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INSIGHTS ON...

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A Message to Insights On... Readers

Dear Readers of Insights On...
Respondents to our business and trade surveys must sometimes wonder what Statistics Canada does with the information that they provide. As a manager, I know that most people do not mind undertaking a task if they see a useful purpose for it. One of the goals of Insights is to show you some examples of how business data helps to follow trends and new developments in our economy. A better understanding of the different industrial sectors and economic trends helps both government and business do their job better.

In this issue of Insights, you will find two articles based on very different data sets. The first is entitled *"Canada's East Coast Container Ports: Do They Compete With or Complement One Another in the Race for North American Container Traffic?"* This article makes use of the Marine International Origin/Destination database to examine developments in cargo and container traffic for Canada's East Coast ports. The second article, entitled *"Overview of Packaging Products Used by Canadian Manufacturers"*, examines a trend closer to home, that is to "reuse, reduce and recycle". This article is based upon the Annual Survey of Manufacturers.

Without your time, we would not be able to assemble the diversity and quality of data that we do at Statistics Canada. I would like to sincerely thank every one of you who helps to make our information as timely and accurate as possible.

If you have a question concerning the use of the information which you provide, do not hesitate to contact me or the person named on your questionnaire.

Ray Ryan
Assistant Chief Statistician, Business and Trade Statistics

INSIGHTS ON...

In This Issue...

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Canada's East Coast Container Ports, Do They Compete With or Complement One Another in the Race for North American Container Traffic?*

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International shipping is a highly competitive industry, especially the shipping of containers. Shipping lines are constantly trying to increase productivity by reducing costs and by attracting larger volumes of containers. In response to spiraling container freight rates, the lines have been driven to increase economies of scale. These economies are expected to be achieved through larger ships and fewer, more efficient port calls. Larger ships and client demands for frequent service have encouraged innovative alliances and pooling agreements among lines to maximize the use of this larger capacity.

Ports competing for this container traffic stand to gain or lose – big time. Old carrier-port relationships are threatened as alliance partners seek the most efficient ports for their combined service. Ports that are constrained by depth, navigation channels, turning basins or landside acreage may be reduced to spoke or secondary port status. Ports that have been naturally blessed with limitless depths, marine and landside space, must race to develop the port and inland infrastructure required to accommodate the mega-ships and their massive container volumes. Even if a port and its inland partners make the sizable investments necessary, there is no guarantee that the mega-ships will call. [1]

* This paper was originally released in the Proceedings of the Canadian Transportation Research Forum's 33rd Annual Conference, May 23-28, 1998.

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Must ports compete for this traffic or acquiesce to declining volumes? Such a scenario in Canadian terms could see the deep water port of Halifax thrive, while the inland port of Montreal declines.

The writer's hypothesis is that while container mega-ships will indeed call at North American ports, the Port of Montreal will continue to succeed, essentially because it is a niche port in the ocean container market and can therefore resist the trend. Halifax, on the other hand, could become a big winner if mega-ships become a dominant factor in the ocean container market by going with the trend – however, it faces some high stakes investment decisions that are not without risk. This hypothesis will be evaluated through a review of academic literature and an analysis of statistics that will contrast the container operations of the two ports.

This report uses container data from two sources, Statistics Canada's marine international Origin/Destination (O/D) database and Journal of Commerce P.I.E.R.S. data (provided by the Maritime Administration of the US Department of Transport). The unit of measure is the Twenty-foot Equivalent Unit (TEU) for containers with cargo or the full TEU (i.e., no empty containers). The data cover a ten-year period from 1987 to 1996. There are limitations with the comparability of these data – P.I.E.R.S. data use country of export/import while the Statistics Canada data use the country of the port of loading/unloading. To derive TEUs by world region from the Statistics Canada data, the TEUs loaded/unloaded at Canadian ports by ship calling at more than one world region were apportioned using the containerized tonnage shipped to or received from each region. These limitations are not expected to have much impact on the analysis.

Containers, Customers and Economies of Scale

The ports' quest for increasing container volumes is directed more at shipping lines than individual shippers. The measure of a container port's success may be the number of containers handled, but they achieve that success by first attracting lines and then encouraging those lines to increase their container activity through programs such as volume pricing and marketing activities that promote both the port and the shipping lines.

Shipping lines choose their ports based on a number of factors including proximity to markets, physical characteristics, availability of inland transportation, port charges, and reliability of port services such as stevedoring. The port selection must also fit well with the carrier's overall strategy including the markets and trade routes served.

Carriers in turn offer their customers a package of cost and service attributes that include the reliability and efficiencies achievable based on the selected port or ports and service delivery options.

Studies of the ocean container market indicate that it is neither stagnant nor homogenous. Shippers' requirements change over time and the market can be segmented both geographically and by class of customer (e.g., freight forwarders, large shippers, small shippers, and consignees) in terms of the cost/service attributes.[2]

While cost is always a consideration, it need not be a determining factor in carrier choice, particularly when customers perceive little cost difference among carriers. Carriers can differentiate their services and attract customers with such non-cost factors as service reliability, frequency and after sales service (e.g., accuracy of documentation, quality of telephone help). Indeed a 1995 poll by Containerisation International found the number three requirement on shippers' top 10 list was port of coverage and the sequence of calls preceding the shipper's destination.

Segmentable markets and non-cost carrier selection criteria suggest that pursuing a lowest-cost service strategy may make a carrier vulnerable to competitors that can identify and exploit niche markets, or that can expand and diversify their product lines (i.e., combinations of cost and service options) to appeal to a wider customer base. Shipping lines may achieve such diversification in their product lines by adding new services[3] or through mergers and strategic alliances. This may be one reason why 1996 was a record year for mergers and alliances, another reason is the cost savings that are possible when resources are combined.[4]

Taking a scale economy approach to cost reduction may also have risks. The concept of scale economies for shipping is generally accepted as sound economic theory. Larger ships are built at a lower cost per gross registered ton (GRT) than smaller ships and have lower running costs per GRT. Indeed, Drewry Shipping Consultants recently estimated that the annual operating and voyage costs of a 6000 TEU super-post-Panamax ship are 21% less per TEU slot than those of a optimized 4000 TEU Panamax container ship.[5] However, the larger ships normally gain their unit cost advantages by increasing overall capital cost, with ships of 6000 TEU capacity costing up to $100 million according to Drewry.

Shipping lines may compensate for this higher capital by purchasing fewer ships thus limiting service frequency even though overall service capacity may increase. Such lines may lose customers due to the lower service frequency and have to discount rates to attract other customers. Lower than expected revenues result in an inability to service a bloated debt load and can lead to the demise of the shipping line.[6]

Ship size is not the only factor that affects the economics of container ship services. Lim (1994)[7] in comparing the revenues and expenses of different size container vessels could find no empirical evidence of unit cost decreases on a TEU-mile basis for larger size ships because non-cost related factors

Chart 1: Full TEUs to/from Overseas Ports and Countries (1987-1996, Millions of TEUs)

