

Influencing Factors of Inflammability of Supply Chain Quality Risk Cascade Failure

Taimin Ding, Qiang Liu, Xueping Li*, Ming Liu

School of Economics and Management, Liaoning University of Technology, Jinzhou, Liaoning, 121001, China

**Corresponding author*

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Abstract: Supply chain quality risk networks are prone to cascade failures under emergencies, and the changes of cascade failure edges or important nodes will have a great impact on the invulnerability of the network. It is easy to lead to the destruction of the enterprise or market supply chain, so it is necessary to maintain the normal operation of the supply chain, and the quality risk of the supply chain as one of the normal operation of the supply chain, should be reduced by quality risk, so this paper uses the literature review method to analyze the factors affecting quality risk, and then use the influencing factors of supply chain quality risk to study and analyze the destructiveness. It is of great significance to understand the cascade failure diffusion mechanism in supply chain quality risk network to improve the invulnerability of supply chain quality risk cascade failure. Therefore, based on the characteristics of the supply chain quality risk network, the influencing factors of cascade failure invulnerability include order error rate, logistics delay, material change, insufficient inventory control, and inadequate quality management in the supply chain. Through the factors influencing the involution of the invulnerability of cascade failure, we propose and take measures, that is, strengthen information symmetry, establish a sound management system, strengthen quality assessment, etc. And measures to reduce the occurrence of cascade failure resistance.

1. Introduction

Supply chain is an enterprise as a supplier procurement of raw materials to the use of technology and labor on product production and processing and product transportation, product sales and many other links together constitute a large supply and marketing network, in the current developed network era, supply chain exists in all areas of the current social and economic development of our country, in all large and small enterprises, supply and marketing network occupies a very important position, it can be said that only the integrity of this supply chain network, can make the company's products can be sold, enterprises can obtain profits. Therefore, it plays a very important role in strengthening supply chain management to improve the company's economic efficiency. This can not only improve the quality of the company's products, but also enhance the stability of the entire market, but the cooperation between various enterprises often occurs due to various factors such as

information asymmetry, market uncertainty and information distortion, and various unpredictable risks often occur. If the supplier does not grasp the strictness of raw materials, because of information asymmetry, it fails to prevent the transportation of raw materials in time, and sells unqualified raw materials to enterprises, which will lose trust between the two cooperative enterprises and the loss of interests of enterprises. Therefore, in order to ensure that the cooperation between enterprises achieves more satisfactory results, the supply chain quality risk management can be strengthened by comprehensively improving the information sharing and information transparency in the supply chain process, further optimizing the enterprise contract model, and creating control, supervision and incentive mechanisms to effectively avoid quality risks in the supply chain and ensure that the supply chain relationship between enterprises can be more efficient. Studying the prevention of supply chain quality risks is of great significance to whether enterprises can operate well and obtain expected results in the entire supply chain.

In recent years, the problem of supply chain quality risk network invulnerability under emergencies has become a hot spot in all sectors of society. Most of the relevant research of Li Rui et al. (2007) focuses on macro issues such as logistics system emergency mechanism, emergency management system and logistics network construction^[1,2], and relatively few studies on cascading failures in supply chain quality risk networks from the quality risk level. Li et al. (2010), L&B (2010), Huang Yingyi et al. (2014), and the existing research mainly uses the cascade failure model to study the transmission and diffusion mechanism of emergencies on the network. Therefore, the phenomenon of cascading failure of supply chain quality risk is explored, and suggestions are put forward to improve the risk of invulnerability^[3-6]. Shuang Q et al. (2014) and Hu P et al. (2015) Cascade failure refers to the chain reaction process caused by successive failures caused by a node on the network that fails due to a sudden failure, and the load on it is redistributed to neighboring nodes according to the business coupling relationship between nodes, resulting in neighboring nodes also exceeding their own load capacity^[7,8]. At present, the model has been applied to the research of social entity networks such as power grid, Internet and transportation network, and is widely used in various network nodes, and Wang J W (2013) is used to propose anti-damage response strategies for networks^[9]. However, there are not many studies on cascaded failure resistance of supply chain quality risk networks, and most of the literature focuses on the problem of cascade failure resistance of logistics networks. Among them, L&B (2010), Huang Ying yi et al. (2014) studied the cascade failure resistance of military logistics support network under uniform capacity distribution, and put forward suggestions to improve the invulnerability of each important node and edge according to various problems of network cascade failure^[3-5]. Liu Xiao et al. (2010) proposed a rule to define the importance of nodes for the cascading effect problem in supply chain networks^[6]. Compared with other networks, the supply chain quality network network has some characteristics of its own: first, different quality nodes may bear different types of quality problems and different quality problems, showing the characteristics of uneven node "degree distribution" in network characteristics, that is, most quality nodes are only adjacent to a small number of nodes, while a small number of nodes "occupy" a large number of resources that is, have a large number of adjacent nodes. Second, the difference between the material conditions and material quality between the quality nodes. This manifests itself in network characteristics as differences in edge weights. These characteristics will greatly affect the diffusion propagation of cascading failures of sudden mass risk networks. At present, there are few studies on this issue.

