Embracing the Future: The Atlantic Gateway and Canada's Trade Corridor

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Executive Summary

This study addresses the Atlantic Gateway initiative, and how it relates to Canada's global trading position as a national policy priority. For the past 100 years, national transportation issues have covered a portfolio of provincial and regional priorities, usually within a highly regulated environment, where many key stakeholders were Crown corporations. Air Canada and airline policy and Canadian National and railway policy, are obvious examples of past involvements and strategic behaviour. New trade priorities like the US-Canada FTA and NAFTA accelerated changes to north-south transport issues, including dealing with transportation bottlenecks between Central Canada and the US market (highways, tunnels and bridges), as well as Open Skies agreements between Canada and the United States for airlines.

The Atlantic Gateway initiative is global in reach, and national in impact. Like its twin the Asia Pacific Gateway, it combines issues of ocean-based transportation, port development and infrastructure, and inter-modal rail and trucking. The policy issue is simple: how can goods flow most easily between Pacific Rim trade and investment partners of Canadian industry? The answer is straightforward, but the challenge is daunting: maritime shipping and ocean-based transportation. That means significant changes to current policy and strategies.

Halifax, originally designated in 1749 as a military port, is an epicentre for these global developments because it is closest in travel time to Europe and to the Suez Canal where the new generation of giant container ships can transit from Asia to North America. Like Vancouver on Canada's West Coast, Halifax can form part of a new transportation grid that involves rail, trucking and short sea shipping linking Atlantic Canada to Central Canada and the large consumer markets of the United States. Fortunately, most of the key infrastructure needed is in place, and as trade volumes increase, new investments will be able to keep pace. But the Atlantic Gateway is not a regional issue, although Atlantic Canada stands to benefit. The Atlantic Gateway is a national issue and a national priority, because it must form part of a national maritime transportation strategy linking the West Coast to the East Coast as part of a pan-Canadian transport strategy – the Pacific Gateway, the Atlantic Gateway, and the Great-Lakes-St. Lawrence corridor.

For Canada, two issues stand out as national transportation policies become linked to global trade and investment issues. The first is truly transformative: the staggering changes in global transportation supply chains, with ever bigger ships and aircraft, fewer but more strategic port developments, shifting traffic corridors through the Panama and Suez Canal, and new, integrated technological and communications links with inland transportation (freight forwarders, railways and trucking) and new, strategic management tools. The second related issue is the role of corporate supply chains as a strategic element of corporate decision-making. Globalization dictates why companies and their employees must refocus their thinking. Past emphasis on provincial, regional, or even national supply chains must shift to truly global sourcing, marketing and transportation linking suppliers and customers across international boundaries. For Canada, and indeed

for North America, ports like Vancouver and Halifax are ideally suited to address these two global supply chain issues, because of location, their deep-water natural harbours and channels, and direct links to inter-modal transport like roads and rail lines. The volume of container trade on mega-carriers is growing so fast that bottlenecks on the West Coast, and the problems of using these ships to serve the shallower ports on the North American East Coast, are the competitive challenges for the Atlantic Gateway. This initiative requires new thinking by all levels of government, the private sector and various stakeholders, because global trade and investment now directly integrate Asia with North America. Jobs, investment, immigration, training and education and national productivity demand new relationships, not only for new trade strategies, but for new technologies, new skills and new policy.

In this sense, the Atlantic Gateway is a national initiative that goes well beyond transportation policies. The development of the two interlinked systems of global transportation supply chains and corporate supply chains, dramatically challenge past practices, both with a national focus or a North American focus. The Atlantic Gateway has global reach, and calls for new measures of human resource training, new forms of communications, and unprecedented measures of global cooperation, strategic alliances and forward planning.

Because the Atlantic Gateway is a national issue, forming part of a truly Canadian gateway and transportation corridor, it requires unprecedented cooperation among all levels of government, the private sector and significant stakeholders, including the education sector. Events and decisions in India, Singapore, Japan or South Korea today impact Canada directly, and Canadian productivity challenges are influenced by these global players. Atlantic Canada is similar to other regions of Canada where silo thinking – barriers between the private sector and government, between educational institutions and the private sector, between corporate decision-makers and unions and employees – leads to short-term thinking, provincial or regional rivalries, and the quest for immediate gains. The Atlantic Gateway is a dramatic example of a global opportunity based on staggering growth rates in the rest of the world that impacts Canada, and offers the opportunity to better link Canada generally, and Atlantic Canada in particular, to the global economy. But Canada is facing a time challenge: failure to seize global opportunities now means that foreign companies and countries may make other choices, and will act accordingly. Global supply chains prefer Just-In-Time systems, but if we fail to act quickly the alternative for Atlantic Canada is that would-be partners will take alternative strategic action based on Just-In-Case.

A country cursed with outmoded or badly run ports is a country that faces great obstacles to find a larger role in the world economy.

- Marc Levinson, *The Box*

Introduction

This study focuses on Canada's marine transportation system, with a particular focus on the Atlantic Gateway and the transport of merchandize goods through Atlantic Canada and the Port of Halifax. The study is based on a series of interviews with provincial and federal trade officials, experts in the transportation sector (rail, road and air), major Canadian retailers, and leading academic researchers who have studied Canada's trade and transportation challenges, including the Atlantic Gateway.

While opinions vary considerably on the specific elements of a Gateway strategy, the overwhelming conclusion is straightforward: the Atlantic Gateway strategy is a national issue, of immense concern to Canada's private sector, and needs to be linked to an integrated national transportation and corridor approach where Canadian trade, transportation, and labour force issues are defined, clearly understood, and acted on. Global trade, of critical importance to Canada's well being, is now shaped by profound changes in the transportation tools available around the world. Economic forces drive these new supply chains, divorced from the national or continental perspectives of the past. In particular, new patterns of marine transportation, with supporting human resources -- educated workers trained in new supply chain technologies -- are being adopted in developing and developed countries alike.

Canada is part of these new and exciting global supply chain opportunities, thanks to its ocean transport links, a large and sophisticated consumer market, and close trade ties to the largest consumer market in the world. Global supply chains now involve a *physical* component – transport of goods via ships, rail, and trucks – an *information* component (computers, software tools, and PDAs) – and a *people* component, representing skilled workers who deliver the products. (See Appendix J for technical terms used in this study.)

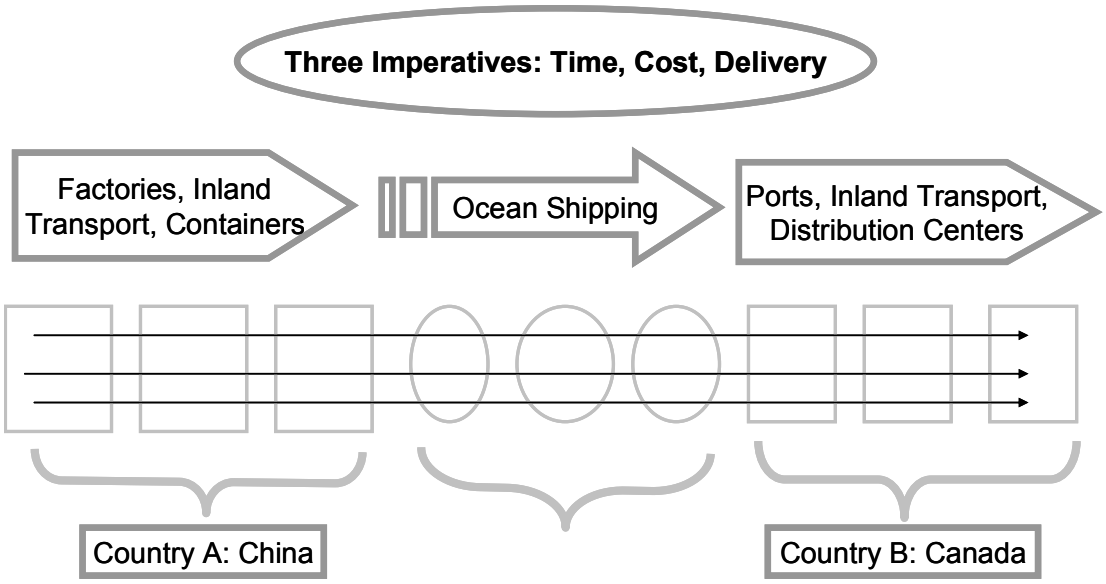
Global maritime shipping is itself being transformed – bigger ships, more cargo in containers, bigger and more productive ports and terminals, and new forms of inter-modal transport. This integrated package forms one element of the global supply chain, linking countries around the world on ocean transport routes, and opening new job and trade opportunities. But this transportation supply chain must be linked directly to the second global supply chain, which is company based. From Wal-Mart to Toyota, McCain Foods to Dell Computers, companies are expanding their supply chains as they enter new markets, and integrate how they source components and parts, process them, and deliver finished goods, on time, to their customers. Supply chains are about three imperatives: price, quality, and delivery.

The Atlantic Gateway can position Canada and Atlantic Canada in particular, in these two supply chains: the global transportation network, and global corporate supply chains. In Canada, only two ports, Vancouver on the West Coast, and Halifax on the East Coast, have the deep-water ocean channel, and land area and terminal capacity to handle the new ships on order in the shipping industry. The West Coast ports of the United States already face massive congestion problems, and there is limited room to grow. There are other challenges – environmental and pollution concerns, labour-relations and road congestion. Shipping companies are introducing mega ships that lower transportation costs per unit shipped, but are a challenge for ports that accommodate them – the ports are too small, the water channels are not deep enough, and they lack inland transport, from terminals to rail and truck lines. Until the Panama Canal is widened, possibly by 2014, global shipping companies are reconfiguring their routes. As more goods come from markets like China and India, shipping companies are planning new transport corridors, through the Suez Canal, across the Atlantic Ocean to North America (see Appendix D). Canada's deep-water ports on the Atlantic coast are the closest to Europe and the Suez Canal, and potentially offer new trade and transportation routes to Asia.

But global shipping and the search for scale economies via large ships are not the only challenges facing Canada. As more firms located in Canada are engaged in global trade, corporations have to deal with a new strategic challenge: organizing their own global supply chains. Such supply chains are enormously complicated, involving inland transit in foreign countries to inland transit in Canada, with various transportation modes in between. In practical terms, global supply chains involve shipping from factories located in distant markets, across the global transportation networks, into stores and factories located in large consumer shopping clusters in Central Canada and markets in the US Midwest. Like their corporate counter-parts in the US, Canadian firms now need both West Coast gateways for cargo through ports and inland transport, and East Coast gateways and corridors. The reason is simple: supply chain economics requires a measure of balance, of inputs and outputs, of suppliers and customers, of a full container in one direction and a full container in the opposite direction.

This is the central strategic point for the Atlantic Gateway strategy. It is a national transportation issue, not a regional issue. The Atlantic Gateway is certainly not just a provincial issue, based on a single port or a single province. It involves several forms of transport and inter-modal connections, and numerous stakeholders. But because the Atlantic Gateway is a national issue, and requires federal government attention, the Gateway is automatically a regional and provincial concern and requires Cabinet-level understanding, attention and priority setting. The two supply chains – one of transportation, one of corporate networks linking suppliers and customers – are intimately linked. This study sets out the plans and issues to promote the Atlantic Gateway as the critical link to these two supply chains.

Exhibit I - Managing the Global Supply Chain



Canada and the ports involved cannot allow this significant opportunity to pass them by.

- Dr. Michael C. Ircha, ***International Journal of Maritime Economics***

1. The Atlantic Gateway – An Overview

In recent years, Atlantic Canada has become interested in the general concept of a new opportunity for the region, that of the Atlantic Gateway. At its most general form, the Atlantic Gateway is an East Coast counterpart to the Pacific Gateway, i.e. airports, deep ocean ports, and other links to Asian markets. After much study, conferences, economic and environmental assessments, the federal government has announced specific plans for the Pacific Gateway (see Appendix G). For the West Coast of Canada, there is a century-old link to Asia, dating from the ships run by Canadian Pacific to Yokohama, Hong Kong and Shanghai. More recently, the startling rise of the Asian economies, first with Japan a generation ago, then Southeast Asia and the Asian Tigers, and now China, all represent a tectonic shift in the global economy.

China, with over a billion people -- 300 million of them attending elementary school – by itself shifts the global economic order toward Asia. Combined with India, with another billion people, the immediate and long-term effects on the global economy are simply enormous. Clearly, British Columbia, with its legacy of immigration, educational ties, trade and transportation links, stands to gain enormously from its ideal location, with spillovers for Canada at large. For the Western provinces, with their abundant natural resources, trade links in potash, wheat, coal, and energy with Japan and other Asian countries, the attractions across the Pacific are even without China.

But these changes in the global order do not exclude the rest of Canada, or Atlantic Canada. For instance, Ontario has more two-way trade with China than Western Canada. Atlantic Canada has its own trade linkages with Asia, from education to French fries, pulp and paper to fisheries. Indeed, if properly managed, Atlantic Canada stands to gain tremendously as another gateway to the world economy, for several reasons:

- Atlantic Canada is the Canadian gateway to Europe and new trade routes to southern Asia and, over time, the polar routes to Russia.
- Global trade routes are being transformed by new transportation modes: global shipping companies, ever larger ships, new hub-and-spoke supply chains that favour speed and cost, not distance or cost per mile.
- New forms of online communications and tracking systems are being used by companies to monitor shipments hour by hour to any place in the world.
- The rise of sophisticated freight forwarding companies, now with a global reach, that allow small and medium-sized firms to ‘contract out’ all aspects of

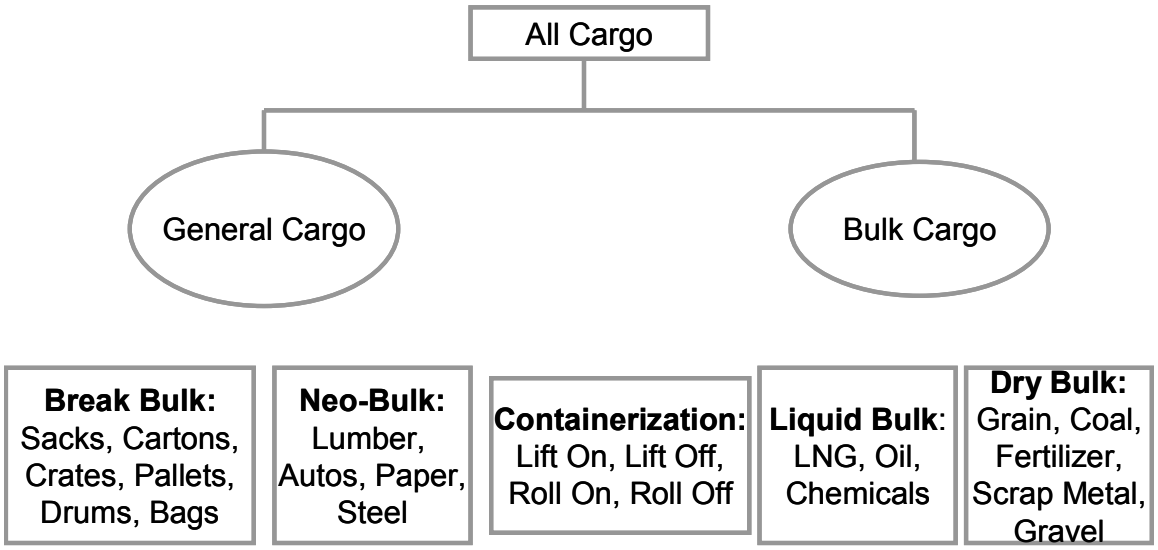
international trade, including documentation, customs clearance, insurance, and ideal mode of transport on a one-off or continuing basis.

- The rise of the container as the ideal mode of transport for bulk cargo, dry cargo, and now refrigerated goods that allow easy transshipments of fresh and frozen goods (e.g. seafood, fruit and vegetables, flowers) in 20 ft and 40 ft boxes.
- Inter-modal transport system for inland shipping from seaports or airports, combining rail, short-haul and long-haul trucks, and new techniques to load, unload quickly, and re-sort loads for deconsolidation for short-distance shipping.
- A new global network of terminal operators, financed by private equity, that increasingly integrate corporate supply chains from large, deep water ports, via global shipping companies that operate ever larger ships (the ocean equivalent of the largest jumbo jets) into other strategically located deep-water ports around the world, reinforced by the latest communication devices, including RFID (radio frequency identification devices) technologies for on-line precision tracking.

These issues illustrate the opportunities for Atlantic Canada. But the world is not standing still. From Dubai to Vietnam, from new ports in China to well-established ports like Rotterdam and Hong Kong, there are new gateway linkages on the East Coast of the United States. Three strategic stakeholders – shipping companies, terminal operators and port facilities (air and sea ports) - are accelerating corporate developments as part of changing global trade strategies. Consider some recent developments:

- A referendum in Panama to enlarge the Panama Canal to receive post-Panamax ships of up to 15,000 TEUs planned over the next 20 years (it was passed):
- New rail services (two trains per day) linking Long Beach, CA, to Atlanta, GA, to help diminish the congestion on the West Coast of North America.
- The development of new ocean ports in India for the shipment of manufactured goods like steel, textiles, and autos, not only for the markets of Asia, but eventually to North America via the Suez Canal.
- New combinations of ocean shipping and air cargo transport to reduce trans-ocean cargo shipping from Asian ports in about 32-35 days for a round trip across the Pacific, or 65 days via the Panama Canal.
- Containerization, the key platform for large container ships, is an organizational disruptive innovation for international trade, is as important as inter-changeable parts, fax machines and the Internet; and will reach 650 million TEUs within a decade, from zero 50 years ago.
- In a post 9-11 world, new (and often untested) security initiatives, including the US *Secure Freight Initiative* of screening through imaging technology for nuclear products and weaponry, including in foreign ports and terminals.
- Global alliances and business cooperation agreements between shipping companies, terminal operators, and railway companies to manage the dramatic new demands of Just-in-Time delivery around the imperatives of price, quality and delivery where true real costs are quickly exposed.

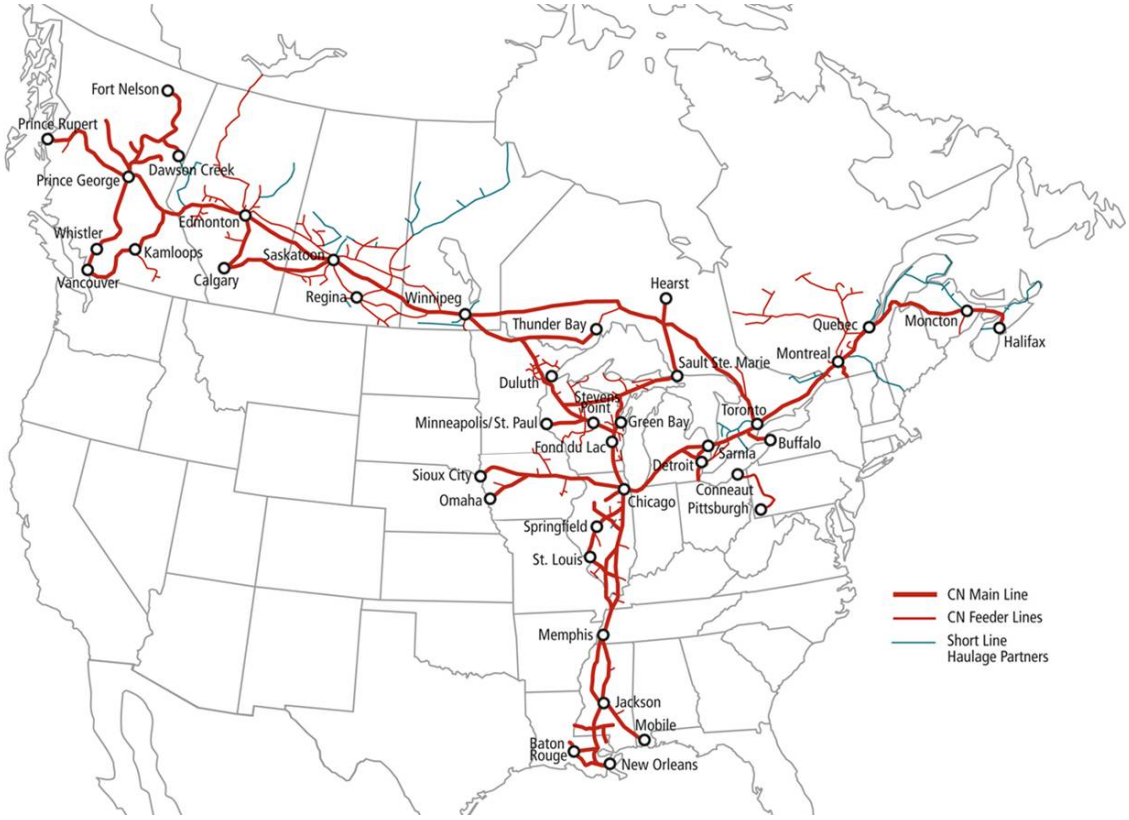
Exhibit 1-1 Global Maritime Cargo Classification



For Canada at large, and for Atlantic Canada in particular, these developments represent new opportunities. For generations, Canadians have been increasing their global trade exposure, but mainly with a mindset that focused on North America. Except for a few industries, Europe is seen as a niche market. Outside the airline sector, much of the transport focus has been through the prism of North America, and especially the states lying contiguous to Ontario and Quebec. Since the Canada-US Free Trade Agreement was signed with the US, later expanded to become NAFTA, Canadians have reoriented their trade links away from a national focus (east-west) to a North American focus (north-south). In the transport area, this has culminated in new arrangements, such as the Open Skies air pact with the United States, a powerful railway system developed by CN, not only across Canada (like rival CPR), but north-south to the Gulf of Mexico, and with a large terminus in Memphis.

