What Determines Supply Chain Risk in the Age of Globalization? Implications for Procurement and Logistics Risk Management
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Abstract: Supply chain is one of the most important parts for the company and supply chain management plays an increasingly important role in business development. Supply chain risk has become a major obstacle to supply chain management, and it makes a deep influence on company’s operation and development. The intricacies of the supply chain network structure, the external environment of uncertainty and supply chain managers excessive pursuit of lean, making the supply chain is vulnerability and the supply chain is increasingly vulnerable to various risks impact. Lean supply chain system which more and more companies used can provide the potential benefits, but with the pursuing the ability to respond faster and at lower cost, this system is becoming more and more fragile, and the impact of risks and uncertainties should be more sensitive. Globalization let supply chain have become more uncertainties. The company’s procurement and logistics part have covered different countries or area, which lead to the supply chain risk higher than before. This paper analyses the background and definition of supply chain risk in procurement and logistics. And collect and analyse the risk management method to assess, evaluate, identify, and manage supply chain risk.

Keywords: Supply Chain, Risk Management, Globalization

1. Introduction
The related case shows that the risk often leads supply chain to irreversible damage and huge losses even complete rupture of the supply chain [1]. The effective supply chain risk management and control can let the supply chain become more flexible and more resistant to various types of risk. Good coordination of risk management also can improve the operational efficiency of the supply chain, reduce supply chain costs, and promote sustainable development of enterprises [2]. Global supply chains have potentially more delay points, greater uncertainties and hence the need for greater coordination, communication, and monitoring.

Nowadays, supply chain is moving in the globalization, inter-enterprise competition in the market will become increasing intensely. The risks faced by the corporate procurement and logistic have increased significantly. Control within the scope of the reasonable cost of procurement risk and logistic risk and ensure the procurement and logistic in manufacturing firm smoothly become the concern of the managers of manufacturing companies [1]. The definition of the concept of supply chain risk is an important foundation and prerequisite for supply chain risk management (SCRM). And on this basis, scholars have a lot of research from a different perspective on the risk of supply chain. But so far there is no unified understanding [3].

2. Literature review
2.1 Supply chain risk
As mentioned by Jack [3], supply chain risk is the potential threat and will lead to the vulnerability in the whole system. It also damages to the up and down businesses, as well as the entire supply chain. According to Kryazhimskii [4], supply chain risk is impact by the supply chain production process due to various uncertainties which cannot be predicted in advance. As a result, that make the actual earnings and expected benefits of supply chain deviations,
which have possibilities for damaged the risks. To sum up, in the basic viewpoints of the supply chain risk connotation described include: the definition of the vulnerability of the supply chain, emphasizing the consequences of the risk factors; uncertainties lead to supply chain failures or accidents. Supply chain risk impact and damage the supply chain safe operation, and also lead to the decline in supply chain efficiency or cost increase, result in the failure and disintegration of the supply chain network and uncertainties and unexpected events. In other words, supply chain risks related to product demand, component cost, and availability uncertainties can have a significant impact on a manufacturing company’s revenue and profits.

Procurement is a link within the different enterprises in the supply chain, to communicate between production demands and supplies simultaneously. The purpose of the procurement activities depends on low-cost, low consumption, high efficiency and high reliability requirements of the organization’s procurement events in order to protect the enterprise supplies. Therefore, it occupies an important position in the supply chain management. The procurement process, all kinds of accidents happened between suppliers and buyers make the actual results and expected deviation from the target. Hence such as the possibility and uncertainty is so-called procurement risk. The impact of the procurement risk to the enterprise cannot be ignored. Businesses should adopt a positive attitude to deal with and to take certain methods and measures to solve the problem.

2.2 The procurement external risk

Contract frauds tend to have a certain degree of secrecy in sometimes. Meanwhile it is difficult to distinguish normal contract. Because of suppliers want to control bid environment and intention to raise prices in the pre-bid collusion, corporate procurement prices are influenced by the risk of loss. However, when the firms purchase of the materials under reasonable price that will be decline in value soon, giving rise to the procurement risk. On the one hand, due to the materials provided by suppliers do not meet quality requirements, which led to the processed product does not meet quality standards. Therefore, cause damage regarding user’s economic, technological, personal safety, and corporate reputation. On the other hand, there have a problem because of the quality of the raw materials, direct impact on the overall quality of enterprise products, manufacturing. Due to technological advances caused the depreciation of intangible loss even be eliminated within enterprise products, resulting in the loss of the backlog in the procurement of raw materials.

