Logistics and the Competitiveness of Canadian Supply Chains

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Introduction

In 2009, Canada ranked ninth among OECD countries with a per capita gross domestic product (GDP) of $46,243,[1] a measurement generally used to compare societies' standards of living. That same year, our main trading partner, the United States, ranked third with a per capita GDP of $56,109—21.3% higher than the figure for Canada. It is generally acknowledged that an increase in a country's standard of living is linked to growth in labour productivity, that is, the relationship between the GDP and the number of hours worked. Based on this criterion, Canada placed 17th among OECD countries in 2009, with labour productivity of $53.79 per hour worked, while the United States ranked 7th, with labour productivity of $64.91—20.7% higher than the figure for Canada. This lag on Canada's part is nothing new. Between 1981 and 2009, average annual labour production growth in Canada was among the lowest for industrialized OECD member countries. In fact, only Italy and Switzerland had lower growth rates during that period.[2]

Between 1984 and 2006, growth in labour productivity in Canada came essentially from the services sector, including a positive contribution from the wholesale and retail sectors. However, virtually none of this growth came from the transportation and warehousing industry.[3] More recently, between 2002 and 2008, the increased labour productivity in Canada's retail sector was much higher than the private sector average. This good performance may be attributable to investments made by companies in that sector in innovative practices, particularly in the area of logistics management (Industry Canada, 2010).

It is therefore appropriate and important to compare Canada's supply chain management performance, both in terms of international trade and from the perspective of innovative practices adopted by Canadian companies in the domestic market. This chapter begins with a comparative analysis of Canada's performance with the performance of 155 countries from the perspective of their global supply chain as measured by an index developed by the World Bank. Next, the relationship between logistics performance and business productivity is

[1] Canadian dollars in 2008.

[2] Centre sur la productivité et la prospérité (2010), *Productivité et Prospérité au Québec – Bilan 2010*, HEC Montréal.

[3] Ibid

examined. In the third section, the logistics performance of Canadian companies is compared with the performance of American companies on the basis of various cost categories and by key economic sector. The fourth section covers innovative practices for managing supply chains and the degree of success achieved by Canadian companies in adopting these practices. The chapter concludes with final observations and implications for government decision makers and policy.

1. Comparative analysis of the performance of global supply chains

The World Bank has just published its second classification of countries based on a Logistics Performance Index (LPI) it developed using the following six criteria (Arvis et al., 2010).

1. Efficiency of the customs clearance process and security measures
2. Quality of transport-related and communication infrastructure
3. Ease of arranging competitively priced international shipments
4. Competence and quality of logistics services
5. Ability to track and trace consignments
6. Frequency with which shipments reach the consignee within the scheduled or expected time.

This index is calculated on a scale of 1 to 5, with a rating of 5 for the best performance and 1 for the worst. It is obtained for 155 countries by assessing each of the criteria listed above using a questionnaire sent to nearly 1,000 managers and specialists working for freight forwarders (e.g., DB Schenker, Kuehne + Nagel and Panalpina) and international courier companies (e.g., DHL, Fedex and UPS). The scores obtained for each of the six criteria used are statistically analyzed using principal component analysis in order to obtain a composite index of logistics performance. The results are presented in Table 1.

Table 1: Classification of the 20 leading countries based on the World Bank's international Logistics Performance Index (LPI)