In general, but with some significant exceptions, Atlantic Canadians and local firms have not been engaged in export trade. New opportunities now beckon with the Atlantic Gateway. Economic geography places Atlantic Canada as a focal point for north-south, east-west, and trans-Atlantic trade routes to Asia. On a global basis, international trade is based on an ocean-going transportation system. Seaborne traffic covers about 96% of international trade. The containerized portion of this passed a milestone in 2004 with 360 million TEU of throughput through the world's ports. (A TEU is a transport term meaning a 20 foot equivalent unit. Most containers in North America are 40 feet, some are 53 feet.) For Canada, the challenge now is to design a national transportation system that is state of the art to deal with the world's biggest market, the United States, and that reinforces Asia's role in that market. Two trends are unmistakable.

Exhibit 1-2 CN's North American Route Structure



Source: CN

- ✓ The global economy has already shifted dramatically, away from the Atlantic-centered market of Europe-North America to the Pacific Rim Asian markets like Japan, China and India; and away from the traditional developed triad economies (Europe, North America and Japan) to the developing world. This new mix, even when China is excluded, now accounts for one third of world trade (28.8% of merchandize exports, 26.3% of imports). China adds about 5.5%, but its trade is growing at 20-25% per year.
- ✓ Developing economies in Asia are following a similar path to Japan in the 1960s and1970s, i.e. accelerating their industrial growth by moving up the value chain to more sophisticated products and technologies. All over Asia, factories operate with state-of-the-art equipment, the latest industrial processes imported from Japan, the US or Europe, with managers and engineers trained in reputable foreign universities. What was true two decades ago about Japan, which trained engineers while the US trained lawyers, applies to Asia: India and China each produce more engineers than Europe and the US combined. As Table 1.1 shows, India and China are shifting their industrial production away from labour-intensive and commodity-intensive product lines to sophisticated technology-intensive output, as Japan did a generation ago.

Table 1-1 Labour vs. Technology-Intensive Production (1965-2003, % of Merchandize Exports)

	Japan		India		China	
	1965	2003	1975	2003	1987	2003
Commodities and Labour-Intensive Products	32.7	3.5	82.9	63.3	63.4	27.9
Low and Medium Skilled Labour, Technology Intensive	46.1	54.0	11.8	17.6	10.4	19.3
High Skill, Technology Intensive (i.e. Electronics)	17.3	37.8	9.60	13.3	11.3	37.4

Source: UN Comtrade; UNCTAD Trade and Development Report

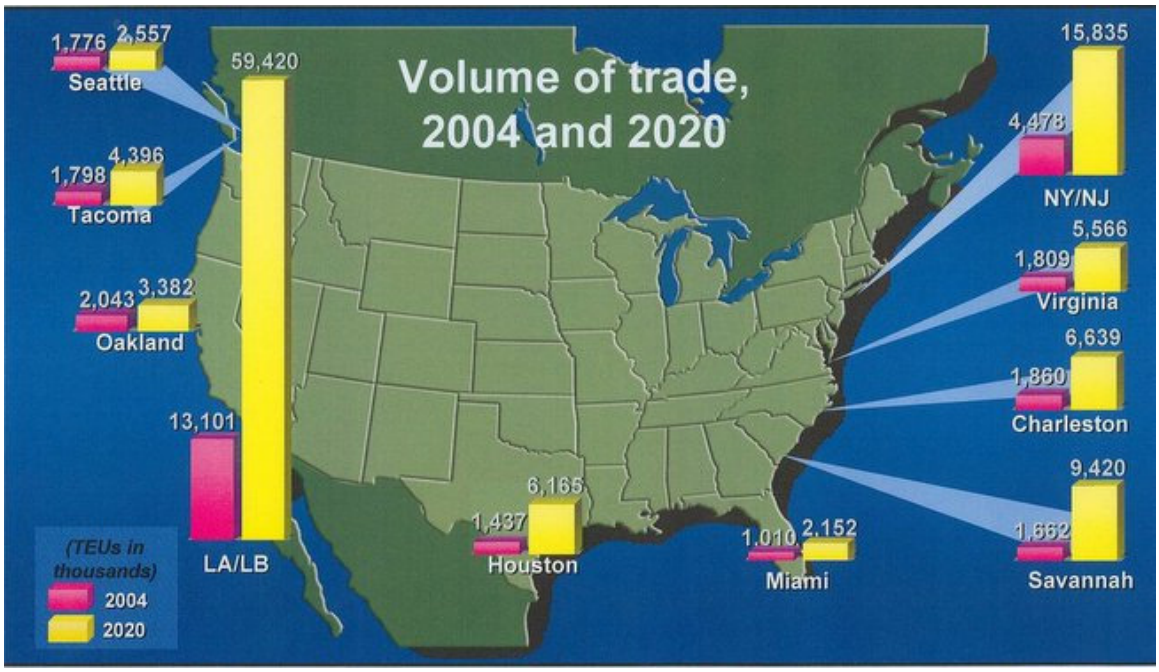
North Atlantic trade continues to grow, as the European Union is the largest single trade area in the world. More compellingly for the future, the continued growth of China and India, and their trade and investment patterns with North American companies, offer an opportunity for Atlantic Canada. Geography now becomes an advantage for the region in a just-in-time (JIT) world. Economics favour Atlantic Canada as a low-cost, maritime entry to North America. In the short term, it is low cost because the infrastructure already exists, unlike the new port in Prince Rupert, and major expansion in Vancouver, where land is expensive and not easily available.

Three issues must be addressed if these opportunities are to be exploited. Despite favourable national and built-up assets in the Atlantic region – ports, highways and airports – the region does not see itself as a hub-and-spoke to the global economy. Interviews, even from provincial Ministers, suggest that provincial opportunities are event driven, guided by provincial priorities, and too often with a short-term political advantage. Increasingly, the Atlantic region needs to look at how local advantages can be used in the global competitiveness game, but that requires more cooperation and political coordination. Further, the perpetual silos -- political, economic and intellectual -- that exist in the region inhibit integrated strategies to deal with global trends. Even worse, the large Canadian firms that deal with the region attempt to express a global view but proceed as if not much will change in the near term. Third, the region is still reluctant to adopt an integrated regional strategy, linking not only transport modes but other assets, including technology and education, that can transform the entire region into an outward-looking global player.

What are these opportunities? What do they mean for Canada generally? The emergence of developing economies as significant global players, often described in the financial press as the BRIC phenomenon (Brazil, Russia, India and China as representing about 60 countries on an accelerated growth track) directly impacts Canada in two ways. First,

these countries represent trade growth opportunities. Second, these markers now represent competition to Canada in the US market. They are already part of American corporate supply chains, from Honda cars to Dell computers. Canada still relies to an extraordinary extent on the US market, and Canadian firms also rely on Canadian sourcing for parts and components. But in the US, and especially where the manufacturing centres of Ontario and Quebec compete with global players, American industries are being transformed by the reliance on Asian parts and components, Asian service functions (e.g. IT, shipping, finance) and thus new Asian supply chains. More specifically, in virtually all of the Ontario or Quebec-based sectors where Canada has some comparative advantage in manufacturing – autos and auto parts, food and agricultural goods, computers and electronics, textiles and fashion, and aerospace, to cite prominent examples - global competition and global logistics are forcing new ways of thinking on Canada's public and private sectors.

Exhibit 1-3 US Container Port Volume Forecasts



Source: US Department of Transport

New partnerships and strategic alliances are the order of the day. Companies are shifting their trade and investments toward global views of markets, not national or regional, with attendant shifts to new strategic behaviour like outsourcing and contracting out certain functions or products to overseas markets while concentrating on corporate core competences. New global trade patterns also shift the global transportation systems necessary to move goods. Courier firms like UPS and FedEx are the notable examples. They have applied the same core tools as the post office, but applied global logistics (e.g. air freight) to move goods quickly and cost effectively. Scaled up, the courier system is happening to air and marine transport globally, as countries rethink their national strategies and design new institutions and models, and adopt new thinking.

For the first time in 100 years, since the Atlantic schooner fleets were among the fastest in the world, Atlantic Canada and its port system have the chance to become part of global trade and shipping. Atlantic Canada has the ports closest in shipping time to Europe in North America, and the closest from Asia via the Suez Canal. Viewed globally, some ports have an advantageous geographic location, but are not competitive because of infrastructure or cost. Some ports are congested and have little room to grow. Halifax and Vancouver have the advantage of location and cost-competitiveness, but they also differ. In particular, Vancouver is distant from the consumer markets of Central Canada and the US. Halifax is best positioned as well to cope with the very large ships now being introduced to the global shipping world. Other Atlantic ports have a role as well, including Montreal, Saint John, Canso, and St. John's as niche players for bulk cargo, container trade, and with links to inland shipping via the St. Lawrence-Great Lakes marine corridor.

The logistics revolution has had an impact on many areas, bringing them closer together, collapsing traditional barriers such as time and distance.

- Kenichi Ohmae, ***The Next Global Stage***

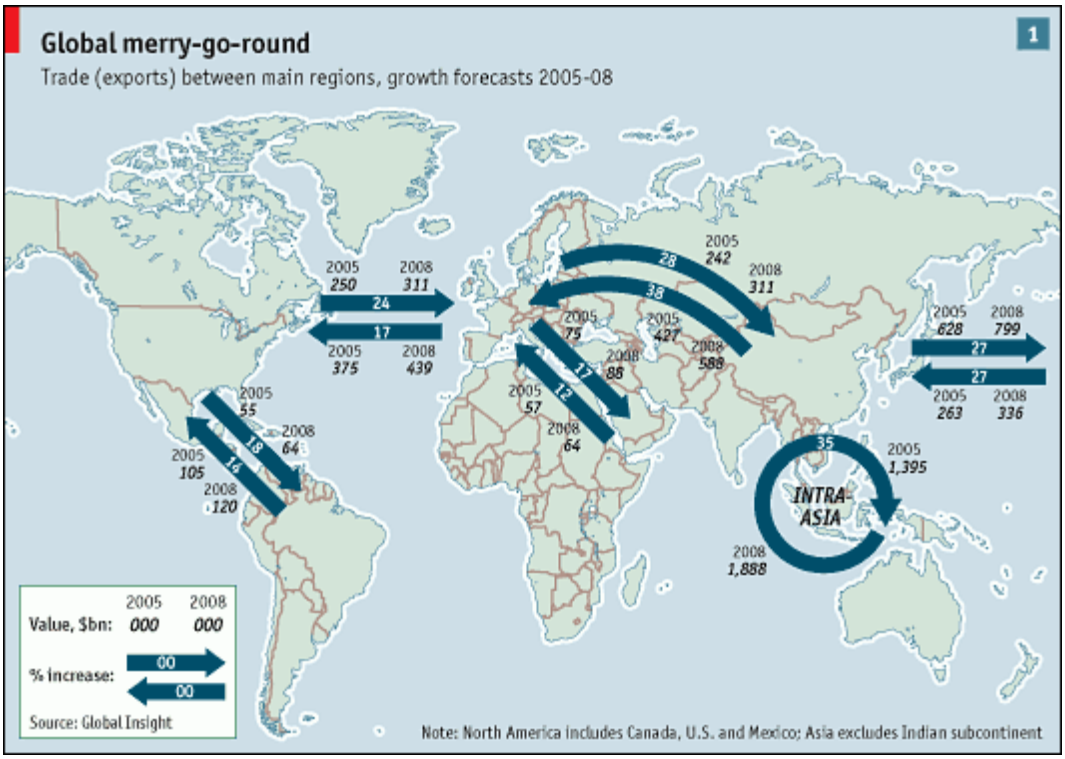
2. Global Trade – Global Logistics

The Atlantic Gateway and corridor thesis is predicated on the revolution in global logistics and supply chain management to enhance global trade. Traditionally, logistics was a military term, and referred to the movement of goods and services to sustain armies, not only troops, arms, and bullets, but a huge and pressing need for supportive equipment, from trucks and supply vehicles to food, medical equipment, water and clothes. Whatever happened in the front lines of military warfare, often the telling path to victory or defeat, was the back office world of supply chain management.

Around the world, global trade is the most powerful stimulant to economic development and job creation. Increasingly, global trade is supported by powerful new instruments of technology and global logistical innovations. Geography, the natural feature that kept countries apart, has been overcome. Continents are effectively linked as ocean travel costs have steadily decreased with bigger ships, better technology and communications, and the opening of markets through bilateral and multilateral trade negotiations. New logistical tools track the movement of goods through global supply chains. Entire economic regions outside conventional trade patterns – in Southeast Asia, China, India, Eastern Europe and Africa – are now part of global trade flows. Global trade spans a variety of new and old industries and sectors, from wood manufacturing to oil, low-priced textiles to sophisticated electronics and pharmaceuticals, and auto production and auto parts and components. These trends are due to innovations in global logistics.

Modern corporate logistical concepts were the basis of Toyota's revolutionary production system, based on the just-in-time (JIT) delivery system. The Toyota model dates from 1956, so this company, and many other Japanese competitors, have vast experience at perfecting it. Japan's post-war recovery influenced Toyota, because Japan was constantly short of raw materials and critical components. That led to the first precept: waste is a cost. Experience studying American supermarkets, where products are constantly replaced on a shelf as goods are purchased, showed a second precept: deliver goods as they are demanded. The third issue, contrasting with traditional auto production systems in Detroit, with its mass production system, was the need to concentrate only on what Toyota was good at, and to leave it to other suppliers to do the rest. The Toyota production system combines these three elements into an integrated, synchronized production flow, where each supplier delivers parts JIT, based on optimal price, quality and delivery.

Exhibit 2-1 Global Trade Linkages, 2005-2008



Source: The Economist

Across all continents, not just in Japan, Toyota operates all its plants on the JIT model. Auto parts firms are classified as Tier I or Tier II. Tier I plants have a history of dealing with Toyota over several years. Such parts firms have a record, carefully monitored, on the three issues that are central to Toyota's aim to produce cars with the highest standards of quality and customer satisfaction: **price**, which is worked out in advance and conforms to Toyota's overall cost schedule, **quality**, which seeks zero defects (z-d) in quality management (or Six Sigma), and **delivery**, based on plant location and delivery times measured in minutes. Tier I firms, as distinct from Tier II, not only have a record of performance, they become part of the firm's rolling agenda for future production, planning and new designs. Toyota's production system is built around customer demand, a pull system based on markets needs, not a push system, where cars or trucks are first designed and manufactured to be pushed on to sales lots, so Toyota saves enormously through unwanted delays or inventory build up. (Supply chain theorists who study Toyota's design now recognize how it can be adapted to other industries and other sectors, including health care and hospitals.)

Clearly, for an economy operating on JIT principles, there needs to be a close understanding between the private sector and the public sector. For the private sector, this requires a careful organization of its suppliers and customers, and the use of superior management tools for back office and front office operations, including state-of-the-art IT, employee training and global logistics. For the public sector, the demands are equally

challenging: state-of-the-art airports, roads and ports, to allow inter-modal transport, using trucks and railways, as well as JIT principles for customs, security and policing of illegal goods.

In all cases, waiting times, queues and inventory buildup, bureaucratic delays, strikes and the like are more than a collection of increased costs. These issues are symptoms of deeper problems that show firms and governments are not operating on JIT principles. Global logistics is now the modern tool used in transport systems to reduce costs with shipment size, stretching from one of the smallest items, a letter delivered around the world cheaper than the cost of a hamburger, to small courier packages delivered by trucks or vans, to railcars and multi-car rail unit-trains to giant barges and container ships. Table 2.1 illustrates the cost-volume trade-offs, from small-lot shipments like an envelope to very large cargo shipments expressed as cost per pound.

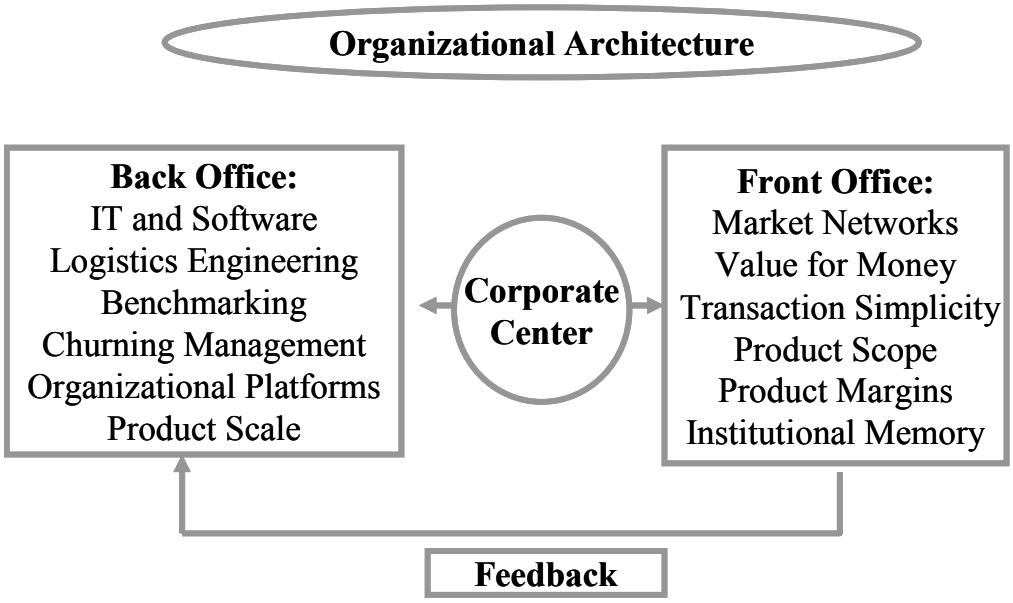
Table 2-1 A Function of Shipment Size and Annual Rate

Shipment Size (pound/year)	Less Than Truck Load	Truckload	Railcar Load
1,000,000	$0.000002	$0.0001	$0.003
100,000	$0.0002	$0.012	$0.30
10,000	$0.02	$1.20	$30
1,000	$1.88	$120	$3,000
100	$187.50	$12,000	$300,000
10	$18,750	$1,200,000	$30,000,000

Source: Paul O. Roberts (2006)

Today, the JIT model is applied to corporations around the world as firms integrate their suppliers (the average car has 2,500 separate parts) and employ global logistics and supply management tools to transport parts, components and finished goods in an integrated supply chain. UPS's slogan, "Synchronizing the World of Commerce," illustrates how various technologies, from PDAs, e-mail, and the Internet, and global transport tools (freight forwarders, shipping lines, air cargo firms, and couriers) combine to accelerate the flow of goods, at a reduced marginal rate of transport per package. Clearly, as the American market is the world's largest and most price sensitive because of the enormous levels of competition, American firms have led the way in global logistics and global supply chain management. American retailers have adopted the system, firms such as Wal-Mart, Home Depot and Dell. It has been estimated that a generation ago, American logistics costs represented about one seventh the total, or 14.5%, of GNP. That figure is now 8%, compared to 11% in Europe, 21% in China, or 13% in India.

Exhibit 2-2 Organizational Architecture



Globally, air cargo and ocean shipping are the manifestation of the way countries around the world are being linked to JIT systems. Historically, primary sectors like the oil industry used these ideas to link the source of oil production to refiners (often located in different countries, in part because of by products) and their distribution outlets, e.g. service stations. The Irving Group of companies illustrates this pattern. The Irvings purchase oil from Venezuela or the Middle East, ship the product to the Saint John refinery, and then market the product at service stations located throughout eastern Canada and New England, usually on their own ships and trucking fleet. In manufacturing, Toyota located its factories adjacent to deep-water ports, where the cost of shipping say from Nagoya to the Port of London was cheaper per car than transport costs for British Leyland shipping by truck or railway from its car factories located within Britain to the Port of London. Today, this JIT global logistics has extended to the retail sector, led by firms like Loblaws, Hudson's Bay Co., and Sobeys in Canada, and Home Depot or IKEA (see Appendix for a list of leading supply chain companies with sales in excess of $10 billion).

