggestions. Provide preventive advice for future supply chain problems. For example, integrating the supply chain and building an e-commerce platform. Through integrated research, this paper will give suggestions from both within and outside the supply chain.

Keywords: Covid-19 · Supply Chain · E-commerce · Policy · Inventory

1 Introduction

In response to COVID-19, governments implemented containment and self-quarantine in line with public policy. So, the COVID-19 pandemic has impacted where and how individuals shop, and accelerated significant industry changes that affect everyone. The pandemic has affected consumer channels, how retailers interact with each other, and how businesses and wholesalers work together. Except for a lot of medical supplies. As people are hoarding basic necessities due to concerns over the epidemic and policies, this has also had a negative impact on the market. There has also been a sharp increase in online shopping activity as many people are confined to their homes. But the supply chain is a global whole, and no part can be missing. But the freight company reduces the transportation capacity, the lack of raw materials, and so on, resulting in people's surging demand can not be met. This means that the pandemic has disrupted supply chains, changed the behaviors of customers and suppliers and raised concerns about

supply chain disruptions. Governments and businesses need a way to change the current supply problem to meet people's needs. The research has collated the impact of COVID-19 on the supply chain and the causes by reviewing studies and reports. By analyzing the causes, propose potential improvement policies to improve the supply chain. The aim of this study is to examine whether policies such as digital marketing capabilities and supply chain resilience can increase supply and improve supply chains in the context of COVID-19.

2 The Impact of COVID-19 on Supply Chains

In 2020, no country is unaffected by the sudden and rapid spread of the COVID-19 pandemic across the globe. This is even though governments have implemented different containment and quarantine policies in response to the outbreak. But that doesn't change the impact the pandemic has had on countries. In the year 2020, there were 81,475,053 confirmed cases of COVID-19 worldwide, including 1,798,050 deaths, according to World Health Organization statistics. In addition, the pandemic will result in a 13%-32% drop in merchandise trade, a 44%-80% drop in international human migration in 2020, and a 30%-40% drop in investment and trade from 2020 to 2021 [1]. The emergence of COVID-19 has undoubtedly exposed the world to the risk of a public health emergency, damaging the global economy and supply chains.

Nowadays, with the development of the global economy, the supply chain system is also improving. Supply chains have been globally designed and optimized for the lowest operating costs for many manufacturing industries. But it is precisely because of the globalization of the supply chain that it is more vulnerable to negative factors. Global supply input, demand and transportation have all changed dramatically due to the impact of COVID-19.

2.1 Global Supply Input

As a result of the policy of containment and self-isolation, many factories were closed and supply inputs were reduced. Today, supply chains are global. And the more advanced the manufacturing industry chain (such as automotive, electronics, etc.), the longer the supply chain, which means that there are more steps to be processed. Supply chain systems for these different parts are often located in different areas. Then through a continuous and rapid logistics system, all kinds of raw materials and semi-finished products are gathered together for reprocessing and reproduction, and finally form finished products [2]. But it also means that when factories are short of any raw material, they can't make things. During an outbreak, your supplier may not be able to provide you with raw materials due to lockdown or containment policies. Not only are factories unable to produce products, but other materials are piling up because they cannot be consumed. Second, illness and death caused by COVID-19 has reduced the workforce. Lockdowns and social distancing have caused business shutdowns and reduced mobility in the workplace [3]. And some companies responded to the lockout by laying off workers and selling equipment to cut costs to prevent the risk of bankruptcy. So, productivity has been decimated

all over the world. These shocks reduced the supply and export of products. In addition, in the face of surging demand for medical supplies. Limited factories have been ordered to produce essential medical supplies such as masks and ventilators. Therefore, enterprises are faced with the accumulation of orders from customers, which cannot be fulfilled due to a lack of productivity.

2.2 Demand

Demand is considered the most influential factor. Because the basic relationship of supply chain lies in supply and demand. Therefore, the impact of demand on the supply chain is fundamental.

