Study on supply chain resilience and resilience under the impact of COVID-19

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Abstract: The COVID-19 pandemic has had a severe impact on global supply chains, exposing many deficiencies in supply chain risk management. Based on the analysis of the impact of the epidemic on the supply chain, especially the supply chain of small and medium-sized enterprises, this paper discusses the path to improve the supply chain resilience, constructs the key influencing factors model of supply chain resilience by using the analytic hierarchy process, and puts forward countermeasures and suggestions to strengthen the supply chain resilience and resilience, in order to provide a reference for enterprises to build a supply chain system with high resilience.

Keywords: COVID-19; Supply Chain Resilience; Small and Medium-Sized Enterprises; Risk Management

Introduction:

The sudden outbreak of COVID-19 in 2020 has had a huge impact on the economic and social development of all countries. In the context of globalization, the supply chain disruption caused by the epidemic is particularly prominent. From the perspective of the global industrial chain, the contraction of upstream raw material supply and downstream demand has led to supply chain disruption; From a regional perspective, major industrial countries have been "shut down" one after another, with shortages of key parts and components and slow recovery of production capacity. Uncertainties such as repeated outbreaks and the spread of mutated viruses persist, and supply chain risks are intensifying. In the face of complex and changeable external environment, how to improve the resilience of enterprise supply chain and enhance the ability to resist risk impact has become an urgent key issue for enterprise supply chain management.

1. Impact of epidemic impact on supply chain

1.1 Global supply chain disruptions

Since the outbreak of the novel coronavirus, governments around the world have taken strict prevention and control measures to contain the spread of the epidemic. Factory shutdowns, restricted movement of people and disrupted transport channels have crippled global supply chains. Many multinational companies' supply chains are at a standstill. Take the automobile industry as an example, China is the world's largest automobile market and an important auto parts manufacturing base, and Wuhan is the key town of the automobile industry. During the epidemic, Wuhan auto parts enterprises have stopped production in a large area, which has greatly affected the production and operation of global vehicle manufacturers. After the global spread of the epidemic, Germany, Japan, the United States and other major auto production countries have been paralyzed, slow recovery of production capacity, causing a catastrophic blow to the global auto industry chain.

1.2 Impact on the supply chain of smes

For the majority of small and medium-sized enterprises, due to their weak anti-risk ability, the supply chain is particularly affected by the epidemic. On the one hand, small and medium-sized enterprises are located in the downstream of the supply chain network of large enterprises, with poor bargaining power and low substitutability of suppliers. Once the suppliers fail to deliver on time, the procurement process will face the risk of interruption. On the other hand, small and medium-sized enterprises orders are unstable, limited financial strength, it is difficult to achieve large-scale inventory, once the downstream customer demand shrinks, their own inventory backlog risk increases. At the same time, small and medium-sized enterprises have a low level of digitalization and intelligence, lack a global perspective of the supply chain, and lack of perception and response ability to supply chain sudden risks, which is easy to suffer heavy losses in the crisis.

2. Path analysis for improving supply chain resilience

2.1 Connotation of supply chain resilience

Supply chain resilience refers to the ability of the supply chain system to respond to unexpected shocks and quickly recover to the original or higher level without damage to the structure and function. A highly resilient supply chain system should have the ability to continuously perceive changes in the external environment, quickly identify potential risks, flexibly adjust response strategies, and quickly return to normal operation. This ability is not only reflected in the prior prediction and prevention, but also includes the response and adaptation in the event, and the recovery and improvement after the event. Therefore, the construction of supply chain resilience is a process of continuous improvement and dynamic optimization.

2.2 Key factors affecting supply chain resilience

Through literature research, it is found that the key factors affecting supply chain resilience can be summarized into four aspects: first, risk prediction and evaluation ability, including information acquisition and analysis, supply chain visualization; Second, rapid response and coordination ability, including production flexibility, resource integration, etc.; Third, supply chain redundancy and flexibility, such as key material safety inventory, spare capacity, etc. Fourth, organizational resilience, such as corporate culture, leadership, and employee skills. It can be seen that the formation of supply chain resilience requires the full cooperation of upstream and downstream members of the supply chain, and it is difficult for individual enterprises to deal with systemic risks.

2.3 Model selection of supply chain resilience based on analytic Hierarchy process

This paper uses analytic Hierarchy Process (AHP) to compare and analyze two supply chain resilience models, “behavior-oriented” and “behavior-cooperative”, from four criterion levels of supply chain prediction ability, response ability, adaptation ability and recovery ability. Through the questionnaire survey of six small and medium-sized electronic manufacturing enterprises, the judgment matrix was constructed and consistency test was carried out. Finally, the conclusion was drawn: under the impact of the epidemic, the construction of supply chain resilience of small and medium-sized enterprises is more suitable for the “behavior-oriented” model. This model emphasizes that enterprises rely on their own flexible organizational behavior, actively take various countermeasures, and constantly adapt to environmental changes, and the requirements for systematic risk prediction and resource integration capabilities are relatively low, which is more in line with the “short and fast” supply chain characteristics of smes.