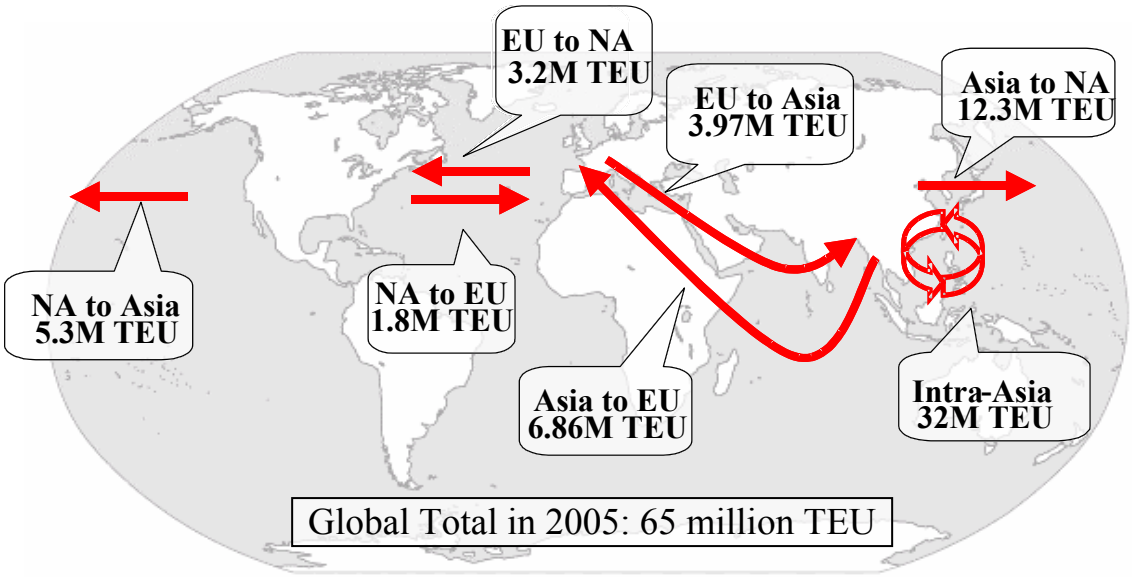
Air cargo and ocean shipping are booming sectors because more countries are linked to global supply chains, which are based around companies. China is the dramatic example, but countries as diverse as the BRIC countries (Brazil, Russia, Indian and China) illustrate how global manufacturing extends around the world, depending on the sector (contrast oil with textiles or furniture production with cosmetics). The trends is clear: more trade means more JIT flows, involving bigger planes and ships, bigger airports and ocean ports, and vastly more people and companies to manage the supply chain, from freight forwarders and trucking companies, to IT and security firms. Global supply chains require intense cooperation among companies, among manufacturing firms and retailers with transport companies, and between private companies and the public sector. As countries become more integrated through global trade, firms require a mix of more

integrated services, and cooperation of specialized functions. In transport, this means inter-modal transport services, from ocean shipping and containers, railways and ease of access to ports and factories, and truck services, often employing an integrated IT system to manage manifests, insurance, and other aspects of the global supply chain system.

While global trade is central to Canada's wealth, so too is the need to become a player in the global supply chain system. For Canadian firms, and for the public sector, that means new imperatives: having global operating scale, a critical mass of skills and trained people, and tight transportation links to global companies. Both supply chain systems, global transport and corporate, illustrate the basic imperative: the organization is only as strong as the weakest line. Any barriers -- bottlenecks, time delays, quality defects or sundry imperfections -- quickly add to costs. The transportation supply chain, by definition, involves both the public sector and the private sector. International trade means that goods cross borders, so there must be customs and security inspection. And that means a changed view of economic geography, where population centres no longer decide the transport economics: the oceans do. Consider the changes in port economics.

Starting with the Second World War, port economics became a function of large population centres, with factories located adjacent to city centres (London, Paris, New York, Chicago and Toronto) because inland transport costs were high and delivery was slow. Time problems could be ignored through scheduling adjustments like high inventories, despite high wastage. But starting with the development of the container, and ships to transport them, the economics changed, both nationally and globally. Once manufactured goods could be easily transported inland by truck or rail, and ocean shipping dramatically reduced the cost per container (despite the distance), there has been a global shift to locate manufacturing to greenfield sites using JIT organization, especially in Asia (starting in Japan, and racing through East Asia into China), with container shipping being the primary means of transport to distant markets. That explains why Asia-North American trade is four times that of Europe-North American container shipments, and why trans-Pacific container trade is rising from 12.9 million TEUs to 16.5 million between 2005 and 2008.

Exhibit 2-3 Global Trade Expressed in TEUs



Source: Drewry Reports, Journal of Commerce

The same model applies to airports and air cargo, as some industries ship by air, e.g. lightweight goods with high value like computer and electronic components, pharmaceuticals and some food products. Clearly, on a global basis, there are serious imbalances; for example, the rise of container shipments from China, from 60 million TEUs in 2006 to a forecast 100 million in 2010, explains the severe congestion in West Coast ports of North America. Large planes, terminals and logistics centres can process orders at the end of the day, often based on past orders and future demand forecasts. Firms organize their shipments on a JIT basis, shipping cargo by planes during the night, and deliver the goods the next day.

Most people think that airline companies are about people. One of the biggest airlines in the world, FedEx, carries no people, only parcels. FedEx is a vast 28,000 employee operation centered in Memphis. Another example is Toronto's Food Terminal, which receives fresh fruit, flowers and vegetables by air shipments from Mexico, Europe, California, Argentina, Brazil, Israel and South Africa, and delivers the goods across Canada by truck for delivery to supermarkets the next day. In this case, trucking makes more sense because trucks can cope better than other transport modes for short hauls, complicated delivery schedules, and specialized individual packages that can be picked up, sorted and hand-delivered, not unlike the services provided by the post-office, but with the advantage of JIT delivery.

Exhibit 2-4 Supply Chain Considerations: Cost Drivers and Service

Cost Driver	Strategic Issue	Performance Result
Inventory	Adds to costs with low turnover	High
Product Variety	Aids customer but adds to cost	Tradeoff with client
Availability	Seasonal variation	Necessary for retailers
Transportation	Function of distance, cost per pound	Shipper wants choices
Warehousing	More difficult for perishables, stock out	Time sensitive
Information	Increasing toward per unit (RFID)	High IT infrastructure
Response Time	Higher costs with variety and distance	Increasing
Product Handling	Costs increase with each delivery mode	Prefer fewer modes

In summary, global trade and global logistics are increasingly two sides of the same coin. The Atlantic Gateway can form part of these new supply chains because Atlantic Canada can accommodate the new sizes of container ships.

I need help from the industry,
from the port, and all of Canada.

- Liu Qimin, President
COSCO Canada

3. The Global Shipping Industry

For 200 years, global shipping and transport of goods have wrestled with the triple goals of speed, size of ship and low cost. Speed met the goal of reducing the time to transport goods from one port to the next, especially as distances became greater – say from London to Shanghai, or New York to Yokohama. Size meant fewer ships to carry more cargo, thus reducing the marginal cost per pound, and fewer workers and lower overall cost per ship. Lower cost meant that actual sailing time lowered fuel consumption (hence the shift from wind to steam, or coal to oil) but also a fully loaded ship traveling both ways, like jumbo jets today, to reduce the overall capital cost of a plane or ship. New, large 5,000 TEU container ships cost between US$100-$150 million, about the cost of a large airplane, or half the cost of a new double-decker aircraft like the Airbus 380, which costs $300 million. Today, the global shipping industry transports about 96% of world trade. Container shipping, which represents about only 25% of volume of seaborne trade, is 60-70% of total trade value, and is forecast to triple in the next two decades.

These three issues are still centre stage in the world of global transport, but with three differences. Bigger ships and planes are only part of the story. Bigger transport vehicles now need an enormously sophisticated infrastructure, not only deep-water ports, which might be an asset bestowed by nature, like Halifax or Canso, or a contrived port through dredging, like New York. They also require complex and sophisticated machinery like heavy duty gantry cranes, automated container handling equipment, container storage yards, and sophisticated software and information technologies for security, customs clearance and container tracking. Bigger ocean ships and aircraft also need complicated inter-modal linkages via roads, rail, and smaller vehicles to strengthen the hub-and-spoke system. A hub-and-spoke system is an organizational innovation to combine big and small vehicles, either at seaports or airports, to allow large carriers, with appropriate infrastructure, to be fed from small carriers, built around a judicious mixture of importers and exporters, shippers, finance and insurance and freight forwarders. Their collective task is to assure that goods move in a relatively straight line, around the world, on time, on cost, with minimum scheduling problems, delays or outright losses.

The third issue which brings these elements together is the enormous advance on the management side, where global logistics replaces national logistics as the planning tool to integrate what happens on one side of the world to what happens in the local neighborhood. None of this is new, of course. The postal system has been in this business for some 200 years. The different today is the way in which time is the ultimate tool.

The central focus for the strategic considerations of Atlantic Gateway options – for both public sector policy makers and for private sector firms – is the structure of the global shipping industry. The trends are unmistakable: scale and global reach. Scale now pervades all considerations: bigger ships, bigger ship owners, bigger and more complicated terminals, bigger port regions encompassing all aspects of inter-modal transport, and bigger and more extensive strategic alliances across the shipping value chain.

Shipping companies have always sought scale – witness bigger cruise ships, aircraft carriers, oil tankers, and container ships – because as a general rule, each doubling of ship size (in gross tonnage) reduces overall costs, both the cost per voyage and the cost per container, especially when the ship is fully loaded. The global reach of the shipping industry now extends across the value chain and the ocean corridors – Trans-Pacific (Asia-North America), Asia-Europe, and Trans-Atlantic (Europe-North America). As shown in Table 3-1, Trans-Pacific trade illustrates the dramatic changes in the world economy, represented by the growing integration of the Asian economies and their global trade expansion, and the continued new investments in China and the rise of state-of-the-art factories there that integrate supply chains with those of Asian companies, e.g. in automobiles, auto parts, consumer electronics, computers, and aerospace.

Further, the data clearly show the problem of shipping imbalances, partly reflecting seasonal imbalances but also the challenges posed by trade shipments: higher value goods like pharmaceuticals and machinery shipped from North America to Asia by air, and dry goods from China and Asia shipped to North America in ocean containers. Moreover, these container flows increasingly come in larger ships, those above 4,000 and 5,000 TEU capacity, replacing smaller ships of 3,000 TEU or less. The move to new, large ships is dramatic. As of July 1, 2006, the world fleet of container vessels includes 3,708 ships, with a total capacity 8.7 million TEU. The global order book of 1,130 ships involves 4.295 million TEU (approximately 50% of existing capacity). By the end of 2008, ships of 6,000 TEU or greater will represent 25% of global container fleet capacity. By end of 2008, there will be 1,250 vessels each with a capacity of at least 6,000 TEU.

Table 3-1 Cargo Flows: Major Ocean Trade Routes (millions of TEUs)

	Trans-Pacific		Asia-Europe		Trans-Atlantic	
Year	Asia-US	US-Asia	Asia-EU	EU-Asia	US-EU	EU-US
2004	12.4	4.2	8.9	5.2	1.7	3.2
2005	13.9	4.3	9.9	5.6	1.8	3.3
% Change	12.1	2.4	11.2	7.7	5.9	3.1

Source: UNCTAD Secretariat, from Containerization International (October 2005).

Consider three areas: ship owners, terminal operators, and strategic ports.

Ship Owners. At the present time, and for the next 5-10 years, the dominate players in the global shipping industry will be the shipping companies. Historically, this industry was highly cyclical, in part because of factors within the industry (e.g. the levels of capacity of the individual firms, based on ships taken out of service, by new investments, and by takeovers). But external factors also influence its cycles, influenced by the price of energy, the transport of goods from emerging markets, and external financial shocks (e.g. Asian financial crisis, Russian ruble crisis, and Mexico peso crisis).

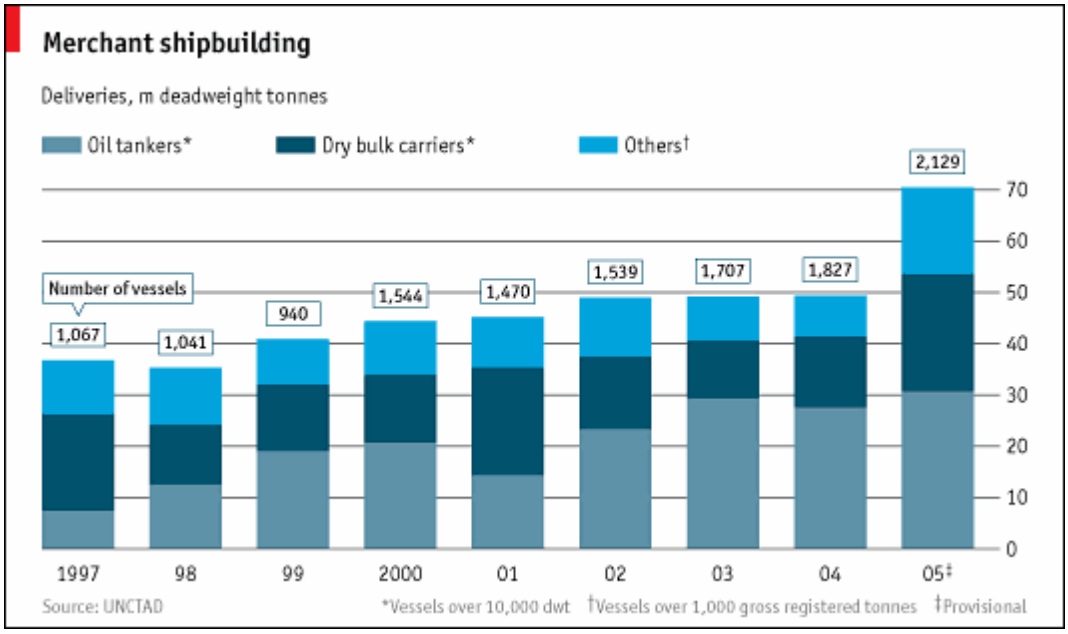
Table 3-2 Projected Delivery of Containerships (2006-2009)

Year	Orders	TEUs
2006	324	1,295,500
2007	362	1,355,600
2008	289	1,287,900
2009	67	348,800

Source: Adapted from Meerswan and VandeVoorde (2006), from LSE/Boxfile Data Base

Despite recent consolidation in the industry, strategic considerations for individual firms suggest new patterns of alliances and long-term agreements with both terminal operators and individual port authorities. The merger of A.P. Moller and P& O NedLloyd, and the acquisition of CP Ships of Canada by TUI AG – Hapag Lloyd reflect continuous new capacity expansion by more than one million TEUs per year (and some 1,042 new ships). Further, despite the dominance of Maersk of Denmark as a significant leader in the industry, with 399 ships with one million TEU capacity (up from 900,000 TEU in 2004), the top 10 container shipping firms account for 49.2% of world capacity, an increase by 12.4% in the last year, to 4.6 million TEUs. Maersk, which operates the massive *Emma Maersk*, 396 metres in length and requiring 50 feet of clearance to go under bridges, has 13 similar sized ships on order, and operates its own terminals.

Exhibit 3-1 Merchant Shipbuilding Deliveries (1997-2005)



Source: The Economist

Further, there is little doubt that Asian companies – Evergreen from Taiwan, China Shipping and COSCO from China, collectively with 375 ships - have more TEU capacity than Maersk or MSC from Switzerland. Another trend in the industry, reflecting its global reach and other strategic considerations, is the development of new capacity by liner companies that now lease container ships under long-term charter. These developments allow the ship owners to assist changes in global demand and the need to provide line balancing between full ships and half empty ships on east-west Pacific voyages. Further, as bigger ships of 6,000 or more TEUs dominate the Asia-Europe and North-America routes, ships of smaller size, 3,000-4,000 TEUs, operate on north-south routes into the spokes of hub-and-spoke port systems.

Clearly, with the development of bigger ships for long distance hauls, trade routes themselves are changing, notably towards the Suez Canal from Asia, assisted by the rise of India as a growing shipper of manufactured goods. These changes now require the shipping companies to develop new forms of strategic alliances and cooperative agreements that reduce economic risk, such as agreements with in-shore transportation modes (trucking firms and rail), logistics firms, freight forwarders, as well as with major customers like auto firms and national retailers.

Terminal Companies. In theory, the ship owners could integrate forward to become the shareholders in terminal companies in order to reduce costs in portside bottlenecks, as goods away inter-modal shipments and customs clearance. In fact, because there are so many ports and so many port calls in some 80 countries, terminal companies have become a new player in the shipping value chain, and they are increasingly helped by private equity capital. Major market players like PSA and Hutchison Port Holdings (HPH) add to the market strength of AMP Terminals and Dubai Ports World (DP World) that

took over the P&O Ports Group: together, these four groups handle 40% of global container traffic. Dubai Ports World alone has 29 container terminals and logistic operations in 100 ports in 19 countries. Today, global capital is investing in port terminals, a reflection of a consolidation of this side of the shipping industry and a projected assessment of the increase in container growth around the world.

Canada is starting to see these financial developments directly, in Halifax and in Vancouver. In the fall of 2006, Macquarie Infrastructure Partners acquired Halterm Income Fund, listed on the Toronto Stock Exchange, and entered into a sale and purchase agreement to provide additional capital resources and global expertise to the Halifax terminal facility. The deal amounted to about C$172.75 million. The Macquarie group has made investments in container terminal operations on the West Coast of the U.S. as well as in Poland (DCT Gdansk) and in Asia. In addition, the Macquarie group has a dedicated ports advisory team which can be called upon to assist in port development issues globally. Halterm operates a container terminal and cargo handling facility located on a 72-acre site in Halifax, which includes deep water berths and six ship-to-shore gantry cranes.

On the West Coast, one of the biggest pension funds in Canada, Teachers, invested over US$2.4 billion to purchase four marine terminals in Vancouver and Delta, B.C. It also bought the main container facility on Staten Island, NY, and a small facility in New Jersey. The terminals were purchased from Orient Overseas (International) Ltd. of Hong Kong, which is increasing its focus on its fleet of container ships.

Container terminals are central to the fast turnaround times needed to take containers off ships to the inter-modal transport connections, both for on-dock or near-dock rail connections, or for road services (e.g. weighing of containers, customs inspection, seal inspection) for truckers. Terminal operators are the middle ground between ocean transport and land transportation, and must adjust to the necessary workforce, equipment needs, and even repair services of containers, especially of refrigerated containers that may need cleaning or temperature maintenance. Terminal operators increasingly operate in a real-time world, based on an enormous data base to track container shipments, tracking of arrival and departure, and the appropriate documentation for bookings, manifests, vessel activity, security control, advanced crane usage and control, and newer advances in radiation detection devices for container imaging.

The two Canadian terminal deals, and others like them, illustrate the evolution of the shipping industry at large, as the large scale of operations partly influences the levels of strategic alliances, pricing and return on capital. Clearly, the terminal operators are a partial offset to the bargaining power of the shipping companies, since about 65% of container shipping comes from Asia and the biggest ships carry the biggest cargo. But the terminal operators, now backed with mobile international capital, can combine their international networks and information to negotiate deals with the inter-modal companies that transport goods inland to factories and retailers. Moreover, strong terminal operators also strengthen the Port Authorities against the shipping companies since they need inland inter-modal transport to reach the customer.

In the past, terminal operators have seen their main constituency and stakeholder as the shipping companies, not the Port Authority, which they have viewed simply as a landlord, and not the importers or the on-land inter-modal shipping companies. Their priority was to load and unload the ship, because every day the ship is sitting idle in port, it costs money ($25,000-plus per day). But trends are starting to slowly change this outlook. Some importers are exceptionally big and demand fast turnarounds from the terminal companies, where North American productivity trails Asian ports. This weak link in the supply chain is changing, because the importers can work closely with the shipping lines and the Port Authority to reduce waiting times in the overall supply chain.

Port Authorities. Around the world, port authorities vary considerably, not only in the water gateways they serve, but in their role in economic development. Port Authorities serve as more than the rental agent for a ocean-based real estate property; they are at the apex between the shipping companies from which they draw business around the world, from the terminal operators, from whom they receive rent, but increasingly from the inland transport groups like truckers and railways, where they are often asked to referee disputes. Usually, ports do not compete against each other: like hospitals, they serve local clients. But vast increases in global trade, the need for larger ships to contain more cargo, and the need for a global outlook have turned Port Authorities into engines of economic growth and development. Increasingly, the management of Port Authorities has changed, because competition forces them to become aggressive marketers of domestic advantages to the two supply chains, global transportation companies and corporate clients.

Port Authorities vary considerably in autonomy and corporate governance. In some cases, like Hong Kong, Port Authorities are privately owned. In some countries, like Canada until legislative reforms in the late 1990s, Port Authorities are agencies of the national minister of transport. In Canada, after changes to the *Canada Marine Act* in 1999, there are 19 separate Port Authorities, which directly and indirectly employ 250,000 people. While many view Canadian ports as competitive with each other, the real competition is between US and Canadian ports, and increasingly, between global shipping lines that want to use fewer ports, continent by continent.