			Criteria Rank and Score											
Rank	**Country** (or territory)	LPI	**Customs** (rank)	score	**Infrastructure** (rank)	score	**International Shipments** (rank)	score	**Logistics Competence** (rank)	score	**Tracking and Tracing** (rank)	score	**Timeliness** (rank)	score
1	Germany	4.11	(3)	4.00	(1)	4.34	(9)	3.66	(4)	4.14	(4)	4.18	(3)	4.48
2	Singapore	4.09	(2)	4.02	(4)	4.22	(1)	3.86	(6)	4.12	(6)	4.15	(14)	4.23
3	Sweden	4.08	(5)	3.88	(10)	4.03	(2)	3.83	(2)	4.22	(3)	4.22	(11)	4.32
4	Netherlands	4.07	(4)	3.98	(2)	4.25	(11)	3.61	(3)	4.15	(9)	4.12	(6)	4.41
5	Luxembourg	3.98	(1)	4.04	(9)	4.06	(7)	3.67	(21)	3.67	(19)	3.92	(1)	4.58
6	Switzerland	3.97	(12)	3.73	(6)	4.17	(25)	3.32	(1)	4.32	(1)	4.27	(15)	4.20
7	Japan	3.97	(10)	3.79	(5)	4.19	(12)	3.55	(7)	4.00	(8)	4.13	(13)	4.26
8	United Kingdom	3.95	(11)	3.74	(16)	3.95	(8)	3.66	(9)	3.92	(7)	4.13	(8)	4.37
9	Belgium	3.94	(9)	3.83	(12)	4.01	(26)	3.31	(5)	4.13	(2)	4.22	(12)	4.29
10	Norway	3.93	(6)	3.86	(3)	4.22	(24)	3.35	(13)	3.85	(10)	4.10	(10)	4.35
11	Ireland	3.89	(18)	3.60	(19)	3.76	(5)	3.70	(16)	3.82	(13)	4.02	(4)	4.47
12	Finland	3.89	(7)	3.86	(8)	4.08	(19)	3.41	(10)	3.92	(11)	4.09	(25)	4.08
13	Hong Kong	3.88	(8)	3.83	(13)	4.00	(6)	3.67	(14)	3.83	(17)	3.94	(26)	4.04
14	Canada	3.87	(13)	3.71	(11)	4.03	(32)	3.24	(8)	3.99	(15)	4.01	(5)	4.41
15	United States	3.86	(15)	3.68	(7)	4.15	(36)	3.21	(11)	3.92	(5)	4.17	(16)	4.19
16	Denmark	3.85	(19)	3.58	(15)	3.99	(16)	3.46	(15)	3.83	(18)	3.94	(7)	4.38
17	France	3.84	(17)	3.63	(14)	4.00	(28)	3.30	(12)	3.87	(14)	4.01	(9)	4.37
18	Australia	3.84	(14)	3.68	(18)	3.78	(3)	3.78	(17)	3.77	(20)	3.87	(18)	4.16
19	Austria	3.76	(20)	3.49	(21)	3.68	(4)	3.78	(20)	3.70	(22)	3.83	(23)	4.08
20	Taiwan	3.71	(25)	3.35	(22)	3.62	(10)	3.64	(22)	3.65	(12)	4.04	(30)	3.95

Source: Arvis et al., 2010

Canada ranks 14th with a composite index of 3.87, just ahead of the United States. In 2007, Canada was in 10th place with a 3.92 index and a confidence interval of ± 0.05, which means that there is not really any significant statistical difference between Canada's performance in 2007 and in 2010. In fact, it is risky

to compare the two classifications, since the definition of criteria chosen was changed in 2010. In 2007, the United States was in 14th place with an index of 3.84 and a confidence interval of ± 0.03.

Closer examination of Canada's performance based on the six criteria used reveals that the third, "ease of arranging competitively priced shipments," is the greatest hindrance to Canada's performance. Canada ranks 32nd for this criterion. To gain a clearer understanding of Canada's results, we requested and obtained more specific information from the World Bank concerning the source of the assessments used. We learned that Canada's performance was assessed by 69 respondents, particularly freight forwarders, located in the United States (32%), Mexico (15%) and Peru (9%). The remaining respondents were from Asia (10%), South America (7%), Central America (4%), etc. Major companies such as UPS, Panalpina, Kuehne + Nagel, DHL and Damco account for close to half of the respondents for Canada, and the rest were smaller companies.

We discovered that the respondents based in Mexico—a NAFTA member country and one of Canada's major trading partners—were somewhat hard on Canada for the criterion "ease of arranging international competitively priced shipments to Canada," assigning a score far below the average, while US-based respondents provided a much more positive assessment. Considering that the respondents based in Peru also gave Canada lower-than-average scores, nearly 25% of respondents are dissatisfied with regard to this criterion. These results confirm the opinions expressed by managers of Canadian companies based in Mexico who report difficulties in shipping their products to Canada. At the same time, it is important not to read too much into this criterion, since developed countries such as the United States appear to be experiencing similar problems.

There are no big surprises in terms of the top-ranked countries. In fact, countries such as Germany and Singapore have policies and master plans for developing their international logistics infrastructures and competencies. Also, it is interesting to note that the top six countries rank first or second for at least one of the six criteria used.

In its 2010 report, the World Bank demonstrates the connection between logistics performance and international trade. For example, a study by Hoekman and Nicita (2008) demonstrates that a high Logistics Performance Index (LPI) is closely associated with bilateral trade growth. A connection is also established between the high LPI index and the market share for parts and components in a country's exports. This reflects the importance of logistics in managing and integrating global production networks. Last, reference is made to other studies that tend to demonstrate the obvious: that good logistics performance is a necessary condition for facilitating international trade.

In conclusion, it is interesting to note that, with the exception of Japan, all of the countries ranked higher than Canada in Table 1 also best Canada in OECD country rankings for labour productivity. In short, Canada would be well-advised to continue developing its logistics competencies, performance and infrastructure in order to facilitate the growth of international trade, productivity and the economy. We will come back to this topic in Section 5 with suggestions for ways to improve, particularly in terms of customs formalities and transportation infrastructure.

2. Supply chain management and business productivity

Is there a connection between supply chain management good practices and business productivity? To answer this question, we analyzed the results of several empirical studies (Beaulieu and Roy, 2009). Based on this analysis, we made the following observations:

- Good logistics practices have a positive effect on operational business performance (speed of delivery, responsiveness, flexibility and delivery capacity) and on their trade performance (average growth of the market share, average growth in sales volume and average growth of sales in dollars). These results come from a survey of the American manufacturing sector with a sample of 142 respondents from organizations with over 500 employees (Green et al., 2008).
- Using good logistics practices (integration, outsourcing and client service) and deploying logistics competencies (quality and services, operations and distribution, and design efficiency) would have a positive effect on companies' organizational performance, particularly in terms of their competitiveness. This survey was conducted among about 100 manufacturing companies in the United States and Taiwan (Chow et al., 2008).
- Establishing quality management practices with suppliers strengthens their involvement and cooperation, which in turn improves organizational performance. These results come from a study of 103 local companies in Hong Kong and Taiwan (Lin et al., 2005).
- Last, strategic logistics management, supported by quality improvement efforts, positively affects service performance indicators (speed, reliability, turnaround time and inventory turnover) and operational efficiency (operational costs), expressed in greater client satisfaction and better business performance (market share, sales volume and profitability). The data come from 225 respondents in Hong Kong (though 75% of them have their head office in the United States), Japan, the Netherlands and other countries (Yeung, 2008).

Generally speaking, good practices should lead to better performance. However, these best practices must be associated with a specific context and carried out from a holistic perspective. Table 2, from a study by Laugen et al (2005), tends to confirm the effect of introducing best practices to business performance.

Table 2: Exemplary logistics and performance management

	Companies with an excellent supply chain	Companies with a less effective supply chain	All respondent
Delivery time for an order	15 days	21 days	20 days
Rate of on-time delivery	95%	90%	93%
Financial cycle	60 days	95 days	70 days
Annual inventory turnover rate	10 turns	6 turns	8 turns
Length of new product development cycle	180 days	340 days	180 days

Source: Laugen et al. (2005)

These studies demonstrate that logistics practices have a positive effect on the operational performance of companies. However, the impact on the organization's financial performance would be more indirect. One of the few studies that establish a direct link is the survey by D'Avanzo et al. (2003) of 636 of the top 3,000 international companies. This study reveals that 90% of respondents consider supply chain management a critical aspect of an organization's performance. The authors suggest a very strong direct link between supply chain management and financial performance. Other surveys reveal that companies with more mature logistical practices are 40% more profitable than manufacturing companies whose practices are not as highly developed (Beaulieu and Roy, 2009).

Moreover, beyond its positive impact on companies' operational and financial performance, there is increasing recognition that supply chain management also constitutes a key source of competitive advantage for organizations that excel in their business line. Examples in this regard include internationally known companies such as Wal-Mart, Dell and Zara, whose success is essentially based on a forward-thinking logistics strategy. In Canada, companies such as L'Oréal Canada, Uni-Select and Groupe Dynamite also stand out for their innovative logistics practices in their respective markets.

3. Comparative analysis of the logistics performance of Canadian and American companies

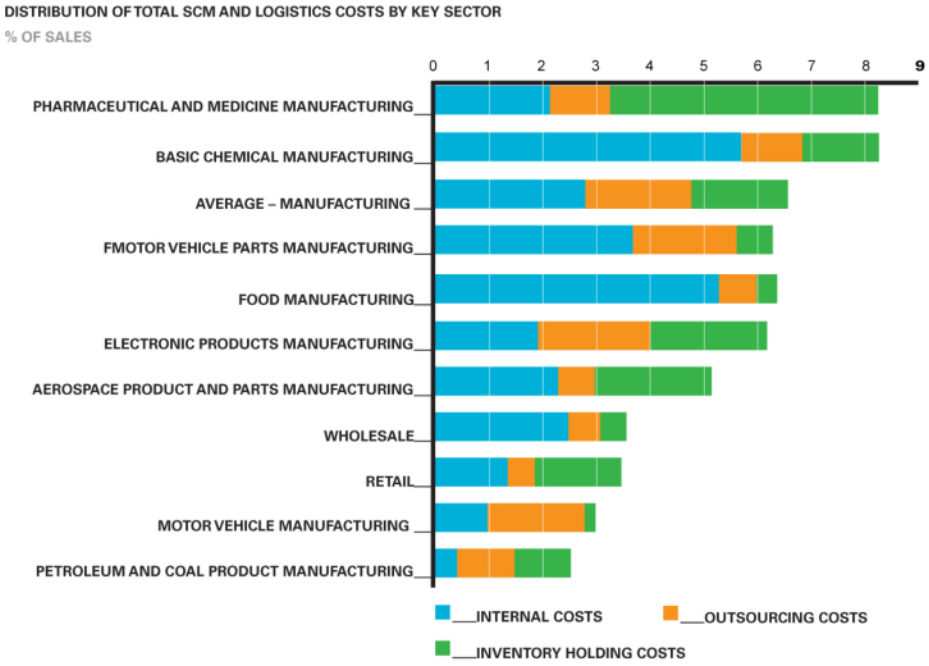
In Section 1, we saw that Canada ranked 14th in the World Bank classification based on the international Logistics Performance Index classification, just ahead of the United States. In the preceding section, we demonstrated the effect of good logistics practices on operational and general business performance. This section answers the question of how the performance

of Canadian companies compares with that of American companies in terms of the main key logistics indicators.

We will look first at the total costs of logistics and supply chain management activities. These costs can be divided into three categories: 1) internal costs, that is, those associated with logistics activities conducted within the company, 2) the cost of logistics activities outsourced to external service providers such as transportation and warehousing, and 3) inventory holding costs such as financing, obsolescence and breakage (Industry Canada, 2008). Figure 1 illustrates the distribution of total supply chain management costs expressed in sales percentages for Canada's main key sectors in 2008.

It can be seen that logistics and supply chain management costs are higher in the manufacturing sector than in the wholesale and retail sectors. Moreover, logistics costs vary widely from one subsector to another. For example, they are higher for the pharmaceutical products subsector than for the motor vehicle subsector.

Figure 1: Distribution of Canada's supply chain total costs in 2008



Source: Industry Canada (2008)

Table 2 compares the costs of supply chain management in Canada and the United States by sector and cost category. In all sectors, the costs observed in the United States are lower than costs in Canada. More specifically, Canada's logistics costs are 12.5% higher than US costs in the manufacturing sector, 18% higher among wholesalers and 29.6% higher among retailers. It is understandable that costs would be higher for Canadian wholesalers and retailers because of the smaller market and the physical size of the country from coast to coast. That said,

these gaps are significant and reflect to some extent the gap referred to in the introduction in work productivity between the two countries. This is especially true for manufacturing companies that compete in the same North American market as their neighbours to the south. The percentages presented in Table 2 may appear low, but it is important to bear in mind that total logistics costs in the United States in 2008 were US$1.344 billion, which accounted for 9.4% of the country's GDP for that year (Wilson, 2009).

Table 2: Supply Chain Management Costs in Canada and the United States

(% of Sales, 2008)

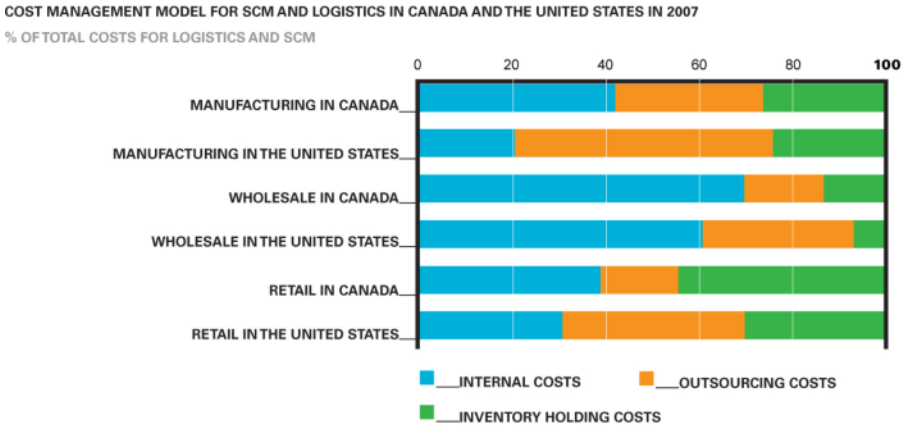
	Canada			United States		
Costs	Manu-facturing	Wholesale	Retail	Manu-facturing	Wholesale	Retail
Internal	2.68%	2.45%	1.22%	1.20%	1.90%	0.80%
Out-sourced	2.10%	0.59%	0.65%	3.20%	0.90%	1.00%
Holding	1.71%	0.50%	1.50%	1.37%	0.20%	0.80%
Totals	6.49%	3.54%	3.37%	5.77%	3.00%	2.60%

Source: Industry Canada (2008)

Closer examination of Table 2 reveals that American companies have lower inventory holding costs than their Canadian counterparts in all sectors of the economy. The reason for this is higher inventory turnover rates than in Canada, one of the most well-used indicators for assessing the industry's agility. In the manufacturing sector, then, just-in-time practices result in high turnover rates for raw materials and other upstream components. The turnover rate observed in the American manufacturing sector is 24% higher than the rate for that sector in Canada. In the distribution sectors (wholesale and retail), there is an increasing effort to supply retailers just in time in order to reduce unsold inventories and provide product assortments that correspond more closely with demand. Here, too, inventory turnover rates observed in the United States are higher by 10% and 29% respectively in the wholesale and retail sectors (Industry Canada, 2008).

Table 2 also indicates that the costs of activities outsourced to logistics service providers are higher in the United States than in Canada. This is expressed in a worldwide trend whereby logistics activities are increasingly being handled by specialists referred to as "3PL," which stands for "third-party logistics providers." The main reason companies outsource logistics services is to save money. It is therefore not surprising to note that the total cost of logistics is relatively lower in the United States than in Canada, partly because of the higher use of outsourcing, as shown in Figure 2.

Figure 2: Distribution of logistics costs in Canada and the United States



Source: Industry Canada (2008)

4. Innovation in the supply chain for Canadian companies

In Section 2, we demonstrated that companies that have adopted best or innovative practices for supply chain management enjoy a higher organizational performance level than other companies. We will now examine the nature of these practices and then determine, where applicable, the extent to which Canadian companies use such practices.

4.1 Supply chain management best practices

A number of authors have proposed lists of supply chain management best practices. Our objective is not to produce an exhaustive list of all of these nomenclatures, but rather to provide an overview of the main practices that in our opinion have garnered fairly broad consensus.

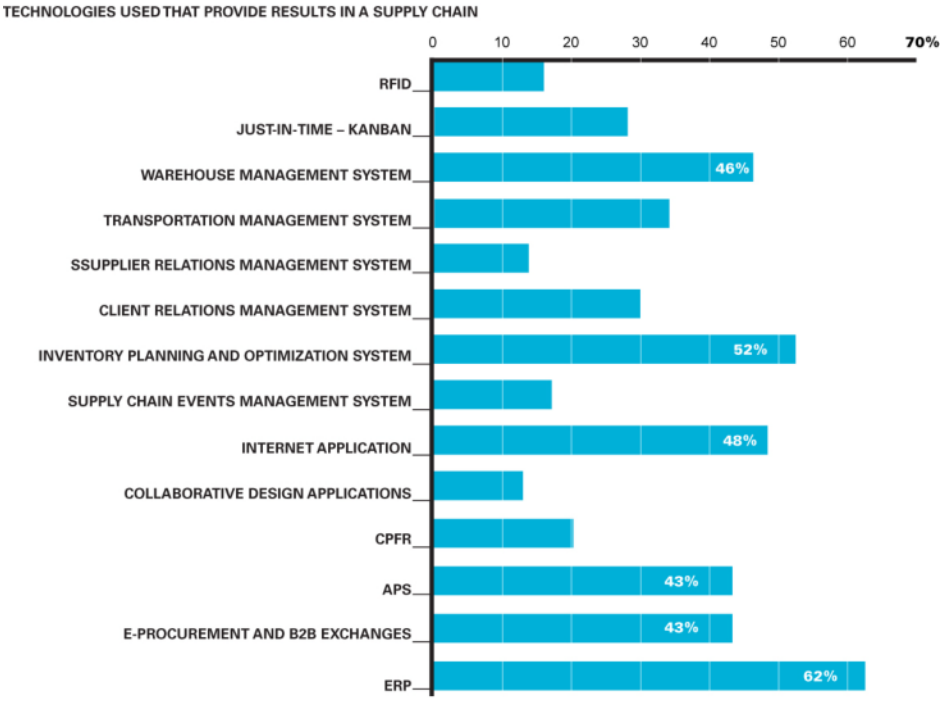
1) The use of information and communication technologies

To properly manage the supply chain, companies must adopt new information and communication technologies to facilitate the integration of upstream and downstream activities and enable the various stakeholders in the chain to collaborate among themselves. These technologies include information systems such as integrated business management systems (enterprise resource planning – ERP), warehouse management systems (WMS) and transportation management systems (TMS). Other communication technologies referred to are on-board computers, global positioning systems (GPS) and radio frequency identification tags (RFID). By extension, these practices also include all optimization software designed to develop the best delivery routes, better manage inventories and obtain the optimal configuration of a logistics network including the number and location of production and distribution units, and to perform other tasks. In short, the use of technology provides greater visibility for products

along the chain and offers partners greater connectivity, which in turn facilitates cooperation and integration.

Figure 3 presents the results of a survey by Poirier and Quinn (2006) among supply chain management professionals in North America, Europe and Australia (120 respondents). The survey indicates the percentage of respondents using one of these technologies. It reveals that 14% of respondents would adopt all of these technologies, and that of the five most popular technological applications (actually six, since two are tied), four involve technologies with internal applications for an organization (ERP, inventory planning and optimization system, WMS and APS).

Figure 3: Use of various supply chain management technologies



Source: Poirier and Quinn (2006)

2) Cooperation between supply chain partners

Over the last decade, the just-in-time philosophy was adapted to the distribution of finished goods from factory to sales outlets and distribution centres. This has given rise to continuous replenishment practices known as Quick Response (QR) or Efficient Consumer Response (ECR), and more recently, to collaborative planning, forecasting and replenishment (CPFR) over the Internet. Essentially, these practices facilitate partnerships between members of a distribution network to better plan replenishment of finished goods for retailers on the basis of information coming from the sales outlets as well as from collaborative forecasting among network members. This approach differs from

the traditional replenishment method based almost exclusively on the independent processing of orders received at each level of the network.

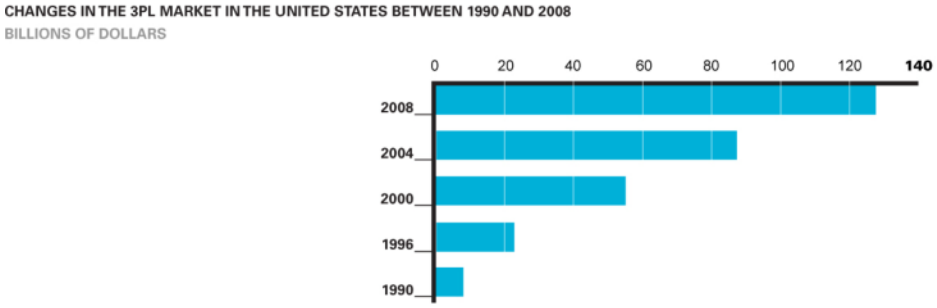
A recent technological innovation, flowcasting, sets forth the idea of an information system through which a database can be developed that is shared by the various stakeholders in a supply chain. The system is based on a single set of forecasts, made at sales outlets, to plan replenishment of retail stores and distribution centres. Tests were performed in the United States between a large retailer and a major food product supplier, and the results are extremely interesting: there was a significant reduction in the inventory level and an increase in the level of service and rate of coverage of in-store products. (Beaulieu and Roy, 2009).