Supply chain quality risks are also subject to cascading failures in logistics, and most scholars are also using simulation models to analyze. Supply chain quality risk networks are prone to cascade failures under emergencies, and the change of cascade failure edges or important nodes will have a huge impact on the invulnerability of the network. In this paper, the influencing factors of supply chain quality risk are used to study and analyze the anti-destructive property, and the

understanding of the cascade failure diffusion mechanism in the supply chain quality risk network is of great significance for improving the invulnerability resistance of supply chain quality risk cascade failure.

2. Influencing Factors of the Insultability of Supply Chain Quality Risk Cascade Failure

For enterprises, when a certain point in the supply chain changes, it will cause damage or even collapse to the entire supply chain of the enterprise. When each node of the enterprise is connected and operated, the coupling reaction will occur, and if a node or edge changes so that it is redistributed to the neighboring point and cannot bear the chain reaction of failure, it is necessary to change a node or edge to resist to prevent the destruction of cascading failure. Therefore, many scholars have studied and analyzed the invulnerability of cascade failure, and obtained that these nodes or edges are the influential factors of cascade failure involvement, including the following factors ^[10-15].

2.1. Order Error Rate in the Supply Chain

The order error rate refers to the proportion of order errors that occur in the supply chain, which will lead to delivery delays, affecting customer satisfaction and quality risks. In the coupling process of cascade failure, the error rate of the order only belongs to a small node, and the error of this node will cause the progress of the entire supply chain to change, and in serious cases, the entire schedule will delay time, which will cause great losses. This also affects cascade failure, where the invulnerability becomes slow. When the staff of the enterprise does not strictly control the generation of orders, it will lead to the collapse of all links after the orders in the entire link of the supply chain quality risk network, so that the supply chain cannot operate normally.

2.2. Logistics Delays in the Supply Chain

Logistics delays often lead to stock-outs in the supply chain, which in turn leads to loss of product quality, leading to quality risks. The importance of logistics occupies a major position in the entire supply chain, and logistics delays will lead to a slower supply chain, lower customer trust rates, and weaker invulnerability to cascading failures. Logistics delay includes two aspects, and its consequences are that raw materials cannot be delivered in time, resulting in products that cannot be produced in time and cannot be delivered to distributors on time. Second, the product is already sold, but due to logistics delays, the product cannot be delivered to the customer's hands in time, and the customer's trust in the enterprise will also weaken.

2.3. Material Changes in the Supply Chain

Material changes will affect the quality of the product, which will lead to quality risks. The change of materials will make the manufacturing time of the product longer, if the quality of the material is qualified and the logistics are not replaced, it will not cause failure, and the effect of invulnerability will also increase. The selection of raw materials should be the most initial step in the entire supply chain process, if the selection of the first step of materials is not timely, the subsequent work will also be affected, the quality of the product cannot be guaranteed, and the process quality risk of the supply chain will increase.

2.4. Inaccuracies in Quotations in the Supply Chain

Inaccurate quotations can affect customers' purchasing behavior and cause quality risks. Customers are rational consumption, if the price is too high, customers will choose relatively low prices for purchase, if the price is too low, customers will hesitate whether to set the price so low because of the product quality. So a reasonable price is the key to selling the product. Quotation for customers is one of the criteria for choosing products, customers on the choice of products first look at the quality, quality will look at the quotation after qualifying, the price is suitable will choose the product, if the customer sees the quotation after choosing to buy, to pay when found that the price does not match what he saw before, then as a consumer is deceived, trust in the enterprise will disappear. The customer-node of the enterprise will be weakened, resulting in the accumulation effect of other nodes, and the phenomenon of cascade failure will increase, so the accuracy of quotations in the supply chain can improve the resistance of supply chain quality risk cascade failure.

2.5. Inadequate Inventory Control in the Supply Chain

Inadequate inventory control can lead to poor product quality, which in turn leads to quality risks. If the sales of the product are good, but the inventory is insufficient, then the entire supply chain is difficult to maintain, and the large sales volume will cause the system to collapse due to insufficient inventory, and the failure of this node of inventory will weaken the invulnerability of the entire supply chain. Inventory levels play an important role in the entire supply chain, and if there is insufficient inventory, other nodes in the entire supply chain will fail.