The Association of Canadian Port Authorities has sought changes to the Canadian Marine Act, in five areas. As noted in a study of Canadian marine infrastructure, there are critical differences between US and Canadian legislative frameworks of ports, shown in Exhibit 3.2. The ACPA is seeking five significant changes to marine legislation: more direct federal financing; increased borrowing limits based on commercial requirements (Saint John has a $15 million borrowing limit; Halifax has $25 million); payments to municipalities by provincial governments; the transfer of gross revenue charges for port infrastructure; and greater flexibility of land sales and land transfers.

Exhibit 3-2 Comparison of Port Authority Model in US and Canada

United States	Canada
Ports are local government agencies and viewed as a requirement for industrial support	Only implicit recognition of marine transport in National Policy
Ready access to local government funding	Different property tax regimes
Raise taxes for development	No federal investment
Tax-exempt municipal bond financing schemes	Taxable market debt financing
Federal government financing of port security	Limited Federal support for port security

Source: Jones 2005, Quoted in AIMS Atlantica Papers # 6, June 2006, p.10.

From a global perspective, some Port Authorities are increasing their role as global gateways, not because of their size and throughput, but because some ports are severely land locked (like most European ports), because of specific location challenges, where the public do not want the noise, congestion, and road bottlenecks (like Long Beach). A further challenge, and one not fully addressed in multinational forums and bilateral groups are the severe challenges of environmental problems and pollution (air and water quality, garbage and unwanted goods, energy usage, noise, dangerous and contaminated goods).

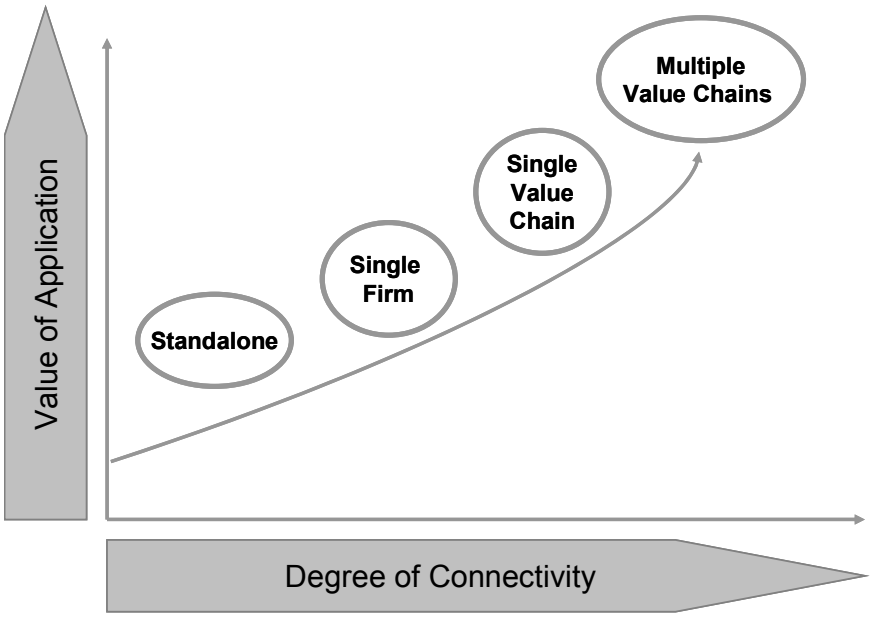
Global Shipping, Supply Chains and IT

In the rapidly changing global transportation industry, dramatic trends are revolutionizing the management both the total system and the varying components – IT. Information technology pervades all aspects now of complex operating systems, but some sectors have trailed state-of-the-art developments – transportation is one, hospitals is a second. This is now changing rapidly. At the first level are the components of the transport system, for example the ships, terminals, trucks and the ports. As each component part becomes more complex, so to the inter-modal connections, which are now best seen as complicated networks requiring on-line communications tools that themselves form a network stretched globally.

What are changing rapidly are not only the increasingly large ships or aircraft used for air cargo, but the new ground-to-air or ocean-to-land communications devices that provide information for the first mile and the last mile of the journey of a container or parcel. This means a dramatic shift in port-to-port links (or air port to airport), but also the communications that stretch from the first mile, e.g. the factories where goods are made and shipped overland, and to the last mile, where the goods leave the port of embarkation and are shipped overland to the end user. In the past, these communications tools were national or regional in scope, as trade focused on regions with geographic proximity, e.g. Nova Scotia to Ontario, Washington State to California or Mexico, Spain to Germany.

Low-cost manufacturing, growing country and regional concentration on national comparative advantage, technological sophistication, economic geography, and JIT manufacturing – these factors alone and in combination - have all changed the information logistics necessary for global trade. Too often, domestic firms have pursued low-cost advantages of cheap labour in China or India, where the differences are 20:1, but often ignoring the enormous increases in transportation and logistics costs from low cost inland factories. In China and India, for examples, inland factories lack easy access to roads and inland water routes to move goods to deep-water ports. Transportation bottlenecks on roads, highways, railroads, plus complications in electricity supply, have increased the cost of logistics and transportation. Indeed, a major American trucking company has invested in China to serve as an inland road carrier for Chinese factories but also as a freight-forwarder for Chinese exporters.

Exhibit 3-3 Increasing Value of Automated Connectivity



At the second level are the global supply chains of multinational manufacturers and global retailers which depend on imported parts, components and finished products. Not only are supply chains impaired because of transportation bottlenecks, but tracking of

goods through the supply chain through physical counting was equally flawed, because supply chains were not fully integrated around a global forecasting schedule. When the US government imposed new pre-clearance conditions in the post-9-11 environment for customs and security, as the US Treasury transferred its customs department to the new Department of Homeland Security, both importers and exporters had to re-examine their IT infrastructure.

Both groups, the transportation companies, as well as the individual importing and exporting countries, now invest heavily in IT infrastructure – software, hardware, and new radio frequency systems, mobile phones and Blackberries. On a global basis, this IT challenge is especially complex because there is no common standard architecture or IT platform. Increasingly, from China to the US, the system preference is wireless communications across all components of the transport value chain and across all elements of the supply chain, away from the tyranny of cables and copper-wire based systems common in advanced countries like Canada and the US, allowing newer entrants (countries and companies) to join new, standardized wireless networks.

An example of the profound changes taking place in global transport is the case of the CN North American rail network of 30,000 kilometers of track linking three coasts. In the past, over 1,000 workers at CN managed repairs and inspections, but were isolated from overall scheduling and tracking of its 4.8 million carloads of freight. Performance across the system was measured in days. Now, massive investments in IT and management systems involving mobile work stations, Blackberries and laptop computers provide an integrated monitoring system, with a clear tracking capability customized for each customer of CN's freight operations across the continent.

The CN model is the state-of-the-art tool being applied with best practice users, including in emerging markets like China and India. IT now revolutionizes what was a discrete, segmented and often incompatible data system. New IT systems allow an online, integrated end-user functional model. Global retailers and manufacturers are applying combinations of radio frequency identification systems (RFID) and global positioning systems (GPS) as the first step in a new "Internet of Things" of what *The Economist* calls the "Physical Internet." Bar codes, of course, are now a standard tool applied to everyday items, from mail to the items in a shopping centre to packages of courier companies like FedEx.

Exhibit 3-4 Advantages of Integrated Technology Platforms

(Demand planning=A, Tracking Product and Stock Quality=B, Security=C)

Production	Storage	Transportation	Point of Sale
Procurement (B,C)	Receiving (B,C)	Asset Management (B,C)	Receiving (A,B,C)
Storage (B,C)	Order Fulfillment (A,B)	Property Management (B,C)	Theft Control (A,B)
Production (B,C)	Loading (B)	Compliance Control (B)	Shelf Management (A,B,C)
	Location Finding (A,B)	Routing (B)	Checkout (B,C)
	Losses/Theft (A,B)		Returns, Reverse Logistics (B)
	Use of Assets (B,C)		After-Sales Support (B)
	Inventory (B,C)		

New software systems illustrate the pent-up demand for IT investments to solve transportation bottlenecks, not only to contain costs like stock outs, fuel consumption, and shrinking order delivery times, but to deal with border security, enterprise resource planning (ERP) for inter-modal transport. As depicted in Exhibit 3.3, best practice firms are increasing their connectivity tools to involve multiple value chains, both upstream and down stream, and pushing the integration into easy-to-use tools, from cell phones, PDAs (personal digital assistants) like Blackberries, and other electronic tools like electronic smart tags and de-activation devices.

How do we get from today's issues in transportation to tomorrow's at an affordable cost? Partnerships between Rail, Road and Sea.

- Wes Amour, CEO
Armour Transportation Systems
Moncton

4. The Atlantic Gateway

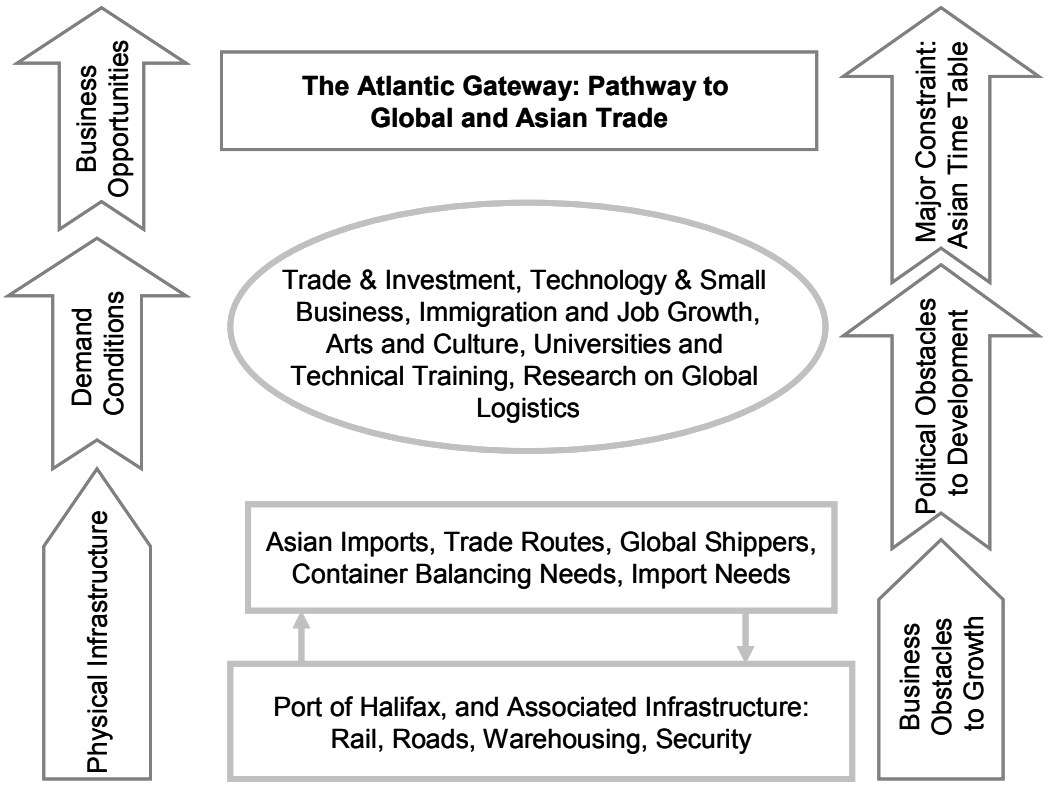
Conceptual Issues

For over 30 years, Canadian policy makers have been concerned with the country's Pacific Rim gateway – transportation links via air, sea and rail – that shape Canada's exports and imports to Asia. In this period, Japan was one of the first priorities, as that country's dramatic growth led to an apparently insatiable demand for Canadian raw materials – timber, coal, grains, fertilizer, chemicals – and an equally dramatic rise of Japanese exports like automobiles and consumer electronics. As Pacific Rim trade with North America has grown, West Coast ports – Los Angeles and Long Beach, Seattle and Vancouver -- have faced increasing port congestion, as the flow of containers across the Pacific skyrocketed, from 2 million TEUs in 1970 to 17 million TEUs in 2005. Vancouver, as Canada's closest port to Asia, suffered from this malaise.

Today, trans-Atlantic trade has been usurped by even greater trade between Canada and Asia, rising dramatically in recent years with trade with China. Trans-pacific trade, represented by the countries of APEC, now accounts for 47% of the world total. West Coast trade and container shipments have forced the global container shippers to reconsider global supply chains. Two years ago, the prospect of a strike at West Coast ports in America was a wake-up call to a 'just in case' prospect of a virtual shut down of Pacific trade. In Canada, management-union conflicts at Vancouver have led to alternative options for certain industries (e.g. pulp and paper exports to Japan). The development of the Port of Prince Rupert is seen as an attempt to deal with container congestion in Vancouver.

Potentially, this Pacific Rim trade opens new opportunities for Canada's East Coast, but Canadian ports like Montreal, Halifax, Canso and Saint John also face growing competition from Atlantic ports in the US. Significant investments in the US, in port development, deepening of waterways, and rail and road links, intensify the competition for container traffic from Asia. New York/New Jersey is by far the biggest East Coast American port, with 14.8 million TEUs handled in 2005. It also has the advantage of being the financial capital of the US and a leading global financial centre.

Exhibit 4-1 Atlantic Gateway: Pathway to Global and Asian Trade



In one sense, the Atlantic Gateway is not a new concept. For four centuries, the Atlantic region has been a gateway for Canada in any numbers of ways: European fishing, immigrants and settlements, the railway, defence and ocean convoys, sailing ships and the earliest postal routes from Europe, the first telegraph signals to Europe, and trans-Atlantic trade between Canada and Europe. Gander and Halifax have a long history in air transport. What do these links imply for Atlantic Canada? Atlantic Canada has a small, local market, and Montreal has the advantage of the St. Lawrence Seaway for two-way trade with Europe. But the prospect of very large container ships coming into service makes Halifax the natural entry point for goods shipped from Europe or through the Panama Canal.

In the US, new investment developments and new infrastructure, such as new terminals, warehouses, and new railway lines, show that the US is not a by-stander to the changing global trade game. Consider recent developments at the US East Coast ports:

- In New York/New Jersey, a $760 million investment to deepen the port channel to 50 feet and $1.6 billion for port infrastructure;
- The Norfolk, VA Port is investing $400 million in container terminals and new on-dock rail capacity;
- At the Port of Charleston, a new three-berth container terminal at a former naval base will elevate capacity by 1.4 million TEUs to more than 4 million TEUs per year, double that of Vancouver. Crane operations have improved substantially,

from 40 container moves per hour to 53 per hour, thus reducing what is called dwell time.

- New warehouse facilities in Houston constructed by Wal-Mart (1.3 million sq. ft.) compliment a 1.4 million sq. ft. warehouse by Home Depot, and 1.5 million sq. ft. facility in Virginia by Target Stores;
- In Miami, there is a plan for $250 million of investments in port infrastructure, including port deepening by the US Army Corps of Engineers.

Part of the East Coast development in the US is driven by the staggering port development in China and, after some considerable delay, in India. In China, there are concrete plans for 100 new container loading berths, each with 500,000 TEUs per year capacity – the equivalent of Halifax. In India, there is a new 20-year plan for the development of ports and port infrastructure, to increase India's port capacity from 750 million tons to 1.5 billion by 2012, and 2 billion in 2016. Private sector development in Indian ports now exceeds $2 billion dollars and is growing fast. Added to competition from the US are new developments in Mexico and ports in the Dominican Republic and other Caribbean islands adjacent to the Panama Canal.

These issues are central to the global context of the Atlantic Gateway. The question is: are local and regional ports in the Atlantic region prepared to build a globally successful Atlantic Gateway extending to a national transportation corridor? As shown in Exhibit 4-1, transportation infrastructure is only one part of the strategy of the Atlantic Gateway. Most manufacturing and service industries in Atlantic Canada depend on quality transportation infrastructure, and as firms grow internationally, air, road and sea lines are central. For instance, how does Labrador deliver its iron ore to the steel mills of Hamilton and Pittsburg? The answer: by train and bulk cargo up the St. Lawrence? Today, the markets of Asia are open to Newfoundland via inshore shipping and container vessels. Transportation challenges constantly face the region, especially in air transport, so critical to the tourist, cultural and convention industries. For example, as PEI develops its golf courses as part of its tourist industry, but inferior air service often means visiting golfers (and musicians) arrive on time, but without their luggage.

It may sound like a contradiction in terms, but Canada needs an Atlantic Gateway strategy to cope with Pacific Rim trade. Two-way trade between North America and Asia, and between Canada and Asia, has increased dramatically. But global trade raises the need for complicated supply chains and logistical problems for Canadian companies. It is accepted that most Pacific Rim trade flows through Pacific coastal ports – Los Angles, Seattle, Vancouver, and soon, Prince Rupert. Much of this trade is in complicated shipping modes – commodities like coal, wheat, potash, and lumber, and manufactured products like capital goods, industrial machinery, transportation and aerospace parts, involving trucks, warehousing, trains and specialty ships.

Some of these goods are destined for the North American interior, especially to Chicago-area manufacturing hubs. But the West Coast has its own challenges (strikes, antiquated facilities, minimal security). As noted, because of West Coast congestion, companies are addressing new shipping needs for East Coast ports. In the past, the cheapest routes were

through the Panama Canal from China, South Korea and Japan into East Coast ports. Increasingly, there is a growing demand for state-of-the-art shipping into the Atlantic coast ports of North America, like Montreal, Halifax and Saint John. Potentially, the Atlantic Gateway combines a new policy mix, involving the needs of importers (countries, companies, and transport firms), the private sector (manufacturers, retailers and niche players), the transportation industry, the provincial governments of Atlantic Canada and the federal government.

How well known is the concept of the Atlantic Gateway? Outside the experts in transportation and logistics and certain policy think tanks, as well as private firms in engaged in transport and external trade, the Atlantic Gateway is largely unrecognized, either as an abstract concept or an integrated transportation plan for the Atlantic Region. Moreover, because most aspects of the Atlantic Gateway are a mix of policy elements – trade enhancement, inter-modal transport, IT, education and training, not to mention financing – there is little real consideration of the ideal strategy either in provincial government circles or in most aspects of the private sector.

Exhibit 4-2 Atlantic Gateway Stakeholders

Group	Past	Future
Port of Halifax	Passive, Inbound	Aggressive, Global
Other Ports	Passive, Inbound	Regional, National Focus
Academic	Passive	Unclear
Provincial Governments	Limited Cooperation	Unclear
Private Sector	Regional-National	Trucking, CN – Aggressive
Retailers	Vancouver-centric	Vancouver and Halifax

Why is this the case? The simplest explanation is: the Gateway, the Atlantic Gateway, or the Halifax Gateway, is seen by most stakeholders within Nova Scotia and across the Atlantic region as a Halifax showcase. In the past, the Port of Halifax bears some of the burden for this perception. Compared to other ports like Montreal or Vancouver, the Halifax Port Authority has been slow to respond to enormous changes in global shipping and the new demands of international trade. The port is only one of competing provincial stakeholders both in Nova Scotia and in the Halifax metropolitan region. Other provincial or regional ports and port stakeholders (like ship repair services) have competed for attention with the Halifax Port Authority. The federal government, with its restrictions in the *Canada Marine Act*, severely limits Halifax as a Canadian Port Authority to cultivate

new business by limiting its capacity to borrow funds (currently $25 million – Saint John, N.B. is $15 million) to construct new facilities for container trade.

But there are other reasons why the Atlantic Gateway strategy has limited appeal in the region. The simple answer is the menace of Atlantic Canadian silos. Most provincial ministers of transport candidly admit that the overwhelming transportation priority is the mix of roads and highways. Because ports were a federal responsibility directly under the Federal Minister of Transport prior to the *Canada Marine Act* of 1998, which created the Canada Port Authority governance system, most Canadian ports are in a no-man's land, largely isolated from provincial or regional transportation priorities. Further, in the past, ports have not been central to many industries, because the private sector has been organized around provincial or regional supply chains, a mix of suppliers, distributors, and warehouses, each largely not integrated by manufacturing companies or retailers, or common technology platforms. Unfortunately, in the new world of globalization, ports are now central to the complex mix of global supply chains, both of the global shipping industry, and corporate supply chains. This concept is now the key to the Atlantic Gateway.

The Atlantic Gateway will advance when leaders in the region – political, academic, private sector and bureaucrats - visit Asia and see the amazing changes taking place, not only in China or India, but Vietnam, Singapore and Hong Kong. All stakeholders must recognize that trade, technology, talent and transportation are now linked. Seeing the Atlantic Gateway as a Halifax initiative totally ignores the reality that the biggest impacts are outside Halifax, including the diverse locations of the trucking industry, regional industrial parks, inland container parks and airports. Once the largest ships come into service in the next 3-4 years (some are already in service), if positioned properly, Atlantic Canada stands to gain enormously, as the industrial spin offs for each TEU is about $1,000. Private sector players, many of whom are located in Central Canada, know that the Atlantic Gateway, like the theory of supply chains, is only as strong as the weakest link.

