EVERYBODY WINS:

Why Growing the Port of Halifax Matters to Moncton (and Saint John, Amherst, Bangor…)

DR. PETER W. DE LANGEN

STEPHEN KYMLICKA

The AIMS Atlantica Ports Series #2

Charles Cirtwill and Ian Munro

Series Editors

June 2007

Atlantic Institute for Market Studies

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b) investigating and analyzing the full range of options for public and private sector responses to the issues identified and acting as a catalyst for informed debate on those options, with a particular focus on strategies for overcoming Atlantic Canada's economic challenges in terms of regional disparities;

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ABOUT THE SERIES

The Atlantica Ports series

Atlantica is a region broadly composed of the Atlantic provinces, south-shore Quebec, the northern tier of New England states, and upstate New York. These territories have a number of characteristics in common – similar demographics, diversity, and migration; a shared history; and interrelated transport issues. These common qualities have led to common public policy interests.[1] The dominant container port in Atlantica is the Port of Halifax, while on a tonnage basis, the largest port in Atlantica is Canso, a significant energy hub. The ports of Saint John and Come-by-Chance are also significant players in the energy transfer business.

Ports provide a key service in the transportation network that moves goods from producer to consumer. All goods and network connections do not have the same needs, however, and so the strategy of any port must be tailored to realistic trade flows. The Atlantica Ports Series takes a comprehensive look at the existing flows, industries, and services that surround Atlantica and asks: What opportunities exist for Atlantica ports to increase volumes? One option would be for industry surrounding the ports to grow. This background paper focuses on the cluster of port-related and support industry companies in the hinterland around the Port of Halifax. It discovers that, like all container ports, Halifax has developed a significant cluster of transportation related companies. Unlike other ports however Halifax's cluster is spread across a far larger geographic region and so growth (or decline) in Halifax has far larger regional implications.

[1] For further information, please see <http://www.atlantica.org>.

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With regard to contract research, he has participated in studies on change processes in the Port of Rotterdam, international policies related to seaports, clustering in maritime industries, governance in seaport clusters, entrepreneurship in seaports and innovation in ship design.

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EXECUTIVE SUMMARY

This report looks at the Port of Halifax and tries to understand the structure of its cluster. Specifically it looks at the direct and support services for transportation providers. It also looks at associated port-led industry, warehousing and distribution. While industry surrounding the Port of Halifax participates in all of these areas, it participates less than expectations derived from port container volume. However, by analyzing the catchments area for the port, a more balanced picture emerges.

The major finding of the report is that the major beneficiaries of the port are not localized in Halifax, but dispersed through the region as suppliers, consumers, transportation providers and regional distribution hubs. Not all supporting industries are equally concentrated however and the port would likely benefit from a stronger warehousing and distribution base. Market forces may be addressing any shortfalls as seen in recent investments in the port, transload facilities and corridor infrastructure. These investments provide additional reasons for regional integration in the port cluster. The success of the Port of Halifax and the region are tied in a virtuous circle; when one wins, we all win.

INTRODUCTION

Much of the discussion around an Atlantic Gateway has focused on the need of the continental interior to access Asian goods that are clogging west-coast ports. This is an interesting idea; however, it begs many questions for Atlantic Canadians, not the least of which is "how can I profit from this?" This may sound like the usual Balkanized response derived from decades of hand-outs; however, the question is fair enough.

In part, the answer lies in understanding the current role of the port. Ports tend to adapt slowly. They rely on ships, which can move, but also on port infrastructure, highways, trains and air connections all of which are pretty stable on medium term (10-year) horizons. They also depend on port-led industry, warehousing and various support services. The analytical tool for studying the structure of a port is a cluster. The framework employed in this paper relies heavily on the work of Eenhuizen (2002) and de Langen (2004). The paper provides background material on the tool, using Rotterdam as an example.

After a brief introduction to the Port of Halifax, the tool is applied to a case study of the Halifax port cluster. The results are surprising in that Halifax appears to have fewer port-related businesses than expected. Given the distance between Halifax and the next container port, the report then widens its scope of inquiry to include surrounding communities that use the port. The picture that emerges is of an interconnected network of industries and transportation support services which use the Port of Halifax as their preferred gateway to the world.

THE CLUSTER CONCEPT

The concept of clustering has become central for analysing the competitiveness of nations (Porter 1990), industries (Panniccia 1999), and firms (McEvily and Zaheer 1999). Clusters have four main characteristics.

First, a cluster is a population of interdependent organizations. These organizations – predominantly firms – operate in the same value chain and to some extent have a shared competitive position. For that reason, they are interdependent: when one firm attracts business, other firms benefit, and when a firm goes bankrupt other firms lose a customer or supplier.

The second characteristic is that clusters are geographically concentrated. Different clusters have different relevant cluster regions and can occur at a variety of scales.

The third feature is that the cluster population consists of four kinds of organizations: business units, associations, public-private organizations, and public organizations. Business units may be organizational units or firms as a whole.

The final characteristic is that the cluster population is linked by a core specialization. All organizations in the cluster are somehow related to this core specialization – there are “banking clusters”, “bio-technology clusters”, and also “port clusters”.

Thus, the seaport cluster consists of business units, associations, and public or private organizations that have relatively strong interrelationships, are functionally linked to the core specialization of the cluster, and are located in the proximity of the seaport. Indicators of the strength of links include the use of common cluster resources and membership in cluster associations.

PORTS AS CLUSTERS

The geographical concentration of similar and complementary economic activities is a widespread phenomenon (Krugman 1991). Firms in various industries cluster together in specific regions. Seaports are not just nodes in a transport chain, but may be seen as regional clusters of economic activities. Central to the cluster perspective is the recognition that the development of individual firms in a cluster depends crucially on the development of the cluster as a whole. The arrival of cargo and ships in ports has always attracted related economic activities.

Cargo handling – including all activities such as pilotage and stevedoring that together facilitate the loading and unloading of cargo – is the core specialization of seaport clusters (Teurelinx 2000). All economic activities related to the arrival of goods and ships are included in the port cluster. Cargo-handling functions are intrinsically linked to transport activities, such as shipping and forwarding. These activities locate in seaports precisely because seaports are transport nodes. Thus, transport firms are included in the port-cluster population. As centres of goods handling and storage, and because of the abundant presence of transport services, seaports are attractive locations for logistics services, such as storage, assembling, re-packing, and consolidating, which are strongly related to transport and cargo handling. Many firms offer cargo handling, transport, and logistics services in one integrated package. This shows the strength of the links between these activities.

Ports are also industrial zones. Because they can handle and store bulky industrial raw materials such as oil, coal, and iron ore, seaports are often centres of manufacturing, such as the chemicals and steel industries. A seaport location greatly reduces cargo-handling and transport costs. When cost minimization is crucial for competitive production, industries locate in seaports, where their production activities are closely integrated with logistics and transport. In addition, ports are centres of trade. For some commodities, such as agricultural products, steel, and oil, trading takes place in the same place as storage, either because buyers and sellers want to see the product, or because information on shipping prices is a crucial part of the services and strategy of trading companies. When trade and storage are related, trading activities are included in a port cluster.