2.3 The procurement internal risk

Firstly, the terms of the contract are ambiguous. Secondly, the behaviour of contract is unfair. Finally, the day-to-day management of the contract is often confusion in the file classification vague and lack of management. Due to human factors resulting in enterprise procurement of goods into the warehouse does not in accordance with the contract and system requirements, the number of procurement of goods, varieties, specifications, quality, price, documentation, and other aspects of the risk caused by the review and acceptance. Procurement cannot be supply of product on time, the occurrence of the interruption in production caused inventory losses risk. Enterprise Manager, department or individual responsibility or management level is not high, result in the procurement of goods do not conform the development production requirements and then formation of the losses. There are many risks caused by procurement personnel office for private gain or corruption. The firms will be taken by pre-payment to purchase materials in order to get the urgent supplies in the most of time. However, once the quality issues existence, they will blame each other and then affect corporate reputation. In the meantime, the funds will control by supply-side in a passive state.

2.4 Logistics risks

With the market competition is increasingly fierce and the impact of economic globalization continues to expand, the logistics service industry is booming. Nevertheless, logistics and accidents occur frequently during business. As a result, face to the logistics risk management in the complex environment, how to identify, assess, warning all kinds of risks is a particularly and important way.

A classification for identifying risks and uncertainties in supply chains is shown as the five networks to each supply
chain: (1) Physical – the real movements and flows within and between firms, transportation, service organization, delivery movement, storage, and inventories. (2) Financial – the flows of cash between organizations, incurrence of expenses, and use of investments for the entire chain/network, settlements, A/R and A/P processes and systems. (3) Informational – the processes and electronic systems, data movement triggers, access to main information, capture and use of data, enabling processes, market intelligence. (4) Relational – the appropriate linkage between a supplier, the organization and its customers for maximum benefit; includes internal supply element relationships throughout the business. (5) Innovation – the processes and relationships through the firm, its customers, suppliers, and resource parties for the aim of discovering and bringing to market product, service, and process chances.

3. Supply chain risk management in the age of globalization

To manage supply chain risk, companies need to follow a path from risk identification to strategies to deal with risks. Supply chain risk management process includes five stages including supply chain risk identification, supply chain risk assessment, supply chain risk monitoring, selection of appropriate risk management, mitigation of supply chain risks.

3.1 Risk identification

The risk identification process is to confirm and identify the risk in enterprise logistics activities. It needs to conduct a comprehensive investigation and analysis of the possible risk factors and categories. The risk factors of risk in the procurement include the balance between supply and demand, availability of raw materials, raw material costs, the complexity of the market and suppliers and its production. Contractual liability, goods transportation, goods custody, on time delivery and accurately delivery are the risk factors in the logistics.

There are many ways and tools to identify and analyse the supply chain risks. The risk positioning system is an important tool. It uses structural methods to locate the sources of risk and to identify the risk of potential outcomes. Usually used to analyse the factors of the accident and the cause of two tools including fault tree analysis and event tree analysis.

3.2 Risk assessment

The purpose of supply chain risk assessment is periodically expected, to prevent the impact of risk. Risk assessment includes two aspects: First, to predict the main impact factors of supply chain operations and their consequences. Second, to assess the supply chain ability to resist risks, such as the supply capacity of suppliers, logistics companies transport capacity, production of enterprise storage capacity. It is noteworthy that, due to the dynamic of the supply chain risk, risk assessment is an on-going process, when find weakness of supply chain, should be timely improved. That is the reason why company need independent regulatory agencies to management supply chain risk.

3.3 The supply chain risk monitoring

The purpose of monitoring the supply chain risk is manifested in two aspects: First, monitor the operation of the supply chain, detect the risk events and predict its impact on the supply chain; another is evaluating the effects of cope with the risks and gets feedback. Supply chain risk early warning system can monitor the risk of supply chain. The risk of early-warning monitoring is the detection of a dynamic analysis. Through the risk early warning system, manager can track and monitor the process of the supply chain operations and compare the actual value of the monitoring and early warning analysis in the supply chain management activities. There are many ways and tools to identify and analyse the supply chain risks. The risk positioning system is an important tool. It uses structural methods to locate the sources of risk and to identify the risk of potential outcomes.

