Information Systems and Economics (2021) 2: 1-6
Clausius Scientific Press, Canada

DOI: 10.23977/infse.2021.020101
ISSN 2523-6407

Quality Risk Contagion Effect of Core Enterprises in Manufacturing Supply Chain

Yan Liang[1, *], Qiang Liu[1], Yu Guo[2], Ming Liu[1]

[1]School of Economics and Management, Liaoning University of Technology, Jinzhou, Liaoning, China, 121001
[2]School of Economics and Management, Harbin Engineering University, Harbin, Heilongjiang, China, 150001
**Corresponding Author: Yan Liang*

Keywords: manufacturing; core enterprises in the supply chain; quality risk contagion effects

Abstract: The manufacturing supply chain network is intricate, and the relationship between the core enterprises and the node enterprises is cross-cutting. When a certain node or a connection of the manufacturing supply chain network has quality and safety problems, it will inevitably lead to the risk of the manufacturing supply chain. Therefore, this study conducts related study on the quality risk contagion problem of core enterprises in the manufacturing supply chain. This study first conducts an overview study on the effects of quality risk contagion among supply chain node companies, and then discusses the supply chain systemic quality risk contagion. Once again, through CiteSpace, it summarizes and analyzes domestic and foreign literature, and explores domestic and foreign scholars' understanding of core manufacturing supply chain companies. The quality risk contagion is analyzed by keyword clustering, and finally summarized, in order to obtain the follow-up study direction and key elements.

1. Introduction

The concept of manufacturing supply chain is based on the core enterprise as the center of the manufacturing supply chain. According to market demand or environmental changes, through capital flow, logistics, and information flow, manufacturers, suppliers, distributors, distributors, retailers and end users are reshaped Form a new manufacturing functional supply chain network[1-3]. It is dynamic, fast, resource-sharing, highly complex and high-risk. Node companies in the manufacturing supply chain face risks inside and outside the network at any time. When the node companies in the manufacturing supply chain are at risk, they will cause fluctuations and shocks to other chain companies, which will affect the economic development of the node companies. At the same time, the manufacturing supply chain Intricately, the change of a single node enterprise will have an important impact on the overall system of the supply chain[4-6]. Each node enterprise of the manufacturing supply chain has different corporate culture, management methods, etc., in the overall management of the manufacturing supply chain, it is impossible to achieve effective unity, and the system management is very complicated[7,8]. At the same time,

there is a supply-demand relationship in the manufacturing supply chain. When there is mistrust or mismatched information between the node companies in the supply chain, it is easy to cause the quality risk in the manufacturing supply chain to expand, and then lead to some network defects in the manufacturing supply chain. Or paralyzed, how to reduce the contagion effect brought by the quality risk of the core enterprises in the manufacturing supply chain has become an important proposition of current research[1-10].

This study first conducts an overview study of quality risk contagion among node enterprises, and then discusses the contagion effects of supply chain systemic quality risk. Once again, through CiteSpace, it summarizes and analyzes domestic and foreign literature to explore the quality risks of domestic and foreign scholars on the core enterprises of the manufacturing supply chain. Contagion is analyzed by keyword clustering, and finally summarized, and study conclusions are drawn.

2. Study on Quality Risk Contagion of Core Enterprises in Supply Chain

2.1. Study on Quality Risk Contagion among Supply Chain Nodes

The most beginners believe that the contagion effect is the negative impact that a company's bankruptcy has on other partners and competitors in the same industry, and then similar risk contagion effects are widely used in the supply chain. Since there are upstream and downstream and core companies in the supply chain, the core companies have an important impact on the upstream and downstream companies in the supply chain. Therefore, the trust crisis and quality crisis generated by the core companies will cause risk contagion effects on the node companies in the supply chain[11-13]. Scholars use the credit risk model to measure and perceive the risks in the real economy and the contagious effects that they bring. The results of the study found that the financial crisis or bankruptcy of a single node enterprise has a huge impact on other affiliated companies, and is likely to cause financial crises in other companies. The information global game theory also points out that the bankruptcy of a single-node enterprise can easily trigger the domino effect and cause other enterprises to go bankrupt. From the perspective of risk sharing, the economic environment determines the degree of risk stability. Node companies under the same supply chain belong to the same interest group. When the companies sign or have a guarantee relationship, when the company faces the impact of quality risks, the two the guarantee behavior of the employer will reduce the risk of risk contagion. Although there are still quality risk fluctuations, it will not cause the bankruptcy of the enterprise[14-16].

