Chapter 69
Risk and Visibility in Supply Chains:
An Information Management Perspective

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ABSTRACT

The emergence of complex supply chains is one of the most important consequences of globalization. The management of these supply chains requires increased efforts by organizations that, on one hand, are increasingly pressured by customers in terms of service levels, on the other hand, must manage their suppliers from various locations and with different local requirements. In this context, an appropriate management of information flows is needed to create the adequate visibility level for managing supply chain risk. This chapter presents an overview on the concepts of risk management, visibility and information management in supply chains. This study proposes a conceptual framework for the selection of risk mitigation strategies in the supply chain and characterizes the external and internal information flows decision makers need to implement two categories of risk mitigation strategies: redundancy and flexibility.

INTRODUCTION

Companies nowadays value the importance of establishing a risk management process to identify, measure, mitigate, and control risks in their supply network (Elmsalmi & Hachicha, 2014). In order to be able to identify these risks, companies are starting to work with their network partners towards creating supply network visibility (Nooraie & Parast, 2015). By sharing what sometimes is sensitive and proprietary

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information with their network partners, companies aim at aligning their common objectives though ensuring the efficient management of the whole chain. Still, there is a need to create visibility over the specific information that will enable companies to identify and act upon the risks and opportunities of their supply network. In fact, in the global and digital context in which firms operate, information assumes a distinctive role, as it supports effective decision-making process.

Supply chains are networks of partners globally dispersed, delivering complex products and services. Today, there is a shift from verticalization of operations in the supply chain to the integration and closer management of the relationships among key partners of the supply chain (Harland, Brenchley & Walker, 2003; Figueiredo, Silveira & Sbragia, 2008; Thun & Hoenig, 2011; Lavastre, Gunasekaran & Spalanzani, 2012; Messina, Santos, Barros & Matopoulos, 2015). All these characteristics may cause uncertainty and disruption along the chain, so there is a clear need to establish risk management processes in the supply chain (Elmsalmi & Hachicha, 2014). Despite the recognized relevance of risk management in supply chains, more research is needed to identify how firms act to mitigate these risks (Bode, Wagner, Petersen & Ellram 2011; Son & Orchard, 2013). Existent literature in supply chain risk management has focused on identifying the different causes of supply chain disruption (Christopher & Peck, 2004; Wagner & Bode, 2008) and implications of supply chain risk management in terms of supply chain performance (Wagner & Bode, 2006; Wagner & Bode, 2008). Still, few researchers have focused in examining how different mitigation strategies can be adopted in different risk scenarios (Ghadge, Dani & Kalawsky, 2012).

The implementation of the risk mitigation strategies require the coordination of the flows of material, information and financial resources, and therefore it is essential to increase the visibility along the supply chain (Goswami, Ravichandran, Teo & Krcmar, 2011; Koçoğlu, İmamoğlu, İnce & Keskin, 2011; Goswami, Engel & Krcmar, 2013). However, the concept of supply chain visibility has till now been associated with information exchange only among supply chain partners (Lamming, Caldwell, Harrison & Phillips, 2001; Swaminathan & Tayur, 2003; Caridi, Crippa, Perego, Sianesi & Tumino, 2010; Nooraie & Parast, 2015). Our research shows, that for the implementation of risk mitigation strategies along the supply chain in complex environments the use of internal information has to be complemented with the analysis of information from outside the supply chain. Consequently, the goal of this chapter is to propose a conceptual framework that characterizes the external and internal information flows decision makers need to implement two categories of risk mitigation strategies: redundancy and flexibility.

The chapter is divided in six sections. The next three sections outline the theoretical foundations of the chapter synthesizing the evolution and characteristics of supply chain risk management, supply chain visibility, and information management. Then a conceptual framework is presented based on the literature that identifies and exemplifies the information needed to implement two risk mitigation strategies, namely redundancy and flexibility. Finally, the last two sections suggest potential paths for future research and discuss the implications for researchers and practitioners of the proposed conceptual framework.

SUPPLY CHAIN RISK MANAGEMENT

Definition of Risk

The origin of the word "risk" derives from the ancient Italian *risicare*, which means to dare (Bernstein, 1996). Its meaning has changed over time according to the perception that different people have of the