

Risk Management in Supply Chain

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Abstract: To demonstrate strategies of managing risk in companies' supply chains, this paper introduces and evaluates these three approaches and how each reduces these potential risks. This paper firstly identifies and examines how flexibility can help avoid the risk of financial failure in supply chain and does so by analyzing the facts of supply, process and demand risk management. Secondly, the paper looks at how sustainability management can lower the risk of financial failure in supply chain and takes three main elements into consideration: environmental, social and economic. Lastly, this paper assesses how visibility strategies can use information sharing, both from a quality and quantify perspective, to minimize the risk of financial failure in supply chain.

1. Introduction

The ongoing process of globalization has serious implications for businesses' managing strategies and this development demands companies to efficiently manage their accounting activities, as accounting is at the core of each large scale successfully operating business. As a consequence, there has been notable academic interest in recent years in supply chain risk management as well as supply chain resilience, which has offered new perspectives on how companies operate their supply chain and which strategies are appropriate contributions (Tukamuhabwa et al., 2015). There are two prominent factors that improve the efficiency and output of accounting work in companies: Management accounting and financial accounting. Management accounting is a common means that can help companies implement strategies, such as risk management (Ho et al., 2015; Jüttner and Maklan, 2011). It is all the more relevant now that the operational environment has changed dramatically, supply chain is becoming more susceptible because accidents, disasters and financial recessions have not infrequently resulted in significant disruptions and considerable financial losses with regards to companies' supply chains.

Some basic distinctions can be made when assessing the likelihood of supply chain weaknesses that can cause risks to businesses. Supply chains that are transnational or global are in its essence more prone to operational disruptions than domestic supply chains. The vast number of interconnecting links that create an interconnected chain or network of firms means that the risk is higher. Macroeconomic changes, bankruptcies, political changes, etc., make it more difficult to execute effective and sound risk management. The strategies companies develop to be more risk averse and the context in which they operate thus have potentially far reaching implications for the company's financial health and operational strength (Manuj and Mentzer, 2008).

In a similar way, and complementary to the previous point about the company's operational reach, research by Finch (2004) demonstrates that companies also increase their exposure when partnering with small- and medium-size businesses. Their heightened vulnerability is due to the fact that partnering businesses can take on critical positions in the supply chain. It is therefore necessary, Finch argues, to evaluate the supply chain's links and determine the weaknesses of each firm's practices. Overall, the research finds that having small- and medium-sized businesses operating as partners in the supply chain, increases risk exposure, but also that these partnering businesses themselves see an increased exposure to operation risks. This means risk assessments are essential for supply chain and it is recommended to consider what exact requirements a company has to guarantee continuity when part of a inter organizational network.

As a result of this new operational environment, it is necessary for companies to take on new innovative measures to improve supply chain risks management. This paper addresses the importance of effectively managing supply chain operations as an effort to minimize financial losses and looks at various risk management strategies to achieve this objective. Research suggests that there is a number of effective measures that companies have adopted to be more resilient and reduce financial setbacks in times of unstable logistical conditions or market uncertainty. The starting point and research hypothesis of this paper is that flexibility, sustainability and visibility strategies are three effective ways to prevent extreme financial harm and challenges that may disrupt companies' supply chain operations.

To demonstrate strategies of managing risk in companies' supply chains, this paper introduces and evaluates these three approaches and how each reduces these potential risks. This paper firstly identifies and examines how flexibility can help avoid the risk of financial failure in supply chain and does so by analyzing the facts of supply, process and demand risk management. Secondly, the paper looks at how sustainability management can lower the risk of financial failure in supply chain and takes three main elements into consideration: environmental, social and economic. Lastly, this paper assesses how visibility strategies can use information sharing, both from a quality and quantify perspective, to minimize the risk of financial failure in supply chain.