Atlantic Canada and Global Trade

The statistics on global trade are compelling, not only because the growth in international trade exceeds the annual growth of GNP for most developed countries, but because the annual growth of the emerging countries now exceeds the growth of the developed world. Overall global trade from 1950 to 2004 increased dramatically, from about US$375 billion per year to US$8.16 trillion, an increase of 22 fold, or 5.87% per year, according to the WTO. Of this growth to US$8.16 trillion, the biggest increase was in manufactures, from only US$138 billion in 1950, to US$6.022 trillion, an annual growth of 7.24%. As a trading nation, Canada understands these changes. As the only member of the G-7 countries not to have ready access to a 100 million customers, Canada entered into a free trade agreement first with the United States, and then with the United States and Mexico.

For Canada, these changes have predictable impacts, as shown by the empirical results of international trade theory:

- Increased need for trade specialization, as firms focus on their core competence but seek higher volumes through export growth;
- Increased inter-dependence as final product output includes foreign inputs as countries specialize across the value chain (for Canada, foreign inputs increased from 20% to 27% of export value; in the US, from 6% to 10.8%);
- Trade obstacles – tariff and non-tariff barriers – do matter. Among the industrialized world, mainly the OECD countries, trade obstacles have been reduced or eliminated for manufactured goods, but trade obstacles remain in agriculture and services, including transport and shipping.
- Distance for trade has changed dramatically. A generation ago, it was thought that large, bulky goods like cement, steel, and chemicals could not be shipped easily. Today, the *Death of Distance*, as Frances Cairncross coined the phrase, means that new forms of transport – container ships, air cargo and global transport instruments – container boxes, huge ships, and giant aircraft have revolutionized international trade and transport systems.

Table 4-1 Atlantic Canada Imports Exports (2001-2005)

	Imports					Exports				
	2001	2002	2003	2004	2005	2001	2002	2003	2004	2005
US	3,625	2,898	3,000	3,002	3,241	15,093	16,512	15,843	16,346	17,409
Asia	305	351	389	1,016	698	802	1,100	1,231	1,173	1,309
Total	13,076	12,725	14,378	16,201	17,712	18,364	19,910	19,498	20,569	21,955

Figures in millions of Canadian dollars

Nova Scotia Imports Exports (2001-2005)

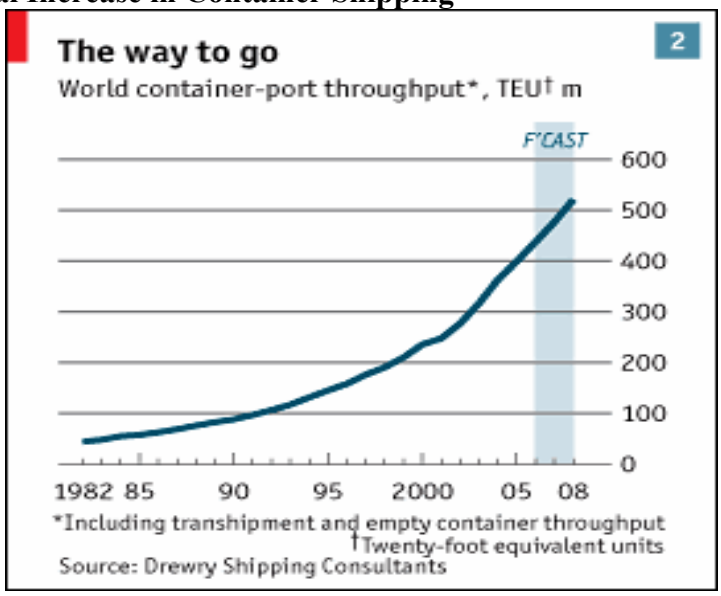
	Imports					Exports				
	2001	2002	2003	2004	2005	2001	2002	2003	2004	2005
US	1,064	413	528	431	463	4,795	4,355	4,423	4,501	4,660
Asia	282	382	362	371	328	282	382	362	371	328
Total	5,594	5,140	5,816	6,590	6,989	5,807	5,344	5,477	5,859	5,815

Figures in millions of Canadian dollars
Source: strategis.ic.gc.ca

As already noted, on a global map, there are three major ocean routes – the Trans-Atlantic linking Europe with North America, the Asia Europe linking the European Union with Asia, mainly via the Suez Canal, and the Trans-Pacific, linking the Americas (and the largest economy, the United States) to Asia. Growth on these trade routes is accelerating with container shipping, the low-cost form for long-distance, with inter-modal land transportation at both ends. Can the Atlantic region accept the consequences of these changes, and act accordingly?

Both Canada at large and Atlantic Canada as a region have focused primarily on trade and investment with the US and NAFTA, where over three-quarters of Canadian trade is concentrated. Within the macro trade figures is an enormous concentration in basic raw materials – timber, coal, minerals, potash, chemicals, as well as relatively low value-added fish and agricultural products. Most of Canada's trade with Asia has been with Japan, but the rise of China, with its $1.4 trillion dollar trade, may make China Canada's second-largest trading partner within a decade. But Atlantic Canada's trade with Asia is small by comparison with other regions, or with other jurisdictions.

Exhibit 4-3 Global Increase in Container Shipping



Clearly, as two way trade with Asia increases, and as Asia at large becomes an export superpower for manufactured goods, Atlantic Canada stands to gain for several reasons, even as a passive player. Consider three impacts on the region:

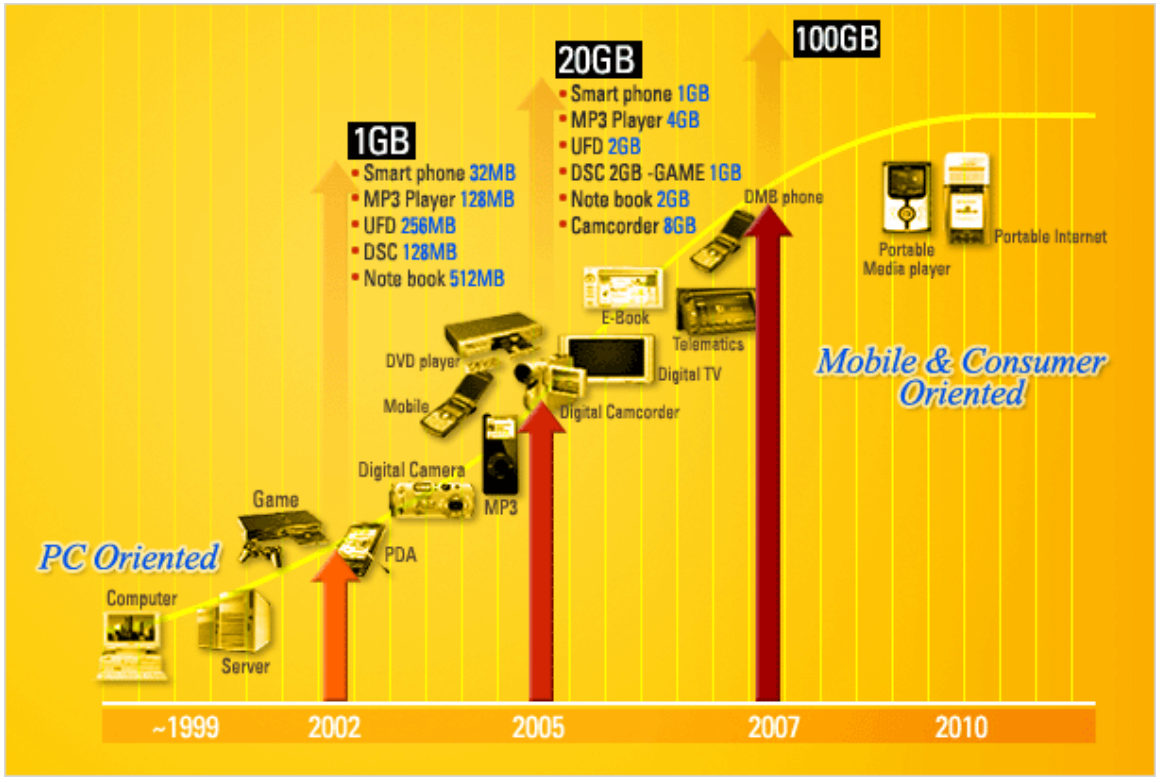
- North American retailers, led by global firms like Canadian Tire, Home Depot, and IKEA, become enormous purchasers of Asian goods. China, of course, is the major beneficiary of these trade supply chains – Wal-Mart already accounts for about 8% of Chinese export trade – but some of these goods will pass through ports in Eastern Canada (see Appendix B).
- Atlantic Canadian trade in goods and services will become part of the supply chains of products sold in the Canadian market, or in the North America at large. Global retailing provides a ready example, but the basic issue applies to manufactured goods as well.
- Global supply chains for manufactured goods have an enormous service component, from shipping to banking, port security to inter-modal transport like railways and trucking. East Coast ports already handle a wide variety of global trade in containers, which has the fastest growth rate in global shipping – 9.7% per year, compared to the average increase in global trade at 3.6%.

Atlantic Canada Trade – Global Logistics

In today's world, global trade is led by large, powerful multinational firms. Even for the US, the world's largest consumer market that accounts for about 25% of global output, most firms do not export. Indeed, various studies show that only 20% of American firms export, and for those that do export, overseas sales account for less than 10% of total output. It is been estimated that 50 firms account for about 50% of global US exports. The same issues apply to other countries, with Japan as an exception, because Japan lacks natural resources, and must export to pay for its food and raw material import requirements. As more goods flow across borders, the composition of trade changes: bigger economies export more than small economies, the weight of goods to the value of goods changes (i.e. the weight/value ratio tends to drop, away from bulk goods), and more goods embody parts, components, and other inputs, including services and IT, from foreign suppliers.

Global trade, regardless of country, is now accompanied by three related developments: technology, global logistics and finance. The three elements reinforce each other, because they constantly reduce cost per unit of output, and shorten the time to manage coordination. Why? Export firms differ from domestic companies because the export market, even when many common features exist (laws, language, distribution channels) carries a higher risk premium: risk is a function of the differences in markets, not the similarities. And companies must pay for this risk up front, although the risks may be mitigated later by higher payoffs (profits) once the lessons of the new market are learned.

Exhibit 4-4 The Power of Chip Technology



A related challenge for companies, and the reason why multinational firms invest in knowledge systems within the company, is the organizational cost of coordination. Any firm is an embodiment of numerous functions across the value chain, from raw materials and design to production, sales and distribution. As firms expand, they learn to manage coordination across national borders, using the unique talents and advantages of the markets they serve. Technology and IT systems greatly reduce the marginal costs of coordination per unit of output, since ideas, data and 'platforms' can be extended across borders almost instantly. The same issues apply to financial capital: vast differences in exchange rates and interest rates, which affect the real cost of capital, allow firms to move capital, invest in growth markets, and repatriate profits with tremendous speed. If economies of scale in purchasing are ignored, operating costs remain high because there is a lack of a critical mass of skills. (Clearly, these issues also apply to public institutions, such as universities, school systems, and hospitals, where logistical costs are steadily increasing.)

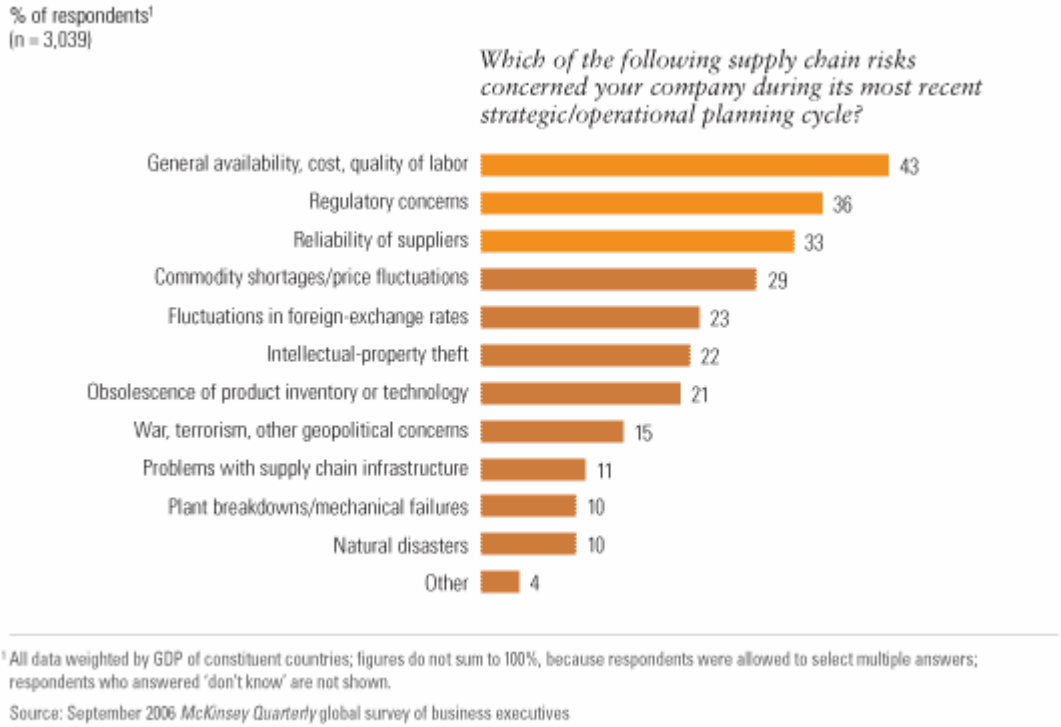
In order to carry out these new functions, Atlantic firms need to learn about global logistics. International surveys show that supply chain problems concern global managers across countries (see Exhibit 4-5), including the availability of skilled labour. In the past, despite notable exceptions, most international trade consisted of transactions across land borders, e.g. trade within North America or within Europe among the advanced industrial countries. The primary means of transportation for international trade has been trucking via advanced highways and throughways, transcontinental railways, and in oil and gas, pipelines. Within most continents, there are sophisticated feeder routes, from barges on rivers and canals to small, medium and large trucking firms, as well as regional and local railways.

In the past 50 years, two events have changed global logistics. The first was the construction of very large airplanes, super jumbos like the Boeing 747 and later the Airbus, which permit long distance air cargo and a rapidly declining marginal cost per kilo. FedEx and other logistics firms pioneered this novel form of transport for parcels, picking up the competitive advantage developed by post offices around the world. FedEx had one great advantage that postal systems did not exploit: speed. People would pay a premium for speed, everything from over night delivery to guaranteed security of delivery. For all kinds of businesses, from governments and professional offices like legal firms and banks to lightweight product lines like computers, pharmaceuticals and parts, air cargo became the mode of delivery. Indeed, firms like Dell operate closely with their supply chain partner, FedEx.

Today, global logistics is complicated by three variables: the need to concentrate factories close to large cities (for sophisticated labour and infrastructure like ports and airports), the economics of global logistics where higher volumes dramatically lower unit costs of transportation, and the need for inter-modal transport, because most shipping is rarely point to point, e.g. Shanghai to Halifax: inland shipping, the so called last mile, involves not ocean container shipping, but flows via trucking, railway, and even air cargo for small lot shipments. In this sense, global logistics consists of a growing need for

sophisticated information and communications networks as firms design global supply chains.

Exhibit 4-5 McKinsey Survey of Supply Chain Challenges



[1] All data weighted by GDP of constituent countries; figures do not sum to 100%, because respondents were allowed to select multiple answers; respondents who answered 'don't know' are not shown.

Source: September 2006 *McKinsey Quarterly* global survey of business executives

For manufacturing companies in sectors like pharmaceuticals, computers and information technology, and auto manufacturing, management have had years of experience to perfect and calibrate these global supply chains, which link their total production system to complicated and sophisticated supply networks, linking all aspects of design, sourcing, production, sales and distribution and marketing. Firms use any number of strategic tools, from outsourcing to supply networks, sub-contracting to strategic alliances, because costs change over time. For instance, exchange rates regularly change both the cost of capital and product margins (in Canada, a shift of 0.67 cents to the US dollar to 0.90cents can make a product that is extremely competitive at 0.70 cents, marginally profitable at 0.80 cents, and unprofitable at 0.90 cents).

In the manufacturing sector, where overseas investments have occurred for generations, firms adapt to local market conditions, internal functional costs, and superior strengths. For instance, firms from Europe, Japan and Canada employ investment strategies in the US to take advantage of American university research and organizational clusters like Silicon Valley and Boston 154. Foreign firms invest in Japan to learn from Japanese engineering and management know-how. Multinationals invest in China for that country's low-cost labour. All of these examples provide a multitude of reasons, some involving cutting costs, others involving access to sophisticated assets (human, technology and organization), but they complicate a firm's supply chain as it competes with other firms from its own home market, but also with other firms in the local market.

In this sense, best practice companies see the global world not as a challenge, but an immense opportunity. For the first time ever, companies have learned to link the immense talents of rich and poor countries in unprecedented ways. The new global linkages combining physical resources; data flows and digital communications and financial flows combine to integrate international economies, some more than others. This is apparent in the consolidation of global logistics through mergers and takeovers, on ever-increasing scale, and the need for a critical mass of skills.

Human Resources and Training

Atlantic Canada faces a human resource gap unlike anywhere else in the country, for two reasons. Unlike the rest of Canada, the Atlantic Canadian provinces receive few immigrants; there is a limited inflow of Canadians from the rest of Canada. More recently, there has been a regular and sustained outflow of young people to the rest of Canada, but now especially to Alberta and B.C., and, despite a larger number of marginal workers (reinforced by seasonal industries), there is a growing skills shortage. For decades, the region focused on marginal workers, with various attempts to create jobs, smooth out cyclical industries and create various wage subsidies, particularly in rural areas with high rates of unemployment (as high as 25% or more). Even worse for the Atlantic region, productivity-enhancing measures like new technologies and improved training have been viewed as job destroyers.

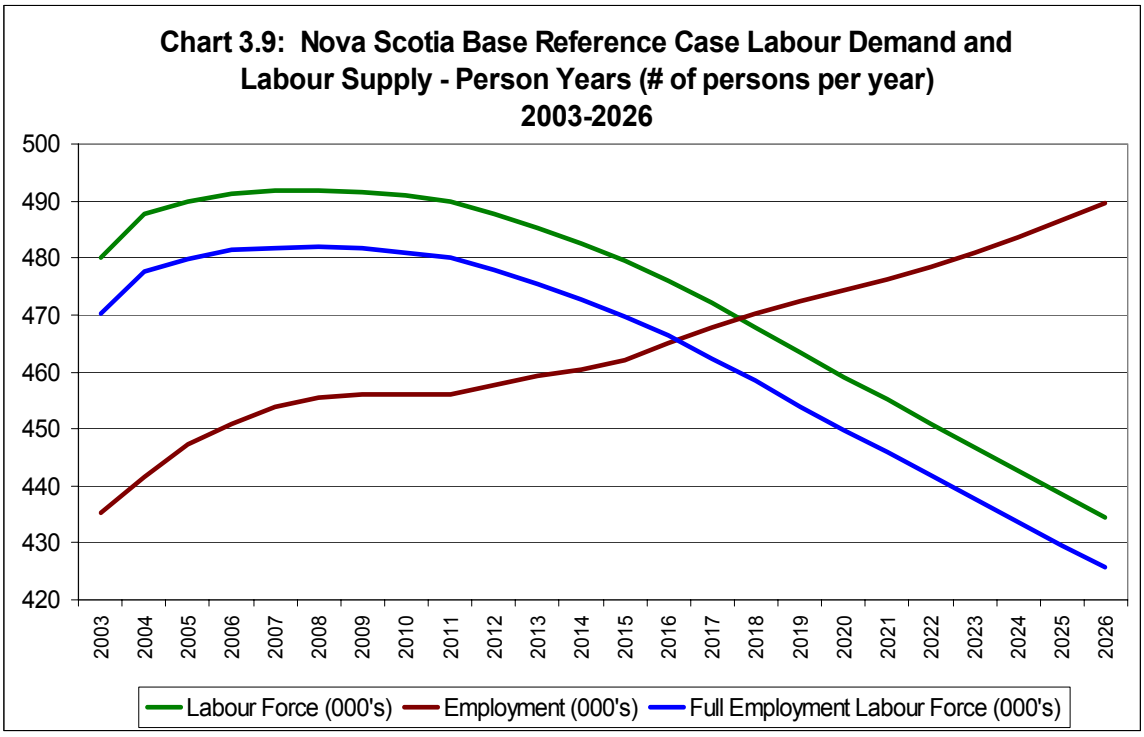
In many ways, the silo features of the Atlantic region come from small scale and four governments, each with different economic priorities. The Council of Atlantic Premiers attempts to bring a measure of policy coherence across the region, both on federal-provincial matters, inter-provincial trade barriers, and some areas of health policy (e.g. medical education) and immigration. But many barriers and silo thinking remain, between the public sector and the private sector, between the business community and the higher education sector, between the universities and the community colleges. The Atlantic Gateway initiative offers opportunities for concrete cooperation on common problems, especially so because the opportunities involve global players and countries like India, China and Japan. To exploit these opportunities, there is a clear role for cooperation between the federal government and the provinces on a range of Atlantic issues, not only transportation infrastructure, but skills shortages and the needs of the entire education sector. But urgency is a challenge. It should come as no surprise that historically, when the 50 US states and 10 Canadian provinces are compared on productivity measures, the four Atlantic provinces are at the bottom (in recent years, Newfoundland ranks considerably higher due primarily to the success of the oil and gas industry). Even nationally, Canada has the highest proportion of low-wage jobs as a function of total employment among the leading industrialized nations.