Some scholars apply complex network theory to the study of quality risk contagion among supply chain node enterprises, and believe that any node enterprise in the supply chain network may cause its own enterprise due to the quality risk of the direct or indirect enterprise in the network. At the same time, the core enterprises in the supply chain network have a greater impact on the node enterprises. The associated credit risk contagion model constructed by social network theory and small world network theory can share the quality risks of other enterprises in the network by establishing asset associations between enterprises and reduce the quality risk contagion effect[17-23].

2.2. Study on the Contagion Effects of Systemic Quality Risks in the Supply Chain

Scholars believe that there are systemic quality risks in the supply chain, and the agglomeration effect of quality risks will amplify contagious behavior and cause a certain impact on the entire industry. Scholars use asset preference theory to study the problem of risk contagion in financial networks, and find that a complete and robust supply chain network structure is more robust than an unsound supply chain network, thereby reducing the possibility of quality risk spreading[1-23].

Some scholars have found that when a node enterprise in the network has a heterogeneous mutation of quality risk, it will increase the risk contagion effect for other node enterprises on the network. At the same time, scholars have found that under the premise of establishing a contract or trust mechanism between node companies, the systemic quality risk contagion effect on the supply chain network can be greatly reduced, but there is still a risk of default. Greatly increase the spread of quality risks of other nodes in the supply chain network, resulting in risk contagion effects. Some scholars use mathematical models to mathematically simulate the contagion effects of systemic quality risks on the supply chain network. Study has found that companies with complete quality risk control projects and projects can block quality risks better than companies that do not pay attention to quality risk control. The spillover effect of contagion; at the same time, when the degree of correlation between the node companies is low, the marginal effect of the systemic quality risk spillover effect is positive, on the contrary, when the degree of correlation between the node companies is high, the marginal effect of the systemic quality risk spillover effect If it is negative, in the supply chain network, the systemic quality risk contagion spillover effect faced by core enterprises is greater[1-23].

3. CiteSpace Literature Analysis

This study takes “manufacturing”, “core supply chain enterprises” and “quality risk contagion” as themes, and retrieves the literature from 2001 to 2021 in the core essays of Web of Science and CNKI. The study on the quality risk of chain enterprises is relatively early, and the domestic study on it is relatively scarce. Therefore, the subject English search is carried out on the core studies of Web of Science, and the full text Chinese search is carried out on CNKI. The retrieved documents are screened and exported to CiteSpace for data conversion and analysis. Figure 1 shows the trend of the number of studies published by scholars with the theme of “Quality Risk Contagion” derived from the core database of Web of Science.

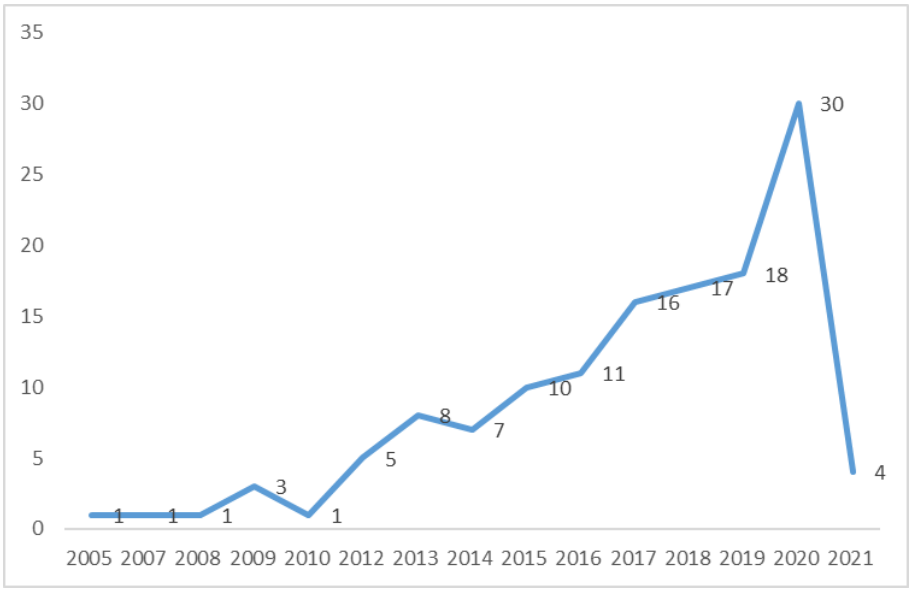

Figure 1: The number of publications on the basis of “quality risk infection” in the past 20 years.

Figure 1 shows that scholars have published fewer documents on the theme of “Quality Risk Contagion”. Since 2001, scholars’ study on “quality risk contagion” has been increasing year by year. By 2021, the number of studies published will reach 30, and by February 2021, a total of 4 studies have been published. In other words, scholars are reaching a climax on issues related to

"quality risk contagion". Based on this, the core studies of Web of Science and CNKI were used to summarize and analyze the literature to screen out the key themes and elements.