People's needs are different because of the pandemic. The first is the home quarantine policy. People are required to work from home and children are home-schooled. This is a new way of life for people. People stay in their homes, but their physical and mental needs still need to be met. In order to enjoy life at home, people will improve their home equipment. For example, people will buy fitness equipment to meet their exercise needs; buy a bigger TV to replace going to the cinema; or buy a computer to meet the requirements of working at home. People will place orders for these products on online platforms. So, people's needs are not diminished by staying at home. On the contrary, there is more besides daily necessities. As mentioned in the previous section, these goods are the most difficult to produce (because of the long supply chain). In addition, there is more demand for retailers. Because of the closure of restaurants and other places. People need to meet all their needs at home. Take meat, for example. It's hard to translate a supply chain that used to supply meat to restaurants into a supply chain that used to supply meat to supermarkets. These are two completely different supply chains, one for households and the other for food services. The former supplies supermarkets, the latter supplies restaurants. Consider, for example, the final product of two supply chains. Restaurants buy whole, unprocessed meat, while families buy processed, packaged meat. This also means that the processing of the two products is completely different. So the two supply chains have different meat requirements, it takes time and cost to transform their supply chains. But people needed meat, so everyone had to go to the supermarket to buy meat, and the supermarket quickly ran out of meat, because the demand was far greater than the supply. In addition, people tend to overstock basic necessities out of fear of the epidemic. People are anxious because they can't buy supplies, which makes them more likely to hoard. It's a vicious circle. Prices are also rising because of rising costs. This is a big test for the supply chain [4].

2.3 Transportation

Because the virus is spread through close contact with other people who have symptoms of COVID-19. Not only does the virus have an incubation period in the body, but it also sticks to surfaces. As a result, governments around the world have imposed strict restrictions on all types of products, including food, whether by land, rail, sea or air. Workers spend some time testing food packages for viruses and the health of people who transport them. The logistics system has slowed as a result. According to recent

studies, the amount of food transported by vehicle has decreased by 65% as a result of the newly issued border transportation management policy [5].

3 Policy Recommendations for Dealing with Supply Chain Disruptions

Supply chain disruption is an unstable change. As a result of these disruptions, short-term real-time prediction of the pandemic and its impact on supply chains has become very important management and decision-making exercise. Medium - and long-term forecasting is also crucial for supply chain planning [6]. Those factors mentioned in the previous section disrupt supply chains both in the long term and the short term, preventing factories from delivering goods to customers to meet demand. Although the supply chain faces huge challenges, some appropriate measures can improve the situation. Businesses and governments need to take steps to address the problem both in the short term and in the long term. The following suggestions are put forward from two perspectives, namely the supply chain itself and indirect measures. The difference between the two is that the former is to change the characteristics of the supply chain in the long term while the latter is to prevent the interruption of the supply chain.

3.1 For the Supply Chain Itself

Improving the elasticity of supply chain is one of the most effective ways to solve supply chain interruption. The so-called “resilience” is the dynamic ability of the supply chain to resist risks. Resilient supply chain is mainly reflected in two important factors: the robustness and recoverability of supply chain. Robustness is the maximum that the supply chain can accept in the face of supply risks. Recoverability is the speed at which the supply chain can return to normal in the face of supply risks. It’s a consistent process. That is to say, when the supply chain is forced to interrupt, it can safely survive with the minimum loss, and can respond quickly and find an effective recovery path to return to a stable state [2].

Generally, in order to control costs, enterprises tend to adopt the strategy of unified procurement from a single supplier for a single raw material. Improve bargaining power with upstream and warehouse logistics suppliers by increasing purchasing volume and business volume. In such circumstances, over-reliance on a single supplier weakens the resilience of the supply chain and increases the risk of supply disruptions. Therefore, enterprises should actively consider how to transform from centralized and unitary industrial supply chain to decentralized and diversified industrial supply chain. Finding multiple alternative suppliers means maintaining partnerships with suppliers in multiple countries or regions to reduce the risk of production and supply outages [2].

Moreover, with the continued spread and negative impact of Novel Coronavirus, regionalization could become the new normal in the post-crisis manufacturing supply chain. On the one hand, the weaknesses of the current global manufacturing model are fully exposed. Because the recovery from the pandemic is out of sync across the globe, factory productivity cannot be guaranteed. As well as continued restrictions on international transport and flights, the recovery of manufacturing supply chains is unlikely

to be achieved in the short term, and supply imbalances persist. On the other hand, the COVID-19 can pose backlash against globalization and aggregate the decoupling afterwards [1].