These productivity issues are now central to the Atlantic Gateway strategy. Even without a truly aggressive approach to advancing the Gateway model, the Atlantic provinces face both a demographic problem and significant skills shortages. Nova Scotia, the most diversified Atlantic province, illustrates the growing demographic gap that faces the

entire region. This problem will grow as fewer young people from the rural areas move to the urban areas where job creation needs are highest. The trucking industry is an example of the changing labour force in the region and the critical skills shortages in the transportation sector and even in customs and security, a particular challenge for Atlantic airports.

The trucking industry illustrates the general lack of awareness of the new requirements for skilled training in global transportation and global logistics. Around the world, new models of training are taking shape that link directly community colleges with universities, private sector training companies with sectoral groups and individual companies, as well as customized short courses and certificate training. The critical shortages in the trucking industry have forced new thinking beyond the educational sector, with new alliances with private training schools, community colleges outside the Atlantic region, and in-house training for new recruits. New technologies may help: the Atlantic Provinces Trucking Association is contemplating using new models of simulation tools to help train drivers, not only in driving skills but in a vast arrange of new demands facing the industry, including fuel emission standards, new transmission and breaking technologies, and equipment maintenance and repair.

Exhibit 4-6 Nova Scotia Labour Force: Demand and Supply



Source: J. McNiven, Dalhousie University; CANMAC Data Base

Clearly, there is a prominent role for both the federal and the provincial governments to play, and as events unfold in the global logistics arena, the educational sector in Atlantic Canada must begin to address the talent shortages of the region. The private sector feels let down by the education community, because the challenges are national and regional,

not provincial. The bias now is toward radical private sector solutions, which are seen as low risk, because the academic community has been slow to see what is occurring in other regions, especially Asia and in particular China. For the Atlantic Gateway, if the education sector is slow to respond, an alternative approach to training and human resource development is to have groups like the Atlantic Institute for Logistics and Transportation in Dieppe, which operates in English and French, and national training groups, like CITT from Toronto, with a well established national courses and curriculum, serve as a training umbrella group, using local community colleges and universities as sub-contractors.

5. Scenarios and Study Recommendations

5.1 Atlantic Gateway Scenarios

Domestic transportation policy in Canada is historically biased toward regional concerns, not national strategies. The national railroad was the last significant nation building transportation exercise, and that was started in the nineteen century, not the twentieth. Even the trans-Canada Highway has been bogged down in inter-provincial rivalries, the presence and strategic outlook of domestic companies, and short-term political considerations. It is easy to forget that what is now termed the information highway as a description of the Internet was copied from the great national highway project in the US after the Second World War.

In one sense, the Atlantic Gateway is part of a national transportation plan that is global in outlook, recognizes the links in inter-modal transport systems, and addresses the close integration of transportation, global trade, technology and talent. Slowly, other countries are taking this approach, and the staggering transportation investments in China and India fit this international perspective. The rise of Japan in the 1970s was a reality check to significant changes in the global economy, shown by the rise of firms like Toyota and Honda, or the consumer electronics sectors in gaming, digital recordings, music, and cameras. What Japanese firms were able to do in sector after sector was a foretaste of what other countries could also do, namely the injection of state-of-the art management systems that have transformed domestic industries into global players. Japan illustrates how economic geography, namely the use of ocean-based shipping from deep-water ports, affects so many other aspects of the economic system.

This is what is happening today in sector after sector with the transformations in India and China, reinforced by neighbouring countries like Bangladesh and Pakistan, for instance, where high levels of investment and the latest machinery are reinforcing their competitive advantage in many areas of manufacturing, with a clear bias toward global exports. These developments transform all aspects not only of global trade patterns but of the transport systems needed to cope with growing levels of global trade. Air cargo traffic and container trade are symptoms of the wider challenge. Even in the West Indies and Central America, new transportation systems, including port infrastructure, are part of east-west transshipments and north-south trade. Bigger ships reinforce these global opportunities for new hub-and-spoke port systems.

No longer are these global forces isolated from Atlantic Canada. Both from a provincial perspective, and from a regional perspective, policy makers must make serious choices. The Atlantic Gateway represents a new opportunity not only for Canada but for the Atlantic region. But the approach to dealing with the opportunity will help define ultimate choices and problems a decade from now. In particular, transportation strategies represent the first part of the Gateway approach. Viewed from a national or regional perspective, the clear bias in provincial transport strategies is improved highway construction. For some provinces, PEI and Newfoundland and Labrador, highways are the key to provincial development and integration, and the best tool to move goods from the hinterland to ports or airline terminals. To some degree, this also holds true for New Brunswick and Nova Scotia, with so much inter-provincial trade, as well as access to in-sea shipping from smaller ports. Further, even by North American standards, let alone global levels, the volumes of international trade from the Atlantic region remains small, not only because the population is small but because the region still concentrates on a few sectors: potatoes, fish, lumber, tires and aerospace products.

But viewed in a wider perspective, both of North America and the new world of globalization, the Atlantic Gateway model offers new opportunities. Increasingly, both the United States and all of North America are engaged in an historic transformation: virtually all sectors are being transformed, directly because of global competition, or as a combination as customers and suppliers to industries around the world. China is the symptom, not the cause of these changes. Other countries are equally a part of these changes, from Japan, by far the second-largest global economy and asset rich in global finance and technology, as well as the booming consumer and industrial markets of Southeast Asia and India. These countries are increasingly becoming fully integrated through share ownerships, strategic alliances, cooperation agreements, industry university research consortium, and free trade agreements, many with the United States and Japan.

Globalization trends are factual statements about the future, and offer unparalleled opportunities for Atlantic Canada. The basic question remains: does Atlantic Canada want to play in this new global trade game? Certainly the region has the internal assets, in the widest sense, to become a player – superb ports, rail links, successful companies, national and global firms, and universities and colleges.

- Human assets remain the region's primary strength, not only because of the region's educational infrastructure, but because, with the appropriate training, Atlantic Canada workforce is one of Canada's most stable, with relatively low turnover, limited strike action, despite constant poaching by other provinces.
- The region has the port facilities to become a global player in world shipping. The Port of Halifax is best positioned to lead the Atlantic Gateway, not only because Halifax is recognized around the world, through time and experience, but because of historical circumstance as a sophisticated military port (the reason the city was established in 1749). Halifax has an ice-free deep water port ideally located for transshipment of containers on an east-west and a north-south basis in North America.

- Atlantic Canada has a road transportation group of companies that are world leaders in long distance and short term haulage, with state-of-the-art carriers and sophisticated IT and communications devices that integrate inter-modal transport. The biggest transport companies are located in New Brunswick but are linked through cooperation agreements and strategic alliances to long haulage services throughout North America.
- CN, a former crown corporation running on an east-west axis, now operates a first class North American railway and inter-modal system that extends from the Canadian West Coast, including the ports of Vancouver and Prince Rupert, to the East Coast through Toronto, Montreal and Halifax, with new offices in Rotterdam and China. Both the Port of Halifax and CN are underutilized: domestic exporters often use Montreal or New York as embarkation points, and, until recently, global ocean shipping trade promotion has been passive.
- Unlike the Port of Vancouver, which has recently exceeded 2 million TEUs per year or even of Montreal, where there is a degree of line balancing of cargo – imported manufactured goods from Asia and export of commodity goods like lumber, potash, coal and wheat from Western Canada -- none of the Atlantic ports can match the export of trade goods, either as bulk cargo or as dry cargo in containers, with the potential for imported TEU traffic. Increasingly, as companies in manufacturing must design their global supply chains into integrated systems, the best possibility for Atlantic Canada is to turn the entire region into a global transportation hub, combining ocean shipping and air cargo as the central elements, using a mix of in shore shipping, rail transport and truck transport. But the key is to cultivate ocean shippers as the central demand point, using Halifax as the drawing card in the global shipping chess game.

That approach suggests three scenarios for the Atlantic Gateway.

Scenario One – The Status Quo: Silo Development

As noted, on some issues, Atlantic cooperation is not a strong suit, as report after report, study after study, amply demonstrate. Despite the enormous opportunities offered by the Atlantic Gateway strategy, many of the political, economic and academic elements have a bias to the status quo, in part because they fail to see the global implications and the new economic opportunities for the entire Atlantic region. The Atlantic Gateway initiative, viewed from the confines of the four Atlantic Provinces, pre-supposes all of the advantages for Nova Scotia, and especially for the Port of Halifax. Too often, the political realm shows that short-term job creation and provincial priorities overwhelm opportunities like the Atlantic Gateway. Even some players in the private sector in the Atlantic region have a view that if big means better, national players will have a competitive advantage over local firms and the job gains with be in Central Canada.

In the extreme, if the region prefers the status quo, national firms can deal with East Coast shipping as opportunities arise and as capabilities exist. But they can also use Montreal or, in time, as bigger ships and cargoes come to Atlantic coast ports in the US, embarkation points like New York-New Jersey, and ship their containers overland by truck or rail. This challenge for Atlantic Canada is the classic flip side of Just in Time –

Just in Case. Companies are risk-oriented, study options from best-case scenarios to worst-case, and plan action strategies accordingly. The status quo option can allow firms to assess their strategies according to what the Atlantic region wants, based on the minimal standard of competitive behaviour of both public authorities and local private firms. They can also wait, because the signals are mixed.

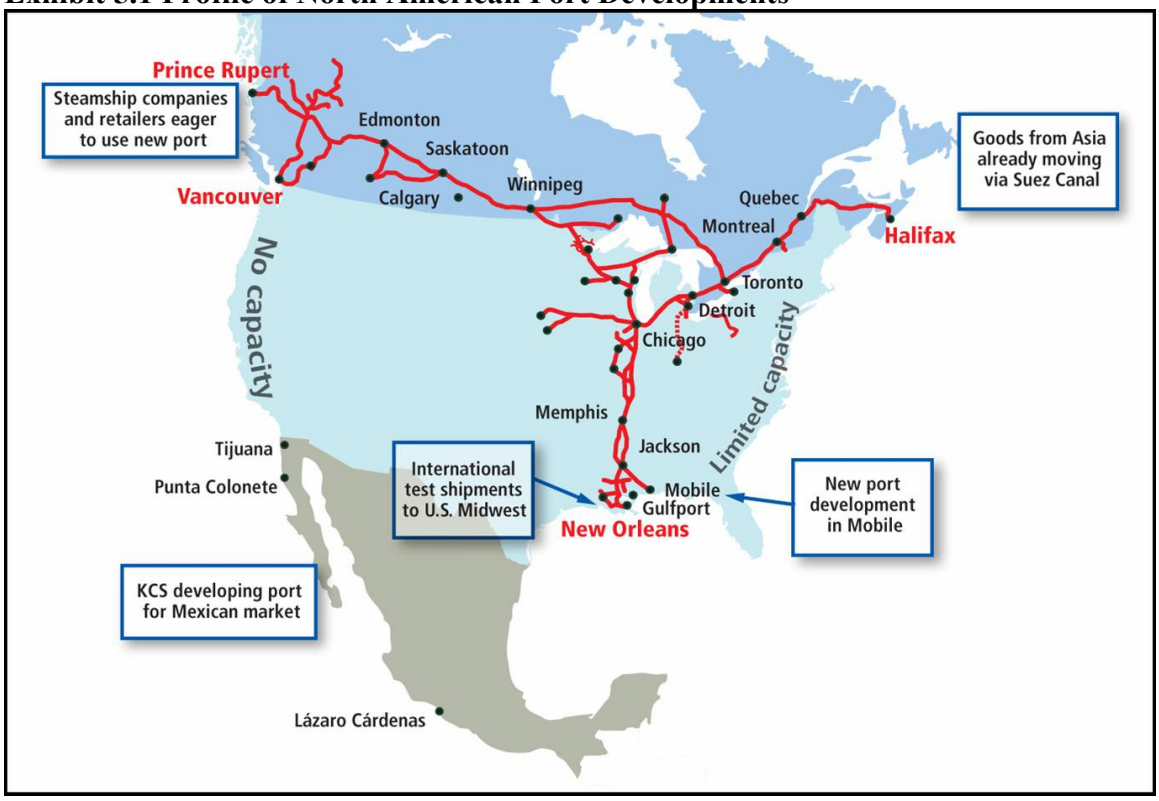
Within the region, the companies, bureaucrats, academics, and some politicians who deal with global issues are worried by the status quo, not because of their personal views, but because the Atlantic Gateway will be an opportunity thrown away. The economic impact is dramatic – based on the spin off benefit of container shipments in excess of $1,000 per container. Changing the inflow from about 640,000 containers in the three main ports by another million represents an economic injection of $1 billion a year, when all assets are utilized – railways, trucking firms, port workers and related sectors like ship repair, financial services, customers and security and the like.

Scenario Two – Incremental Development – The Transport Sector

The global shipping industry is just that: global. From Dubai to Hamburg, Yokohama to Memphis, a vast array of sophisticated experts devote their energies to the shape and structure of transportation systems around the world. In particular, multinationals, from auto firms to retailers, are reconfiguring their supply chains because of the global transportation supply chains. From IKEA, with vast new retail stores of 200,000 sq. ft. in places like Shanghai or Moscow, to firms like Toyota, with plans for car and truck plants across the world, companies assess investment strategies, employment opportunities and supplier linkages on the basis of JIT models and transportation.

What Canada at large faces, and what Atlantic Canada must address, is how the region fits into the global transportation supply chains. In Canada, national policy has addressed the West Coast issue, with an investment package amounting to $591 million. B.C. is now an extremely active player in Asia at all levels, from regular visits by the Premier, Cabinet Ministers, and private sector groups, and the Lower Mainland ports are integrating to form a new unified Port Authority. Vancouver is clearly the main container port in Canada, and West Coast container shipments are projected to double, from about two million TEUs per year to five million by 2020. However, there remain a lot of assumptions about the second West Coast port, Prince Rupert. Here, First Nation land claims, port infrastructure, and terminal construction are closely watched around the world, and by countries like Mexico, which sees its own port development as a possible competitor for the West Coast trade, possibly because, with China as a partner, time is on Mexico's side.

Exhibit 5.1 Profile of North American Port Developments



Source: CN

An incremental approach for the Atlantic Gateway is predicated on minimal regional political support, and thus is driven by the Port of Halifax, and the transportation partners in the trucking and rail industry. In one sense, time is on the side of Halifax, as it builds support among the global shipping companies and the terminal operators. Steps are already underway to build strategic alliances with the ports of Canso and Saint John, and the Port of Montreal is also a likely partner. In the short run, Montreal, with close government support provincially and federally, will gain increased container shipments per year, because the Quebec government wants to improve inter-modal transport along the Great Lakes-St. Lawrence marine corridor, possibly accelerating the use of inland shipping for bulk cargo, and as a compliment to an improved highway-rail network from Quebec City to Windsor. But Montreal can't cope with the very large ships, well over 5,000 TEUs, that will service North America. Alliances and cooperation are thus necessary. How far the ports are prepared to push cooperation to service the Atlantic coast, from overlapping board members, to cooperative marketing agreements, is a function both of practical necessity but also personalities and government edicts.

These developments compliment the Atlantic Gateway, because they fit a broader national transportation grid including roads, rail, marine and air. But an incremental strategy for the Atlantic Gateway is, in many ways, the least optimal, because it is centered on each province, and the inter-modal connections are not seen as a unified grid. Even provincial transport ministers know that highways are the provincial priority. As already noted, the perception of the Atlantic Gateway is that it is really a Halifax

Gateway, despite the fact that much of the Gateway strategy goes well beyond the Port of Halifax, including rail and trucking, and significant spin-offs for air transport, inland shipping, and short sea shipping serving the entire region.

Scenario Three – A Global Hub

Numerous studies and commentators have examined the Atlantic Region as a global transportation hub, instigated by the possibility of changes in global transportation and the use of very large ships. In 2005, the average carrying capacity per ship went from 2,235 to 2,324 TEUs, but the average age of ships is declining rapidly, as new tonnage for bigger ships comes from superior economics and environmental concerns (the same is happened with airlines). But the key issue remains: the growing use of very large ships, mega-carriers, like the new 9,200 TEU *MSC Bruxelles* and the 9,500 TEU *COSCO Guangzhou* for long-distance runs. Only Halifax on the Canadian East Coast has the port capacity, weather conditions and facilities to deal with these mega-ships.

A global hub strategy requires unprecedented coordination across the Atlantic Region, for two reasons. First, a global hub is a multi-purpose transportation hub, linking short sea shipping from big ships to smaller ships, and from one form of transport, e.g. marine, to rail and trucking. Within the region, both the Irving group (for oil) and Oceanex from Newfoundland are leaders in short sea shipping. Moncton is well advanced in thinking with plans for an inland container port for trucking and air cargo around the Moncton Airport. But again there are local challenges: even with more airlines and more cargo, the federal government has restricted funding for customs and security personnel.

To succeed, a global hub strategy would require public commitments by the federal and provincial governments to assure a measure of certainty for both the public and private sector. The direct analogy is probably not the Asia Pacific Gateway and Corridor but an initiative closer to the Atlantic Region, the Fixed Link, or 13 km bridge between New Brunswick and PEI. Once the federal government made the political commitment, it was left to the private sector, finance companies and the federal government to work out the best modalities, such as a tunnel, a car-truck bridge, a railway-road bridge, etc.. The central issue for the Atlantic Gateway is an unequivocal single voice undertaking to pursue the global transportation sector, with Halifax as the lead port. To the global shipping companies, that means a central message, lead by private sector players (Canadian manufacturers, retailers and transport companies) as well as the Atlantic provinces and the federal government.

5.2 Study Recommendations

The Atlantic Gateway's time has come. The Atlantic Gateway needs to part of a three-way national strategy, linking the Pacific coast ports, the Atlantic coast ports and the St. Lawrence-Great Lakes corridor. But any initiatives along these lines require a massive educational process, showing Canadians at large why the country intends to be a global player in international trade and willing to invest the time and money to design a transportation system that has global reach. This is not only a job for government,

although they are a part of it. It is not only the task of transportation experts to exert pressure on both the public and private sector, although they can demonstrate what other countries are doing. And the Canadian private sector must change its outreach programs by openly having their own Team Canada trade missions to demonstrate what the rest of the world, and Asia in particular, are doing to play the global trade game.

In the Atlantic region, the Atlantic Gateway is often seen as an abstract plan that detracts from immediate transport problems (roads and highways), or a distant issue that can be addressed in the future. At best, it is a national issue that can be addressed with federal money. Obviously, the people at the centre of trade and transportation policy-making, both in the public sector and the private sector, must recognize both the opportunities and the challenges to cultivate support for these Gateway initiatives. In one sense, the issue is not public policy or even education. It is a hands-on approach through travel and visits to the strategic ports in Asia, starting with Singapore, Yokohama and Shanghai, to see first hand the changes in the global transport sector. Otherwise, the Atlantic Gateway will remain a topic for specialized experts, and will serve as an interesting but abstract case study of opportunities missed. By definition, lack of concerted action reinforces the status quo. What are some action plans?

Federal Government

1. Canada is one of the few maritime economies without a national ocean strategy for national gateways and corridors. It is also one of the few industrialized countries without a national highway strategy. As globalization proceeds, not as an offset to US-Canada trade or NAFTA enlargement and integration, but as a close complimentary advantage, Canada must adjust its thinking and design transportation strategies accordingly. Time is not on Canada's side -- the changes taking place in Mexico and the US will soon be operational. As such, an Atlantic Gateway is a national priority and a natural compliment to the Pacific Gateway investments in new infrastructure. Operationally, the two are similar in the close nexus to global trade, but there are important differences as well.

    a) There are similar problems in developing a national corridor, linking the two gateways. How Canada reacts to new global shipping trends is a measure of the need for better coordination among the major container ports, especially Halifax and Montreal, not only for trans-Atlantic trade but container cargo through the Suez Canal, where Halifax is better situated to serve ultra large container ships.
    b) Changes to the *Canada Marine Act* should be seen as a federal priority, in particular the opportunity to allow ports to develop 3-P partnerships to finance new infrastructure, develop improved roadways and decrease the bottlenecks in inter-modal shipping. But unlike the West Coast, the Atlantic Gateway is not about massive investments in new port infrastructure, but in improvements to port access. Much of the port infrastructure can be undertaken by 3-P partnerships and the private sector, as container demand grows.

c) Manufacturers and retailers prefer a National Gateway Council, a private sector advisory group and gateway Port Authorities, to meet with the Ministers of International Trade, Foreign Affairs, and Transport to address long term and short term transportation issues. The transportation industry itself is sub-divided into new private associations so that long term planning gives way to immediate, crisis-oriented problem solving. How Canada deals with global transportation issues, given the distance apart of its two ocean ports when the large consumer markets are in Central Canada, is a serious trade and industrial challenge.