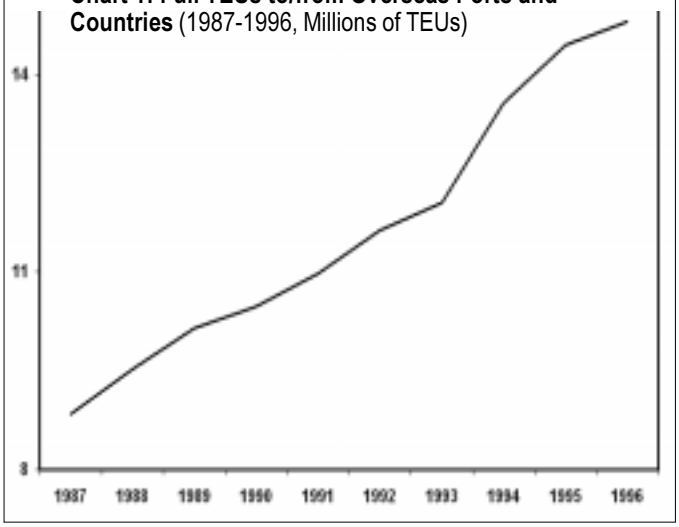


Table 1: Number of Full TEUs Handled at North American Ports by World Region of Origin/Destination in 1996

World Region	North American Coast			
	Atlantic	Pacific	Gulf	Total
	(in millions)			
Asia and Oceania	1.51	6.59	0.04	**8.14**
Europe	2.81	0.28	0.41	**3.50**
South and Central America*	1.69	0.22	0.42	**2.34**
Middle East and Africa	0.42	0.04	0.07	**0.53**
North America N.E.S.	0.01	—	—	**0.01**
Total	**6.44**	**7.13**	**0.95**	**14.52**

*Includes Mexico

conspired to eliminate their scale economies. Factors such as route characteristics, prevailing freight rates, load factors and operating days can affect the economics of container shipping and are independent of ship size. Even for vessels operating on the same route, differences in the ships' purchase prices may bias unit costs (TEU-mile) in favour of a smaller vessel. Introducing larger container ships on some routes may also exacerbate over tonnage and increase downward pressures on freight rates for all ships that ply those routes.

Still the trend to larger container vessels continues unabated. The number of existing container ships and ships on order with over 2500 TEU capacity grew by 55.9% from November 1, 1990 to November 1, 1994, while ships with less than 2500 TEU capacity increased just 16.0%. Slot capacity provided by these larger ships increased by 73.0% in the same period, suggesting that the growth has been in ships much larger than 2500 TEUs.[8] The growth has really been phenomenal in ships of 3250 to 4249 TEU capacity which went from 68 ships in service at the end of 1991 to 170 ships by the end of 1996. Ships over 4250 TEU capacity increased from 8 to 66 ships in service during the same period.[9] However, while the growth rate for large container ships (2500+ TEUs) may be increasing faster than for medium sized container ships (1000-2499 TEUs), there are more of the latter and shipyards build more medium sized ships each year than mega-ships.[10] This suggests that larger ships do not meet all the market needs envisaged by carriers.

In Europe, this trend to larger ships has indeed had an impact, setting in motion a trend to coastal port locations with inland urban ports either losing container volumes or relocating most of their own container handling capacity downstream to new coastal port locations. The new coastal port locations save transit time, particularly for larger ships as they do not have to await locks or high water to navigate confined channels. Hamburg and Antwerp, however, have resisted the trend to coastal port locations with container volumes that have risen from 2.2 million TEUs and 1.8 million TEUs, respectively, in 1991 to 2.9 million TEUs and 2.3 million TEUs in 1995.[11] Antwerp's success has been attributed to a strong concentration of port based industries and extensive transport links with the hinterland, while Hamburg is a cargo transshipment centre with Free Port status and strong trading links with the Far East[12]. Unlike other upstream European ports, Hamburg and Antwerp are geo-politically constrained from opening coastal port operations and are therefore likely to continue to resist such change.

In summary, the literature suggests that while the global trend to larger container ships is well established, such ships are not an industry panacea. Shipping lines that choose to use the larger ships must continue to balance the customer's demand for frequent service with the increase in unit capacity (TEU slots per ship) while maintaining compensatory freight rates. Lines are attempting this through mergers, alliances and service extensions. Mid-sized container ships have a role in enabling lines to differentiate their service by calling with greater frequencies and at ports not easily accessible to the larger ships. Maersk Lines' initiation of direct weekly service from Northern Europe to Montreal, in alliance with Sea-Land Services and P&O Nedlloyd, particularly demonstrates this concept, as Maersk often leads in the race for mega-ships.

The North American Ocean Container Shipping Market

In 1996, North American ports (excluding Mexico and Alaska) handled 14.5 Million full TEUs (i.e., containers with cargo) in trade with overseas ports. In the decade 1987 to 1996, this market has grown at an average annual rate of 5.9% **(Chart 1)**. In terms of world regions, Asia and Oceania was by far the most important origin/destination (O/D) with 56.1% of the full TEUs in 1996, followed by Europe with 24.1%.

Ports on the Pacific coast, which handled 80.9% of the full TEUs originating in or destined to Asia and Oceania, accounted for 49.1% of the total traffic. Atlantic coast ports handled 44.4% of the full TEUs because they dominated the traffic to and from Europe and South and Central America. Ports on the Gulf Coast handled almost all of the remaining TEUs as Great Lakes ports handled just 410 TEUs from/to overseas ports in 1996. **(Table 1)**

From 1987 to 1996, growth rates for container traffic varied significantly among world regions. Traffic to/from South and Central America and the Middle East and Africa led the world regions with average annual growth rates of 12.1% and 9.7%, respectively. Europe had the lowest average annual growth rate at 3.3%, while container traffic to/from Asia and Oceania grew at an average annual rate of 5.6%.

Canadian ports handled 10.0% of the full TEUs handled by North American ports in 1996. However, the proportion by world region varied widely, ranging from 2.1% of the rapidly growing South and Central American market to 24.6% of the more slowly growing European market. Canada's share of the markets for Asia and Oceania, and Middle East and Africa were 6.2% and 5.9%, respectively.

Canada's eastern ports (Montreal, Halifax and others) were particularly active in the European market, handling 30.1% of the full TEUs exchanged between Europe and North America's Atlantic Coast in 1996.

Comparing Canada's East Coast Ports to U.S. East Coast Ports

The decade 1987 to 1996 saw 74% growth in the number of full TEUs handled by ports on the Atlantic Coast of North America from ports overseas (i.e., excludes Canada-U.S. traffic). However, the growth rates varied significantly among ports from –25% for Baltimore, Maryland, to 2493% for the port of Wilmington, Delaware. The growth rates for Canada's two main Atlantic ports also varied significantly with full TEUs for this overseas market increasing 60% at Montreal and decreasing 9% at Halifax. (Including Canada-US traffic, Halifax's total TEUs (full and empty) increased 7% during this period with strong growth in traffic with US ports.) In 1996, the two ports ranked third and nineth among ports on the Atlantic Coast of North America in terms of TEUs. **(Table 2)**

The factors that determine a container port's potential include: natural endowments

Table 2: Full TEUs Handled at Atlantic Coast Ports in 1996 and 1987 with Overseas Ports/Countries of Origin/Destinations

Port	TEUs 1996	TEUs 1987	Increase from '87 to '96
NY/NJ	1 530 622.3	1 143 924.0	34%
Charleston, S.C.	800 050.9	379 746.6	111%
Montreal, P.Q.	745 760.4	465 223.0	60%
Norfolk, VA	680 175.5	310 353.5	119%
Miami, FL	503 858.1	190 610.7	164%
Savannah, GA	455 695.3	284 423.1	60%
Port Everglades, FL	422 153.1	123 261.9	242%
Baltimore, MD	275 815.5	368 624.0	-25%
Halifax, N.S.	229 857.8	252 181.0	-9%
Jacksonville, FL	185 403.5	78 336.9	137%
Other Canada	25 232.1	23 245.9	74%
Other U.S.A.	585 777.6	313 204.3	87%
Total	**6 440 402.3**	**4 019 705.7**	**64%**

(navigating and landside access and space); man-made endowments (docks, cranes, intermodal infrastructure); human factors (labour harmony and productivity, legislative environment, port tariffs and fees); and perhaps most importantly location. Location determines the port's market potential given the other necessary endowments.