3.1. Analysis of Foreign Literature

With the theme of "Quality Risk Contagion", the document types are "Study" and "Review", and the language is selected "English" to search in the core studies of Web of Science. CiteSpace clustering analysis of the 133 documents that were exported resulted in 8 cluster types: financial crisis, covid-19, habitat selection, HIV, auditor reputation, simulation model, spillover effects, and agency problems.

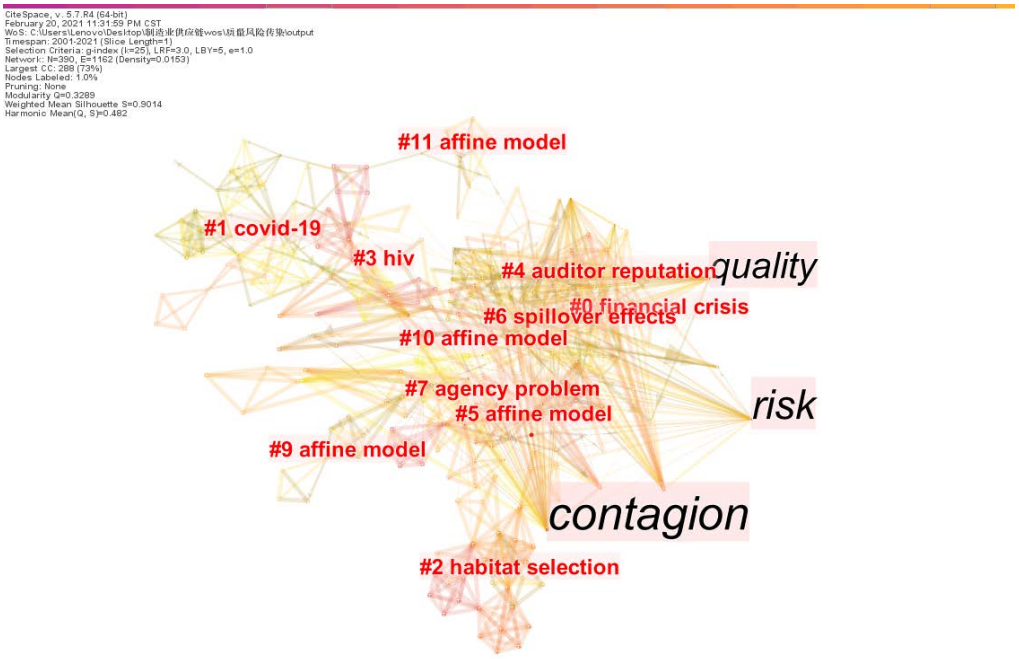

Figure 2: Cluster analysis diagram of foreign language.

As shown in Figure 2, foreign study on quality risk infection can be roughly divided into four parts: the first is virology, mainly discussing covid-19, HIV, etc.; the second is biology, mainly habitat selection The third is the financial aspect, including: the financial crisis, the reputation of auditors and agency issues; the fourth is mainly through mathematical simulation models to illustrate the quality risk contagion effect.

3.2. Domestic Literature Analysis

Due to the relative lack of domestic study on "quality risk contagion", the total number of documents searched for subject retrieval is not enough for literature analysis. Compared with Figure 2, the Chinese clustering analysis chart is clearer, and the lines obtained by clustering are clear, further verifying the relative lack of domestic study on quality risk. According to the current clustering results, it can be seen that the study on quality risk contagion mainly focuses on innovation networks, and there are also many study keywords for individual nodes, such as corporate networks, industrial transfers, and technological innovation networks to study quality risk contagion issues; Network analysis and trust are the key words of quality risk contagion; ecological industry and ecological economic system quality risk contagion.

4. Study Conclusions

The CiteSpace analysis and combing of the literature found that foreign study on “quality risk transmission” started earlier, with a larger number of published documents, and the medical study is relatively mature; domestic study on “quality risk transmission” is relatively backward. The study directions of scholars mainly focus on innovation networks and enterprise clusters. In the key themes of foreign literature, the clustering of quality risk issues related to supply chain management has led to increasing study on the quality risk contagion problems of core enterprises in the manufacturing supply chain, and the correlation to the quality risk contagion effects of core enterprises in the manufacturing supply chain Issues need to be explored and discussed urgently.

Acknowledgements

This research is funded by 2019 science research fund of department of education of Liaoning Province (JQW201915402).