2. Flexibility Strategies

There is a significant amount of 'flexibility strategy' evidence that supports the idea that flexible strategies will reduce the risk of financial failure in companies' supply chain. Empirical data supports this theoretical claim and clearly proves that while flexibility enhances levels of resilience in supply chain, Tang and Tomlin (2008) argue that flexibility is applied in different levels and it thus remains unclear to what extent flexibility actually mitigates risks in supply chain, which leads to reluctance for firms to invest in flexibility. Yet, for companies there are effective ways to overcome this unclarity and obtain significant strategic value, based on accurate cost/benefit analysis as well as reliable data. There are several main flexibility strategies for companies to avoid the risk of financial failure in supply chain and these strategies are directed at and deployed in the following four areas: supply, process, demand and transportation.

Research on supply chain and risk mitigation generally uses separate models for product mix, capacity, input supply, distribution, etc., but such conventional approaches lack a clear understanding of how to integrate these and establish a comprehensive strategic model. While it is worthwhile to calculate the optimal production, distribution and capacity amounts for a company, it fails to see how these isolated components interrelate and thereby potentially pose threats to the company's daily operations. Flexibility assumes agility and adaptability to swiftly respond to economic changes and prospective market scenarios. Integration can help companies to be agile and adapt to these conditions (Das, 2011).

The assessment of flexibility is twofold. On the one hand, companies can adopt flexibility method in the areas of supply, process and demand risks to avoid the risk of financial failure in supply chain. Tang and Tomlin (2008) illustrate in their flexibility research that flexibility can reduce supply chain risks in several ways. Tang and Tomlin discuss five distinct businesses that adopted flexibility as part of their risk management and resilience measures. The first focuses on multi-suppliers, their research uses the exemplary case of Intercon Japan; the second concentrates on the importance of establishing lean tailored supply contracts, the telling example that is used to substantiate their point is that of Hewlett-Packard; the third one introduces the indispensable character of a clear-cut manufacturing process, the LCD parts used in Texas Instruments is the example at hand; the fourth is about postponement, through the example of HP; and the fifth is about responsive pricing, through the description of the pricing practices of Dell (p.15-16). Meanwhile, the models that are used to demonstrate the level of flexibility is presented as following: " $P = 1 - UC(n) / UC(1)$ ", in which "P" stands for the percentage of benefits companies can get when using each flexibility approach. UC(n) decreases with "n" increasing (p.17-23).

On the other hand, companies can also use flexibility strategies for transporting products.

Flexibility approaches can be used by companies when competing with others. Tang and Tomlin (2008) highlight the example of flexible transport measures of Seven-Eleven Japan. This company deploys trucks, boats and even helicopters to ship their commodities from different distribution centers to each of the stores in their country, which is done to ensure their products remain fresh and to make their logistics more efficient and reliable. Meanwhile, adopting a variety of transportation modes can also help companies to reduce inventory levels by controlling the transporting time. Several methods can be developed to monitor for example optimal transportation moments, time planning and mixing forms of transportation. Fan, Schwartz and Voß (2017) use a quantitative model to comprehensively investigate the idea that various transportation modes can make supply chain less vulnerable to unexpected logistical hiccups and financial setbacks. The authors state that the utilization of flexible transportation modes can reduce storage levels at warehouses by analyzing different disruption types, different supply chain structures, different disruption probabilities and different transportation modes as used in supply chain (p.654-666).

To sum up, the research and evidence documented in this paper show flexibility approaches is an efficient way for companies to avoid the risk of financial failure in supply chain at the stages of supply, process, demand and transportation. Using models conclude that a certain flexibility level is needed in each strategy and low-speed transportation in certain stage can help companies reduce inventory. As a result, companies can use flexibility strategies to avoid the risk of financial failure and disruption in supply chain.