Council of Atlantic Premiers

The Council of Atlantic Premiers meets about three times a year, and serves as a coordinating body on public policy for the Atlantic Provinces. For the most part, the Council addresses operational issues (common drivers' licences, access to medical schools) rather than long-term issues like the demographics of the region, immigration or the Atlantic Gateway. Part of the challenge is that few bureaucrats in the region have traveled to Asia to see directly the changes in global transportation, or the key Asian ports. As a result, there are few provincial champions of the Atlantic Gateway because they have not seen the opportunities personally.

The Atlantic Gateway needs to be on the agenda of the Atlantic Premiers. Site visits to Asia are a starting point, because travel gives a context of the policy issues to be addressed. The Atlantic Gateway should be the basis of other policy linkages, from education to immigration, trade promotion to technology infrastructure. Nova Scotia has already taken a lead with a transport official in charge of Gateway issues for the province, but only a strategic approach by the Council will support related initiatives by other stakeholders.

Provincial Governments

Transportation is rarely viewed as an integrated policy with other industrial and service sectors, especially with trade. To some degree, this approach is understandable, because national policies for airports and the airline industry dwarf marine-related issues that impact global transportation. But the Atlantic Gateway offers the opportunity to reverse the approach: how do provincial transportation issues impact supply chain issues in the Atlantic Gateway. For instance, short sea shipping lanes that link the Atlantic Provinces with New England, and new short sea shipping from the Atlantic Region to Central Canada, especially for large bulk cargo, offer cost effective, environmentally friendly transport alternatives to clogged roads and highways.

Perhaps the biggest immediate concern for provincial governments is the critical shortage of skilled labour for the transport sectors. This shortage is a national problem, and exacerbated by the high salaries offered in Western Canada. But the shortage is a symptom that the education system responds slowly to skills shortages, even as the demand for skilled transport, trucking and port workers grows.

Trucking Industry

No group gains more from the Atlantic Gateway that the trucking industry. But the trucking industry nationally and regionally has its own challenges: the steadily rising price of fuel, shortage of workers, environmental and safety issues, the complicated features and expense of replacing the fleet, and new communications technologies. For the most part, the trucking industry has been a silent partner in the Atlantic Gateway, as other stakeholders have pressed forward or held back. The trucking industry is important for the overall transport sector, because it is diversified throughout the Atlantic region. It can play a special role in advancing the Atlantic Gateway strategy, because the benefits impact the entire region, not a single province, and certainly not a single port. The trucking industry, through its industry association, should become a champion for the Atlantic Gateway: it has immense credibility in the transportation sector, it is a partner to the railways, and it operates at all the key ports in the Atlantic Provinces.

Port Authorities

The key Atlantic Port Authorities are clearly in a transition, away from the bureaucracy of Transport Canada, where most transportation and sectors were highly regulated, to the new governance model of stand-alone Port Authorities. Across Canada, after some experience, most Port Authorities now realize that they must move away from internal, domestic concerns to global issues: new ships, new markets, new technologies and new talent pools. The global transportation supply chains require extraordinary levels of global coordination, say between Halifax and Shanghai, China and Calcutta, India, compared to Halifax and Sydney or Saint John and St. John's. In many ways, the Atlantic ports, aside from the needs of the new mega-carriers, can address niche markets, niche shipping lines and niche products. But that means greater levels of coordination, overseas marketing and understanding of inter-modal shipping. Not every port is suitable for the global transportation supply chains, and recognition of that issue is central to the advancement of the Atlantic Gateway as a national priority.

Railways: CN

CN has a monopoly on rail service to two Gateway ports, Halifax and Prince Rupert. In an ideal world, shippers would prefer a second line to provide competition. But there is little chance in the next decade that a second rail line will appear, or that CN will invest in a double-stack container train linking the Port of Halifax to US markets like Boston or New York. CN, like all railroads in North America, faces constant congestion problems, which lead to delays, postponed trips, leading shippers to trucking as an alternative.

But CN, despite the challenges of running a railway across the North American continent, now has huge advantages for the Atlantic Region. It has access to inland terminals in the US, opening the way to the Atlantic Gateway as an alternative to West Coast congestion. CN's new offices in Rotterdam and Shanghai offer European and Chinese contacts, alliances, and direct links to the biggest shipping companies as a vehicle to promote the

Atlantic Gateway, in concert with the Port Authorities and other stakeholders, including the Atlantic Provinces.

Community Colleges and Universities

Perhaps no sector better demonstrates the silo mentality in Atlantic Canada than the universities and the community colleges. The silos are dramatic: between universities and community colleges, between universities in one province and another, or between the community college in one province and another. Curiously, all these elements of higher education are publicly funded but the integrating mechanisms hardly exist. Now they face the challenge of steadily declining enrollment as the demographic bulge passes.

Yet around the world, universities and community colleges are integrating their domestic campuses and forming foreign alliances and joint ventures, and new forms of global partnerships. The supply chain issues emphasized in this study are not on the curriculum of most courses taught in the region, and there are few offers even of short-term certificate programs. Yet the Atlantic Gateway offers enormous potential for transportation issues and supply chain course developments that serve not only the Atlantic region, but other areas facing the same issues. From England to Tennessee, Shanghai to Dubai, new institutes are springing up to offer short-term certificate or university courses, including the applications to other sectors like health care. Even hospitals and medical schools are studying JIT, supply chain issues, and continual training as part of the health care debate.

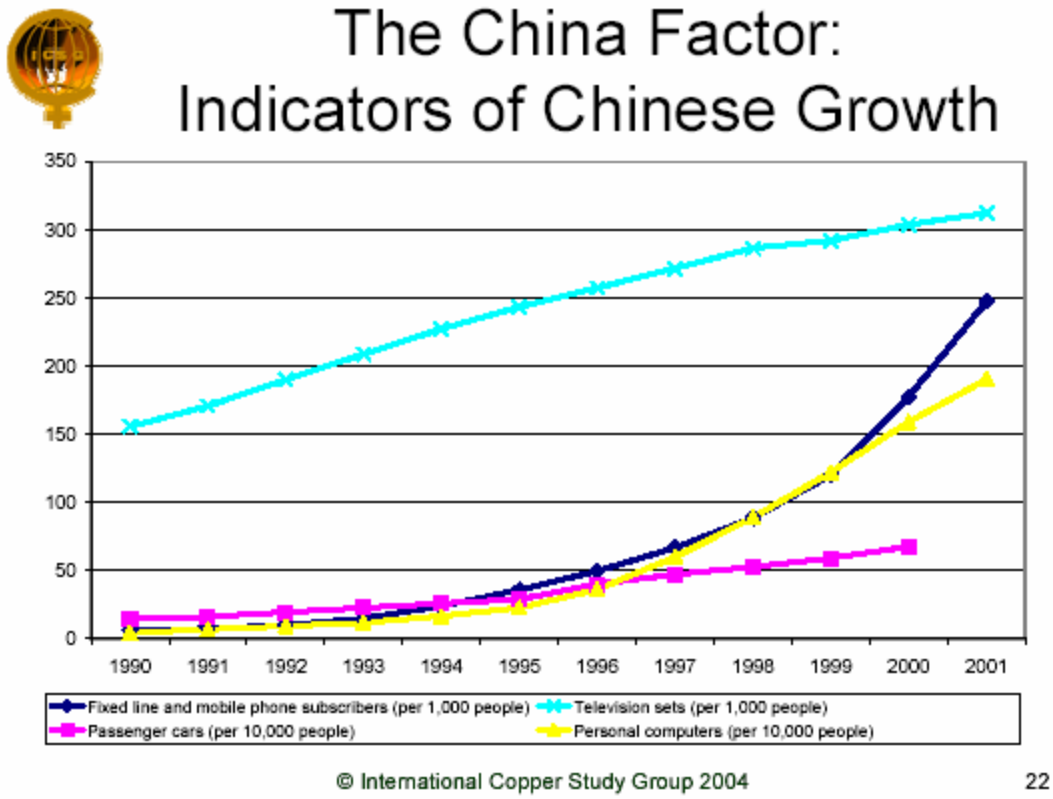
But quality programs need a critical mass of skilled experts, not one-off programs by unskilled teachers who have not studied, let along visited the leading ports, shipping companies, courier firms and airports, and leading edge supply chain companies.

Appendices

Appendix A - Demand Analysis for Containers

The single biggest change in demand for trans-ocean shipping and ports like Halifax is the phenomenal increase in global trade, which is on average doubling every 7-9 years. Double digit growth in China, and 8% annual increases in the GNP of India assure not only increased trade but increases in the demand for trans-ocean shipping, as both countries spread their customer base to the rich countries of North and South America, and Europe. The impacted sectors cross primary, secondary and tertiary industry groups. They include commodities, energy and food (including fruit and flowers, in addition to heavy goods like corn and wheat), industrial manufactures (cement and steel) to consumer goods (textiles, cars, consumer electronics) and service-related industries (aerospace, entertainment, financial). Both in India and China, industrial product, which creates the demand for container traffic, is growing at double digit rates, to 14.7% in China in 2006, 11.7% in India, compared to about 5.5% in Japan and the US, and a negative figure for Canada.

Exhibit A-1



The enormous growth in Asian and Chinese trade generally, and Asia-North American trade in particular, forces new demands on global logistics and corporate supply chain management. The capacity to handle increased ocean shipping is a function of both demand and supply. Increased demand for Asian goods in North America comes from both manufacturers and retailers. Increased supply is curtailed by capacity considerations,

where ports like Los Angeles and Long Beach, California may have to cope with double the demand in 2020 compared to2005, from about 17 million TEUs to 35 million in 2020. With growth at present levels, even the Panama Canal expansion is likely to be only part of the solution to the shipping industry's problem: booming global trade volumes, in excess of 10% a year. In North America, two new container ports, in Prince Rupert and in Lazaro Cardenas, Mexico are each initially expected to handle upwards of 500,000 TEUs per year.

For Canada, these issues represent a chicken and egg problem for port authorities: what comes first, improve the supply in terms of better facilities (terminals, infrastructure, roads, land and real estate development) or wait for growth in demand. In Canada, among federal and provincial bureaucrats, there is clearly a fear of a Mirabel phenomenon: huge expenditure in capacity but little demand for the facility. Atlantic ports have the unique advantage, unlike Vancouver and Prince Rupert, where congestion and various bottlenecks, plus imbalances in inbound-outbound throughput, create growing demand for ocean shipments directly to East Coast ports. Other issues include post-Panamax shipping in vessels above 8,000 TEUs through the Suez Canal, where the tonnage of containerized cargo is increasing by double digit rates, but not significantly yet for North American ports.

Interviews with large retailers in Canada show an ambivalent perspective on trans-ocean shipping, and the use of Vancouver or Halifax. At present, they are fully aware of the problems and challenges facing Vancouver, the continued congestion at the port and the many operational strategies to improve them, plus the investment plans for the Port of Vancouver. Clearly, Vancouver has its natural advantage as the Canadian port closest in shipping time to Asia. In the past five years, the port has been aggressive in dealing with the challenges of West Coast congestion, including strategies for better rail links, improved cooperation among the railway companies and the trucking industry, and development of the new port in Prince Rupert.

Vancouver also has two advantages for Canadian retailers located in Central Canada. The first is a legacy advantage, derived from years of experience dealing with the port, the major shipping lines, and other modes of transportation, including the railways and the trucking industry. This experience of cooperation is a form of competitive advantage, because the players have alliance networks that spread knowledge about past, current and future trends that allow retailers to build their supply chains between Asia and Canada. The second advantage is a cost factor: it is still cheaper to ship from say Shanghai via Vancouver to Toronto, than from Shanghai to Toronto via Halifax or Montreal. The different cost assessment is between $400-600 per container (all in costs), ignoring domestic time problems: shipping delays, internal problems of inland shipping (e.g. shortage of railway cars), etc.

Exhibit A-2 Obstacles to Growth

Vancouver	Halifax
Nearest port to Asia	Inbound cost disadvantage
High congestion	Road congestion
Record of strikes	Inadequate training
Far from markets	Inter-provincial silos
High imbalances	45% capacity
Cost competitive	

But this disadvantage is changing. For one thing, the levels of Asian imports are escalating fast, as much as 30% a year, or doubling in volume every 2-3 years. These levels of volumes increasingly challenge the strategies of traditional supply chains, because this cargo must be moved overland by truck or rail to be close to retail stores. Time becomes a competitive tool: delays or scheduling problems pose internal risks, and call for just-in-case thinking against just-in-time delivery. Further, retail store demand changes dramatically with the seasons. Global supply chain management is now much more complex between the Asian manufacturers and retail stores (e.g. imported barbecues and garden tools for the spring season, summer and fall clothes, winter sports gear). Leading companies recognizing the lead times necessary to prepare the stores for new arrivals, inventory sell off, and customer advertising of new products.

Like the airline industry and air cargo, global ocean-based shipping is not a function only of distances, because other factors are at play, including the type of cargo, the ease of inter-modal shipping at both ends of the voyage, and how many ports are involved across the supply chain. Clearly, Vancouver has the advantage of being the Canadian port closest to Asia. Shanghai to Vancouver, for instance, is about 32-35 days round trip sailing time, compared to Shanghai-Halifax via the Suez Canal at 62-65 days round trip. But all-in costs go beyond ocean container shipping: efficiencies at the in-bound and out-bound port, inter-modal connections at each port, including inland shipping connections, rail, and short-distance trucking and time to ship containers by rail or truck. Here Halifax has a distinct time advantage over Vancouver, two days vs. five to Toronto.

These changes in corporate supply chain management – higher volumes, just-in-case thinking, and closer attention to customer needs – also impact the wider issues of global transport issues: larger ships, greatly reduced cost per TEU over longer hauls, and better management of port facilities via easier loading-unloading into terminals and inter-modal transport. These factors build demand for the Port of Halifax and the Atlantic Gateway as an East Coast transportation hub. Consider three demand strategies: a) incremental growth, b) East Coast cooperative strategy, and c) a global hub.

a) Incremental Growth

Halifax is growing in TEU demand by 5-7% a year, or double its container volume of 550,000 per year every 10 years. That growth would reduce its current excess capacity from about 45% to zero, without dramatic changes in its infrastructure needs.

Year	2006	2007	2008	2009	2010
TEU (thousands)	550	577-588	606-630	636-674	668-721

It must be recognized that at these levels, Halifax is a very small port relative to global competitors (Appendix C), and relative to most ports even on the Atlantic Coast. Montreal has the advantage of large shipping from Europe to Canada and a judicious balance of in-bound and out-bound cargo.

b) East Coast Cooperative Strategy

Slowly, the Atlantic Provinces are realizing their strategic advantages as the region closest to Europe, closest to American East Coast ports for inland shipping, and closest for inter-modal shipping for vessels arriving from the Suez Canal. What the Atlantic Provinces lack is an integrated strategy as a transportation hub for both air cargo and ocean shipping. Canadian retailers, the biggest potential source of added demand, recognize this problem and watch events unfold, but are waiting for events to unfold rather than risk corporate resources in the short run.

Incremental TEU via Halifax

Atlantic provinces	10,000 – 30,000
Province of Quebec	20,000 – 30,000
New England	30,000 – 100,000
Other: USA	50,000 – 100,000
Other: Caribbean / South America	10,000 – 50,000

For instance, the Port of Halifax has most of the natural advantages of a deep-water port, and is the only serious candidate to host post-Panamax ships through the Suez Canal, prior to the completed developments of the Panama Canal, expected in six years. Estimates of inland shipping demand from the other Atlantic Provinces, from Quebec, and from the US, according to retailers and shippers, could be an increase in TEU demand between a low of 100,000 and a high of 300,000, especially with aggressive transport via new inland terminals like Memphis.

c) Global Hub

An aggressive strategy for Atlantic Canada is to develop a state-of-the-art global hub modeled on Singapore or Rotterdam, using all the transportation assets of the region – air cargo and airports, inland shipping and global shipping, and a sophisticated rail and road network to turn the region into an East Coast transport hub with links to Europe, South America, and the large consumer markets of central North America (east-west Chicago-Toronto-Montreal – and north-south from Memphis to Toronto).

Clearly, this is possible: a single post-Panamax ship carrying a weekly cargo of 8,000 TEUs increases volumes at Halifax by 400,000 TEUs per year, with an economic return of some $400 million. Doubling that is also possible, if the capacity challenges are met and an integrated plan for the region is adopted. A global hub strategy, even if implemented over a ten-year period, with investment commitments for infrastructure in the future, while IT, security and road infrastructure were improved, would accelerate international interest in the Atlantic Gateway. The development of the Panama Canal, with a forecast completion date of 2014, is only 7-8 years away, and most new infrastructure in Canada requires 24-36 months to get underway.

Appendix B - Supply Chain Imbalances and Transport Links

Case Study

Supply Chain Management: The Challenge of Line Balancing

Corporate supply chains are changing in two ways: from being an operational issue based on monthly, weekly and day to day demand forecasts linking suppliers and customers, to becoming a significant strategic issue, where growth patterns and investment are linked to supply chain strategies. The second change is equally profound: supply chains are no longer local or regional, but global, and link all forms of transportation links, from airlines and courier companies to freight forwarders, rail and trucking, and global shipping.

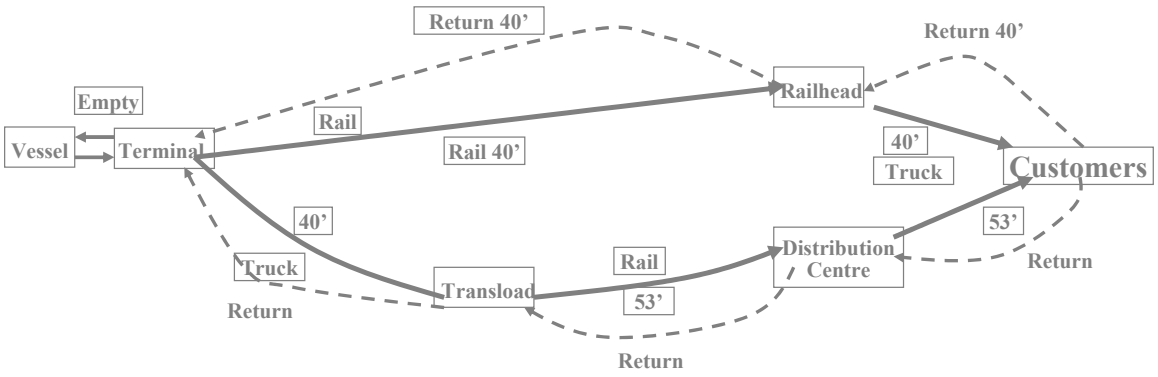
Consider these issues for a Canadian company, now recognized as a growth leader, which has anticipated and responded to customer needs. Canadian Tire has $9.1 billion in national retail sales, operates a range of 360 stores across Canada, and is intensively involved with shipment of goods from domestic suppliers to its warehouses and stores, as well as with suppliers from Asia. Like many Canadian manufacturers and retailers, global logistics and supply side management are central to the firm's strategic direction. Canadian Tire will invest $1.75-$2 billion in growth between 2005 and 2009, and has designed its supply chain strategies to be closely linked to its strategic investments. Canadian Tire works closely with its transportation supply chain partners, as shown in Exhibit B-1.

Canadian Tire, like many firms in Canada, must address the population distribution of the country, with the large consumer markets of Central Canada and the contiguous American states. As more goods flow from Asia, they must balance these import demands with sourcing goods from domestic or North American suppliers. Like many Canadian companies, Canadian Tire needs to balance this complex flow of goods and transshipments. It is a sensitive balancing act, involving constant tradeoffs and balancing transport costs, delays, bottlenecks, and shifting demand: for example, between imported goods and retail store demands, between domestic sourcing and international sourcing, between East Coast shipments and West Coast shipments, and between goods that have a long shelf life (e.g. tires, auto parts) and those that do not (custom items for the Christmas season).

