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Research on Supply Chain Risk Management in E-commerce Industry

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Abstract: In the era of Internet information, e-commerce has largely replaced offline procurement and has become the primary choice for people to purchase daily items. In this context, the formation of risk problems and risk mechanisms existing in the supply chain has become the primary problem that needs to be solved in this field. By examining the development status of China's e-commerce industry, this paper emphasizes the risk identification and formation mechanism of the e-commerce supply chain as well as prevention and control strategies, and by comparing the contents of previous studies, a set of updated and relatively complete supply chain risk assessment standards are obtained. A comprehensive analysis has revealed that the current supply chain risk analysis framework has not adequately adapted to changing market dynamics. Therefore, it will be fully combined with the contemporary market situation and supply chain steps, continuously optimized and summarized, aiming at using more perfect risk assessment standards to reduce the risk loss and profit loss of e-commerce, so as to make it more accurate. In addition, the study's conclusions highlight the business implications of logistics and product supply in the e-commerce industry, as well as the importance of identifying supply chain risks in e-commerce.

Keywords: E-commerce supply chain, procurement, supply chain risk mechanism.

1. Introduction

In the process of the supply chain, the reasons leading to supply chain problems and negative effects can be divided into three categories from a macro perspective: natural environment, insufficient supply, and uncertainty of demand. Therefore, the actual supply chain and its conceptualization will bring more challenges and opportunities for practitioners and scholars. In a real supply chain, there are always important turning points. Seven years ago, Kouvelis, Chambers, and Wang predicted very accurately that the major emerging themes regarding supply chain security would be: risk management, particularly related to supply chain disruptions caused by man-made or natural disasters, and the use of closed-loop SCs and RFID in SCS.[1] Due to natural disasters and many force majeure factors, the supply chain is interrupted, resulting in the loss of costs and goods. For example, the great earthquake in Japan in 2011 brought risks to the supply chain of components in the IT industry; The "El Nino" phenomenon intensifies the supply chain enterprises' attention to natural risks. In addition, the complexity of the supply chain network of e-commerce, the uncertainty of cooperation among supply chain members, and the asymmetry of various information may also lead to the generation of supply chain risks. As an indispensable part of the e-commerce process, supply chain risk

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management mainly studies how to effectively manage the disruption and uncertainty of the supply chain, including risk identification, risk assessment, risk control and risk supervision. It is necessary to establish an efficient supply chain system and an identification system for uncertain factors.In addition, most researchers focus on supply chain wind power management (SCRM) when they focus on supply chain risk analysis. In order to solve the identified gaps and uncertainties in the field of supply chain, this paper adopts a structured approach and a series of conclusions of previous studies and self-discovered factors to elaborate. These parts jointly aim to explore the main formation mechanism and risk identification types of supply chain risks in the context of the e-commerce industry. This content provides a comprehensive analysis of the current state of supply chain processes, challenges and innovative solutions. This paper will focus on the relatively complete supply chain procurement links involved in the e-commerce industry and conduct a detailed analysis of the risks existing in each process, so as to provide the theoretical basis for the sustainable development of the e-commerce industry. By clarifying the risk formation mechanism and risk content of the e-commerce industry, costs and losses can be reduced, procurement efficiency of the e-commerce industry can be improved, and supply chain risks can be mitigated.

2. Procurement Risk Content of E-commerce Industry

The flow of inventory is closely related to the cash flow required by the business activities of the enterprise, and inventory management is needed in every stage of the enterprise life cycle. From the perspective of enterprise risk management and operation capability, the research finds that effective inventory internal control can reduce the risk of overstocking and shortage caused by the mismatch between inventory supply and demand, while the improvement of inventory management performance and the existence of inventory internal control defects will have a significant negative impact on enterprise operation and management performance [2]. According to the research findings, Zeng Jishu tried to establish inventory risk management as an independent system. He discussed each link and node of inventory management respectively, and put forward a reasonable and scientific forecast --including inventory purchase quantity, strict control of inventory storage period, and the method of implementing inventory classification management. The goal was to reduce inventory capital occupation, lower expenses, and improve enterprise economic benefits [3]. Many enterprises still have inadequate procurement management and loopholes in the system, such as the lack of systematic sorting out and safety assessment of the weak links and main risks in the supply chain, and failure to evaluate the security of the supply chain in terms of product research and technical support, which will not only lead to cost losses for enterprises, but also pose significant risks to their overall operations. It will also lead to the whole industry chain services of enterprises in the short and medium term.

At present, due to the overstocking of most goods and the absence of a complete supervision system, as well asd the lack of unified supervision standards and supervision positions in the inventory logistics of e-commerce, leaders cannot clarify the true situation of warehouse storage, leading to a situation of information lag or information interleaving. Each function and function distribution should be clearly defined to avoid the phenomenon of managers favoritism and fraud, and to maintain the circulation of information. In 2022, Dong Xiaochen explored and practiced the informatization of inventory control, built a five-stream inventory control model integrating "physical flow, information flow, business flow, financial flow and responsibility flow" by using the Internet information means [4].

Enterprise management and employees lack a sufficient understanding of procurement risk management, ignore the forecast of procurement risk management, and lack of attention to the risk early warning mechanism and skills training of employees. In the enterprise procurement work, the emphasis has not been placed on pre-purchase prevention.

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3. E-commerce Supply Chain Risk Identification and Classification

3.1. Risk Identification

From the initial stage of supply chain risk management, risk identification mainly involves the process of judging, classifying and identifying existing and potential risks [5]. Risk identification is not only the basis of supply chain management, but also the key factor in the process of risk management, which involves risk assessment and risk control. [6] Based on the supply chain's requirements on time, cost, quality and other aspects as well as management ideas, researchers mostly focus on these three aspects when identifying supply chain risks to study the existing risks and potential risks as well as their impact and consequences, analyze the causes from the results, and determine the inducing mechanism and function of different risks. At present, the existing risk identification methods of supply chain can identify supply chain risk accurately although the emphasis is different. Based on previous studies, the basic methods and ideas of risk identification in the supply chain are as follows:

- (1) Environmental scanning method: Obtain information about the relationship between the supply chain system and the environment, which will help analyze the development trend of the system after internal and external environment changes, explain and predict the impact of environmental changes on the supply chain [7], and identify the risks in the supply chain.
- (2) Fault tree method (FTA method): A series of basic events and their logical relationships to the supply chain system are presented through the tree structure as the basis for finding the causes of risk induction, and the occurrence probability of the top event (system risk) can be obtained by determining the occurrence probability of the bottom event, so as to judge the risk level of the system [8].
- (3) Data mining method: algorithms are used to extract, transform, analyze and model a large amount of data [9], and to predict the behavior of the supply chain to help supply chain managers prevent risks.
- (4) Operability analysis (HAZOP method): The working group conducted a structured analysis of the supply chain through brainstorming of the whole group, and discussed various situations that deviated from the original intention of the design [10].
- (5) Supply Chain Operation Reference Model (SCOR model): Integrating concepts such as business process reengineering, benchmarking and process evaluation into a framework, it can describe the attributes, processes and measures of the supply chain in detail, and then help users identify supply chain risks [11].
- (6) Grounded theory method: review and analysis based on cases, and then summarize the sources of supply chain risk [12].

Based on data class analysis, academic researchers generally use the above six methods for risk identification and risk control, starting from the development trend and data statistics to predict the behavior of the supply chain, and after conducting a large number of surveys and statistics, using big data to summarize and identify possible sources of risk.

3.2. Supply Chain Risk Classification

Based on risk sources, many researchers currently divide supply chain risk into external and internal aspects. There are also some researchers on supply chain risk, flavor, natural environment risk and social risk.

- (1) External risks: natural disasters such as typhoons, floods, and disasters; as well as various political factors and international relations; Economic forms such as inflation, and financial crisis.

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- (2) Internal risks: production cost and efficiency, inventory cost and supply and demand relationship, product qualification rate and supply, logistics distribution, after-sales, refund, etc.

4. Formation Mechanism of Supply Chain Risk in E-commerce Industry

In the supply chain, various enterprises form an organic whole by means of information flow, capital flow and logistics, which has the structural feature of a network chain [13]. From the perspective of the market, the supply chain replaces the traditional market-based negotiation through a series of contracts, which strengthens the integrity of the supply chain enterprises and, to a large extent, enables the enterprises to gain a stronger ability to cope with external risks. Therefore, the emergence of the supply chain transfers the risks in the operation process from the outside to the inside of the supply chain, making the risks more controllable. This advantage is relatively attractive to enterprises in the supply chain, and is also an important reason for the rapid development of the supply chain. [14] In order to overcome the capital risk in the supply chain, supply chain finance has emerged to solve the financing problem for small and medium-sized enterprises. The long run of the supply chain and whether the overall risk will explode depends on three mechanisms.

