A Total Logistics Cost Approach to Measuring Collateral Benefits of Security and Supply Chain Improvements at International Gateways

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ABSTRACT

Freight security initiatives do not necessarily result in cost increase or reduced service. Security improvements can also reduce logistics and supply chain costs by improving supply chain visibility and enhancing transit reliability, resulting in collateral benefits to efficiency and effectiveness of the supply chain. Conversely, supply chain and logistics improvements may improve security, producing collateral benefits to security in the supply chain. Previous studies have examined the impact of security ex ante, typically through surveys. We develop a Total Logistics Cost model to simulate alternative logistics scenarios and security strategies to determine the influence of security initiatives on the total logistics cost. The application of the model to the Asia-Pacific Gateway is used to demonstrate the usefulness of such a model in evaluating how security impacts the total logistics cost of using this gateway and subsequently the gateway’s competitive advantage.

The assistance of Amy Yeung and Kelly Loke is gratefully acknowledged.

1. FREIGHT SECURITY IN NORTH AMERICA

Since 9/11, the necessity of improving security in the supply chain has been a mandate for both the Canadian and U.S. governments. Shortly after the World Trade Centre terrorist attack, the Canada-US Smart Border Accord was introduced and signed by December 2001. The Accord reflected the reactionary security-focused climate after 9/11, but 5 years later, the underlying principles of the Accord are embedded in the security policies of both countries as confirmed by the Security and Prosperity Partnership of North America signed by all three NAFTA countries in 2006.

U.S. initiatives included:

- Advanced Manifest Rule (AMR) - Advanced Cargo Information (ACI US) requiring detailed data for all modes to be submitted to the U.S. Customs and Border Patrol (CBP) prior to arrival within certain time windows to allow pre-screening of incoming containers and vehicles
- Container Security Initiative (CSI), which pushes inspection and screening of overseas containers to originating ports
Customs-Trade Partnership Against Terrorism (C-TPAT), which encourages the implementation of best practices and procedures in freight security in return for reduced inspections, expedited processing and other benefits such as “front of line” inspections.

The Free and Secure Trade (FAST) initiative which allows low risk goods transported by trusted drivers and trusted carriers to pass rapidly through border crossings.

The Smart and Secure Trade Lanes (SST) program to develop tests and deploy infrastructure that provides visibility, alerts and physical security for containers throughout the journey. These “secure” containers can then pass through borders in “green” lanes, which require no inspection except for random checks.\(^1\)

Since the U.S. continues to be Canada’s single largest trading partner, U.S. security initiatives directly influence freight moving from Canada to the U.S. including freight in transit to the U.S. from other countries. Canada has also implemented many security initiatives for freight traffic entering Canada from the U.S. and other foreign countries. These include Partners in Protection (PIP) and Advance Commercial Information (ACI Canada), the Canadian equivalents to C-TPAT and ACE respectively, as well as Canada’s version of FAST.

2. THE ASIA-PACIFIC SUPPLY CHAIN AND THE ASIA-PACIFIC GATEWAY / CORRIDOR

Trade in the Asia Pacific region is important to both North America and Asia. Asia and in particular China is one of the most important trading partners to both the U.S. and Canada for both exports and imports. At the same time, the U.S. continues to be Canada’s single largest trading partner. This trade and the integrated production-distribution networks that underlie this trade are highly dependent on an efficient and effective supply chain. The Asia Pacific Supply Chain is the integrated network of trading organizations supported by logistics, financial and information service providers on all sides of the Pacific. Together they manage the raw material sourcing, manufacturing, and delivery of goods from the source of the commodities to the ultimate users. Trading organizations include raw material providers, manufacturers, wholesalers, distributors and retailers. Logistics service providers include transportation carriers, forwarders, airport and seaport or port terminal operators, warehousing and distribution service providers, customs brokers and third party logistics providers. Other stakeholders involved in supply chain operations include governments, consultants, information service and software providers, financial institutions and insurance providers.

The efficiency and effectiveness of the Asia Pacific Supply Chain is dependent on the physical, information and financial connections in the Asia Pacific Region. Transportation or freight corridors are links that physically connect the spatially separated economic activity centers or markets in the Asia Pacific region, while gateways are important zones that facilitate transportation and freight flow to or within a corridor. The Asia-Pacific Gateway and Corridor

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\(^1\) An extensive review of security and other border regulations is found in Chow, Frank and Gados (2006).
(APGC) is one such gateway and corridor which includes the British Columbia Lower Mainland and Prince Rupert ports, their principle road connections stretching across Western Canada and south to the U.S., via key border crossings and major Canadian airports (Transport Canada, 2006). For freight moving by rail and sea, this gateway would include the rail connections both East-West and North-South, and short sea links along the Pacific coast.

For most international shipments, there are multiple logistics service providers involved. An example of the supply chain network of a major Canadian retailer and how it utilizes the Asia-Pacific Gateway is shown in Figure 1 (Chow, 2007).

The APGC is but one of many gateways and corridors, some of which are interconnected and some of which are competitive. The Cascadia Gateway region connects B.C. with Washington state and includes all of the border crossings for all modes on the western side of both B.C. and Washington state. The Cascadia Corridor connects B.C and the Pacific Northwest, and the West Coast corridor extends the Cascadia Corridor into the Baja peninsula of Mexico.

All major seaports in North America represent competing gateways and corridors to the APGC. Freight movements between North America and Asia have the alternative to move via the ports of Seattle - Tacoma, Oakland and Los Angeles - Long Beach. These ports and their inland transportation connections can reach destinations in Canada just as the APGC extends into the U.S. This port competition extends to shipments, which can be routed through Mexico, via the Panama Canal to ports in the Gulf of Mexico (e.g. Houston) and the east coast. East coast ports can receive from or send freight to Asia via the Suez Canal. For Canada - Asia traffic, the Port of Halifax is potentially a competitor as well.

Each of these gateways/corridors is characterized by cost and service characteristics, which determine the relative cost, speed and reliability of using an alternative gateway. These performance characteristics are dependent on the quality and capacity of the logistics infrastructure and the private sector users of the logistics infrastructure. In this paper, we focus on the impact of security on logistics costs. We posit that security can have differential impacts on different shippers, in different directions, on different modes of transportation and on different gateways/corridors, so as to change the competitive advantages or disadvantages of using different forms of transport or different gateways.

3. THE IMPACT OF SECURITY ON SUPPLY CHAINS

9/11 heightens security concerns of both government and commercial enterprises. Both are cognizant of the higher probability of substantial disruption. Governments have increased regulations, intensified inspections resulting in higher transportation and shipping costs, greater shipping delays and less certainty in transit times. In addition, participants in the supply chain must invest and modify operating processes in order to comply with new regulations.

Numerous studies and anecdotal evidence exists on the impact of security initiatives on different performance aspects of global supply chains.