2.6. Quality Management is not in Place

Non-standard supplier management: When selecting suppliers, it is necessary to investigate the suppliers from all angles, if they are arbitrarily selected, it will lead to the untimely production of raw materials supplied by suppliers and the quality of raw materials. As a result, the progress of production cannot be delivered in time. Serious cases will lead to product quality failure. The failure of this node of quality management will cause the entire supply chain to not start. At this time, the degree of recovery of the anti-destruction performance of cascade failure is not large, and even collapse will occur. There are also imperfect control processes, imperfect process documents and other reasons that can also lead to these problems.

3. Measures

As the market competition becomes more and more fierce, the quality risks faced by enterprises are more and more serious. Therefore, managing quality risks must be consistent. The main factors and main risk elements of quality risk assessment introduced above can provide necessary technical support for enterprises to create product quality risk and supplier risk assessment and early warning evaluation index system, and classify product quality risk elements and supplier risk elements. In addition, different countermeasures should be taken to deal with the different quality risks and characteristics that may exist in all cooperative enterprises in the supply chain, especially for quality risks, which can be considered from the technical and strategic levels. For supply chain enterprises, in order to achieve the expected goals, it is required to reach cooperation with the corresponding supply chain enterprises, and form a win-win result of sharing risks and sharing profits. Therefore, a very close partnership should be established with all members of the supply chain, which needs to become a very important condition for the successful operation of the entire supply chain and

strengthening risk prevention.

3.1. Strengthen Information Symmetry

The symmetry of information can optimize the cooperation between enterprises, and when there is a problem with the supplier's raw materials and the quality problem of the supplier's product, it can be dealt with in time through information exchange. If the information between suppliers, distributors and other cooperative enterprises is equivalent, various problems will be dealt with in time, and even when there is a problem at a small node in the logistics, raw materials or products can be dealt with in time through communication. It can also strengthen the trust of cooperation between companies.

3.2. Establish a Sound Management System

Establish a sound quality management system: a perfect quality management system can effectively reduce quality risks, the quality management system includes the management of human factors, to ensure that each staff member is responsible for quality management; the management of environmental factors plays an important role in the quality of products, and healthy environmental factors are the premise of quality. Strengthen quality inspection: the quality requirements of each link should be strengthened, such as the strengthening of the quality of raw materials, the quality of production, the quality of transportation, and the quality of sales, and each link has an important relationship with the quality of the final product reaching the customer. Strengthen the management of interpersonal relationships: interpersonal relationships will increase the quality of products, transportation quality, and the quality of raw materials.

3.3. Strengthen Quality Assessment

Improve the quality assessment of suppliers, use information technology to evaluate the raw materials provided by suppliers, and qualified raw materials are the guarantee of quality risks for both suppliers. Check the quality at any time, find the problems in each link in time, and inspect the logistics, information, price and other related problems, especially the problems in the quality.

4. Conclusion

According to the existing research conclusions of most scholars, this paper analyzes the influencing factors affecting the involvability of cascaded failure of supply chain quality risk, analyzes the influencing factors affecting the inflavability of cascade failure from the factors affecting supply chain quality risk, and then proposes measures to improve invulnerability according to the influencing factors. The impact of the invulnerability of supply chain quality risk cascade failure is generated by the influencing factors of supply chain quality risk, which includes the quality risk of raw materials, processing quality risk, inaccurate quotation in the supply chain, logistics, etc. will have an impact on the invulnerability of cascade failure. The supply chain as the network channel of each enterprise, each link occupies an important role, the extraction of raw materials, product processing, product transportation, product sales and other links connected to become a complete supply chain network, which also shows that the mistakes of each link will make the neighboring links oppressed, when the bearing capacity support of this link is destroyed, it will lead to the failure reaction of the entire network. This requires strict control of each node to reduce the occurrence of failures, and improving the invulnerability of cascade failures can improve the security of the entire supply chain quality risk network. Each link of supply chain quality risk is

very important in the entire market in which the enterprise operates, of course, to avoid the phenomenon of cascade failure of supply chain quality risk, we must first start from the invulnerability of cascade failure. The research of the paper is only for the research of the entire supply chain market, in fact, in the entire supply chain, subtle small factors will have a greater impact on the quality risk cascade failure of the supply chain the resistance of the failure, that is, the measures to improve the invulnerability should be strictly controlled from the supplier to the quality of raw materials, and the staff involved in the processing of products to communicate and communicate, so as to achieve the staff to the production of products carefully and meticulously, the logistics quality to strictly control, establish a complete quality management system to inspect and manage the quality risks of the entire supply chain.

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