



Higher supply chain security with lower cost: Lessons from total quality management

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Abstract

Supply chain security has become a major concern to the private and public sector, after the disastrous event of September 11, 2001. Prior to September 11, 2001, supply chain security concerns were related to controlling theft and reducing contraband such as illegal drugs, illegal immigrants, and export of stolen goods. But after September 11, 2001, the threat of terrorist attacks has heightened the need to assure supply chain security. The public is of course concerned with the potential of having weapons of mass destruction embedded in the shipments through the supply chain. In addition, the private sector is concerned with the costs of assuring security, and the potential disruptions associated with real or potential terrorist acts. Governments and industry have all responded with proposals to create more confidence in supply chain security, while maintaining smooth flows of goods and services in a global supply chain. One of the most effective strategies may be to apply the lessons of successful quality improvement programs. In this paper, we describe how the principles of total quality management can actually be used to design and operate processes to assure supply chain security. The central theme of the quality movement—that higher quality can be attained at lower cost by proper management and operational design—is also applicable in supply chain security. By using the right management approach, new technology, and re-engineered operational processes, we can also achieve higher supply chain security at lower cost. We will demonstrate how this can be done with a quantitative model of a specific case example.

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1. Introduction

After September 11, 2001, the security of a supply chain has become a major concern to the

public and private sectors. In particular, the ocean segment of a supply chain is most vulnerable to security threats. More than 90% of world trade involves containers aboard ships, amounting to about 20 million containers trips annually (Cuneo, 2003). For the US, 17,000 containers arrive at US ports each day. Both the government and industries

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have begun to examine ways to address the threat of terrorism and the potential of having weapons of mass destruction (WMD) in materials flowing through a supply chain. “Every container destined to enter or pass through the US should be treated as a potential weapon of mass destruction”, Rob Quartel, chairman and CEO of Freightdesk Technologies, told the Senate Committee on the Judiciary’s Subcommittee on Technology, Terrorism, and Government Information on February 26, 2002 (Mottley, 2002). WMD can result in significant loss in human lives, destruction of infrastructure, and erosion of public and business confidence. Ultimately, global trade and prosperity are threatened.

The public sector is of course concerned about the potential of having WMD embedded in the shipments through the supply chain. In addition, the private sector is concerned about the costs of assuring security, and the potential disruptions associated with real or potential terrorist acts. Governments and industry have both responded with proposals to create more confidence in supply chain security, while maintaining smooth flows of goods and services in a global supply chain. Some of these proposals call for increased information exchange among trading partners, ports, shipping companies, and the governments. Some call for heightened inspection and scrutiny of the goods flowing through a supply chain. These measures can add cost, delays, and uncertainties in the supply chain. At the same time, supply chain disruptions resulting from security breaches, can be disastrous. For example, if ports and border crossings were closed for a meaningful time after a major terrorist attack, the economic impact would be devastating. It is not possible to quantify the full direct costs of damages and casualties, recovery measures, congestion, and disruption to business and daily life.

There are indirect costs to a supply chain without security confidence. For example, such a supply chain may be less cost-efficient due to higher freight and insurance rates. Since September 11, 2001, the general liability rates for trucking companies have increased by an average of 32% as carriers renewed their policies in the subsequent year (Hannon, 2002). The cycle time of the supply chain can be lengthened due to longer delays in

getting goods through the global supply chain. Companies without security confidence may have to abandon just-in-time and lean inventory processes, to safeguard against unexpected security breaches and supply chain disruptions. Some companies may have to expand their supply bases and source from higher cost but local suppliers.

One of the most effective strategies may be to apply the lessons of successful quality improvement programs. In this paper, we describe how the principles of total quality management (TQM) can be used to design and operate processes to assure supply chain security. The central theme of the quality movement—higher quality can be attained at lower cost by proper management and operational design—is also applicable in supply chain security. By using the right management approach, new technology, and re-engineered operational processes, we can also achieve higher supply chain security at lower cost. We will demonstrate how this can be done with a quantitative model of a specific case example.

In the next section, we outline the key lessons from TQM and describe how they are applicable to developing supply chain security approaches. Section 3 then describes some examples of the measures and initiatives developed by governments, port operators and technology companies, to use information flows, and wireless technologies to help supply chain security. We describe the latest SST initiative that is in line with the TQM approach. Section 4 describes some simple quantitative model that we can use to assess the benefits of these measures and initiatives. Section 5 illustrates a hypothetical case study based on an actual manufacturer in the high technology industry with a supply chain that started with manufacturing sites in Malaysia, ending with the distribution center (DC) in the US. The quantitative models and the case study are used to illustrate how higher supply chain security can be attained at lower costs. Section 6 concludes with summaries.

2. Lessons from TQM

While counter-strategies are being developed by the public and private sectors to enhance supply

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