Thus, cargo handling, transport, logistics, specific production functions, and some trading activities are strongly interrelated, and they constitute the "port cluster". The relative strengths of these activities will vary with the role of the port; however, a concentration of these activities is a measure of the port's strength. One method for measuring a "localization quotient"[2] would be to compare the importance of cluster firms to a region to the importance of the same cluster to the country. Table 2 shows an analysis of the regional concentration of these port activities, in the case of Rotterdam, using the following formula (de Langen, 2004):

[2] See Appendix 1 for a discussion of methodology and terminology.

$$localization\,quotient = \frac{(no.\ of\ \ Rotterdam\ cluster\ \ firms / total\ no.\ Rotterdam\ \ firms)}{(no.\ of\ \ Netherlands\ cluster\ \ firms / total\ no.\ Netherlands\ \ firms)}$$

In other words, a score of 2 would mean that the concentration of a particular type of firm in Rotterdam was twice that of the Netherlands national average. While it might be argued that urban communities naturally have a greater concentration of firms, each community will specialize in different industries. High concentrations tend to attract related industries, thereby further enlarging the cluster.

Figure 1: Concentration of cluster activities in Rotterdam, 2002

Component	*Activity Description*	*Localization Quotient*
Cargo handling	Marine cargo handling	7.7
	Port and harbor operations	4.7
Transport	Freight transportation arrangement	4.6
	Inland water freight transportation	4.0
	Coastal freight transportation	3.8
	Other support activities for water transportation	3.7
	Pipeline transportation of crude oil	3.5
	Deep sea freight transportation	3.2
Logistics	European distribution centres	3.1
	Support activities for transportation	3.0
	Process, physical distribution, and logistics consulting services	0.7
Manufacturing	Industrial gas manufacturing	4.9
	Pipeline transportation of crude oil	3.5
	Petroleum refineries	3.4
	Petrochemical manufacturing	3.1
	Petroleum and petroleum products wholesalers	1.8
	Basic chemical manufacturing	1.7
	Flour milling and malt manufacturing	0.7
	Iron and steel mills	0.6
Trade	Petroleum and petroleum products wholesalers	1.8
	Chemical products wholesalers	1.4
	Metal and mineral (except petroleum wholesalers	1.0
	Grain and field bean wholesalers	1.0

Source: Bureau van Dijk (2003).

The relevant port region is not limited to the municipality where the port is located because other municipalities in the vicinity also specialize in port-related activities (see Figure 2).

Figure 2: The port cluster region in Rotterdam, 2002

Municipality	*Total Number of Firms*	*Cluster Firms*	*Localization Quotient*
Moerdijk	537	115	6.6
Rhoon/Portugaal	1,744	224	4.0
Zwijndrecht	3,214	409	4.0
Lekkerkerk/Krimpen aan de Ijssel	2,345	200	2.6
Hardinxveld Giessendam	1,629	128	2.4
Ridderkerk	3,947	290	2.3
Maasland	1,105	80	2.2
Papendrecht	2,163	146	2.1
Alblasserdam	1,343	88	2.0
Krimpen a/d Lek	1,305	79	1.9
Rozenburg	567	34	1.9
Barendrecht	3,168	185	1.8
Rotterdam	55,986	3,253	1.8
Dordrecht	9,082	525	1.8
Hendrik Ido Ambacht	1,660	93	1.7
Spijkenisse	3,424	183	1.7
Capelle a/d IJssel	5,617	235	1.3
Brielle	1,414	59	1.3
Geervliet	1,025	42	1.3
The Netherlands	1,417,506	45,656	1.0

Source: Based on data from Bureau van Dijk (2003).

This analysis shows the specializations of the port and the relevant port region and, through comparison with ports of similar specialization, provides a basis for growth activities. In the case of Rotterdam, the importance of the petrochemical industry can be seen in the fact that the top five manufacturing activities associated with the port are in this industry. This specialization is continued through the components of transportation (that is, pipeline transportation) and trade (for example, petroleum and petroleum products wholesalers). For the sake of brevity, the industrial level of detail is not presented for the satellite municipalities; however, the basis for inclusion in the port region is their high industrial use of the port (as seen in their concentration indices) and the associated logistical services in Rotterdam itself. Much more detail would be needed to determine where there are opportunities for growth.

HALIFAX CASE STUDY

Port Attributes

Halifax is the world's second-largest harbour, scooped out by glaciers to a depth of 18 metres (55 feet). Since no large river flows into the harbour, it requires no dredging. It is ice-free all year and is the first mainland port on the great circle route from the English Channel to New York City.

Halifax was founded in 1749 as a British military outpost with 2000 settlers. Its main purpose was to be a balance to the French fort at Louisbourg. Since the founding of the city, the port has played a dominant role in the development of the city.

Halifax has a rich military history and played a crucial part in the activities of the navies and merchant marine in both World Wars. According to the 2001 census, the Canadian Armed Forces, including Maritime Forces Atlantic (MARLANT), which operates the naval dockyards at CFB Halifax, was responsible for over 3000 jobs in Halifax. Other important military maritime facilities are the docking facilities at CFB Shearwater and the various Canadian Coast Guard operations.

Figure 3: Terminals operated under the Halifax Port Authority

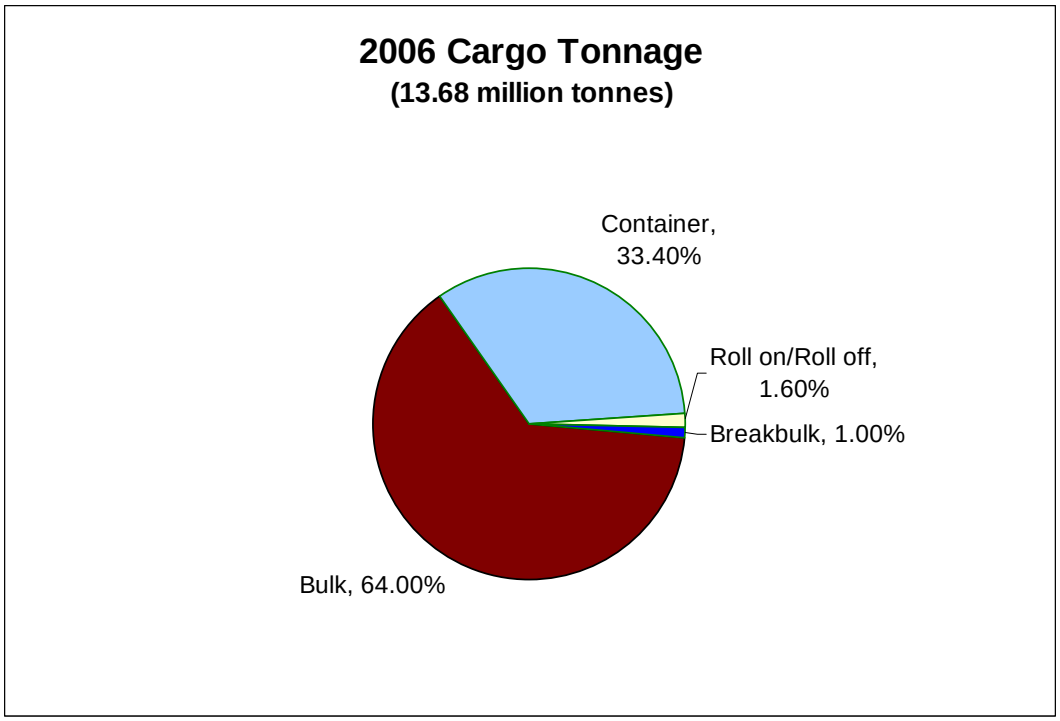
- South End Container Terminal – Piers 36-42 (operated by Halterm Limited)
- Ocean Terminals – Terminals A and A1 (Piers 23-34) including the Halifax Grain Elevator
- Seawall – Piers 20–22, Cruise Ship Pavilion, and Pier 21 museum
- Richmond Terminals – Piers 9 and 9A
- Richmond Offshore Terminals – Piers 9B–9D (supply base for offshore activity)
- Fairview Cove Container Terminal (currently operated by Cerescorp)
- National Gypsum Wharf
- Woodside Atlantic Wharf (owned by NSBI – vessel lay-up and repair)
- Imperial Oil Wharves (serving the Dartmouth refinery)
- Autoport (operated by CN Rail)

