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Articles

Inter-relationship among risk taking propensity, supply chain security practices, and supply chain disruption occurrence

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ABSTRACT

Supply chain disruptions often led to declining sales, cost increases, and service failures for the company. Considering the profound impact of supply chain disruptions on business survivals, there is a need for formulating business initiatives that will make the company's supply chain network more resilient in the presence of risk and uncertainty. This paper sheds light on the inter-relationships among risk propensity, supply chain security practices, and disruption occurrence so that it can help the company figure out what it takes to overcome the company's vulnerability to supply chain risks and then gain competitive advantages over its rivals by better preparing for potential supply chain disruptions. This paper attempts to identify factors affecting the firm's risk behaviors and supply chain security practices based on the questionnaire survey of supply chain professionals. The finding indicates that firms which take the risk of supply chain disruption seriously are more likely to comply with security initiatives and build safety stocks and subsequently reduce the frequency of supply chain disruption occurrence.

1. Introduction

As the globalization of business activities accelerated, today's supply chains span the globe with unprecedented complexities and uncertainties. These complexities and uncertainties not only increase risk, but also reduce visibility that, in turn, makes supply chain operations more vulnerable to unforeseen disruptions. Reflecting growing concerns over supply chain disruptions, supply chain risk management (SCRM) has become an emerging research topic (Altay and Ramirez, 2010; Ellis et al., 2011; Manuj and Mentzer, 2008a, 2008b; Revilla and Sáenz, 2014; Schoenherr et al., 2012; Son and Orchard, 2013; Tang, 2006a; Whitney et al., 2014; Zsidisin and Wagner, 2010). One of the central themes of past SCRM research includes the definition and categorization of supply chain risks and identification of their sources. For instance, borrowing from investment portfolio concepts, Rao and Goldsby (2009) defined supply chain risk in two ways: First, risk is considered the manifestation of uncontrollability that may result in either positive or negative outcome. Second, risk refers to a form of negative outcomes that adversely affect organizational performance. Altay and Ramirez (2010) investigated how natural disaster such as earthquake, windstorms, floods, and fires affected firms in different business sectors. They observed that firms did not take disaster disruption management seriously due to their perceived low probability of disaster occurrence, despite the fact that natural disaster actually affected firm performances.

Considering the potential connection between the firm's perceived risk and risk mitigation actions, Ellis et al. (2011) identified individual, organizational, and environmental factors that affected the formation of risk perception and mitigation actions. Despite a variety of risk factors (sources) and their level of importance to mitigation actions, Revilla and Sáenz (2014) found the level of disruption management implementation to be universal all across the world. More recently, Ambulkar et al. (2015) identified three antecedents for enhancing the firm's resilience to supply chain disruptions: (1) supply chain disruption orientation; (2) resource reconfiguration capabilities and (3) firm's risk management infrastructure. They found that supply chain disruption affected the firm's resilience level differently depending upon the firm's resource configuration and risk management infrastructure. Focusing on the effectiveness of risk mitigation actions rather than the identification of risk sources, Whitney et al. (2014) noticed that multiple sourcing was often used as a temporary hedge to reduce supply chain disruption risks. However, they found that temporary multiple sourcing turned out to be ineffective in dealing with supply chain disruption, if product design and manufacturing methods for the disrupted items were complex. Supporting this

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finding, Bode and Wagner (2015) showed that horizontal, vertical, and spatial supply chain complexities increased the frequency of supply chain disruption and thus made a temporary hedge less efficient.

In the presence of various supply chain risks illustrated above, this paper aims to develop risk mitigation action plans that help firms better control such risks, while assessing the impact of supply chain security and safety stock practices on supply chain disruption occurrence based on the empirical study. In particular, drawing upon the contingency theory, this paper introduces firm's risk taking propensity as an antecedent, which may reflect the firm's risk management behavior, proposes security compliance and safety stock plans, and identifies various types of supply chain disruption occurrence.

2. Relevant literature

Reflecting the growing awareness of supply chain risk and a need for contingency planning, there exists abundant literature dealing with supply chain risk (e.g., Tang, 2006a, 2006b; Khan and Burnes, 2007; Manuj and Mentzer, 2008a, 2008b; Vanany et al., 2009; Tang and Nurmaya Musa, 2011; Chaudhuri et al., 2013, Zhao et al., 2013). Given the plethora of articles reviewing and synthesizing the past supply chain risk literature, our focus in this section is to examine what has been studied up to this point to identify various forms of supply chain disruption, and assess their impact of supply chain security practices on reduction of such disruption occurrence.

