Chapter 5

Security Based Operation in Container Line Supply Chain: A Literature Review

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Container Line Supply Chain (CLSC) plays a dominant role in world cargo transportation, but also subjects to various threats during its operation due to its inherent features. The threats can not only cause disruptions for CLSC operation, they may also lead to various disasters globally. To help to manage the potential disasters, in this chapter, current research on security for CLSC operation is reviewed. Specifically, the research is divided into three categories: (1) research from a general level, including standards, regulations, codes, etc. issued by international, national and industrial organizations, aiming at improving CLSC security, (2) research on specific security issues in CLSC, e.g., threats faced by CLSC, features of CLSC, criteria for security assessment of CLSC, etc., and (3) research on different risk analysis tools and their applications in CLSC security related areas. Further, the limitations of current research are also analyzed and potential directions for future research in this field are suggested.

5.1 Introduction

One of the most prominent features of modern business is that more and more companies, instead of operating on their own, are operating cooperatively within a supply chain. Supply chain, since its introduction into business operation, has played and will continue to play an important role in modern business. However, the level of risks involved in supply chain is also increasing due to some features of contemporary business, for example, trend of globalization and outsourcing (Chopra and Meindl, 2004; OECD, 2004), increasing product and service complexity (GAO, 2005), more rapid consumer demand changes (Sørby, 2003), shorter product lives (Sørby, 2003), and so on.
As one of the major categories of supply chain, Container Line Supply Chain (CLSC), which transports cargo in containers, shares many common characteristics and risks with general supply chains. At the same time, it also has its unique features.

Since their introduction in the 1950s, containers have become increasingly important in world cargo transportation as it enables smooth and seamless transfer of cargo among various modes of transportation, and thus makes cargo movement much more efficient (Levinson, 2006; Wydajewski and White, 2002). It is estimated that approximately 95 percent of the world’s trade moves by containers (OECD, 2003) and approximately 250 million containers are shipped annually around the world (DHS, 2007). These two figures clearly indicate that CLSC is a dominant means to ship cargo around the globe (Fransoo and Lee, 2011; OECD, 2005).

Despite the dominant role of CLSC in world cargo transportation, CLSC is also subject to many threats due to the following reasons:

- **CLSC is complex.** A typical container transaction involves as many as 30 different physical documents and at least 25 different organizations (Cooperman, 2004), including raw material vendors, semi-finished and finished product manufactures, exporters, shippers, freight forwarders, importers, consignees, and so on (Yang, 2011). Further, documents and organizations involved in CLSCs may spread all over the world. In addition, among many organizations involved, there is no single organization governing the international movement of containers (Bakir, 2007) and there is no single organization that has full responsibility for the CLSC security (OECD, 2003).

- **CLSC is vulnerable.** During the transportation process of a container, many different kinds of threats, including cargo theft, smuggling, stowaway, terrorist activity, piracy and even labor protest, can have a serious impact on CLSC. In addition, any breach in security in one part of CLSC may compromise the security of the entire chain (Bakir, 2007; Ø. Berle et al., 2011; Khan and Burnes, 2007; Sarathy, 2006).

- **CLSC operates with insufficient preventative measures.** Despite the complexity and vulnerability of CLSC mentioned above, corresponding preventative measures against various threats are not sufficient. For example, nowadays, only about 2 percent of the imported containers are physically inspected in most countries (Closs and McGarrell, 2004), and the bill of lading, which states the contents of containers, is rarely verified through inspections of containers after packing or during transportation (OECD, 2003).