Note: The container terminals and several bulk terminals have on-dock rail and access to the CN Halifax Intermodal Terminal.
Source: Halilfax Port Authority website.

Figure 3 lists the terminals operating under the Halifax Port Authority. In addition there are several marinas, the Halifax Shipyard, which is a mid-sized vessel construction and repair yard run by Irving Shipbuilding; various naval facilities, and the Bedford Institute of Oceanography facilities for various government scientific vessels.

Indicative of the changes in global trade practices is the increase in the number of containers coming through the Port of Halifax. However, Halifax has long been a major source of dry bulk gypsum and liquid petroleum commodities, and their export dominates the port in terms of total tonnage. The current breakdown can be seen in Figure 4.

Figure 4: Halifax throughput, 2006



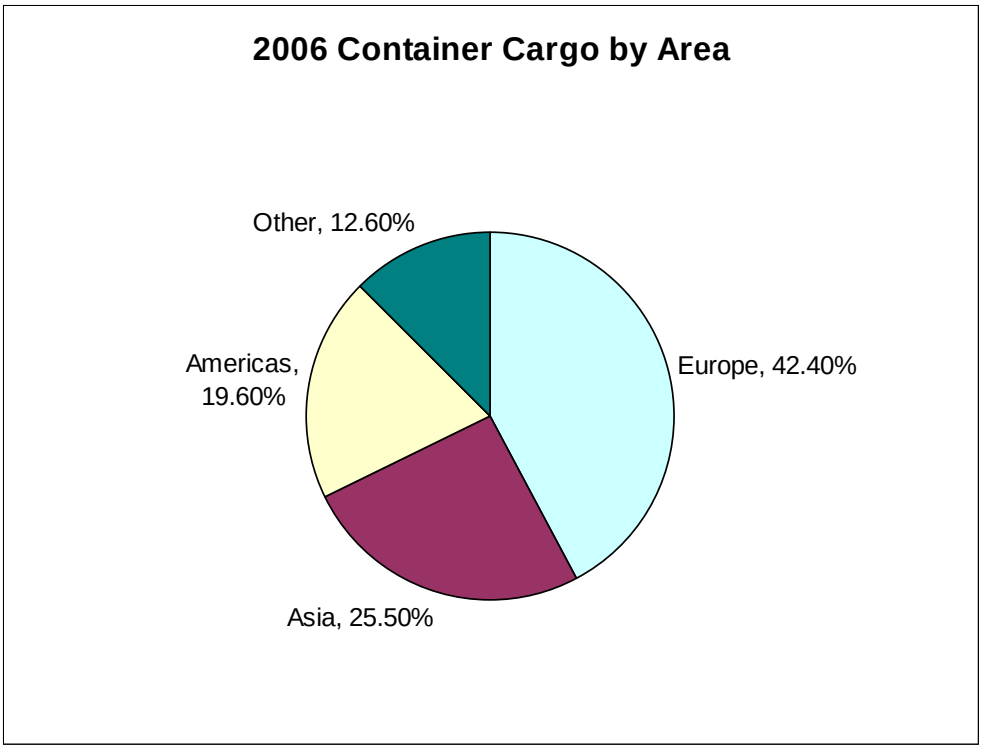
Note: Break-bulk is cargo shipped in various-shaped packages as opposed to standardized containers. Bulk is non-packaged material (e.g., liquids, coal).
Source: Port of Halifax Website, 2007

In 2005 the port handled over 550,000 TEUs containing 2,085,335 tonnes for import and 2,559,660 tonnes for export. Of this container traffic, between 65 and 70 percent arrived or departed by rail. More than half started or ended in Ontario or Quebec, and 17.3 percent started or ended in the American Midwest. The rest arrived or departed by truck. Twenty-two and a half percent starts or ends in the Atlantic provinces; 3.6 percent has New England as a market.[3] The dominant trade lane for this last segment triangulates in Montreal or Ontario for return cargo.

Containerized export cargo has many destinations (see Figure 5).

[3] Patrick Bohan, personal communication with author, April, 2006.

Figure 5: Export destinations for container cargo, 2006



Source: Port of Halifax website, 2007

The variety of destinations, which is unique, reflects the fact that Halifax is a regular stop on many shipping routes. These routes exploit Halifax's position far out into the Atlantic Ocean; a position that makes Halifax not only the closest North American mainland port to Europe, but also the closest North American port to Africa and the second-closest to Brazil (after Miami).

Halifax as a cluster

For the Halifax study, employment rather than number of firms was used for the calculation of industry concentration. As such, the term "concentration index" is used rather than "localization quotient". These concentrations can be seen in Figure 6.[4] As a reminder, an index value greater than one means that Halifax would have a greater concentration of people working in a field than the national average.

As expected, support activities for water transportation are very clearly concentrated in Halifax (with a concentration index of 4.93). The importance of support activities for rail transportation (concentration index 4.06) results from the fact that Halifax is a terminus for a class 1 rail line that takes 65–70 percent of the container cargo into and out of the Maritimes. Other notable strengths are ship and boat building, although this is largely ship repair as opposed to building (3.24); sugar and confectionary product manufacturing (2.82); manufacturing of navigational,

[4] Detailed comments on methodology and comparativeness can be found in Appendix 1.

measuring, medical, and control instruments by several firms (2.14); support of and transportation by air (1.37 and 2.30 respectively); and water transportation itself (2.01).

Given the containerization of global maritime traffic, the analysis has focused on those industries that most directly support container-based port activities. However, Halifax benefits from several other industries that contribute indirectly to the health of the port. For example, not included in the cluster are defence services (8.28) and scenic and sightseeing transportation. In 2006, 169,821 passengers arrived in Halifax on cruise ships[5].