In theory, the Canadian ports could compete for all North American container traffic with an Atlantic Coast O/D. However, it is more instructive to compare these ports against those ports that are more likely to compete within the same markets. To identify these competitors, it is useful to consider the markets that could be well served by the two Canadian ports based on their locations.

The world's busiest container ports are all well situated in terms of centrality and intermediacy. Centrality is the port's location near a strong traffic-generating local or immediate hinterland, while intermediacy is its location along the path between two pairs of distantly located traffic-generating regions.[13] However, these concepts, particularly centrality, are very much affected by scale. For example, Halifax's immediate hinterland could be restricted to just Halifax county or extended by good intermodal connections to include the Atlantic provinces and the New England states. Montreal's hinterland could be similarly restricted to metropolitan Montreal or extended to include Ontario, Quebec and the U.S. Census Region known as the Middle Atlantic (New York, Pennsylvania and New Jersey). The resulting markets have vastly different consumption and production levels (i.e, traffic-generating potential).

For Halifax, the extended market would have a 23-fold increase in population and a 96-fold increase in the value of manufacturing shipments. For Montreal, there would be a 10-fold increase in population and a 26-fold increase in the value of manufacturing shipments (**Table 3**). For these extended hinterlands, the Canadian ports must compete with: NY/NJ, which resides within the US Middle Atlantic; Baltimore, which resides on Middle Atlantic's border; and Norfolk, which has been an effective competitor with Baltimore for this traffic. Halifax and Montreal could also compete with one another for containers in the New England, Middle Atlantic, Ontario, and Quebec markets.

To assess the Canadian ports' potential in terms of intermediacy, it is necessary to consider the pairings of traffic-generating regions in North American and world regions overseas. The main North American region of interest to the Canadian ports, is the U.S. Census East North Central Region (Wisconsin, Michigan, Illinois, Indiana and Ohio). The traffic-generation potential of this region is huge with its population of 23.9 million in 1996 and manufacturing shipments of $US 815.2 billion in 1994. Both Canadian ports have excellent rail connections to this important market.

The most important world regions for the Canadian ports are Europe, which in 1996 accounted for 97% of Montreal's overseas container traffic, and Europe and Asia and Oceania, which together accounted for 88% of Halifax's overseas container traffic.

Montreal is the leading Atlantic coast gateway for full containers of European O/D, followed by NY/NJ. NY/NJ leads for the world regions of Asia and Oceania and the Middle East and Africa. Halifax is the fifth busiest port based on the 1996 data, for the Asia and Oceania region and the sixth busiest for the European region. The Central and South American market, which accounts for less than 1% of the full TEUs handled by Montreal and Halifax is dominated by Port Everglades and Miami, Florida, perhaps due to their southern location relative to the North American heartland (**Table 4**).

From 1987 to 1996, the Canadian ports' performance in the European and the Asia and Oceania markets compared to the three main US ports competitors has been mixed. Montreal has surged ahead in the European market with an increase of 62% over the decade and has replaced NY/NJ as the number one port on the North Atlantic. Halifax has lost some ground in both the European and the Asia and Oceania markets, which continues to be dominated by NY/NJ. Norfolk has made significant gains in all markets and has overtaken Halifax in the Asia and Oceania market. It has more than doubled the full TEUs of European O/D over the decade and handled almost half the European volume handled by Montreal in 1996. Baltimore has lost significant ground in both the European and the Asia and Oceania markets (**Table 5**).

NY/NJ, the Canadian port's largest competitor, has seen its full TEUs to/from overseas countries climb 34% over the decade. NY/NJ has a large local market, which according to one study, accounted for 68.1% of the TEUs handled by the port in 1994. The other main inland markets served by NY/NJ in that year were the Mid Atlantic (11.9% of TEUs), the Great Lakes area (8.0%) and New England (7.6%).[14] Despite such a vibrant local market, the port complained to the U.S. Maritime Administration of containers diverted to Canada due to shippers' desire to

Table 3: The Impact of Extending the Ports' Hinterlands

	Manufacturing shipments 1994 (US $ Billion)	Population 1996 ('000)
Halifax port:		
Halifax county	1.7	343.0
Nova Scotia	4.8	909.3
Atlantic Canada	12.7	2,333.8
Atlantic Canada and New England States	168.0	7,774.9
Port of Montreal:		
Montreal	24.9	3,326.5
Quebec	74.9	7,138.8
Quebec and Ontario	237.7	17,892.4
Quebec, Ontario and US Middle Atlantic	638.9	34,631.1

Sources: Statistics Canada's 1996 Census and Annual Survey of Manufacturers. US Bureau of Census Population Estimates Program (SU-96-11) and Annual Census of Manufacturing.

Table 4: Shares of Full TEUs Handled at Atlantic Coast Ports in 1996 by Region of Origin/ Destination

Port	Europe	Middle East & Africa	Asia & Oceania	Central & South America	North America NES	Total
NY/NJ	24.3%	32.4%	34.3%	11.4%	0.1%	23.8%
Charleston, S.C.	12.9%	16.6%	18.5%	5.2%	0.0%	12.4%
Montreal, P.Q.	25.8%	3.7%	0.1%	0.1%	0.0%	11.6%
Miami, FL	13.6%	14.2%	10.5%	4.7%	0.3%	10.6%
Norfolk, VA	2.2%	1.6%	5.5%	20.8%	0.0%	7.8%
Savannah, GA	3.6%	13.7%	15.4%	3.9%	0.0%	7.1%
Port Everglades, FL	1.7%	0.5%	0.1%	21.9%	0.0%	6.6%
Baltimore, MD	4.7%	8.3%	3.7%	3.0%	0.0%	4.3%
Halifax, N.S.	4.1%	3.4%	5.8%	0.6%	97.8%	3.6%
Jacksonville, FL	0.9%	0.1%	0.7%	8.8%	0.0%	2.9%
Other U.S.A.	0.2%	0.1%	0.0%	1.2%	0.8%	0.4%
Other Canada	6.1%	5.3%	5.5%	18.3%	1.0%	9.1%

circumvent U.S. regulations (e.g., filing of ocean rates) and lower port tariffs.[15]

However, NY/NJ's main concern with Canadian competition appears to have been its own draft limitations. The port's main channels (Kill van Kull, Newark Bay and Elizabeth Channel) have a limiting depth of 40 feet which causes ships such as Maersk's 4000 TEU M-class vessels to top-up or lighten their loads at Halifax or Norfolk.[16] Despite contaminated dredge spoils, the port recently received approval and federal funding for 65% of the US$621 million cost to dredge the channels to 45 feet.[17] This may stem some of the diversion of containers through Canadian ports which NY/NJ estimates at 100,000 containers a year. In fairness to Canadian ports, it should be noted that the diversion of containers is not uni-directional. P.I.E.R.S. 1996 data show that the port of NY/NJ handled over 84,000 TEUs of Canadian origin/destination in trade with counties overseas. Other US Atlantic ports handled a further 31,000 TEUs.