3. Suggestions on measures to strengthen supply chain resilience and resilience

3.1 Improve demand forecasting capabilities

Under the impact of the epidemic, market demand has fluctuated greatly, which has brought great challenges to supply chain management. In order to cope with the uncertainty of demand, enterprises should enhance the foresight and flexibility of demand forecast. On the one hand, it is necessary to make full use of advanced technological means such as big data analysis and artificial intelligence, combined with factors such as industry development trends and consumer behavior changes, to carry out hierarchical and rolling forecasts for market demand, and improve the accuracy of forecasts. On the other hand, it is necessary to establish and improve the multi-department collaborative mechanism of demand forecasting, break the information barriers between departments, and realize the full sharing and effective use of data in all links of the supply chain. At the same time, for the possible demand gap, supply shortage and other situations, we should take measures in advance, such as production and marketing coordination, supplier development, and channel expansion. In particular, it is necessary to pay close attention to market changes caused by epidemic prevention and control, incorporate epidemic factors into the scope of demand forecasting, formulate multi-scenario emergency plans in response to demand fluctuations, and minimize supply chain operational risks.

3.2 Strengthen supply chain collaboration

The foundation of the stable and efficient operation of the supply chain lies in the close cooperation between each link and each sub-

ject. Limited by their own resources and capabilities, small and medium-sized enterprises are often in a weak position in the supply chain. To overcome the impact of the epidemic, we must break through our own limitations and actively seek the support of upstream and downstream partners in the industrial chain. On the supply side, it is necessary to strengthen strategic coordination with key raw material suppliers and establish a solid partnership; At the same time, the diversification of supply channels is developed, the multi-level backup system of suppliers is formed, the necessary safety inventory is stored, and the risk of supply interruption is reduced. On the demand side, it is necessary to establish long-term and stable cooperative relations with downstream customers by signing flexible contracts, improve customer stickiness, and alleviate the pressure of demand fluctuations. In the logistics distribution link, it is necessary to actively expand new logistics modes such as multimodal transport, sling transport, and warehouse distribution integration, and improve transportation timeliness and distribution elasticity. At the capital level, it is necessary to take the initiative to connect with financial institutions such as banks, strive for financial support such as supply chain finance, and alleviate the pressure on capital turnover.

3.3 Enhance the stability of capital flow

Small and medium-sized enterprises generally have the problem of shortage of funds, and the ability to resist risks is weak. During the epidemic, we should make full use of various government relief policies and actively strive for various preferential measures such as tax relief and low-interest loans. We will appropriately reduce non-rigid expenditures, optimize the cost structure, and increase the efficiency of the use of funds. Innovate marketing models, increase online channel development efforts, and strive for diversified cash flow sources. Pay attention to the management of accounts receivable, accelerate the withdrawal of funds, and use financial tools such as commercial factoring to revitalize accounts receivable stock when necessary to ease the pressure on funds. For small and medium-sized enterprises in strategic emerging industries and key areas, the government and financial institutions should also provide targeted financial support to help them tide over difficulties and resume development.

3.4 Accelerate digital transformation and flexible transformation

Digital technology is a key support to enhance enterprise agility and resilience. Smes should adapt to the development trend of the digital era and accelerate the process of digital transformation. It is necessary to strengthen the construction of digital infrastructure, use cloud computing, big data, the Internet of Things and other next-generation information technologies to build a digital management platform integrating business management, data analysis, and risk early warning, so as to achieve data connectivity, business coordination, and agile response in all links of the supply chain. It is necessary to speed up the digital transformation of the supply chain, use the industrial Internet, blockchain and other technologies to achieve the digital integration of the upstream and downstream information flow, capital flow, and logistics of the supply chain, build a transparent and visual supply chain panorama, and improve the overall coordination level of the supply chain. At the same time, we must pay attention to the innovation of manufacturing and service models, enhance flexible production and personalized customization capabilities, and improve the ability to respond quickly and meet diversified market demands.

Conclusion:

The COVID-19 pandemic has sounded the alarm for the industrial development of all countries and the security of global supply chains. In the future, with the intensification of uncertainty risks and the frequent occurrence of “black swan” events, supply chain resilience has become an important part of the core competitiveness of enterprises. Small and medium-sized enterprises should start from the overall perspective of the supply chain, enhance risk awareness, improve forecasting and early warning capabilities, strengthen the coordination of all links of the supply chain, and constantly improve the resilience of the supply chain to cope with shocks and restore operation. Only in this way can we be invincible in the volatile market environment and achieve dynamic balance and sustainable development of supply chain operations.

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