Figure 6: Concentration of cluster activities in Halifax, 2001

NAICS Activity Description	***Canada, Workforce***		***Halifax, Workforce***		***Concentration Index***
	N	%	*N*	%	
Total labour force	***15,872,070***	***100***	***196,590***	***100***	***1.0***
Ship and boat building	14,695	0.1	590	0.3	3.2
Sugar and confectionery product manufacturing	13,175	0.1	460	0.2	2.8
Navigational, measuring, medical, and control instruments manufacturing	23,730	0.2	630	0.3	2.1
Beverage manufacturing	29,175	0.2	480	0.2	1.3
Aerospace product and parts manufacturing	54,600	0.3	790	0.4	1.2
Petroleum and coal products manufacturing	15,940	0.1	225	0.1	1.1
Medical equipment and supplies manufacturing	19,615	0.1	240	0.1	1.0
Dairy product manufacturing	22,160	0.1	225	0.1	0.8
Seafood product preparation and packaging	39,800	0.3	385	0.2	0.8
Cement and concrete product manufacturing	26,115	0.2	240	0.1	0.7
Manufacturing Subtotal	***259,005***	***1.6***	***4,265***	***2.2***	***1.3***
Pharmaceuticals, toiletries, cosmetics, and sundries wholesaler-distributors	27,635	0.2	535	0.3	1.6
Other machinery, equipment, and supplies wholesaler-distributors	53,530	0.3	1,015	0.5	1.5
Beverage wholesaler-distributors	9,545	0.1	170	0.1	1.4
Food wholesaler-distributors	78,355	0.5	1,355	0.7	1.4
Petroleum product wholesaler-distributors	14,765	0.1	250	0.1	1.4
Paper, paper product, and disposable plastic product wholesaler-distributors	14,940	0.1	240	0.1	1.3
Recyclable material wholesaler-distributors	18,200	0.1	285	0.1	1.3
Wholesale agents and brokers	40,715	0.3	605	0.3	1.2
Chemical (except agricultural) and allied product wholesaler-distributors	12,370	0.1	180	0.1	1.2

[5] Port of Halifax website.

Lumber, millwork, hardware and other building supplies wholesaler-distributors	51,205	0.3	700	0.4	1.1
Trade/Distributors Subtotal	***321,260***	***2.0***	***5,335***	***2.7***	***1.3***
Support activities for rail transportation	3,285	0.0	165	0.1	4.1
Support activities for air transportation	22,140	0.1	375	0.2	1.4
Freight transportation arrangement	27,810	0.2	385	0.2	1.1
Support activities for road transportation	25,200	0.2	270	0.1	0.9
Warehousing and storage	32,160	0.2	185	0.1	0.5
Support and Logistics Subtotal	***110,595***	***0.7***	***1,380***	***0.7***	***1.0***
Scheduled air transportation	60,060	0.4	1,710	0.9	2.3
Deep-sea, coastal, and Great Lakes water transportation	12,875	0.1	320	0..2	2.0
Specialized freight trucking	86,190	0.5	780	0.4	0.7
Pipeline transportation of natural gas	2,465	0.0	20	0.0	0.7
General freight trucking	165,015	1.0	990	0.5	0.5
Transportation Subtotal	***326,605***	***2.0***	***3,820***	***1.9***	***0.9***
Support activities for water transportation	10,890	0.1	665	0.3	4.9
Direct Port Support Subtotal	***10,890***	***0.1***	***665***	***0.3***	***4.9***
Grand Total	***1,028,355***	***6.5***	***15,465***	***7.9***	***1.2***

Source: Statistics Canada (2002).

Given that Halifax is the only sizable port east of Montreal, the relative weakness of transportation (0.9), support and logistics (1.0) and the overall cluster's weakness (1.2) are striking. Even allowing that most of the cargo traffic through Halifax has a destination or origin in the continental interior, 22% is still regional.

The top 15 containerized exports through the port are listed in Figure 7.

Figure 7: Top 15 containerized exports through the port of Halifax, 2006

Commodity	*Tonnage*	*% of Exports*
Paper - Newsprint: Roll/Sheet	312,001	13.3%
Misc Manufactured Goods	187,407	8.0%
Vegetables - Other Edible	158,107	6.8%
Wood - Woodpulp	156,442	6.7%
Fish - Fresh/Chilled	118,532	5.1%
Machinery - Machinery, Mechanical Appliances, Parts	104,785	4.5%
Misc - General/Mail/Etc	92,324	3.9%
Paper - Other	77,423	3.3%
Paper - Scrap	68,668	2.9%
Fish - Other Shellfish	63,772	2.7%
Peat	62,627	2.7%
Meat - Beef:Frozen	57,956	2.5%
Vehicles - Other Parts	57,554	2.5%
Textile - Other Articles	46,557	2.0%
Ores - Asbestos	38,690	1.7%

Source: Port of Halifax.

An analysis of the cargo shows the practice in Nova Scotia of locating manufacturing, warehousing, and logistics at hub points outside the port and the world trend toward the containerization of bulk commodities. Many of these exports are regional in origin. Much of the pulp and paper cargo draws from Nova Scotia and New Brunswick, the peat from New Brunswick, and mining and agricultural products from the Maritime provinces. Special note should be made of the fishing industry in Nova Scotia. Fishing is not a dominant industry in metropolitan Halifax (1.19), but provincially it has the highest concentration index (8.67) with the preparation and packaging of seafood products ranking second (6.07). Results for imports are in Appendix 2. Most of these commodities have the continental interior as their primary destination; however, rubber stands out as destined for Michelin's three Nova Scotia plants.

The regional cluster

Given this dispersal, the Halifax cluster needs to be reconstituted as a regional entity. A project of this size cannot capture all of the local nuances of industry employment; however it can capture the use of regional hubs in importing or exporting for local industry. Although rail support for the historic hubs is now weak, the hubs continue to provide large flows for the port by truck. For this study, Kentville, Truro, New Glasgow, and Moncton were analyzed. In fact, when the same categories, including support activities for water transportation, were used, these satellite communities all score a higher concentration index than Halifax. Detailed results for the satellite communities can be seen in Appendix 3. For comparison, other selected Canadian port cities can be seen in Appendix 4.

When the Halifax cluster is reconstituted to include these satellite communities, a much stronger picture emerges (see Figure 8).[6] It is most striking that the addition of several manufacturing centres raises the cluster concentration index for the manufacturing component from 1.33 to 1.78. All components benefit from the aggregation, because of the specialization of roles. For example, rail transportation, at 0.38, does not appear on the Halifax list, but it is 0.85 on Moncton's role as a rail hub.

Even with aggregation, it is clear that Halifax has certain weaknesses. First and foremost is the poor performance of warehousing and storage within the context of logistical support. The reasons for this performance are discussed in some detail below. And while trucking and support for trucking are comparable to national averages, they do not provide any competitive advantage to the port. Conversely, some industries (for example, fishing) will be understated if they are based largely in rural areas and not in the satellite communities.

Figure 8: Concentration of cluster activities in the port catchments region, 2001

NAICS Activity Description	*Concentration index*
Railroad rolling stock manufacturing	4.2
Rubber product manufacturing	3.3
Ship and boat building	2.3
Sugar and confectionery product manufacturing	2.0
Navigational, measuring, medical, and control instruments manufacturing	1.6
Fabric mills	1.6
Beverage manufacturing	1.3
Meat product manufacturing	1.2
Animal food manufacturing	1.2
Medical equipment and supplies manufacturing	1.2
Manufacturing Subtotal	***1.8***
Petroleum product wholesaler-distributors	1.9
Food wholesaler-distributors	1.9
Recyclable material wholesaler-distributors	1.5
New motor vehicle parts and accessories wholesaler-distributors	1.4
Pharmaceuticals, toiletries, cosmetics, and sundries wholesaler-distributors	1.3
Beverage wholesaler-distributors	1.3
Other machinery, equipment, and supplies wholesaler-distributors	1.3
Lumber, millwork, hardware, and other building supplies wholesaler-distributors	1.2
Paper, paper product, and disposable plastic product wholesaler-distributors	1.2
Motor vehicle wholesaler-distributors	1.1
Trade/Distributors Subtotal	***1.5***

[6] The justification for including these satellite communities rests largely on the absence of competing ports. See Appendix 1 for a discussion of other Maritime ports.

Support activities for rail transportation	3.4
Support activities for air transportation	1.7
Support activities for road transportation	1.0
Freight transportation arrangement	0.9
Warehousing and storage	0.6
Support and Logistics Subtotal	***1.1***
Scheduled air transportation	1.7
Deep-sea, coastal and great lakes water transportation	1.6
Specialized freight trucking	1.0
General freight trucking	0.9
Rail transportation	0.9
Transportation Subtotal	***1.1***
Support activities for water transportation	3.2
Direct Port Support Subtotal	***3.2***
Grand Total	***1.4***

Source: Statistics Canada (2002).

State of distribution and logistics in Halifax

To get a deeper understanding of the distribution and logistics sector, consider Figures 9, 10, and 11.

Figure 9: Summary of ocean transportation firms

Sub-service Group	***Number of Firms***			
	Halifax	**Saint John, NB**	**St. John's, NL**	**Montreal**
Ocean transportation, services	44	3	58	41
Ocean transportation, ports[a]	7	5	8	10
Ship and boat building and repair	4	2	3	6
Vessel operations	15	3	17	50
Ocean transportation, services (other)	4	0	6	0

[a]*The terminology is that of the National Oceans Industry Database. "Terminals" would be more accurate than "Ports."*

Note: Survey boundaries use broad ranges of postal codes and may not correspond to municipal boundaries.

Source: Canada, Department of Fisheries and Oceans.

Figure 10: Port volumes - Four Canadian ports, 2003

	Halifax	Saint John, NB	St. John's, NL	Montreal
2003 TEUs	540,000	45,638	60,000	1,108,837
2003 Tonnage (millions of tonnes)	3.3	6.2	Less than 0.6	3.9

Source: Statistics Canada and port Websites.

Figure 11: Distribution and logistics firms

Yellow Pages category	Halifax	Saint John, NB	St. John's, NL	Montreal
Freight forwarding	23	8	10	148
Customs brokers	11	1	3	68
Air cargo service	7	0	2	32
Warehouses, merchandise	15	7	11	83
Cargo & freight containers	1	0	2	1
Containerized freight service	4	2	2	10
Transport service	38	16	40	424

Note: Montreal is taken to be anything within 20 km of the centre of Montreal.
Source: Yellow Pages (2006).

Notice that for ocean services alone, there is no relationship between tonnage and the number of firms. For example:

- Saint John has the greatest tonnage throughput and the lowest number of logistical firms.
- St. John's, with only a slightly greater container throughput than Saint John and negligible tonnage, has a substantial number of logistical firms.
- Montreal, with twice as much container volume as Halifax and similar tonnage, has 10 times as many logistics firms.
- Halifax, with 10 times the containers and tonnage of St. John's, has similar logistical support.

This is because the size of logistics services is a function of the following two factors:

1. Container volume. If there is no cargo, there is nothing to manage. Bulk commodities, especially liquid bulk, are passed off without additional handling requirements. Although freight flows are often initiated (and dominated) by a few key players, there are usually other players that piggy-back on the developed trade lane. As volumes increase, the number of players and their needs increase accordingly.
2. Distribution complexity. Even with a few players, there may be geographic dispersal issues. As the number of spokes on a distribution hub increases, the complexity increases.

Therefore it is easy to understand why St. John's, as a distribution centre for Newfoundland, would have greater logistical support than Saint John, since New Brunswick distribution is usually handled from Moncton.[7] Similarly, Montreal lies on conduits that go back up into Quebec, down through the Toronto-Detroit-Chicago corridor, back to Halifax, and down to New York and Boston. To manage all of these flows, Montreal needs substantially greater logistical support than Halifax which has fewer associated corridors.

On the surface, the most difficult finding to understand is the small number of firms in Halifax compared to St. John's. This is even stranger when one considers that St. John's operates as a feeder port for both Halifax and Montreal. If anything, Halifax should benefit from this role of St. John's.

It would seem that this scarcity of logistical services is due to the fact that many distribution functions for the Maritimes are managed from Ontario and Quebec. For example, the distribution functions for Costco and Ford are in Montreal, for Wal-Mart in Cornwall, for Home Depot in Mississauga, for Dare Foods in Toronto, and for Quaker Oats in Trenton, Ontario. So it might be said that developing the logistical capacity of Halifax depends on wresting that capacity away from central Canada.

[7] St. John's also benefits from supporting a large off-shore oil and gas industry, which partially accounts for the logistics support.

CONCLUSIONS

This paper set out to describe the structure of the port cluster in Halifax. A naïve focus on the metropolitan area showed a sizeable port cluster, but with some large gaps. An examination of the port cargo showed a more regional role. As such, the cluster was reconstituted as a regional player with supporting industry, trucking and warehousing residing at regional hubs. This aggregate view resulted in a more balanced, more reasonable understanding of how the port works. In fact, on this view, the Port of Halifax is a critical aggregation point for Atlantic Canadian supply chains.

Even so, the regional cluster shows areas of weakness, especially in the specialization of logistics and warehousing associated with logistical functions. This is likely due to the small size of the consumer market and the historical dominance of Montreal as a distribution centre. It is possible that Halifax will be able to address this with the development of more corridors through the region to major markets.

The best predictor of the cluster's future is private sector investment. Indeed, several recent developments are noteworthy:

- Ceres Global (operator of the Fairview Cove Terminal and owned by NYK Lines) recently bought two more super-post-Panamax cranes and leased additional land to handle additional traffic in 2007.
- A new transload facility to be operated by Fastfrate Consolidated is under construction in the Burnside Industrial Park.
- CN has recently spent $25 million on the line between Halifax and Montreal to allow for longer trains.
- Macquarie Investments (partner or operator in several world-class ports) has acquired Halterm (operator of the South End Terminal) for C$172.8 million, a significant price-to-earnings premium compared to other terminal operators.
- The East-West Corridor from Bangor, Maine to Watertown, NY has gained high priority status from the US Congress. Further, the $1 million US Department of Transportation-funded bi-national CanAm Connections study to evaluate the relationship of transportation and the economy of the region is nearing completion.
- Several highway twinning and border crossing projects in the region have been completed or are scheduled for commencement soon.

Several statements about the Halifax port cluster can be made with confidence:

1. There is sufficient strength in the port cluster to warrant investment by world-class firms.

2. Recent large investments foreshadow increased traffic.

3. Corridor access to markets is improving, which may foreshadow increased warehousing and distribution investment.

4. The development of transload facilities will make more containers available to local exporters, further strengthening the regional role of the port.

In short, the Port of Halifax lies at the centre of a regional cluster which is attracting significant investment. Opportunities exist throughout the region to build on cluster elements – especially in warehousing, distribution and logistics. In turn, this investment will make the port more attractive. The success of the Port of Halifax and the region are tied in a virtuous circle; when one wins, we all win.

APPENDIX 1

Methodology

There are some differences in methodology between the Canadian studies and the Rotterdam study. The consequence is that the results are not directly comparable. Nonetheless, they give a strong indication of the strengths and weaknesses of the port of Halifax.

Localization Quotient and Concentration Index. The Location Quotient formula for Rotterdam is:

$$\textit{Localization Quotient} = \frac{\textit{(no. of Rotterdam-Cluster firms / total no. of Rotterdam firms)}}{\textit{(no. of Netherlands-Cluster firms / total no. of Netherlands firms)}}$$

A value greater than one means that Rotterdam has a greater concentration of cluster firms than the Netherlands generally.

If available, a better method would be to use number of employees rather than number of firms because that would control for differences in the size of firms. In an ideal world, firms in both studies would be weighted in proportion to their use of the port. For example, if only 70 percent of the firm's inputs and output go through the port, then only 70 percent should be counted. Clearly this kind of analysis on a national level is beyond the scope of this paper.

For the Halifax study, the employment method was used. To avoid confusion, the index was relabeled "Concentration Index":

$$\textit{Concentration Index} = \frac{\textit{(employed in Halifax-Cluster firms / employed in Halifax firms)}}{\textit{(employed in Canadian-Cluster firms / employed in Canadian firms)}}$$

Number of Industry Codes. Two factors limit comparability and accuracy. First, there is not an exact correspondence between the categories of firm used in the Rotterdam study and the NAICS codes used in the Halifax study. Second, since the data come from a census and are therefore self-declared, they are not always comparable. For example, different logistics firms may describe their business as either "freight transportation arrangement" or "support activities for road transportation."

The NAICS codes recognize 86 possible manufacturing classifications, 26 trade and distributors classifications, 7 support and logistics classifications, 10 transportation classifications and 1 direct port support classification. The Halifax study took concentration indices from the top 10

manufacturing codes, the top 10 trade and distribution codes, the top 5 logistics codes, the top 5 transportation codes, and "marine transportation support" as a basis for comparison. When concentration indices were high, the component firms were identified to ensure that the concentration represented port-related activities. This method can understate the role of the port – if fewer industries than the top codes included engaged in port activity, or overstate the role – if more industries than the top codes included engaged in port activity.

Geographic dispersal. The average distance from Rotterdam of associated cluster communities is 23.1 km; the greatest distance is 49.0 km. This compact arrangement is necessary because of the nearness of other ports; specifically, Antwerp is 137 km away and Amsterdam is only 73 km away. To draw cluster firms from a greater distance would be to infringe on the cluster of the other ports.

In the case of Halifax, however, there are no nearby ports. The closest significant container-handling capability is in Boston, which is 1100 km away by truck and Montreal, which is 1250 km away. There are several ports that can handle bulk commodities, most notably Saint John, 414 km away, and Port Hawkesbury, 270 km away. But of these two, only Port Hawkesbury can handle post-Panamax ships and it does not have class 1 rail access.

Consequently, this study has drawn from a wider area to include Kentville (110 km), New Glasgow (159 km), and Truro (95 km). Moncton (264 km) is also examined as the traditional hub of the Maritimes. As such, Moncton can be considered a shared resource with Saint John and with the Maritimes generally; however, it is important to the Halifax cluster on volume grounds.

Comparability with other Canadian ports. The care taken to include major industry firms (for example, Michelin and Stanfields) outside of metropolitan Halifax has not been applied to the cluster analysis for other Canadian ports. This undermines comparability; however, this effect is probably secondary to the imprecision in the NAICS categories (see above). For example, Montreal also functions as a major highway and air hub. As such, the size of the error resulting from associating a particular NAICS code with port activity is likely greater than errors resulting from the omission of major port users outside of the metropolitan area.

APPENDIX 2

Port of Halifax imports

Commodity	Tonnage	% of Imports
Misc. Manufactured Goods	169,441	9.0%
Machinery, Machinery, Mechanical Appliances, Parts	160,422	8.5%
Mach-Electrical Mchy/Equipment	80,201	4.3%
Misc-General/Mail/Etc	71,831	3.8%
Clothing- Accessories	68,219	3.6%
Bldg-Other Ceramic Products	67,873	3.6%
Vehicles-Other Parts	64,561	3.4%
Food-Misc Edible Preparations	60,161	3.2%
Furniture/Lights/Mattresses	59,323	3.2%
Stone-Monument/Building	53,966	2.9%
Metal-Articles-Iron/Steel	51,473	2.7%
Fish-Fresh/Chilled/Frozen/Live	49,064	2.6%
Beve-Wine/Cider	45,856	2.4%
Rubber - Natural	43,499	2.3%
Plastics-Other	36,380	1.9%

Source: Port of Halifax.

APPENDIX 3

Satellite analysis

The following tables detail the industry concentrations in selected communities near Halifax. The concentration index is the ratio of local employment in an activity as a percent of the local population to national employment in the same activity as a percent of the national population. Please see Appendix 1 for further details. What is immediately obvious is that much of the manufacturing, trucking, and distribution activities for the region exist outside of Halifax proper. There are several historic reasons for this. It is not surprising that Truro's motto used to be the "Hub of Nova Scotia" and Moncton's the "Hub of the Maritimes." What has changed is that these activities now service an import-export economy in addition to the regional market.

Kentville	
NAICS activity description	***Concentration Index***
Rubber product manufacturing	21.4
Meat product manufacturing	12.8
Animal food manufacturing	7.5
Fabric mills	6.4
Pesticide, fertilizer, and other agricultural chemical manufacturing	5.7
Other food manufacturing	4.8
Lime and gypsum product manufacturing	4.6
Fruit and vegetable preserving and specialty food manufacturing	3.5
Bakeries and tortilla manufacturing	2.3
Cement and concrete product manufacturing	1.5
Manufacturing Subtotal	***7.8***
Farm, lawn and garden machinery and equipment wholesaler-distributors	4.2
Food wholesaler-distributors	2.0
Agricultural supplies wholesaler-distributors	1.8
Recyclable material wholesaler-distributors	1.8
Other miscellaneous wholesaler-distributors	1.0
Chemical (except agricultural) and allied product wholesaler-distributors	1.0
Personal goods wholesaler-distributors	1.0
New motor vehicle parts and accessories wholesaler-distributors	0.9
Petroleum product wholesaler-distributors	0.9
Construction, forestry, mining, and industrial machinery, equipment and supplies wholesaler-distributors	0.8

Trade/Distributors Subtotal	***1.5***
Support activities for road transportation	2.02
Freight transportation arrangement	0.69
Support activities for air transportation	0.58
Other support activities for transportation	0.00
Warehousing and storage	0.00
Support and Logistics Subtotal	***0.8***
General freight trucking	1.3
Specialized freight trucking	1.0
Rail transportation	0.3
Deep-sea, coastal, and Great Lakes water transportation	0.0
Scheduled air transportation	0.0
Transportation Subtotal	***0.9***
Support activities for water transportation	0.00
Direct Port Support Subtotal	***0.00***
Grand Total	***2.6***