Canadian ports have traditionally been seen as low-cost alternatives to the U.S. ports. However, they do have significant locational advantages over the U.S. ports. Halifax is on the Great Circle route and is the closest North American port to Northern Europe (e.g., Antwerp, Rotterdam), with an ocean-distance advantage of 1150 kilometres over NY/NJ the closest of its U.S. competitors. The opening of the Sarnia tunnel in 1995 has given Halifax direct access to the U.S. Midwest. This resulted in a 40% gain in the number of containers carried by the tunnel's owner, Canadian National, between Halifax and the U.S. in 1997 over 1996.[18] The port's 60-foot channel depths are the deepest on the Atlantic coast. Only two other Atlantic ports, Baltimore and Norfolk have the 50-foot channels necessary to accommodate a fully ladened 6000 TEU container ship.

Montreal, with its location 1,600 kilometres inland, has the closest rail access to the U.S. Midwest. The port has strengthened this locational advantage by enhancing its multi-modal connections with dockside rail access for the two railways, Canadian National (CN) and Canadian Pacific (CP), that serve the port. Continuous improvements in the intermodal connections have reduced rail times from Montreal to 10 hours for Toronto, 25 hours for Detroit and slightly more than 30 hours for Chicago. Double-stack service has been available for the CP route from Montreal since May 1994. Montreal has also benefited from the Sarnia tunnel as CN has offered high-cubed double-stack service from Montreal to the U.S. Midwest since 1995.

The locational advantages of the Canadian vis-à-vis the U.S. Midwest may be considered long-term strategic advantages. However, other advantages such as depths, lower port tariffs and the shipping lines' ability to offer confidential ocean rates may be affected by the counter-actions of U.S. ports, such as NY/NJ's dredging program and attempts to cut costs.[19] If the Canadian ports are to compete with U.S. ports they must continue to maintain their advantages in these other, less permanent areas, as indeed they have in the past. The U.S. ports, particularly NY/NJ will continue to have the advantage when it come to the size of their immediate port hinterlands, which Canadian ports would likely have access to only as low cost service providers.

Comparing Montreal and Halifax

As container ports, Halifax and Montreal can aptly be described as a study in contrasts. The contrast starts with the most obvious difference, vessel size and how vessel size has changed over the decade 1987-1996. As expected, the ships calling at Halifax tend to be larger than those calling at Montreal. In 1996 ships over 2000 TEUs represented 68% of the vessel calls at Halifax for ships transporting containers, 80% of the total TEU capacity and 75% of the TEUs handled by the port. For Montreal ships over 2000 TEUs had just 28% of the vessel calls, 45% of the TEU capacity and 45% of the TEUs handled by the port (**Table 6**).

While the shift to larger vessels from 1987 to 1996 is quite apparent in both ports, it is interesting to note that the proportion of TEUs loaded and unloaded by the smaller ships (<1000 TEUs) in Halifax was unchanged from 1987 to 1996. The trend to larger ships seems to have more impact on the ships in the 1000-1999 TEU bracket which lost considerable share in terms of vessel calls, total capacity and TEU volumes to the larger vessels (2000 TEU and above). In Montreal, both the small and mid-sized (1000-1999 TEU) vessels lost share to the larger ships, however there appears to have been a cap in vessel size at about 2500 TEUs.

Table 5: Full TEUs by World Region for Canadian Ports Relative to Main U.S. Competitors ('000 TEUs)

Yr. - Port	Europe	Middle East & Africa	Asia & Oceania	South & Central America
96 - NY/ NJ	683.8	135.6	517.9	193.3
87 - NY/NJ	551.3	53.2	441.1	92.3
Increase 96/87	**24%**	**155%**	**17%**	**97%**
96 - Montreal	726.7	15.7	1.1	2.3
87 - Montreal	449.4	3.5	2.3	1.0
Increase 96/87	**62%**	**347%**	**-54%**	**128%**
96 – Norfolk, VA	381.4	59.4	159.4	80.0
87 - Norfolk, VA	188.9	17.9	88.2	15.4
Increase 96/87	**102%**	**232%**	**81%**	**421%**
96 – Baltimore, MD	133.6	34.7	56.2	51.3
87 - Baltimore, MD	218.8	34.0	86.5	29.3
Increase 96/87	**-39%**	**2%**	**-35%**	**75%**
96 – Halifax	115.2	14.3	87.6	10.4
87 - Halifax	137.9	7.9	100.4	3.6
Increase 96/87	**-16%**	**81%**	**-13%**	**188%**

Table 6: Distributions of Container Activity by Vessel Size in TEU Capacity for Halifax and Montreal (1987 & 1996)

	<1000	1000-1999	2000-3249	3250+
Halifax - 1987				
Share of vessel calls	27%	36%	37%	0%
Share of TEU Capacity	8%	39%	53%	0%
Share of TEUs loaded/unloaded	10%	37%	52%	0%
Halifax - 1996				
Share of vessel calls	23%	9%	54%	14%
Share of TEU Capacity	4%	7%	65%	25%
Share of TEUs loaded/unloaded	10%	6%	66%	19%
Montreal - 1987				
Share of vessel calls	74%	24%	2%	0%
Share of TEU Capacity	64%	28%	9%	0%
Share of TEUs loaded/unloaded	42%	58%	1%	0%
Montreal - 1996				
Share of vessel calls	37%	36%	28%	0%
Share of TEU Capacity	19%	36%	45%	0%
Share of TEUs loaded/unloaded	21%	34%	45%	0%

The larger ships calling at Halifax load/unload a lower percentage of their container capacity than the ships calling at Montreal. On average, the container ships calling at Montreal in 1996 unloaded containers amounting to 73% of their container capacity and then loaded 81% of their capacity before leaving port. In Halifax, the percentage of capacity used was 11% for unloaded containers and 11.9% for loaded containers. This is consistent with Montreal's role as the single North American port of call for some lines on the North Atlantic trade route. By contrast Halifax is one of a number of ports-of-call for ships offering North Atlantic and Round-the-World services. The smaller ships that use Halifax appear to be engaged in supply of St. Pierre and Miquelon and spoke services to US ports.

Montreal's role in the North Atlantic also seems to have had an impact on the number of empty containers that are handled at the port. Empty containers accounted for 8.7% and 17.7%, respectively, of the total containers for Montreal and Halifax in 1996. At both ports there was a significant disparity between the rate of empty containers outbound (Halifax 2.4%, Montreal 2.5%) and inbound (Halifax 33.8%, Montreal 15.5%), suggesting that there is a significant amount of container repositioning for the inbound trades.

For the decade 1987 to 1996, both Montreal and Halifax experienced average annual growth rates around 4% in the total tonnage of containerized cargo (including cargo to/from the U.S.). However the pattern of growth varied significantly between the two ports. Whereas Montreal's containerized cargo grew each year since 1989, Halifax's containerized cargo tonnages have fluctuated considerably with peak years in 1990 and 1996. **(Chart 2)**

It is evident from this foregoing discussion that the ports do not compete for exactly the same kind of container ship traffic. However, this is only part of the story as the real concern is whether or not the ports and their respective lines or services, compete for the same containers. One would expect that they do compete for at least some containers with a European O/D, particularly since the ports' hinterland markets are likely to overlap (i.e., both ports attempt to serve New England, US Middle Atlantic, US Midwest, Ontario, Quebec and Atlantic Canada).

Three data series could be used to consider this question: total TEUs (full and empty) handled by the ports; tonnage of containerized cargo; or, full containers with a European O/D. The first data series is affected by empty containers which were allocated based on tonnage of containerized cargo by world regions and is therefore suspect. The second data series has some double counting of containerized cargo for Halifax in the years prior to 1994. A correlation analysis of the full TEUs with a European O/D was therefore undertaken.

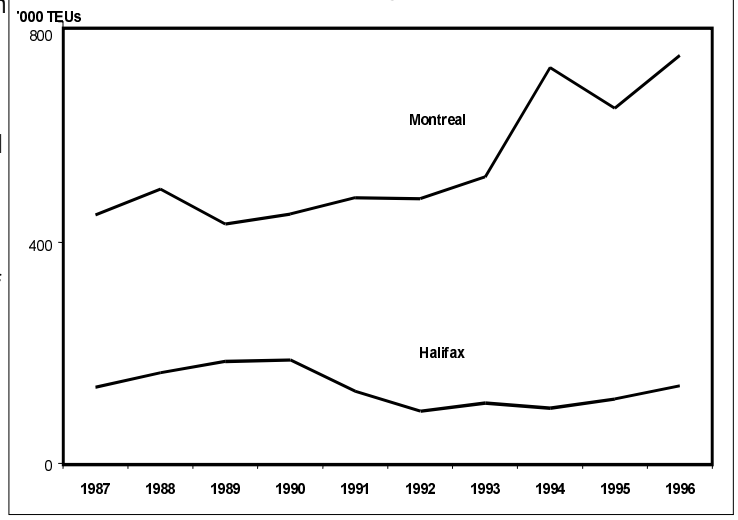
The analysis found a correlation coefficient of r=-0.44 for full TEUs with an European O/D for the ports of Halifax and Montreal over the decade 1987 to 1996. This suggests that there has been some competition between the two ports for North Atlantic container traffic as a gain at one port may be accompanied by a loss in the other port. However, it also suggests that competition between the two ports is less important to the success of either port than are other factors. Such factors as the economic climate in Canada and its trading partners and competition with U.S. ports appear to have more influence on the success of the ports of Halifax and Montreal. The opening of the Sarnia tunnel could increase the competition between the ports for containers with a US Midwest O/D.

Conclusion

The increasing size of container ships has had an impact on Canada's two main Atlantic coast ports. Halifax and Montreal have both seen their containerized freight arrive and depart in larger ships over the decade 1987-1996, as shipping lines attempt to reduce costs through scale-economies. Halifax has been able to accommodate much larger ships than Montreal. However, while there appears to be some competition for containerized cargo between these ports, the competition appears to be directed more at U.S. Atlantic coast ports. The large size of U.S. markets make them very attractive in an era of free trade and Canadian ports are well suited to compete within these markets.

The continuation of the trend to larger ships does not necessarily imply that there will be a loss of traffic at Montreal in favour of Halifax or other deep-water U.S. ports. Montreal appears to have developed a niche-market with lines that specialize in direct service to Europe that use the port as their sole North American port of call. These services appear to have generated a

Chart 2: Full TEUs with a European Origin/Destination for Halifax and Montreal



growing volume of traffic for the port in the past and this seems likely to continue in the future. The success of such services appear to be based on giving the customer (e.g., shippers, freight forwarders) a wider set of options to move their freight. A 1996 survey by Containerisation International revealed that shippers want a say in the selection of shipping conferences and the routing of their cargo[20] and Montreal's inland location near major markets will likely continue to give it an advantage in competing for these customers.

Halifax seems to have a competitive advantage due to its location on the Great Circle route and its deep waters. Using this advantage to attract mega-containerships (6000+TEUs) will depend on its ability to make a sizeable investment in cranes for post-panamax ships, which individually cost about $20 million. This is not without risk, as NY/NJ will continue to be a major competitor with its recently approved dredging program. Norfolk is also able to offer deep draft and has improved its competitive position over the past decade. In the future, Halifax may continue to play a role as a port where container ships top-up (i.e., load to capacity) before heading overseas, or lighten-up (i.e., unload containers to reduce draft) before heading to other North American ports with draft limitations such as NY/NJ. With the investment in cranes, there could be potential for Halifax to become a major centre for post-panamax ships from Asia and Oceania when these ships are introduced to the Suez express services. However, this potential needs to be investigated.

1 In August 27,1996, K. Barry Olsen, President of Maersk Canada Inc., told the Canadian Ports and Harbours Association that if Halifax port did not invest in post-panamax gantry cranes - jumbo, post panamax container ships would not visit the port. However, he gave no commitment the ships would call at Halifax if the investment were made.

2 Brooks, M.R. (1995), Understanding the ocean container market – a seven country study. *Maritime Policy Management,* **22**(1), 39-49.

3 For example Maersk's decision to add direct service to Montreal.

4 Tirschwell, P. (1998). Mergers reshape shipping. Journal of Commerce. 5 January 1998. P8.

5 Damas, P. (1996) Big…bigger…super-post-Panamax. American Shipper **38** (11) 61.

6 Lim, S-M. (1996) Round-the-world service: the rise of Evergreen and the fall of U.S. Lines. *Maritime Policy & Management,* **23**(2), 119-144.

7 Lim, S-M. (1994). Economies of container ship size. *Maritime Policy & Management,* **21**(2), 149-160.

8 Containerisation International Yearbook. (1991 and 1995). Table 3.

9 Lloyd's Shipping Economist (1997). Poorer prospects for larger vessels. **19**(11) 12-15.

10 Based on a comparison of the numbers in reference 9 and the article "Large tonnage hits small containerships". Lloyds Shipping Economist **19** (5) 12-15.

11 Containerisation Annual Yearbook. 1997.

12 Baird, A.J. (1996). Containerisation and the decline of the upstream urban port in Europe.

13 Fleming, D.K. (1997). World container port rankings. *Maritime Policy & Management,* **24**(2), 175-181.

14 Ashar, A. (1997) Impact of Dredging New York Harbour. Transportation Quarterly **51**(1) 45-62.

15 America Shipper. Canadian ports gain in transatlantic. March 1997, 66-67

16 Containerisation International. Dredgement day approaches **29**(7) 78-79

17 Canadian Sailings. 23 February 1998, 37

18 Peters, T. (1998) Port of Halifax posts strong container growth. Canadian Sailings. 12 January, 1998 p5.

19 Canadian Sailings. 26, January 1998 p5.

20 Containerisation International. Shippers know best. **29**(11) 67-70

Overview of Packaging Products Used by Canadian Manufacturing Industries - 1998*

by Étienne Saint-Pierre, Manufacturing, Construction and Energy Division

Summary

Packaging is playing an increasing role in the marketing of products. At the same time enviromentalists are pushing for reuse of containers and reduction of packaging. What impact are these two forces having on packaging products and their use? This article provides an overview of the packaging products used by Canadian manufacturing industries, and identifies recent trends regarding the types of containers used.

Containers and packaging products are a major component of production costs for some manufacturing industries. Fluctuations in demand, price levels, consumers' preferences, regulations, and development of new technologies directly affect the amount and types of containers selected such as the substitution of plastic and corrugated cardboard packaging products for metal boxes and glass containers.

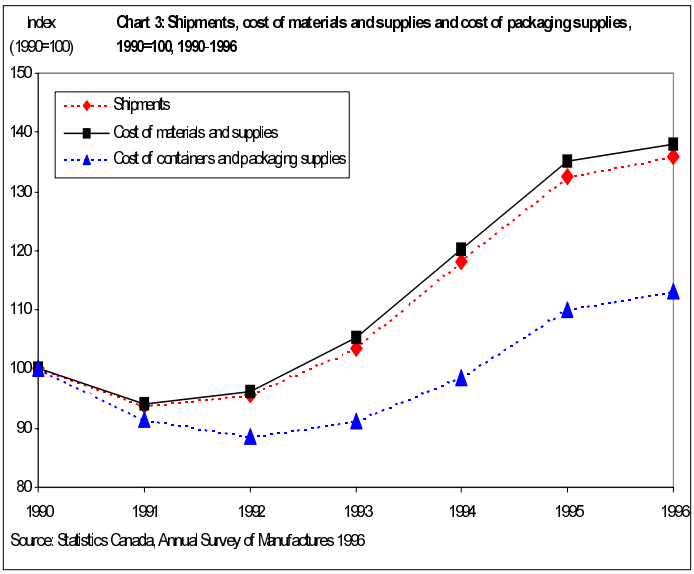
* This article was originally release in the November 1998 issue of *Consumption of Containers and Other Packaging Supplies by the Manufacturing Industries* (Catalogue No 31-212-XPB).

Consumption of Containers by Manufacturing Industries in 1996

Manufacturing establishments use several types of containers and packaging materials to protect, preserve, and facilitate the delivery of products. The most common types used by manufacturers are plastic containers and packaging materials; corrugated boxes; metal cans; set-up and folding boxes; and glass containers.

In 1996, manufacturing shipments increased albeit at a lower rate than in the previous year, 2.6% compared to 12.3% in 1995. The growth rate of the value of manufacturing shipments, and that of containers and other packaging product expenditures, has almost always followed the same lines. In 1996, manufacturing industries spent 7.2 billion dollars for containers and packaging products, i.e. 2.9% more than in 1995. In that same year, the increase in consumption of containers was 11.6%, compared to the previous year.

In 1995, a significant part of the increase in expenditures for packaging products was due to price increases for all major types of containers. In contrast in 1996, the rise in total expenditures for containers and other packaging products was due mainly to increased demand for these products. Indeed, the price levels for various types of packaging were much more stable (and, even, in some cases, lower) in 1996 than the previous year. This stability coupled with the decline in price levels were the major reasons for the decrease in expenditure growth for containers. It should be noted that this phenomenon was observable not only for packaging products, but also for manufacturing products in general. Low interest rates, a weak Canadian dollar, strong consumer demand in North America, and a healthy construction sector all played a role in the increased demand for Canadian industrial products, and, consequently, for related packaging products. The aggregate increased consumption of containers can be explained, almost entirely, by the rise in consumption of plastic



and corrugated cardboard packaging products, leaving metal and glass containers as slower demand types of packaging

Since 1990, containers and packaging supplies have become a smaller proportion of the costs of material and supplies in general although the percentage has remained stable for the most recent three years at about 3%. (**Chart 3**). This decrease can be explained partly by the increasing trend to reduce, reuse or recycle containers and packaging materials owing to environmental considerations. (For example the National Packaging Protocol, announced in 1990, aims at reducing by 35% the amount of packaging waste for 1996 and by 50% for the year 2000).[1]

Major Users of Containers

Traditionally, the Food Industries and Beverage Industries have been the largest consumers of containers for their transformed products representing more than half of the expenditures for containers and other packaging products. **(Table 7)** In 1996, 16 of the 22 industrial groups spent more than the previous year for containers and packaging products. Among the industries that spent the most on packaging products were Chemical and Chemical Products Industries which showed the largest growth in expenditures for containers, an increase of about 75 million dollars (almost 10%). On the other hand, Beverage Industries reduced its consumption by more than 67 million dollars (almost a 5% decrease) during the same period.

Over a longer period, it is possible to note that only two industries spent less on containers and packaging products in 1996 than in 1990. These were the Textile Products Industries and Clothing Industries which have also reduced their production over this period.

The cost of containers and other packaging materials forms a substantial portion of the total cost of materials and supplies used in manufacturing activities in certain industries. For example in the Beverage Industries, for each dollar spent on materials and supplies used in manufacturing activity, 50 cents was spent on containers and packaging products, by far the highest proportion of any industry. With a proportion of 19 cents on containers for every dollar spent on materials and supplies, the Tobacco Products Industries came in second place. At the other end of the scale, the cost of packaging products was minimal, compared to the overall costs for materials and supplies, for Transportation Equipment Industries and the Refined Petroleum and Coal Products Industries (less than ½ cent by dollar in materials and supplies used).

Main Types of Containers and Packaging Products

Manufacturing industries use a wide variety of containers and packaging products. Plastic containers and packaging products, corrugated boxes, metal cans, set-up and folding boxes, and glass containers accounted for more than 70% of the total expenditures in packaging products for manufacturers. **Table 8** shows the most popular containers by various manufacturing industries.

Corrugated boxes are the most popular form of packaging used by Canadian manufacturing industries. In 1996, consumption of this type of product amounted to some 1.5 billion dollars, which represents an increase of more than 9% over the previous year. This increase was far higher than for other packaging products. The consumption of this type of container is now almost at the same level as it was in 1990 (**Chart 4**). The 10% decrease in price level in 1996 certainly played an important role in making corrugated cardboard boxes more attractive as packaging products for manufactured goods.

The development of new technologies allowing superior graphic quality printing of lettering and illustrations of finished products on boxes, such that consumers can "see" the goods better that they buy also played an important role in the success of this type of packaging. Moreover, cardboard boxes are popular for environmental considerations: "Made from a renewable resource, only 13% of corrugated is comprised of logs. The rest comes from recycled boxes at the retail level and from leftover chips, shavings and sawdust from logging and sawmills."[2]

Following closely behind cardboard boxes in importance are plastic containers and packaging materials. In 1996 their con-

TABLE 7: Consumption of Containers by Industry Group, Canada, 1991-1996

Industries	1991	1992	1993	1994	1995	1996
	(millions of dollars)					
Food	2,319	2,210	2,271	2,387	2,640	2,688
Beverage	1,224	1,124	1,145	1,225	1,408	1,341
Chemical and chemical products	799	731	738	779	802	878
Paper and allied products	381	413	411	442	533	572
Tobacco products	117	142	142	167	147	156
Plastic Products	107	112	121	153	199	195
Wood	96	99	118	131	147	178
Electrical and electronic products	118	119	117	131	150	168
Non-metallic mineral products	114	111	107	115	128	140
Fabricated metal products	79	90	100	124	127	134
Transportation Equipment	82	74	90	108	136	139
Other	409	431	463	527	604	637
Total	**5,845**	**5,655**	**5,823**	**6,289**	**7,021**	**7,226**

Source: Statistics Canada, Annual Survey of Manufactures, 1996

TABLE 8: Consumption of Containers by Industry Group and Type of Container, 1996

CANADA Industries	Plastic containers & packaging	Corrugated boxes	Metal cans	Folding & set-up boxes	Glass containers	Other	Total
	(millions of dollars)						
Food	756.9	546.4	358.4	374.3	111.9	540.1	**2,688.0**
Beverage	204.9	168.1	506.8	67.9	160.2	233.1	**1,341.0**
Chemical and chemical products	232.2	164.4	95.0	63.3	76.1	247.0	**878.0**
Paper and allied products	47.3	91.6	x	x	-	356.7	**572.0**
Tobacco products	23.2	13.1	x	80.2	-	x	**156.0**
Plastic products	18.1	89.1	x	28.9	-	x	**195.0**
Wood	25.8	12.7	-	1.3	-	138.2	**178.0**
Electrical and electronic products	2.9	56.8	-	59.7	-	48.6	**168.0**
Non-metallic mineral products	20.5	50.7	1.1	5.7	-	62.0	**140.0**
Fabricated metal products	3.0	49.9	x	10.2	-	x	**134.0**
Transportation equipment	0.6	65.5	x	x	-	56.7	**139.0**
Other	78.7	226.2	12.3	83.0	-	236.8	**637.0**
Total	**1,414.1**	**1,534.5**	**979.8**	**861.4**	**348.2**	**2,088.0**	**7,226.0**

Source: Statistics Canada, Annual Survey of Manufactures, 1996

sumption by manufacturing industries amounted to 1.4 billion dollars, an increase of about 5% compared to 1995. Again Food Industries are the most important consumer at 757 million dollars. Since the beginning of the 1990s, the market share for this type of container has remained relatively steady at close to 20%. However, by comparing this market share over a longer period, it can be noted how much the use of plastic containers and packaging products has increased compared to metal cans and containers and glass containers. The market share of plastic containers and packaging materials has more than doubled during the past 20 years, from 9% to 20%. **(Chart 5)** Fluctuations in prices aside, the use of this type of container has increased the most in the nineties. Indeed, during the last two decades, more and more plastic containers have been used to replace glass and metal containers.

Metal containers are of importance to only a few industries and are declining in importance. In 1996, Canadian manufacturers spent almost 980 million dollars for metal containers, which represents a 9% decrease compared to the previous year. This decrease resulted in the lowest level of use over the last 20 years. The use of this type of container is effectively concentrated in the Food Industries and Beverage Industries with more than 88% of expenditures for metal cans coming from these two industries.

The decline in the consumption of metal cans by manufacturing industries is largely due to reduced usage by Food Industries. While, in 1986, Food Industries consumed 46% of all metal containers, this proportion was 10 percentage points lower than ten years ago. The consumer trend toward reheating food in microwave ovens in its original container, and growing consumer preference for fresh and frozen products helps to explain the substitution for other types of containers.[3] In contrast the Beverage Industries are using more and more metal cans for their products. The regulations concerning the percentage of use for filling and refilling containers, the penetration by American consumer products resulting from free trade, and changes in consumer tastes (for example, the migration in the beer market to large sized cans) have a direct impact on the use of metal containers in these industries.

For the first time in the last 20 years, the market share for glass containers fell below 5% in 1996. **Chart 4** illustrates the marked decrease in the consumption of glass containers during the last 10 years (a decrease of more than 31% in constant dollars since 1987). The introduction of plastic bottles and aluminum cans in the

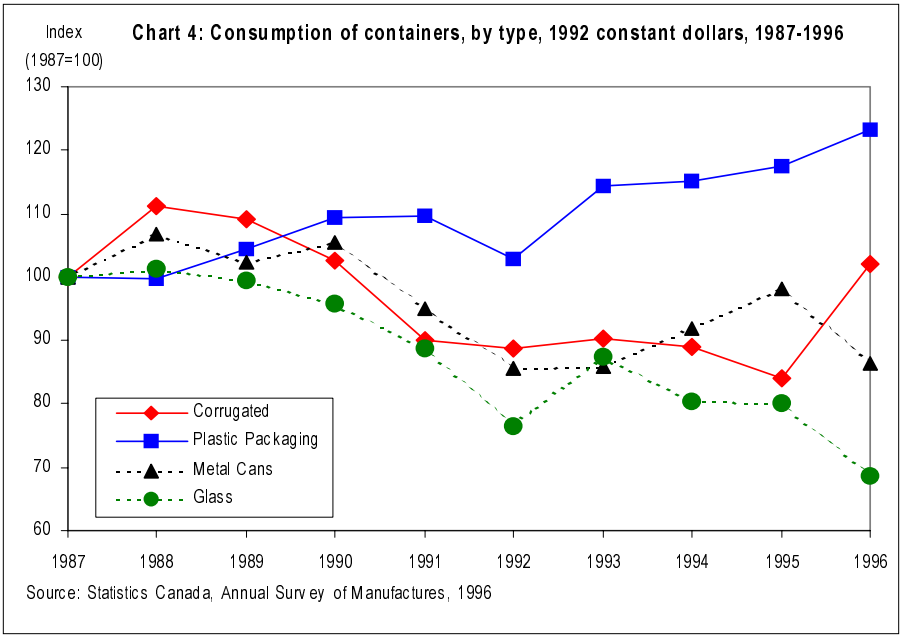


Chart 4: Consumption of containers, by type, 1992 constant dollars, 1987-1996

Source: Statistics Canada, Annual Survey of Manufactures, 1996

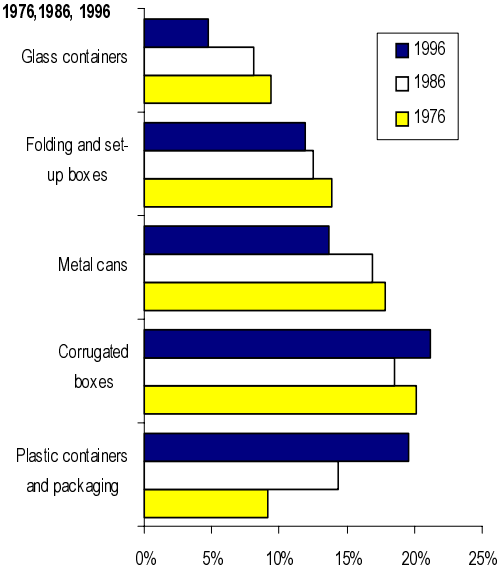


Chart5: Consumption of Containers by type (market shares), 1976,1986, 1996

Source: Statistics Canada, Annual Survey of Manufactures, 1996

Beverage Industries largely contributed to the decrease in consumption of glass containers. Without the introduction of glass containers in Chemical and Chemical Products Industries, the decline would have been even more significant.

Conclusion

While economic factors such as industry demand and price are important in influencing the consumption of packaging products, social preferences also have an important role to play. The consumer still appears to be "king" when it comes to the types of packaging products used by manufacturers, however environmental legislation has also had an influence.

1 This can also be explained by the fact that, in 1992, there was a 15% decrease in the number of establishments who had to answer a question on their purchase of containers and other materials.

2 Purwitsky, Steve; "The Strong and Silent Type, Report on Corrugated Packaging"; *Canadian Packaging*; April 1997.

3 Industry, Science and Technology Canada; Industry Profile 1990-1991, Metal stamping, closures and containers, 11 pp.

WHAT'S NEW?

Farm Financial Survey, 1998

Statistics Canada, Agriculture Division recently released the Farm Financial Survey, 1998. This publication provides information on Canadian farm assets, liabilities, capital investments, capital sales, revenues and expenses for 1997, as well as for 1995 and 1993. The data are provided by region, major farm type and revenue class.