4.1. Benefit Distribution Mechanism

The fundamental reason for the long-term and stable operation of the supply chain lies in the common interests of the e-commerce enterprises in the supply chain, but the benefits that the enterprises in the supply chain can reap are very different. In the supply chain, the core enterprise has the right to distribute the benefits. Since the risk of a single enterprise is weakened in the supply chain, the best way for the core enterprise to distribute the benefits is to ensure that the non-core enterprise can obtain the same profits as before joining the supply chain, while the core enterprise can obtain the additional benefits generated by the supply chain. Although non-core enterprises in the supply chain do not increase profits, they can reduce risks by joining the supply chain, so for non-core enterprises, this way of profit distribution is acceptable. However, in the long run, because the core enterprises occupy the supply chain for a long time, it is difficult to ensure the enthusiasm of non-core enterprises, which ultimately leads to the emergence of moral hazard of non-core enterprises. At present, the phenomenon of no-ticket purchase enters the market, and the seller formulates an acceptable sales price in order to enter the market competition, and the post-pricing profit is determined based on this. For the purchaser, purchasing without invoicing means that the actual cost is cheaper. In addition, individual purchases are not eligible for invoicing. Since the issue of whether the invoice is issued will involve the benefit part and the benefit distribution mechanism, the phenomenon of purchasing without a ticket should be avoided as far as possible.

4.2. Information Sharing Mechanism

Moral hazard is the main risk in the process of information sharing. Information sharing is an important part of supply chain collaborative management, which ensures the smooth running of the supply chain. In addition, information sharing in the supply chain is the sharing of key information, demand, inventory, etc. between the upstream and downstream enterprises in the supply chain. For enterprises in the supply chain, information from other members of the supply chain is needed to adjust their business activities in the process of operation. However, from the current information flow within the supply chain in the market, supply chain enterprises are often asymmetric in terms of information mastery. In the enterprise supply chain, there are information exchanges between members, between bosses and employees, and between employees and third parties. Due to the error type of information, the price transmission mechanism can not play a normal role, and enterprises can not adjust production and business activities through price information. Through the information

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sharing mechanism, all links in the supply chain can obtain data and information in real time, so that they can better respond to market changes and reduce inventory and operating costs. The upstream enterprise will link the procurement information to the core enterprise and the logistics information enterprise to the logistics enterprise, and then the supply transaction information of the core enterprise will be linked to the downstream enterprise and the logistics information will be linked to the logistics enterprise, forming a closed loop.

4.3. Risk Co-prevention Mechanism

Risk co-prevention mechanism in supply chain risk has become an important direction in modern supply chain management risk, its main content includes six points: establishing information sharing mechanism, establishing a shared risk mechanism, diversification of the supply chain, establishing close cooperation relationship, flexible production and inventory strategy, making emergency plan, introducing insurance mechanism. In the supply chain, enterprises cooperate closely through long-term contracts and common interests, forming an organic whole. Therefore, relevant enterprises also reach a consensus to some extent and jointly pursue the maximization of supply chain benefits. The reasons why the operation of the supply chain cannot maintain long-term stability also include the above-mentioned benefit distribution mechanism and information sharing mechanism. [15]. Therefore, for supply chain enterprises, a unified risk prevention mechanism should be established in the process of cooperation. From the current point of view, non-core enterprises do not show high enthusiasm for the construction of risk prevention mechanism due to the current benefit distribution mode. However, core enterprises can share most of the benefits in the supply chain, so they have relatively high enthusiasm for the construction of supply chain risk prevention mechanism.

5. Conclusion

According to previous studies, there are mainly procurement risks in the supply chain of the e-commerce industry and the mechanism of supply chain identification and classification is required. At present, the research in the field of the e-commerce industry is less than that in other fields, which has more profound research significance. It can accurately identify the risks in the e-commerce supply chain, avoid risks for the development of the e-commerce industry, and improve safety benefits.

This paper details the supply chain literature problems in the e-commerce industry from three general directions: risk identification, risk classification and risk formation mechanism. Risk assessment should be carried out in the purchasing, storage and transportation involved in the procurement process, and the use of online networks to promote the activity of products in the e-commerce industry. The three risk formation mechanisms are related to the integrity of the enterprise, which is an important factor in determining the long-term stability of the supply chain.

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