The Costs of Supply Chain Congestion, Disruption and Uncertainty

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ABSTRACT

Cargo transportation is no longer a narrow concern of those within the industry. Supply chain issues are being more widely debated. However, the real economic costs and risks of supply chain congestion in the global economy are not being tallied and are therefore understated as key inputs for policy makers. A greater awareness and understanding of the costs of supply chain congestion, disruption and uncertainty is needed by governments and the private sector to justify urgently needed transportation infrastructure investments, as well as the implementation of new operating practices that expand system capacity in a timely manner.

This paper adopts a case study approach to examine the “congestion tax” on logistics. Many years have been spent transforming logistics from a “push” to a “pull” system to reduce inventories, drive down logistics costs and improve customer service. Modern logistics now critically depends on tight distribution schedules and reliable, consistent transportation performance. Yet supply chain bottlenecks increase inventories, cause production delays and add to the costs of imports/exports. This paper explores these impacts from the perspective of shippers and the Canadian economy and identifies some of the policy implications.

1. INTRODUCTION

There are many who think that congestion is one of the most pressing issues facing North America’s transportation system. Research by the Texas Transportation Institute (2005) indicates that the largest U.S. metropolitan areas experienced 3.7 billion vehicle-hours of traffic delay, resulting in $63 billion in lost productivity. Furthermore, the data suggests the majority of congestion is concentrated in four or five key regions that have a major economic influence on the economy and that are part of global supply chains.

The Gateway Program (British Columbia Ministry of Transportation) estimated congestion costs in B.C.’s Lower Mainland economy of up to $1.5 billion a year in lost economic opportunity. The annual cost to trucks alone is estimated to be $500 million, up from about $110 million a little more than 10 years ago. This trend is a big concern given that truck traffic in the region is expected to increase by 50% by 2021.
British Columbia’s Asia Pacific Initiative recognized that “without a world class port, airport, road and rail network, B.C. cannot promote itself as a Pacific Gateway . . . the province and the private sector understand that in order to compete successfully on the world stage as an international gateway, B.C. requires a reliable, cost-competitive supply chain.” Indeed, supply chains critically impact:

- National and regional economic growth and investment
- Living standards in Canada’s export dependent economy
- International production, consumption and trade flows\(^2\)
- Competitiveness and productivity
- International reputation and perception regarding distribution reliability
- Quality of life and the ability to balance economic growth with sustainable environmental and social objectives

Supply chain congestion, uncertainty and delay effectively impose a “tax” on inventories and result in production and distribution delays that add to the costs of exports and imports. Yet the real economic costs of congestion are largely invisible to end consumers and are not being tallied.\(^3\) The problem needs to be made more visible to provide policy-makers and industry leaders with the necessary data to make informed decisions and to ensure that timely supply chain capacity expansion and adequate funding remain top priorities.

The observations and case study results presented in this paper are based on consultations conducted in April-May 2007 with three major Canadian shippers in both the retail and bulk commodity sectors. This is supplemented by a brief literature review and analysis.

### 2. Modern Supply Chain Realities

#### Trade expansion

Since 1980, world trade has expanded faster than world economic output, mainly because of global production and increases in the flow of goods and services. This has shaped maritime trade patterns and world container port traffic that has increased from about 50m TEU in the early 1980s to 350-400m TEU by 2006. Exhibit 1 shows the world flows of laden containers. The key points are:

- Trade is highly integrated. Production processes are being relocated to low-cost countries and goods may cross several borders in various stages of production before being shipped to final market.
- Traffic flows are imbalanced. The volume of laden containers moving from North America to Asia is about 4m TEU versus 10m TEU moving from Asia to North America.

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\(^1\) British Columbia Asia Pacific Initiative, Ministry of Economic Development, April 2007.

\(^2\) Research by the Conference Board of Canada concludes that Canada’s international standing can be improved by increasing the economy’s openness to international trade. Supply chains will therefore have a key role in our future success.

\(^3\) Rodrigue (2007) notes that because of the overall efficiency of freight transportation, the outcome (retailing) is seen, but not the process (distribution). Therefore the importance of freight transportation is often understated in public policy even though the global economy is based on the backbone of freight distribution that in turn relies on gateways and transportation networks.
Trade with Asia has grown more rapidly than trade with Europe. This trend favours west coast ports and makes intermodal rail service to large inland markets a key element of the supply chain.

In future, supply chains—not just individual companies—will compete. This places a premium on information sharing and cooperation to plan, adapt and deliver reliable supply chains.

U.S.-Canada cooperation is needed. Coordinated continental policies and strategies will be needed to ensure Canada is as a valuable conduit between Asia and the large U.S. market.

**Exhibit 1: laden Container Flows**

Source: Containerization International

**Complex networks involving many different stakeholders**

As shown in Exhibit 2, supply chains consist of many different parties and information flows. Modern supply chains are also increasing in length and complexity due to global sourcing, a large number of supply chain partners and long lead times, etc. Competitive pressures are also driving companies to develop very lean supply chains to reduce costs and improve productivity.

A key challenge cited by many supply chain stakeholders is the lack of end-to-end accountability—which is what matters most to businesses depending on supply chains to get products to market and to succeed against their rivals.

**Stringent customer needs**

Logistics has generally been transformed from a “push” to a “pull” system. In today’s modern manufacturing and production environment with lean supply chains and precision distribution, logistics cannot fail. The needs of today’s shippers are: