Chapter 17

Risk Management in Supplier Selection:
A FMEA–Based Approach for Retail Supply Chain

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ABSTRACT

Risk management issues have been widely researched in areas such as system engineering, business management, financial planning, market research, and service industry. Many approaches have been proposed to reduce or minimize risks, maintain productivity or profitability in organizations. However, different risk management strategies are needed under different situations and different industries. In this chapter, the authors address the theme of risk management in supply chains. They begin by reviewing the metrics of supply chain performance, followed by design and development of supplier relationship management process, and a failure modes and effects analysis (FMEA)-based approach to identify and evaluate the potential risks in the process of commodity procurement. After analyzing the causes and effects of potential risks in procurement, they develop a strategic plan to monitor and control risk management and implement continuous improvement. A case study is provided for supplier selection and buyer-supplier relationship management.

INTRODUCTION

In the past several years, the topic of supply chain risk management has been researched and discussed in the inner circles of operations professionals, business management references and so on. However, until recently, very little has been done to help organizations to evaluate and measure their degree of exposed supplier risks and more importantly, how to manage these risks exposed to the facilities throughout the supply chain.

As a definition of SCOR risk management mode, "Supply chain risk management is the systematic identification, assessment, and quantification of potential supply chain disruptions with the objective to control exposure to risk or reduce its negative impact on supply chain performance (SCOR, 2007)." In SCOR 8.0 mode, we might see that "Potential disruptions can either occur within the supply chain (e.g. insufficient quality, unreliable suppliers, machine break-down, uncertain demand etc.) or outside the supply chain (e.g. flooding, terrorism, labor strikes, natural disasters, large variability in demand etc.)." And also, "Management of risk includes the development of continuous strategies designed to control, mitigate, reduce, or eliminate risk." Therefore, with the SCOR risk management model, the contents include identifying risk, designing detection measures, controlling risks exposure, and eliminating risks.

In the literature of Wagner and Bode (2006), it is easy to distinguish such terms:

- *Risks in Supply chain*: The risk is defined as a negative deviation from the expectation of valuing a certain performance measure, resulting in negative consequences for the focal firm or a certain supply chain facility. Hence, risks are equated with the detriments of a supply chain disruption. The authors explicitly adopt the notion of risk as purely negative as the one that corresponds best to supply chain business reality. As a consequence, they do not consider "happy disasters" nor the situation where managers intentionally "gamble" on risk.

- *Disruption in Supply chain*: a supply chain disruption is an unintended, untoward situation leading to supply chain risk. For the affected firms or supply chain facilities, it is an exceptional and anomalous situation in comparison to every-day business. Supply chain disruptions can materialize from various internal and external areas into a supply chain. Consequently, their nature can be highly divergent.

- *Risk source in Supply chain*: attempting to circumscribe supply chain disruptions (i.e. the demarcation of supply chain risks from another business risk), many scholars have proposed classifications in the form of typologies and/or taxonomies of risks. The derived classes of supply chain disruptions are often labeled supply chain risk sources.

- *Supply chain vulnerability:* while a supply chain disruption is a situation that leads to the occurrence of risk, it is not the sole determinant of the final result. It seems consequential that also the susceptibility of the supply chain to the harm of this situation is of significant relevance. This leads to the concept of supply chain vulnerability. In another way, Christopher and Peck (2004) define supply chain vulnerability as "an exposure to serious disturbance", while Barnes and Oloruntoba (2005) describe vulnerability as "a susceptibility or predisposition to loss because of existing organizational or functional practices or conditions".

Hence, to sum up, supply chain risk management can be described as the management of the supply chain risks through coordination or collaboration among the supply chain partners, so as to avoid business failures and ensure profitability and continuity. Then, the aim of risk management would be to plan a management strategy to detect risks, control failures, monitor the process of implementing risk management, audit and evaluate the results. All the countermeasures are serving to safeguard continuity and maximize profitability (Tang, 2005). Additionally, the mechanism of procurement risk management is often created through an agreement between buyers and suppliers with the purpose of these efforts being to avoid the damage caused by buyer uncertainty, system malfunction, buyer or supplier error, and product or service mismatch (Tang & Shee et al., 2001).

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