Highlights

- Average net worth increased in 1997 as compared to 1995 for most farm types, as higher levels of current and long-term debt per farm were more than offset by higher average asset values.
- As was the case in 1993 and 1995, supply-managed farm types (ie. dairy, poultry and egg) continued to report relatively high average net worth, as compared to other types of farms.
- Hog farms reported the largest increases between 1995 and 1997 in average values for total assets, liabilities, net worth and gross farm receipts.
- Dairy farms also reported high increases in average net worth between 1995 and 1997, as large increases in liabilities were offset by increased assets.
- Ontario and Alberta farms had high increases in average net worth between 1995 and 1997, due to increases in average total assets which more than compensated for high increases in average total liabilities.
- Fewer farms reported capital investments and capital sales in 1997 compared with 1995 (eg. land, buildings, and farm machinery and equipment); participation declined with revenue class. However, average total capital purchases and capital sales were up for those that participated.
- Hog and potato farms had the highest average total investments in 1997.
- Hog farms invested mostly in land and buildings in 1997. Potato farms invested fairly equally in land and buildings, and in farm machinery and equipment.

Source:
Farm Financial Survey, 1998
Catalogue No. 21F0008XIB

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Agriculture Division

Entertainment services – a growing consumer market

Canada's consumer market for entertainment services grew almost 50% in real terms from 1986 to 1996. Canadians are spending more on renting cablevision, video games, videotapes and satellite services, and they still attend live sports events, movies and theatre. As a result, spending on entertainment services comprises a growing proportion of the average household's budget. This article explores the shares of Canada's consumer market for entertainment services that are accounted for by various household types and income groups.

Source:
Services Indicators, Third Quarter 1998, Vol. 5 No. 3
Catalogue No. 63-016-XPB

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Labour and Household Surveys Analysis Division

Employment and remuneration in the services industries since 1984

In recent years, Canada's economy has continued to become more service-based. This shift is particularly evident when examining information by sector for Canada's workforce. This article offers a descriptive historical overview of changes in employment and remuneration in the service sector during the 1984-97 period. Particular attention is devoted to shifts occurring in such service industries as: finance, insurance and real estate services, business services, food and beverage services, communication services, amusement and recreation services and traveler accommodation services.

Source:
Services Indicators, Third Quarter 1998, Vol. 5 No. 3
Catalogue No. 63-016-XPB

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Short Term Expectations Survey

The *Short Term Expectations Survey* is a monthly survey conducted with a group of economic analysts from across the provinces to get a representative view of the Canadian economy.

The analysts forecast the year-over-year changes in the consumer price index (CPI), the unemployment and participation rates of the labour force, the level of merchandise exports and imports, and the monthly change in gross domestic product (GDP). They provide key economic indicators for the following three months.

Questionnaires are prepared and faxed on a monthly basis to each of the analysts across the country. They have approximately one week to return their forecasts. Answers are then compiled and compared to actual data. An analysis is produced from the results and published in *The Daily* the following week.

The following graphs show the actual historical data with the average forecasted data for the four key economic indicators included in the survey.

Watch fot the results of the *STES* which are published during the first week of each month in *The Daily*. Visit our web site to see a new issue of *The Daily* every working day at: www.statcan.ca

For any information on the *Short Term Expectations Survey*, please contact:

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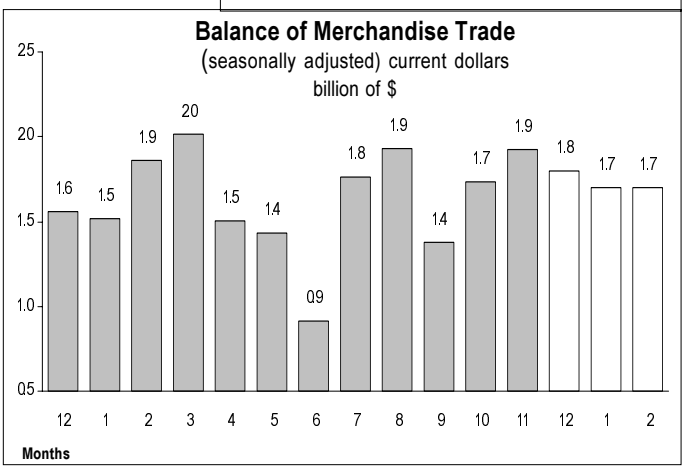
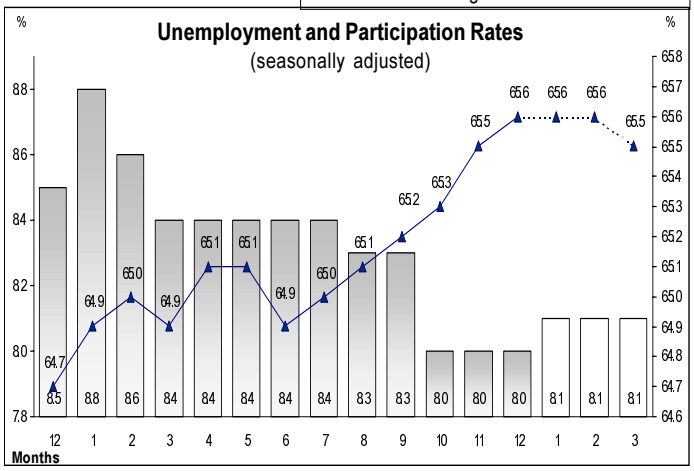
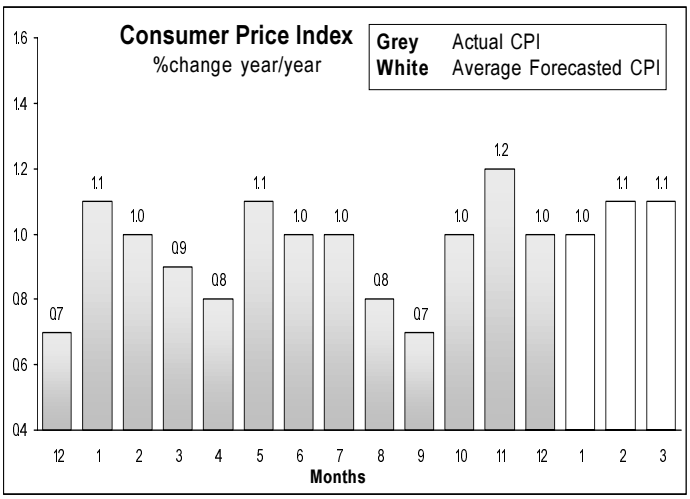
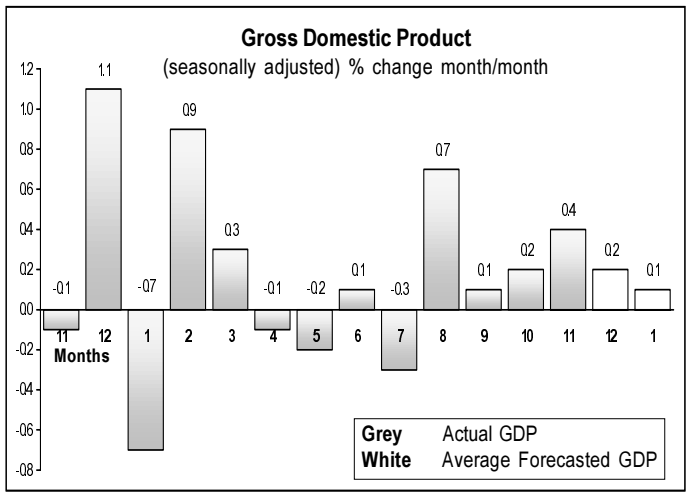
Grey Actual Balance of Merchandise Trade
White Average Forecasted Merchandise Trade



Grey Actual Unemployment Rate
White Average Forecasted Un. Rate
Full line Actual Participation Rate
Dotted line Average Forecasted Part. Rate







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