3) Outsourcing of logistics services

With globalization and market liberalization, companies are increasingly looking to focus on activities in which they excel, be it motor vehicle assembly or product marketing. In many cases, however, these activities exclude product supply and distribution, which is outsourced to companies specializing in logistics, better known as 3PLs (third party logistics providers). These companies handle some or all of their clients' logistics activities: transportation, warehousing, handling, order processing and preparation, inventory management, supply, distribution, etc.

These logistics service providers have developed rapidly over the past decade and continue to increase steadily. Figure 4 illustrates this trend by showing how the 3PL market in the United States has grown over nearly 20 years, whereas Figure 2 demonstrates that Canadian companies were less likely to outsource their logistics activities to 3PLs. As a result, the Canadian logistics services industry grew by 47% between 1998 and 2007, according to Industry Canada (2008). Still, it is difficult to compare this figure with the American percentage, because the Canadian definition includes transportation service providers. Even so, it is interesting to note that the GDP for Canadian logistics service providers should increase by 40% between 2007 and 2015 to C$56 billion, according to Industry Canada (2008), a rising trend similar to that observed in the United States.

Figure 4: Changes in the 3PL market in the United States between 1990 and 2008



Sources: Chow and Gritta (2002) and Wilson (2009)

4) Approaches for measuring and improving performance

Operational excellence is based on a performance management approach that includes process mapping and improvement, performance measurement using key indicators often grouped into management dashboards, activity based costing, and comparative analysis, better known as benchmarking. Though this performance management approach is not specific to supply chain management, it is still recognized as a necessary condition and best practice. In fact, companies that use key performance indicators report better logistics performance than those that do not (Industry Canada, 2006).

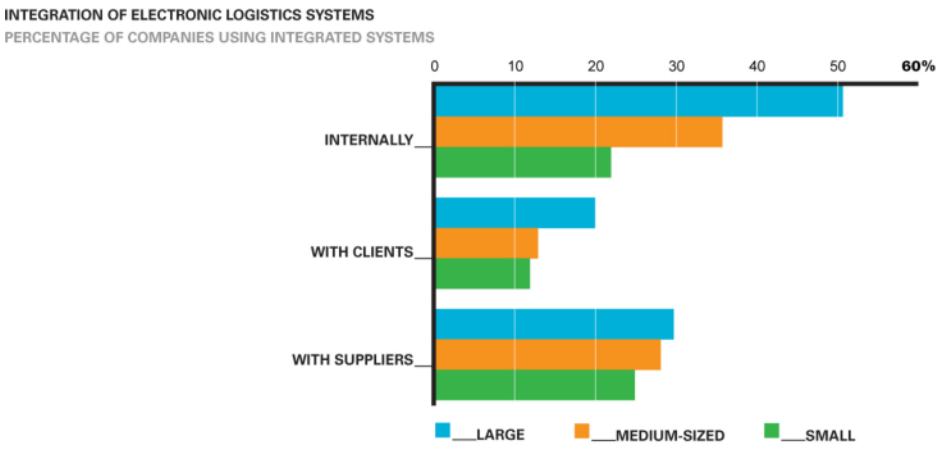
4.2 Use of electronic systems linked to logistics in Canada

In Canada, there has been a relatively low rate of adoption of electronic information systems to manage logistics functions, with use at slightly over 20% by medium-sized and large companies, and a mere 10% by small companies. In the United States, the rate of use is 30% higher than in Canada, regardless of the size of the company (Industry Canada, 2010a). Though use remains low for all sectors, wholesalers boast the highest rate, with 35% adopting electronic logistics management systems. Moreover, retailers and wholesalers are relatively more inclined to use electronic systems to coordinate replenishment activities with their suppliers such as CPFR. This does not prevent manufacturers from increasingly adopting collaborative approaches such as CPFR with their own suppliers.

Last, we know how important it is to integrate electronic information systems to achieve excellence in managing supply chains. Barely half of Canada's major companies have succeeded in integrating electronic supply management systems with their other internal systems as indicated in Figure 5. Naturally, this percentage decreases inversely with the size of the companies. Also, the degree of integration with client and supplier systems is a key indicator of business performance in terms of collaboration and exemplary management of the supply chain. However, relatively few companies have reached this degree of integration with their suppliers. Retailers have achieved the highest adoption rate (close to 40%), which is a result of their efforts in terms of collaborative planning, forecasting and replenishment, or CPFR (Industry Canada, 2010a).