3. Sustainability Strategies

There are more probabilities for companies facing financial failure in complex global supply chains. The dynamic character of supply chain management practices and the underlying processes and structures is often regarded as a positive marker for cost and time efficient operations, yet it also brings along challenges for each company involved in the chain. Because risk management, economic efficiency and sustainability are interconnected, these factors deserve consideration when attempting to minimize risks and expanding a supply chain's resilience. It needs to be stressed that any emerging disruption threatens operational continuity and it thus is recommended to consider factoring in sustainability to increase resilience and design a chain structure that can mitigate ripple effects (Ivanov, Sokolov and Dolgui, 2014). Any disruption will cascade down the supply chain when a disruption at a supplier fails to be localized.

There are two main classifications of supply chain risks: endogenous risks and exogenous risks (Faisal, 2009). This paper focuses on the endogenous risks because the risks generally originate from companies' behavior or lacking oversight of their suppliers. There are existing strategies that can directly control these particular risks. Furthermore, sustainability is increasingly regarded as an effective approach to cope with the difficulties in complex global supply chains. Hence, developing and implementing sustainable management frameworks can help companies avoid any financial failure in supply chain when active in various environmental, social and financial areas. There are two primary steps for companies to develop a sustainable supply chain to avoid financial failure.

This first stage is risk analysis on environmental, social and financial components. Giannakis and Papadopoulos (2016) state that companies can use taxonomies and risks trees to identify the risks. The first analysis focuses on environmental risks and it includes: pollution, non-compliance with sustainability rules, energy consumption and product waste; the second is social risks which include: unfair wages, exploitative hiring behaviors and inequality as well as healthy and safe working conditions; the final is financial risks which include: false claims, patent infringements, tax avoidance (p.457). The research outcomes demonstrate that endogenous environmental risks are considered to be most important across various different industries as the interconnectedness between sustainability-related risks is perceived to be remarkably high and consequently require more attention when structuring supply chains.

The second stage is risk treatment. There are three ways for mitigating supply chain risks and thereby avoid financial failure. The first is green supply chain management related to environmental risks. When engaged in examining green supply chain management, the core of the matter should be

environmental concern and companies should adapt new approaches to embrace sustainability and improve supply chain's environmental performance. In practice, this strategy means that companies should shift their attention from internal activities and products to extended producer responsibility and product life cycle analysis, which requires companies use more advanced technology to produce and recycle products (Sarkis, 2014). In addition, companies who take these matters to heart should also optimize their supply chain models by incorporating measures that provide insights about the potential economic and environmental trade-offs when operating their supply chains. Analysis of the business activities help identify the critical activities closely in line with the supply chain activities. Most prominent examples of critical scenarios that run counter to sustainable, durable practices is fuel-pricing and carbon-pricing.

The second pillar of sustainable risk management practices is protecting employees' rights and social risks. This strategy suggests that using diverse employee practices: behavioral codes, health policy and safe rules can ensure companies' compliance with national laws (Lee, Lau and Cheng, 2013). While irresponsible employee practices, for example child labor or below standard workplace conditions are still adopted by companies (regardless of the existence of a substantial amount of workplace implementation guidelines on workers' rights, the ongoing malicious practices has not only negatively impacted the business performance of companies but also damaged the reputation of large globally operating companies such as Apple, Adidas and Nike.

The third and last component of sustainability in risk management for supply chain is implementing compliance programs for financial risks, which means that companies can monitor the occurrence of incorrect behaviors (dishonesty, tax avoidance and corruption) and identify any changes in the constantly changing supply chains (Giannakis and Papadopoulos, 2016, p.458). This economic point factors is the responsibility of companies to comply with existing legislation but also provides companies in supply chains the possibilities to check on partnering or competing firms. When sub suppliers fail to comply with the corporate sustainability standards, they may face challenges from suppliers (and to a lesser extent other sub suppliers). Not meeting the standards can result in harsh evaluation, possibly followed by mediation and execution of corrective action. Companies' decisions to involve strategic business partners boosts positive effects on managing sub suppliers and their compliance with sustainability standards.