Moncton	
NAICS activity description	***Concentration index***
Meat product manufacturing	3.2
Medical equipment and supplies manufacturing	2.5
Household appliance manufacturing	2.4
Bakeries and tortilla manufacturing	2.2
Other food manufacturing	1.8
Beverage manufacturing	1.8
Converted paper product manufacturing	1.7
Architectural and structural metals manufacturing	1.6
Other furniture-related product manufacturing	1.5
Fruit and vegetable preserving and specialty food manufacturing	1.5
Manufacturing Subtotal	***2.1***
New motor vehicle parts and accessories wholesaler-distributors	3.4
Food wholesaler-distributors	3.2

Cigarette and tobacco product wholesaler-distributors	3.0
Petroleum product wholesaler-distributors	2.9
Recyclable material wholesaler-distributors	2.0
Paper, paper product, and disposable plastic product wholesaler-distributors	1.8
Construction, forestry, mining, and industrial machinery, equipment and supplies wholesaler-distributors	1.6
Pharmaceuticals, toiletries, cosmetics, and sundries wholesaler-distributors	1.5
Lumber, millwork, hardware, and other building supplies wholesaler-distributors	1.5
Electrical, plumbing, heating, and air-conditioning equipment and supplies wholesaler-distributors	1.2
Trade/Distributors Subtotal	***2.2***
Support activities for air transportation	3.4
Support activities for rail transportation	1.5
Warehousing and storage	1.3
Support activities for road transportation	1.0
Other support activities for transportation	0.8
Support and Logistics Subtotal	***1.7***
Rail transportation	2.7
General freight trucking	2.0
Specialized freight trucking	1.1
Scheduled air transportation	0.9
Deep-sea, coastal, and Great Lakes water transportation	0.8
Transportation Subtotal	***1.7***
Support activities for water transportation	0.0
Direct Port Support Subtotal	***0.0***
Grand Total	***1.9***

Truro	
NAICS activity description	***Concentration Index***
Textile furnishings mills	14.7
Fabric mills	13.1
Animal food manufacturing	8.4
Other textile product mills	7.0
Glass and glass product manufacturing	4.9
Pesticide, fertilizer, and other agricultural chemical manufacturing	4.4
Cut and sew clothing manufacturing	4.3
Sawmills and wood preservation	3.3
Dairy product manufacturing	3.2
Cement and concrete product manufacturing	3.0
Manufacturing Subtotal	***5.0***
Motor vehicle wholesaler-distributors	6.4
Used motor vehicle parts and accessories wholesaler-distributors	5.2
Home furnishings wholesaler-distributors	3.3
Farm, lawn, and garden machinery and equipment wholesaler-distributors	3.0
Petroleum product wholesaler-distributors	2.9
Recyclable material wholesaler-distributors	2.5
Lumber, millwork, hardware, and other building supplies wholesaler-distributors	2.4
Beverage wholesaler-distributors	2.2
Food wholesaler-distributors	1.8
Construction, forestry, mining, and industrial machinery, equipment and supplies wholesaler-distributors	1.3
Trade/Distributors Subtotal	***2.4***
Support activities for rail transportation	2.2
Support activities for road transportation	1.5
Support activities for air transportation	1.1
Warehousing and storage	0.3
Freight transportation arrangement	0.3
Support and Logistics Subtotal	***0.8***
Specialized freight trucking	2.3
General freight trucking	1.6
Deep-sea, coastal, and Great Lakes water transportation	1.1
Rail transportation	0.4
Scheduled air transportation	0.4
Transportation Subtotal	***1.4***

Support activities for water transportation	0.7
Direct Port Support Subtotal	***0.7***
Grand Total	***2.6***

New Glasgow	
NAICS Activity Description	***Concentration index***
Railroad rolling stock manufacturing	74.2
Rubber product manufacturing	40.4
Other leather and allied product manufacturing	6.5
Architectural and structural metals manufacturing	4.4
Seafood product preparation and packaging	3.5
Pulp, paper, and paperboard mills	2.7
Tobacco manufacturing	2.3
Boiler, tank, and shipping container manufacturing	2.2
Printing and related support activities	1.8
Cutlery and hand tool manufacturing	1.6
Manufacturing Subtotal	***8.0***
Farm product wholesaler-distributors	0.0
Petroleum product wholesaler-distributors	3.1
Food wholesaler-distributors	2.1
Beverage wholesaler-distributors	2.4
Cigarette and tobacco product wholesaler-distributors	0.0
Textile, clothing, and footwear wholesaler-distributors	0.0
Home entertainment equipment and household appliance wholesaler-distributors	1.9
Home furnishings wholesaler-distributors	0.0
Personal goods wholesaler-distributors	0.0
Pharmaceuticals, toiletries, cosmetics and sundries wholesaler-distributors	0.0
Trade/Distributors Subtotal	***1.2***
Support activities for rail transportation	7.0
Other support activities for transportation	2.9
Support activities for road transportation	0.7
Warehousing and storage	0.3

Support activities for air transportation	0.0
Support and Logistics Subtotal	***0.7***
Pipeline transportation of natural gas	3.7
Deep-sea, coastal, and Great Lakes water transportation	1.4
Specialized freight trucking	1.3
General freight trucking	0.7
Rail transportation	0.3
Transportation Subtotal	***0.9***
Support activities for water transportation	0.8
Direct Port Support Subtotal	***0.8***
Grand Total	***3.4***

APPENDIX 3

Analysis of Other Selected Port Cities

In addition to industry concentrations, a comparison between other ports and Halifax requires an understanding of volumes and how each port functions in the global network. For example, Montreal has an extensive distribution concentration that reflects its role as a land hub to many markets, and Vancouver has a great deal of transportation strength, which reflects the fact that it has the highest volumes in Canada. However, in each case, the primary role of the port emerges from the data.

Montreal	
NAICS Activity Description	***Concentration index***
Clothing knitting mills	4.9
Aerospace product and parts manufacturing	4.3
Commercial and service industry machinery manufacturing	3.2
Clothing accessories and other clothing manufacturing	3.1
Cut and sew clothing manufacturing	3.1
Pharmaceutical and medicine manufacturing	3.0
Tobacco manufacturing	2.9
Textile and fabric finishing and fabric coating	2.8
Other leather and allied product manufacturing	2.7
Communications equipment manufacturing	2.6
Manufacturing Subtotal	***3.3***
Textile, clothing and footwear wholesaler-distributors	3.5
Pharmaceuticals, toiletries, cosmetics, and sundries wholesaler-distributors	2.0
Home furnishings wholesaler-distributors	1.9
Paper, paper product, and disposable plastic product wholesaler-distributors	1.7
Other miscellaneous wholesaler-distributors	1.7
Personal goods wholesaler-distributors	1.5
Computer and communications equipment and supplies wholesaler-distributors	1.4
Beverage wholesaler-distributors	1.4
Home entertainment equipment and household appliance wholesaler-distributors	1.4
Food wholesaler-distributors	1.4
Trade/Distributors Subtotal	***1.7***

Freight transportation arrangement	1.5
Other support activities for transportation	1.3
Support activities for rail transportation	1.1
Support activities for air transportation	1.0
Support activities for road transportation	0.9
Support and Logistics Subtotal	***1.2***
Scheduled air transportation	1.6
Non-scheduled air transportation	1.4
Rail transportation	1.2
General freight trucking	0.8
Natural gas distribution	0.6
Transportation Subtotal	***1.0***
Support activities for water transportation	1.3
Direct Port Support Subtotal	***1.3***
Grand Total	***1.9***