The decision analysis approach can be used to assess supply chain risks and generate a solution set. For example, Berger, Gerstenfeld, and Zeng use the decision analysis approach to determine the number of suppliers. They define decisions as having higher risk to the extent that their outcomes are more uncertain, decision goals are more difficult to achieve, and the potential outcome set includes some extreme consequences. Berger, Gerstenfeld, and Zeng suggest
the use of a Critical Ratio \[ \text{Critical ratio} = \frac{(\text{costs of operating with multiple suppliers} - \text{costs of operating with one supplier})}{\text{Disaster loss}} \] to make the single versus dual sourcing decision.

\[ IT = PdsIds + PpeIpe + PisIis + PtaIta + PqIq \]

Where:

- \( IT \) = the total impact of the sourcing strategy
- \( P \) = probability
- \( I \) = impact
- \( ds \) = disruption of supply risk
- \( pe \) = price escalation risk
- \( is \) = inventory and scheduling risk
- \( ta \) = technology access risk
- \( q \) = quality risk

### 3.4 Modelling of supply chain

Once risks are identified, we can evaluate alternative strategies and their impact on the cost of the business. The modelling of the supply chain is valuable tools in this area. For instance, an organization with an extended supply chain can easily model the impact of increasing fuel costs and transportation and test different approaches to adopt sources in case of still increased fuel costs. For rapid expansion, they can measure how much extra capacity you need and where to place the new manufacturing capacity and distribution or absorbing capacity among the remaining plants in a process of consolidation. New product developments can identify and avoid material shortages in the world, or those with different legislative requirements depending on the country, and thus reduce the risk of compliance. As enterprises increase the use of outsourced manufacturing sources and providers develop higher value products, the functionality for supplier compliance, levels and countries within the supply chain can expose hidden risks. There are technology solutions available that facilitate assessment of the impact of risk in a supply chain and evaluation of alternative strategies that allow managers to make a final survey if it is worth the company to take that risk.

### 3.5 Supply chain flexibility

A number of organizations have developed their risk mitigation strategies under the principle of flexibility in the supply chain. The efficiency of supply chains often builds in predictability, repeatability and a strong network of supply chain. When the unexpected occurs, the chains can be slow to react. The fashion industry is the first to recognize the benefits of agility and they have coined the term “fast fashion” to describe supply chains that offer design to reach the shelves within weeks, as consumer trends several times during the season. This approach provides a competitive advantage and significantly reducing the risk of supply chain for those who play fast fashion to meet demand driven by an unusually rainy summer or react quickly to any design that has quickly become something “must-have “copying a TV character.

As soon detect an unplanned event, increase the chance to minimize the impact or maximize profit. For instance, early notification of a promotional success of a product in the business can quickly move the stages of the chain advantage and achieve higher profits this peak. Similarly, if a release is detected then a poor product can save millions by avoiding obsolete inventory or unused capacity properly. There are endless opportunities for real-time detection can be the eyes and ears of the supply chain, continuously and silently monitor unusual events, freight not achieved, late orders, discrepancies in the data and write offs of stock. Not a preventive measure, but an identification and early action are a valid strategy to mitigate risk.

### 3.6 Procurement risk

Every firm uses suppliers in one way or another. It is inherent in the business model. Traditional procurement is no stranger to risk management, witness any good company’s approach to contract terms and conditions and supply planning. But things move on. Public and private sector organizations have outsourced activities previously conducted in-house; what were domestic supply chains now span the globe in search of low-cost sources; and communications technologies have dramatically increased the possibility and appetite for rapid, constant change whilst also rendering a company’s activities more transparent and open to public scrutiny. Despite this, most companies are so focused on managing the people and assets employed in the business and on satisfying their customers that they fail realize what is going on behind them in their supply markets. And it is not all good news: Vulnerabilities in physical supply chains are poorly understood and managed.
Increasing supplier bankruptcies coming in the train of the economic crisis only add to supply chain woes. One consequence of this is that procurement risk has emerged as a comprehensive topic rather than being a facet of specific but fragmented procurement tasks. The benefit of this ‘promotion’ up management’s agenda is the requirement for more clarity about what is ‘procurement risk’ and greater awareness that risks can lurk in areas where traditionally they have not been sought.

Conclusion

Supply chain management has become one of the key factors to gain a competitive advantage. With the quick development, supply chain has not a simple chain structure, but developed into a network structure. The supply chain becomes more and more cross-cutting and more and more complex structure, which increased the supply chain risks. Supply chain risk management in procurement and logistics has become one of the key factors to gain a competitive advantage. Good supply chain risk management is benefited to company’s development. Supply chain risk management process including risk identification, risk assessment, risk control. Right using the risk management tool can reduce or avoid supply chain risk.

References