

# Chapter 21

## Path Analysis Model for Supply Chain Risk Management

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### ABSTRACT

*The purpose of this paper is to develop a model to understand the relationship of supply chain risk sources, risk drivers, and risk mitigation strategies to the overall risk exposure of the firm and to validate the model empirically. An attempt has been made to determine the major contributors of supply chain risk as viewed by automotive professionals in today's competitive market. This study empirically validates the effects of the three critical constructs on overall supply chain risk exposure. The limitations of this study can be seen in the use of perceptual data from single informants and the focus on automotive firms in a single country. The detailed operationalization of the constructs sheds further light on the major risk sources, drivers, and mitigation strategies in supply chain networks. Clear evidence of proactive strategies in mitigating risks provides managers with a business case to invest in such initiatives.*

### 1. INTRODUCTION

Today's business environment poses great challenges to companies that are striving for global competitiveness using their supply chain as a weapon. In a complex and uncertain business environment, manufacturing companies must manage their supply chain efficiently and effectively in order to increase efficiency and agility (Chopra and Sodhi, 2004; Lee, 2004). In the last number of years events such as the 9/11 terrorist attack, and the tsunamis in 2004 and 2011 have pointed the attention of researchers

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and practitioners towards a very important field in supply chain management: supply chain risk management (SCRM) (Helfrich and Cook, 2002; Sodhi and Son, 2012). Not only high impact events but also everyday problems such as supply quality problems, delays, and forecast errors make SCRM important.

Since the 1990s, the supply chain focus has been on cost efficiency and streamlining supply chain processes by adopting just-in-time concepts. These initiatives increase supply chain vulnerability. Hence, managers often make a tradeoff between the efficiency and robustness of the supply chain and safety of the supply chain (Craighead et al., 2007).

Several trends have forced companies to deal with risk issues in their supply chains. Outsourcing resulted in increased dependencies and globalization that increased lead time uncertainty (Juttner et al., 2003; Cagliano et al., 2012). However, it has been argued that while outsourcing of business processes may reduce risk on one hand, it also increases organizational vulnerability through decreased control over the outsourced processes (Kotabe et al., 2008). Information technology caused the reduction in customer search time and shrinking product lifecycles that leads to higher vulnerability due to higher complexity (Harland et al., 2003; Hauser, 2003; Wagner and Bode, 2006; Thun and Hoenig, 2009).

Several articles addressed the effect of supply chain disruptions and external events on supply chain performance. A study by Hendrick and Singhal (2003, 2005a,b) empirically established that supply chain disruptions have a significant negative impact on shareholder value and on operating performance. An example in the Indian automotive industry is the loss of \$100m Maruti suffered due to Japanese's tsunami in 2011. Many companies reported losses on account of disasters in 2004, 2008, and 2011. The Indian automotive industry is truly a global industry, which is expected to be the largest automotive manufacturer by 2050 (SIAM, 2012). The wide range of risks exacerbated by modern trends may pose negative problems for supply chain performance.

There is an eminent need for organizations to have mitigation strategies to manage supply chain disruptions. Given the high relevance of the SCRM, researchers presented the best practices as well as guidelines for risk mitigation to secure robust and resilient supply chains. The majority of these research articles were based on anecdotes and case studies. Some of the researchers investigated the SCRM practices in developed countries like Germany and France (Thun and Hoeing, 2009). There is need for an empirical work in the field of SCRM to analyze the sources of supply chain risk and instruments for supply chain risk mitigation specifically in developing countries.

The purpose of this paper is to investigate the impact of supply chain risk sources, supply chain risk drivers, and supply chain risk mitigation strategies that have been adopted by firms. This study would help supply chain managers to understand the risk implication of supply chain design decisions.

In section 2, the various sources of risks to the supply chain are discussed, taking into consideration both demand side as well as supply side risks. We then look at risk drivers, followed by strategies adopted by the firms to mitigate these risks. Thereafter in section 3, we put forward our theoretical model and develop related hypotheses. In section 4, research methodology for the present study has been provided and in section 5 data analysis has been explained. Section 6 provides the managerial implications of the study and section 7 provides a conclusion and suggestions for the future research.

## **2. LITERATURE REVIEW**

It is critical to define the term risk appropriately since it is a vague construct with a variety of meanings and measurements. The word risk means to dare (Bernstein, 1996). Moore (1983) notes that risks

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