Exhibit B-1

Supply Chain Infrastructure Assets:

Case Study of a Canadian Retailer

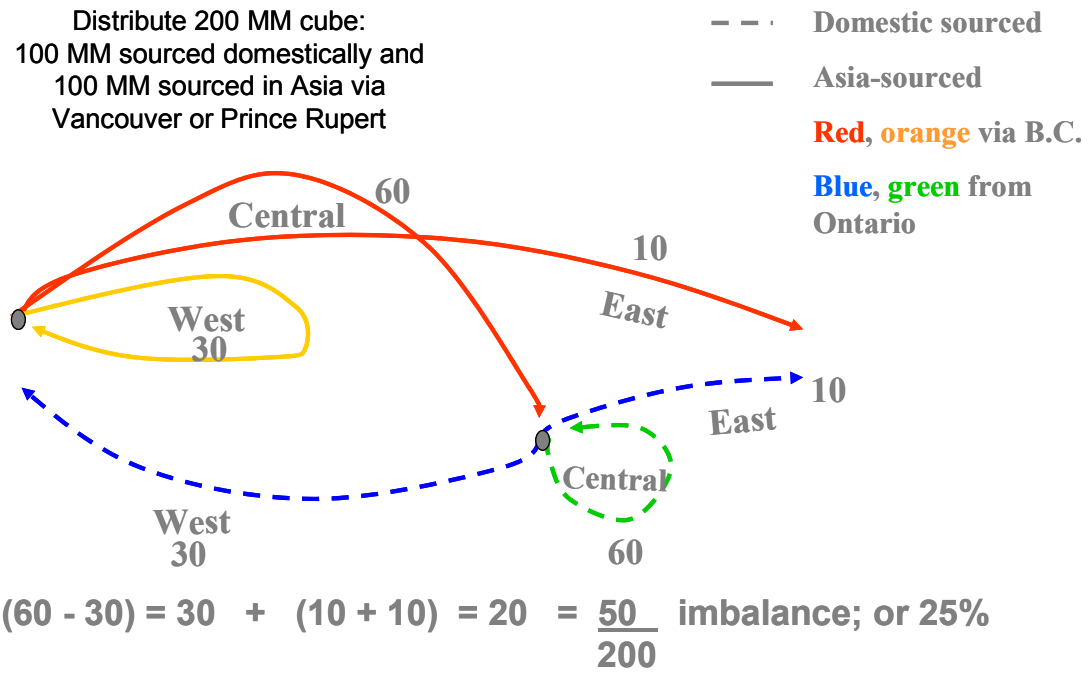


- **Synchronize existing terminal, railway and trucking operations to reduce total supply chain cost and increase throughput from existing assets.**
- **If each partner in the "vessel to customer" supply chain self-optimizes, then bottlenecks occur causing delays, increasing cost and reducing throughput.**

Source : Canadian Tire Corporation, Limited

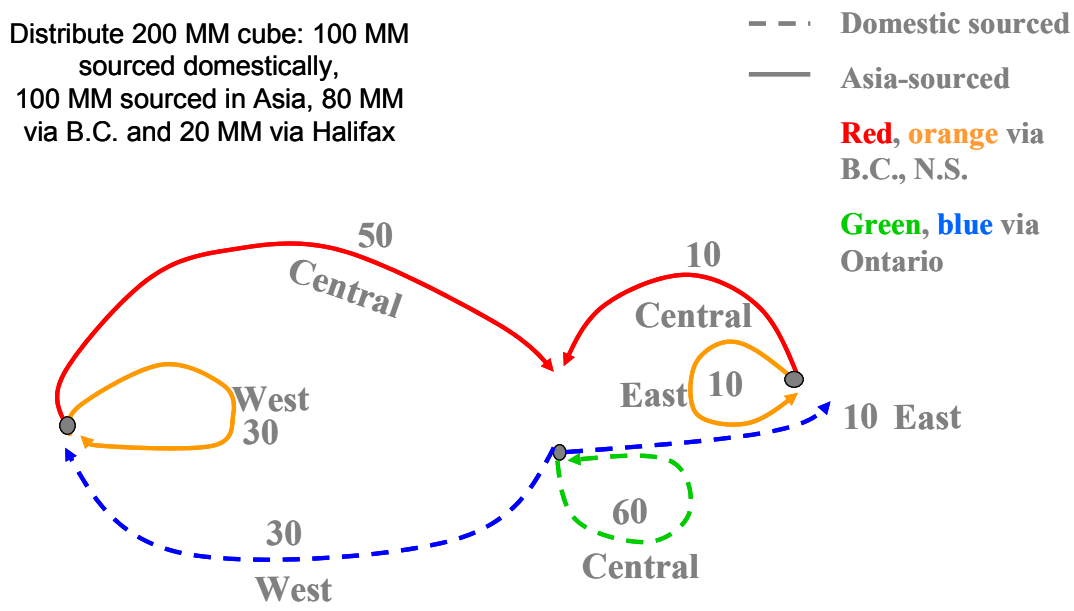
Exhibit B-1 illustrates the need to optimize the supply chain, as goods leave a vessel from a single port like Vancouver or Halifax. Clearly, the transportation supply chain must have all of the partners – Canadian Tire, the Port Authority, the ocean carriers, the inshore companies (truckers, railways), the terminal operators, not to mention employees, customs and security officials – constantly cooperate and share work practices in close alliance to cut out delays, focus on utilization of all assets (not simply one part of the chain), and minimize costs through delays, bottlenecks, congested roads, and the like. Firms like Canadian Tire design sophisticated supply chains to mitigate the challenges of supply chain imbalances, as well as the challenges of just-in-case. Consider the hypothetical case of a single, West Coast port strategy.

Exhibit B-2 Single Port Strategy: Hypothetical Example Cost of Imbalance



This example illustrates the need for line balancing, i.e. how corporate supply chains must fit into global transportation supply chains, involving ships, terminals, port authorities, rail and trucking, and corporate warehouses and distribution centres. Exhibit B-3 shows the hypothetical linkage when a company that imports 100 million cubes of goods from manufacturers in Asia, and 100 million cube in Canada, transports the Asian goods through a West Coast port like Vancouver. It will have a 25% imbalance. But using a West Coast port and an East Coast port like Halifax, firms can reduce their line imbalances, hence their all in costs, substantially.

Exhibit B-3 Hypothetical Two Port Strategy: Vancouver and Halifax Mitigates Line Balance Challenges



(50 - 30) = 20 + (10 - 10) = 0 = $\frac{20}{200}$ imbalance; or 10%

Appendix C - Port Capacity: Global Comparisons

World Port Ranking by Container Throughput

World Rank	Previous Rank	Port Name	Trade Region	Total TEU
1	1	Hong Kong	East Asia	22,427,000
2	2	Singapore	Southeast Asia	22,288,000
3	3	Shanghai	East Asia	18,084,000
4	4	Shenzhen	East Asia	16,197,173
5	5	Busan	North East Asia	11,840,445
6	6	Kaohsiung	East Asia	9,470,000
7	7	Rotterdam	Northern Europe	9,300,000
8	9	Hamburg	Northern Europe	8,087,545
9	10	Dubai	Mid-East	7,619,222
10	8	Los Angeles	North America West Coast	7,484,624
11	12	Long Beach	North America West Coast	6,709,818
12	11	Antwerp	Northern Europe	6,482,029
13	14	Qingdao	East Asia	6,310,000
14	13	Port Klang	Southeast Asia	5,543,527
15	17	Ningbo	East Asia	5,191,000
16	18	Tianjin	East Asia	4,801,000
17	15	New York/New Jersey	North America East Coast	4,792,922
18	22	Guangzhou	East Asia	4,684,000
19	16	Tanjung Pelepas	Southeast Asia	4,169,177
20	19	Laem Chabang	Southeast Asia	3,765,967
		Vancouver	Canada – West Coast	2,000,000
		Halifax	Canada – East Coast	550,000

Source: Containerization International, March 2006.

Appendix D - Global Shipping Lines

Ocean Carrier Ranking by TEUs in Service

Company	Ranking	Previous Ranking	TEU	Ships	Order Book TEU	Order Book Ships
Maersk Line	1	1	1,458,542	488	595,355	104
MSC	2	2	808,903	279	239,000	33
CMA CGM	3	3	418,479	150	319,900	59
Evergreen	4	4	355,265	122	19,646	3
Cosco	5	5	325,908	123	200,296	23
China Shipping Container Lines	6	6	323,989	93	137,190	16
APL	7	7	314,784	99	89,908	26
Hanjin	8	8	310,485	76	69,100	12
MOL	9	9	259,777	86	87,400	13
NYK	10	10	259,013	82	146,600	25
HLCL	11	11	245,805	61	52,500	6
OOCL	12	12	238,230	66	109,504	19
K Line	13	13	226,588	76	103,506	21
Yang Ming	14	14	193,459	70	130,642	29
CP Ships	15	15	190,329	78	29,771	7
Zim	16	16	160,790	56	62,141	13
Hamburg Sud	17	17	149,393	65	88,434	25
HMM	18	18	142,257	37	125,200	20
PIL	19	19	111,447	66	61,462	24

Source: Containerization International (March 2006)

Appendix E - The Panama Canal: Expansion Issues

The Panama Canal illustrates the dramatic changes to 20th century cargo transport, and illustrates the close nexus among three variables: the size of the port where containers embark, the size of the ocean-going ships, and the transport bottlenecks in the global supply chain, on land by roads and trucking or rail links, or by strategic land linkages like the Suez Canal or the Panama Canal.

The locks of the Panama Canal are 1,000 feet long and 110 feet across. About half the ocean going ships are designed to pass through the Panama Canal, but there is very limited extra space either ahead or behind each ship, or on each side. In the ocean transport business, such ships are called "Panamax" vessels. The challenge is two fold: as more cargo is transported across the oceans, in particular between Asia, mainly from China, but including shipping from Japan, South Korea and other Asian countries, to North America and Europe, the Panama Canal cannot easily handled the incremental demand, now about 5% of world trade. The second challenge is in the economics of ships. By the end of the 1970s, container ships could carry up to 3,500 20 ft. containers. In the 1980s, new ships could contain 4,200 20 ft. containers: the economics changed dramatically, with less construction costs of bigger ships (incrementally, less steel, less engine capacity, less fuel consumption) so that the costs per container declined by about 4%.

In this sense, the three maritime transport drivers – ports, ships, land-based bottlenecks – transform global supply chains, led by the shipping lines. Countries and national ports

were now subject to economic geography. Small ports and land-based bottlenecks gave way to the new economics of ocean shipping -- the precise combination of ocean shipping that reduced costs. It made sense to load and unload from very large, strategically-placed ports, where size reduced costs of labour (and associated factors like security, warehouse and terminal space per container). Traffic increased dramatically among the biggest ports – Rotterdam, Antwerp and Hamburg in Europe, Hong Kong, Singapore, Yokohama and Kaohsiung in Asia, New York and Long Beach in North America. As Levinson notes, "the ship line would make those decisions at its discretion – and it would make them based entirely on which combination of vessel operating costs, port charges, and ground transport rates would lead to the lowest total cost per box" (p. 236).

Clearly, the Panama Canal understands the limits of Panamax ships, based on the bottlenecks where ships are severely restricted in size. At present, containerships built before 1990 can travel through Panama's locks, but the Canal faces constant congestion. Waits of 3-4 days are common. Further, the new ships under construction will not be able to navigate the Panama Canal, putting growing pressure on other waterways like the Suez Canal. The maximum size of a containership navigating the Panama Canal is 295 metres long and 35 metres wide. When the Panama Canal Authority, a semi-autonomous government agency operating the canal since the US Government turned it over to Panama in 2000, announced a modernization program of $500 million, it recognized that the Canal will operate at full capacity by 2009. Although 5% of global seagoing traffic went through the Panama Canal in 2005, it was over a third by cargo weight for shipments from northeast Asia, mainly China, to the US East Coast.

Global shipping rates have prompted the Panama Canal Authority to design plans to double capacity at the Canal, in order to accommodate "post-Panamax" ships, designed by shipping carriers from Asia. The expansion program includes new locomotives to steady the ships in the locks, new lighting and superior safety systems. In 2006, 90% of the capacity of the Panama Canal is used, leaving little slack for repairs and maintenance, unscheduled delays, even as demand steadily increases.

The expansion will allow not only bigger ships but modern design modes: refrigerated ships, roll-on, roll-off car carriers, cruise ships, as well as large, traditional bulk carriers. The new lane of locks will be 427 metres long, and 55 metres wide, large enough to accommodate all but a few very large ships, such as the Emma Maersk, which will be a metre too long for the Canal. The Emma Maersk is 396 metres long, the equivalent of nearly four football fields, and can hold 22 containers across, compared to 18 for the current biggest ships.The expected cost of the expansion is $5.2 billion, which includes a 30% allowance for unforeseen cost overruns. The Canal Authority hopes to finance the expansion by increasing its tolls. The planned construction includes a third pair of locks at each end of the canal with new recycling chambers to use 7% less water than the existing locks, and new navigational channels that would be deepened and widened for the bigger ships. Now that Panamanians have approved the expansion in a referendum, completion of the project is expected in 2013 or 2014.

Appendix F - Leading Supply Chain Firms

Ratings of Supply Chain Firms by AMR Research

#	Company	2004 Rank	AMR Opinion (40%)	ROA (25%)	Inventory Turns (25%)	Trailing Growth (10%)	Composite Score
1	Dell	1	346	13.1	86.8	18.7	19.37
2	Proctor & Gamble	3 (+1)	289	11.4	5.7	18.5	13.23
3	IBM	4 (+1)	278	13.2	16.7	8.0	12.89
4	Nokia	2 (-2)	234	14.1	12.7	7.0	11.54
5	Toyota	6 (+1)	213	4.8	11.1	34.0	11.24
6	Johnson & Johnson	7 (+1)	191	16.0	3.0	13.1	10.91
7	Samsung	New	110	15.7	9.2	31.5	10.67
8	Wal-Mart	5 (-3)	241	8.5	7.3	10.3	10.41
9	Tesco	9	207	6.7	24.3	8.5	9.66
10	Johnson Controls	8 (-2)	172	5.4	24.2	17.3	9.21
11	Intel	19 (+8)	131	15.6	3.7	13.5	9.18
12	Anheuser-Busch	20 (+8)	129	13.9	11.7	5.6	8.29
13	Woolworths	12 (-1)	80	8.7	12.1	31.1	8.18
14	Home Depot	21 (+7)	108	12.9	4.7	12.8	7.81
15	Motorola	New	92	5.0	7.9	35.3	7.79
16	PepsiCo	10 (-6)	89	15.1	8.0	8.5	7.55
17	Best Buy	18 (+1)	112	9.6	7.2	11.8	7.13
18	Cisco Systems	New	59	12.5	4.7	16.8	6.74
19	Texas Instruments	New	24	11.6	4.3	27.9	6.55
20	Lowe's	22 (+2)	68	10.3	4.0	18.2	6.53
21	Nike	New	57	13.8	4.1	12.2	6.50
22	L'Oreal	23 (+1)	29	19.9	4.7	3.6	6.41
23	Publix Super Markets	New	42	13.7	12.9	10.3	6.31
24	Sysco	New	43	11.6	16.7	12.2	6.17
25	Coca-Cola	17 (-8)	54	15.5	4.8	4.4	6.09

Source: AMR Research, Top 25 Supply Chain for 2005

Appendix G - Asia-Pacific Gateway and Corridor Investments

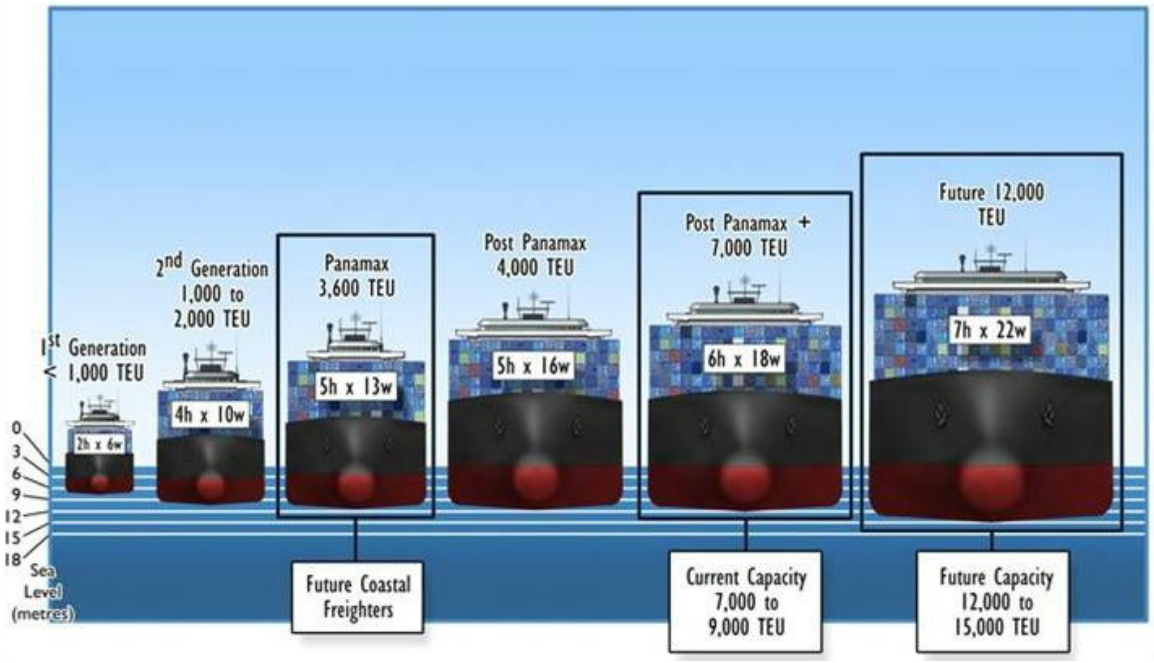
The Federal government announced *Canada's Asia-Pacific Gateway and Corridor Initiative* on October 11, 2006, committing $591 million in investments relating to the Gateway. Of the $591 million, $321 million was put forward for immediate commitments:

Immediate Investments

Pitt River Bridge and Mary Hill Interchange	$90 million over 4 years
Roberts Bank Railway Corridor Overpasses and Underpasses	Up to $50 million
Twinning of the Trans Canada Highway in Banff National Park	$37 million over 4 years
South Fraser Perimeter Road – Deltaport Connector	Up to $100 million
Environmental Assessment for South Fraser Perimeter Road	Up to $2 million over 2 years
Dredging at Fraser River Port Authority	Up to $4 million over 2 years
BC Lower Mainland Traffic Management Centre	Up to $2 million over 4 years
Border Services at Prince Rupert Port Authority	Up to $28 million over 4 years
Marketing of Gateway	Up to $7 million over 5 years

The majority of the remaining funds, approximately $234 million, have been put in to an infrastructure fund to be spent in future years. Some $27 million has also been allocated to a competitiveness initiative.

Appendix H - Diagram of Evolution of Containership Size



Source: Atlantic Institute of Market Studies with data from Prince Rupert Port Authority

Appendix I - Study Approach

Nova Scotia	Port Authorities (Halifax, Strait of Canso) Provincial Government Atlantic Canada Opportunities Agency Atlantic Institute of Market Studies Shippers Telecommunications Universities	Studies/Interviews Interviews Studies/Interviews Studies/Interviews Interviews Interviews Interviews
New Brunswick	Port Authority Atlantic Chamber Provincial Government Trucking Association	Studies Studies, Interviews Interviews Interviews
Prince Edward Island	Provincial Government	Interviews
Newfoundland and Labrador	Provincial Government Port Authority	Studies/Interviews Interviews
Montreal	CN Port Authority	Studies, Interviews Interviews
Ottawa	Transport Canada Prime Minister's Office Atlantic Canada Opportunities Agency Industry Canada	Interviews/Studies Interviews Interviews Interviews
Toronto	Importers Security Firms Retailers	Studies/Interviews Interviews Studies/Interviews
Ports Day - Halifax	Conference	Presentations Interviews

Appendix J - Glossary of Terms

Atlantica – a trade and transportation concept based on close integration between Atlantic Canada and New England.

FTA – Free Trade Agreements, illustrated by the US-Canada Free Trade Agreement, where countries reduce tariff and non-tariff barriers for the free flow of goods and services.

Hub And Spoke – a geographical term, copied from a bicycle wheel, where a central transportation hub (airport or ocean port) allows very big planes or ships to feed into in-coming cargo supply chains, as well as out-going supply chains, where size and density help to lower costs.

Just-In-Time (JIT) – a highly formal logistics process pioneered and perfected by Toyota Corporation, where parts and components from suppliers are delivered to a factory just as they are needed, thus reducing inventories and waste. More generally, JIT refers to logistical processes where time issues are central to the delivery of goods.

Open Skies Air Agreement – bilateral air agreements between countries, e.g. the US or Canada, allowing airlines from either country to land and takeoff at each other's airports, pick up passengers, and fly to other airports in the same country.

RFID – radio frequency identification devices are modern tools that actually date to the Second World War, now involving the exchange of information via radio waves between one object and a receiver/transmitter in a miniature electronic microchip.

Six Sigma – an analytic tool used to measure the defect rate out of a million units produced, and design a methodology to improve product quality.

TEU – Twenty-Foot Equivalent Unit – a transportation term referring to container size, used to denote 20-foot equivalent units, where a 40-foot container (typically employed in North America) is two TEUs.

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