Quebec	
NAICS Activity Description	***Concentration index***
Footwear manufacturing	7.9
Tobacco manufacturing	3.6
Navigational, measuring, medical, and control instruments manufacturing	2.9
Medical equipment and supplies manufacturing	2.6
Cutlery and hand tool manufacturing	1.7
Glass and glass product manufacturing	1.6
Other food manufacturing	1.5
Bakeries and tortilla manufacturing	1.4
Architectural and structural metals manufacturing	1.2
Ship and boat building	1.2
Manufacturing Subtotal	***1.9***
Used motor vehicle parts and accessories wholesaler-distributors	3.0
Beverage wholesaler-distributors	2.4
Pharmaceuticals, toiletries, cosmetics, and sundries wholesaler-distributors	1.3
Cigarette and tobacco product wholesaler-distributors	1.2
Food wholesaler-distributors	1.2

Lumber, millwork, hardware, and other building supplies wholesaler-distributors	1.1
New motor vehicle parts and accessories wholesaler-distributors	1.1
Paper, paper product, and disposable plastic product wholesaler-distributors	1.1
Home furnishings wholesaler-distributors	1.0
Construction, forestry, mining, and industrial machinery, equipment and supplies wholesaler-distributors	1.0
Trade/Distributors Subtotal	***1.2***
Support activities for road transportation	1.5
Other support activities for transportation	0.7
Support activities for rail transportation	0.7
Support activities for air transportation	0.4
Warehousing and storage	0.4
Support and Logistics Subtotal	***0.7***
Deep-sea, coastal, and Great Lakes water transportation	1.2
Non-scheduled air transportation	0.8
Specialized freight trucking	0.7
General freight trucking	0.7
Inland water transportation	0.7
Transportation Subtotal	***0.7***
Support activities for water transportation	1.5
Direct Port Support Subtotal	***1.5***
Grand Total	***1.2***

Saint John	
NAICS Activity Description	***Concentration index***
Petroleum and coal products manufacturing	16.9
Pulp, paper and paperboard mills	3.6
Ship and boat building	3.1
Dairy product manufacturing	2.6
Beverage manufacturing	2.6
Cement and concrete product manufacturing	2.1
Seafood product preparation and packaging	2.0
Sugar and confectionery product manufacturing	1.2
Converted paper product manufacturing	1.0

Lime and gypsum product manufacturing	0.9
Manufacturing Subtotal	***3.3***
Cigarette and tobacco product wholesaler-distributors	6.3
Other machinery, equipment and supplies wholesaler-distributors	2.6
Petroleum product wholesaler-distributors	2.0
Construction, forestry, mining, and industrial machinery, equipment and supplies wholesaler-distributors	1.8
Metal service centres	1.2
Electrical, plumbing, heating, and air-conditioning equipment and supplies wholesaler-distributors	1.2
Motor vehicle wholesaler-distributors	1.1
Computer and communications equipment and supplies wholesaler-distributors	1.1
Used motor vehicle parts and accessories wholesaler-distributors	1.1
Beverage wholesaler-distributors	1.0
Trade/Distributors Subtotal	***1.7***
Support activities for air transportation	0.8
Support activities for rail transportation	0.8
Freight transportation arrangement	0.7
Support activities for road transportation	0.5
Warehousing and storage	0.1
Support and Logistics Subtotal	***0.5***
Inland water transportation	4.8
Deep-sea, coastal, and Great Lakes water transportation	4.5
Scheduled air transportation	2.1
Specialized freight trucking	1.5
Pipeline transportation of crude oil	1.1
Transportation Subtotal	***2.0***
Support activities for water transportation	7.0
Direct Port Support Subtotal	***7.0***
Grand Total	***2.2***

St. John's	
NAICS Activity Description	***Concentration index***
Ship and boat building	4.6
Beverage manufacturing	2.7
Seafood product preparation and packaging	2.2
Dairy product manufacturing	1.7
Bakeries and tortilla manufacturing	1.2
Navigational, measuring, medical, and control instruments manufacturing	1.1
Cement and concrete product manufacturing	0.9
Meat product manufacturing	0.9
Audio and video equipment manufacturing	0.8
Converted paper product manufacturing	0.6
Manufacturing Subtotal	***1.5***
Cigarette and tobacco product wholesaler-distributors	6.0
Food wholesaler-distributors	1.5
Electrical, plumbing, heating, and air-conditioning equipment and supplies wholesaler-distributors	1.4
Paper, paper product, and disposable plastic product wholesaler-distributors	1.2
Chemical (except agricultural) and allied product wholesaler-distributors	1.1
Beverage wholesaler-distributors	1.1
Pharmaceuticals, toiletries, cosmetics, and sundries wholesaler-distributors	1.1
Other machinery, equipment and supplies wholesaler-distributors	1.0
Lumber, millwork, hardware, and other building supplies wholesaler-distributors	1.0
Recyclable material wholesaler-distributors	1.0
Trade/Distributors Subtotal	***1.3***
Support activities for air transportation	2.06
Support activities for road transportation	1.4
Freight transportation arrangement	0.9
Other support activities for transportation	0.6
Warehousing and storage	0.3
Support and Logistics Subtotal	***1.0***
Deep-sea, coastal, and Great Lakes water transportation	5.7
Inland water transportation	3.7
Non-scheduled air transportation	1.3
Pipeline transportation of crude oil	1.2
Scheduled air transportation	1.0

Transportation Subtotal	***1.8***
Support activities for water transportation	4.6
Direct Port Support Subtotal	***4.6***
Grand Total	***1.4***

Vancouver	
NAICS Activity Description	***Concentration index***
Ship and boat building	2.4
Computer and peripheral equipment manufacturing	1.4
Medical equipment and supplies manufacturing	1.4
Other textile product mills	1.3
Industrial machinery manufacturing	1.3
Engine, turbine, and power transmission equipment manufacturing	1.2
Paint, coating and adhesive manufacturing	1.2
Beverage manufacturing	1.2
Sawmills and wood preservation	1.1
Seafood product preparation and packaging	1.1
Manufacturing Subtotal	***1.3***
Other miscellaneous wholesaler-distributors	2.0
Cigarette and tobacco product wholesaler-distributors	1.8
Home entertainment equipment and household appliance wholesaler-distributors	1.7
Beverage wholesaler-distributors	1.7
Wholesale agents and brokers	1.7
Home furnishings wholesaler-distributors	1.6
Food wholesaler-distributors	1.5
Paper, paper product, and disposable plastic product wholesaler-distributors	1.4
Farm product wholesaler-distributors	1.4
Personal goods wholesaler-distributors	1.3
Trade/Distributors Subtotal	***1.6***
Support activities for air transportation	2.1
Freight transportation arrangement	2.1
Warehousing and storage	1.6

Support activities for rail transportation	1.1
Other support activities for transportation	0.8
Support and Logistics Subtotal	***1.9***
Scheduled air transportation	2.8
Deep-sea, coastal, and Great Lakes water transportation	2.7
Inland water transportation	2.0
Natural gas distribution	1.2
Non-scheduled air transportation	1.2
Transportation Subtotal	***2.4***
Support activities for water transportation	4.8
Direct Port Support Subtotal	***4.8***
Grand Total	***1.7***

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