2.1. Risk taking propensity

Since the firm's corporate culture in dealing with risk may influence the way the risk is managed, we take into account the degree of risk taking propensity for formulating SCRM strategy. Generally, risk taking propensity refers to a company's willingness to commit their resources to risk management (Miller and Friesen, 1978). Sitkin and Pablo (1992) defined risk taking propensity as a general tendency for a person to either take or avoid risks. Risk taking propensity ranges from risk-aversion tendencies to actively avoiding risk to risk-seeking tendencies to actively exploit uncertainty (Weber et al., 2002). Kocabasoglu et al. (2007) is one of the first to study risk taking propensity at an organizational level to understand SCRM behavior and then define risk taking propensity as a likelihood of a firm's acceptance of less or more risky behavior over time. Also, Gilley et al. (2002) and Das and Joshi (2007) observed that the more the firm was willing to take risk by engaging in risky business activities, the more likely it was to take bold actions that can lead to innovative product and service development.

2.2. Supply chain security practices

Wagner and Bode (2009) proposed a cause-oriented focus and an effect-oriented focus when managing supply chain risk. A cause-oriented focus refers to a reduction in the likelihood of disruption occurrence and the avoidance of possible risk through switching and relocating existing facilities and launching preventive safety and security initiatives. An effect-oriented focus refers to the adoption of redundancy principles, such as the establishment of organizational slacks, use of buffering strategy, capacity expansion, and multiple sourcing. Zsidisin and Wagner (2010) postulated that the development of supply chain resilience involved increased flexibility and redundancy to weaken the adverse effect of supply chain disruption. Their statistical result indicated that redundancy had a moderating role between perceived supply risks and disruption occurrence. Bode et al. (2011) introduced the concept of motivation to act as supply chain disruption orientation to explain the firm's responses to supply chain disruption. Also, they explained how the firm's supply chain disruption orientation influenced its choice of disruption responses such as bridging and buffering actions. In particular, they found that the buffering action worked as safeguards which enhanced firm's stability by protecting them from supply chain disruption. Speier et al. (2011) developed a supply chain security practice which can mitigate product safety and security risks. Their proposed security practice includes information sharing, process management, and supply chain partnership management. They also recognized the importance of top management mindfulness and commitment to security, since it could help lower the detrimental effect of supply chain disruption and foster a security culture. Hoffmann et al. (2013) introduced buffering and insurance as a reactive risk mitigation action. They discovered that buffering was unable to prevent disruption but it could absorb the detrimental effect of supply chain risk. They also found that risk mitigation actions such as buffering moderated the relationship between environmental uncertainty and supply risk management performance. Based on the aforementioned studies, since security compliance and safety stock plans can be considered risk mitigating security measures, we regard security compliance and safety stock plans as supply chain security practices.

2.2.1. Security compliance

In the aftermath of 9/11 incident, a growing number of firms began to realize how significantly a lack of contingency planning or disaster preparedness can disrupt supply chain operations and subsequently damage business performances. To develop “safe-harbor” plans of action against supply chain risks, many firms took supply chain security more seriously and then considered developing more effective security measures. For instance, the U.S. firms invested in approximately $65 billion to enhance supply chain security in the wake of 9/11 incidents (Williams et al., 2009). Notable examples of these security measures include compliances with the Customer-Trade Partnership against Terrorism (C-TPAT), the Container Security Initiative (CSI), Fast and Security Trade (FAST), the Emergency Planning and Community Right to Know Act (EPCRA), the Advanced Manifest Rule (AMR), Antitamper Seals, X-ray and/or Gamma-ray scanning of containers, Safe and Secure Tradelanes (SST), and ISO/PAS 28000:2005 (Williams et al., 2008, 2009; Willis and Ortiz, 2004). Generally, a supply chain security system refers to the application of policies, procedures, and technology to protect supply chain assets (e.g., product, equipment, facilities, information, and personnel) from the theft, damage, sabotage, terrorist attack or unauthorized contraband (Closs and McGarrell, 2004; Whipple et al., 2009).

2.2.2. Safety stock

In this paper safety stock refers to the extent to which a company maintains redundant inventory (i.e., added finished goods and extra components/parts) to absorb or cushion the detrimental effect of supply chain disruption. Creating redundancy enables firms to reduce the likelihood of disruption and increase resilience. Safety stocks, multiple sourcing, expanded capacity, and backup sites are examples of redundancy. Sheffi and Rice (2005) claimed that redundancy could incur sheer cost with limited benefit. Thus, redundancy was needed only in the case of disruption, because it might lead to underutilized capacity, idle inventory, and increased waste. That is to say, redundancy can disguise inefficiencies by inhibiting the advantages of a lean supply chain (Tang, 2006a). Tomlin (2006) viewed redundancy as a mitigation action. Examples of such an action included multiple sourcing, added inventory, and increased production capacity. Similarly, Tang