Besides, not only through constructing supply chain digital platform and supplier diversification system, enterprises can further form their own supply chain early warning system. Under the current situation, in order to grasp the risks or uncertainties of the industrial supply chain in a timely manner, the government and enterprises need to establish key monitoring industries and regions, especially vulnerable industries and regions [7]. By tracking indicators of all dimensions of supply chain operation (Transaction flow, logistics, capital flow and information flow) in time, and searching for supply chain alternatives according to index changes and early warning triggers, fast recovery can be achieved. When an enterprise processes an order, the supply chain early warning system can not only help the enterprise quickly assess the impact of an emergency on the direct upstream and downstream of the enterprise, but also help the enterprise take the lead in finding solutions from the supply chain alternatives in the initial stage of the outbreak of an emergency. In terms of transaction flow, the early warning system is used to timely evaluate and estimate the impact of the epidemic on the supply market and the demand side. In logistics, it is necessary to pay attention to the possible obstacles to enterprise operation caused by transportation, storage and other factors. As mentioned earlier, many logistics have been disrupted and critical points are backlogged due to the current COVID-19 pandemic. Companies need to consider whether there are alternative logistics systems or other ways to mitigate this situation. In terms of cash flow, we should pay attention to the cash flow of the supply chain. When the cash flow is negatively affected and the cash outflow is greater than the cash inflow, the payment and settlement policies of purchasing and sales shall be adjusted timely according to the specific changes of cash flow. Or strive to negotiate with core enterprises or platform enterprises to improve the current financial difficulties. For example, negotiate with suppliers to reach an instalment policy to alleviate short-term financial difficulties; In information flow, real-time and transparent data and information on all aspects of supply chain operation are mastered to enhance flexible operation ability. However, the establishment of early warning systems requires effective means of data collection, transmission and acquisition. Any delay in data feedback increases supply chain risk. Therefore, the construction of zero-delay information data platform and system is very important. In this way, external forces (such as the technical capabilities of some technology companies and big data companies) and the cooperation of various management departments can be used to establish real-time information data monitoring systems for enterprises and industries.

3.2 Related Measures to Improve Supply Chain Indirectly

There are many ways to improve the supply chain indirectly outside of the supply chain itself. The first is to build digital platforms, which is one way to leverage computer and Internet technology. The advantage of establishing supply chain digital platform is that it can help enterprises manage suppliers and customers effectively. All the information will be integrated quickly and orderly. Digital platforms can improve the supply chain's ability to respond quickly and fulfil contracts when the risk of supply disruption arises.

Digital platforms can disintermediate supply chains and shorten them as much as possible through explicit point-to-point relationships. This shortens the distance between upstream resources and end customers.

In addition to supply chain digital platforms, e-commerce is also important. The industrialization transformation of the digital and intelligent industrial Internet system, artificial intelligence technology, 5G related technology application, smart medical technology and other high-tech technologies will inevitably become the development trend. The industrial application of these technologies will make manufacturing operations more flexible, less costly and more responsive to emergencies. The outbreak of the epidemic not only increased investors' enthusiasm for high-tech investment, but also increased users' demand for applications [8]. The outbreak has shown the advantages of e-commerce platforms. The risk of an enterprise partly depends on the size of its fixed costs. Compared with retail stores, e-commerce platforms have no fixed costs and can arrange customer orders more quickly. So, Retail stores face a greater risk of bankruptcy as a result of the pandemic. But e-commerce platforms are less affected when the economy is unstable.

And customer information is very important. Companies can increase communication with customers to identify the range of immediate needs of individuals. Enterprises according to the requirements of customers to adjust the sales and distribution plan have reached the optimal solution of enterprise operation mode.

Finally, inventory management can also play a certain positive impact. An intuitive and visible inventory management system can not only help enterprises make plans, but also soothe the nervous emotions of the masses, to reduce the occurrence of hoarding behavior.

4 Conclusion

COVID-19 has disrupted supply chains in three main ways: supply input, demand and transportation. Although the damage done by supply chains cannot be changed, there are ways to improve them. Gradually return to a level of supply that can meet people's needs. Because the complexity and specificity of supply chain globalization help enterprises improve profitability in general but also cause the decline of supply chain resilience. Be easily influenced by negative events. Therefore, enterprises should change the supply chain model to improve the resilience of the supply chain to cope with emergencies. According to the reasons for supply chain interference, we have some solutions. Supply chains need to diversify. The enterprise should be supported by multiple suppliers and maintain cooperative relationships. Secondly, the supply chain develops from globalization to regionalization, which is one of the effective methods in the short term. Secondly, a supply chain warning system should be established. Anticipate the impact of an emergency in advance. Find the optimal solution from the alternatives. In addition, digital platforms, customer information and inventory management can improve supply chain resilience. This research also has some deficiencies. On the one hand, the studies and reports referred to are limited and not comprehensive enough. On the other hand, this research mentioned that logistics and transportation played a great role during the epidemic but also suffered a great blow. Some stages of the supply chain need to be

supported by sufficient logistics capacity. This study summarizes the negative impact of COVID-19 on supply chains and proposes potential solutions. However, this study lacks recommendations for improving logistics transportation. In addition, the recommendations presented in this paper are not universal. Companies should weigh the pros and cons before making changes.

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