To sum up, the research and evidence documented in this paper show sustainability approaches makes an important position in companies to avoid financial failure. Sustainability strategies reduce supply chain risks from three main aspects: environmental, social and financial. The strategies are green supply chain, protection of employees' rights and implementing compliance programs and monitoring incorrect behaviors. Therefore, sustainability is an efficient way to avoid the risk of financial failure in supply chain. In order to achieve this objective, companies in supply chain should concentrate their efforts on developing approaches of integrated sustainability risk management that help facilitate the development of effective strategies with a high sustainability character.

4. Visibility Strategies

Visibility strategies get an optimal treatment to supply chain risk, this measure suggests that the entire supply chain is assured to have sufficient transparency. Nooraie and Parast (2015) state that it is desirable for companies to increase visibility in supply chain as to lower the possible risks and reduce the costs, but also to more efficiently operate or manage supply chains (p.192). Therefore, visibility in information sharing can help companies to control supply chains to avoid the risk of financial failure. Supply chain visibility is characterized in terms such as quality, accessibility and high quality information, of which each helps to guarantee a company's operational effectiveness and improved business performance but also benefits the company's strategic competencies.

Information sharing can enhance supply chain visibility by mastering the real demand quantity of products. Information sharing can master the real demand quantity from three aspects: order, demand and shipment information sharing. The first is order information sharing approach. The demand prediction of each level is based on the order of the lower level which means that the order information in other levels is unclear. In this strategy, each level can share the forecasting order

information to make more accurate plans for the order. The second is demand information sharing approach. In this approach, each level provides the real demand and each level should share their forecasting system of demand with a higher level in the supply chain. The final point is the shipment information sharing approach, which means that each level should share the historical real shipment message in order to provide full transparency and thereby improve operational effectiveness. A higher level initially shares its shipment information to the lower, which then, consequently, can help the lower customer make decisions on production or inventory with more accuracy (Zhou et al., 2008).

Information sharing can also enhance supply chain visibility by controlling and monitoring the products' quality. Visibility can use three ways to measure the quality of the processed products. The first one entails providing the product quality evaluation report in supply chain, meaning that companies can develop certain standards for quality checks, such as the use and amount of chemical materials in products. The second aspect is providing listings of reliable and certified materials. Companies should organize a group that is responsible for supervising the source of original material. The final method depends on a traceable system so that means companies are able to establish a clear information system, which is utilized so that all the product sources can be traced (Zhou et al., 2008).

To sum up, visibility strategies can avoid the risk of financial failure through two forms of information sharing, those being quantity information sharing and quality information sharing. The quantity information sharing can have notable positive effects with regards to order, demand and shipment; quality information sharing can be an effective method for evaluating quality, monitoring the purchases and establishing a traceable information system. Therefore, more visibility can make companies control products' quantity and quality to avoid the risk of financial failure in supply chain.

5. Conclusion

Research clearly demonstrates that flexibility, sustainability and visibility can help companies to avoid the risk of financial failure in supply chains. Furthermore, these strategies are all efficient and practical. Flexibility strategies that are applied in supply chain help the operation in the areas of supply, process, demand and transportation. When correctly developed and used, sustainability strategies have proven to be successful in the environmental, social and financial areas. Lastly, visibility strategies that deal with information sharing (quantity and quality) indicate there are significant gains from this strategy for managing the supply chain. These strategies and the outcomes of the study support the research hypothesis that risks can be mitigated when companies develop the correct risk management strategies.

However, it is necessary and recommended to doing further research to prove the research thesis that flexibility, sustainability and visibility strategies can avoid the risk of financial failure in supply chains. Although these strategies are effective in much theoretical research, more empirical research needs to be done to prove its effects in different industries. More importantly, current research demonstrates that it is necessary that the accuracy of identifications for the supply chain risks by Ciannakis and Papadopoulos (2016) should be affirmed and conceptually broadened in further research. Such research will make the strategies become more suitable and will advance the existing knowledge of this discipline.

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