References

[1] Gong X L, Xiong X, Zhang W. (2020) Systemic Risk Measurement and Spillover Effects of my country’s Financial Institutions. Management World, 36(08): 65-83.

[2] Miao W L, Yan J J. (2020) A Review of the Research on Systemic Financial Risk——Based on the Perspective of Macro-prudential Supervision. Financial Supervision Research, (02):85-101.

[3] Li Z, Zhu M H, Fan Y L. (2019) The Contagious Risk and Systemic Risk Contributions of my country's Financial Institutions——A Research Based on the Perspective of Extreme Risk Network. Nankai Economic Research, (06): 132-157.

[4] Marjolaine Bezançon, Denis Guiot, Emmanuelle Le Nagard. (2019) The role of negative physical contagion in the online purchase of second-hand products. Recherche et Applications Marketing (English Edition), 34(4): 2-28.

[5] Hendrik Trekels, Bram Vanschoenwinkel. (2019) Both local presence and regional distribution of predator cues modulate prey colonisation in pond landscapes. Ecology Letters, 22(1): 89-97.

[6] Yingying H, Pu G, Xiang Z. (2016) Correlations and risk contagion between mixed assets and mixed-asset portfolio VaR measurements in a dynamic view: An application based on time varying copula models. Physica A: Statistical Mechanics and its Applications, 444: 940-953.

[7] Xie X F. (2019) The Contagion Effect and Evaluation of Associated Credit Risk in the Supply Chain. University of Electronic Science and Technology of China.

[8] Zhang C Q, Bao Q, Sheng M Q.(2019) The Credit Risk Contagion Effect of Corporate Bond Default——Empirical Evidence from the Pricing of Bond Issuance by Companies in the Same Industry. Economic Management, 41(01): 174-190.

[9] Janis Hootman. (2002) Quality Improvement Projects Related to Pediculosis Management. The Journal of School Nursing, 18(2): 80-86.

[10] Hu L Q, Hu D, Peng H F. (2018) Institutional Association, Network Structure and Banking Systematic Risk Contagion——An Empirical Analysis Based on the VAR-NETWORK Model. Research in International Finance, (06): 53-64.

[11] Wang Z H, Guo J E, Xue Y. (2016) Balance Sheet Association, Price Association and Inter-bank Risk Contagion. Chinese Journal of Management Engineering, 30(02): 202-209.

[12] Resetarits William J, Silberbush Alon. (2016) Local contagion and regional compression: habitat selection drives spatially explicit, multiscale dynamics of colonisation in experimental metacommunities. Ecology letters, 19(2): 191-200.

[13] Liu H M, Wang Z W, Cao T Q. (2016) An Empirical Study on the Contagion Effect of Guarantee Networks. Management World, (04): 81-96+188.

[14] Chen T Q, Li X D, Wang J N. (2016) Entropy space model of CRT market credit risk contagion under multi-factor coupling. System Engineering Theory and Practice, 36(01):1-14.

[15] Li L, Zhou Z F. (2015) The Dynamic Contagion Mechanism of Enterprise Group Credit Risk. Management Review, 27(01): 48-56.

[16] Chen T Q, Li X D, Wang J N (2015) Spatial Interaction Model of Credit Risk Contagion in the CRT Market. Computational Economics, 46(4): 519-537.

[17] Patrick Konermann, Christoph Meinerding, Olga Sedova. Asset allocation in markets with contagion: The interplay between volatilities, jump intensities, and correlations[J]. Review of Financial Economics, 2013, 22(1): 36-46.

[18] Jiang S S, Fan H.(2020) Analysis of Banking System Stability under Dual Channel Risk Contagion. China Management Science, 2 8(11): 51-60.

[19] William J. Resetarits Jr, Christopher A.(2009) Binckley. Spatial contagion of predation risk affects colonization dynamics in experimental aquatic landscapes. Ecology, 90(4): 869-876.

[20] Ma X P, Wang J, Sun X L, Li J P.(2019) The Dynamic Characteristics of Sovereign Risk Spillover Network: A Case Study of "One Belt One Road" Countries. System Engineering Theory and Practice, 39(06): 1363-1372.

[21] Ren X H, Tang S Q.(2018) The formation mechanism of mass incidents based on the measurement of emotional infection. Journal of Safety and Environment, 2018, 18(03): 1059-1064.

[22] Peng X, Wang X Y.(2018) Does the risk of customer stock price collapse have a contagious effect on suppliers?. Journal of Financial Research, 44(02): 141-153.

[23] Qian S T, Chen X Y.(2014) Summary of Research on Systemic Risk of Foreign Banks. Economic Theory and Economic Management, (09): 58-71.