Few surveys have been done to assess the degree to which Canadian companies have adopted logistics practices. One of the most exhaustive such survey was conducted in 2001 in Quebec and was based on a sample of 668 respondents (Roy et al., 2002). The results are presented in Table 3.

Figure 5: Integration of electronic logistics systems



Source: Industry Canada (2010a)

These results indicate that for all of the statements in Table 3 (except for the choice of suppliers on the Internet), deployment is based on the size of the respondents, with the large companies systematically adopting practices and technologies in greater numbers than the small and medium-sized companies. Care should be taken in interpreting these results today, since the survey is several years old and the portrait is bound to have changed, even simply on the basis of new perspectives or technologies such as RFID.

Canadian companies would be well-advised to make a greater effort to adopt and integrate electronic management software. By doing so, they could catch up with their American counterparts, enjoy substantial savings in terms of logistics costs and improve the quality of client services to give them an advantage over their competitors. In fact, adopting supply chain management best practices is not just a matter of saving money, but also—and most importantly—it is a way to obtain a lasting competitive edge.

Table 3: Adoption of Logistics Practices by Quebec Companies
(In Percentages)

Logistics practices	Companies		
	Small	Medium-sized	Large
Inventory management by the supplier	30.0	38.0	43.8
Management of your clients' inventory (VMI)	29.6	31.1	40.0
Alliances or partnerships with transportation or logistics companies	28.0	48.5	60.4
Alliances or partnerships with suppliers (other than transportation or logistics)	44.5	57.2	72.5
Establishment of quality standards (ISO or others)	45.5	52.0	75.0
Use of bar code and optical scanning systems	25.1	48.8	70.0
Training of teams of employees with clients or suppliers	29.5	39.1	46.2
Development or re-engineering of processes with clients or suppliers	26.9	38.9	51.6
Just in time	45.7	55.0	62.9
Forecast sharing with clients and suppliers (CPFR)	34.2	44.8	59.9
Tracking system or logistics performance dashboard	25.6	31.3	61.6
Choice of suppliers on the Internet	25.1	23.9	31.9
Electronic product catalogue	28.2	40.1	52.5
Continuous replenishment method (ECR, *Quick Response*)	12.3	19.8	35.2
Sharing of information gathered at sales outlets	25.9	44.9	47.5

Source: Roy et al. (2002)

4.3 Outsourcing to countries with low production costs

Market globalization and increased international competition is prompting companies to focus increasingly on competencies in which they excel, and consequently, to outsource to third parties the activities at which they are less adept or for which emerging countries have a significant competitive cost advantage. China is obviously central to this phenomenon by reason of its size and very high and sustained growth rate. In 2007, 90% of Canadian manufacturers

outsourced to China (Industry Canada, 2007). Foreign subsidiaries of multinationals in China account for over a quarter of that country's industrial production and 58% of Chinese exports and provide jobs for over 10 million people (Sydor, 2006). However, offshoring production activities also benefits other Asian countries and growth is being observed in emerging countries in Central and South America as well as in Eastern Europe.

In Canada, this phenomenon certainly affects companies working in traditional sectors such as clothing (Gildan) and furniture (Shermag), but the same trend can be seen in hi-tech sectors such as aeronautics. In fact, Pratt& Whitney Canada has production activities in Poland and Bombardier Aerospace manufactures electrical harnesses and other components in Mexico and China.

There are numerous consequences of this globalization of supply sources (global sourcing). First, companies obviously enjoy the advantages associated with lower production costs, which unfortunately come with ever-increasing transportation costs and the need to maintain more inventories locally to ensure the continuity of their operations during the supply period, and this in turn generates increased warehousing and inventory holding costs. In some cases, more rapid transportation methods such as air transport are preferred, rather than the slower method of shipping by sea, but there again, this increases transportation costs significantly. According to Industry Canada (2007), the time frame for outsourcing products to China varies from a minimum of one to three months, to a maximum of three to six months.

There are other consequences of this phenomenon such as additional delays owing to port congestion and capacity problems experienced by foreign suppliers as their popularity increases. Other challenges are errors in the orders received and problems with the quality of the products delivered. Avoiding these risks often means increasing the level of inventory kept locally or setting up alternative supply sources, which increases complexity and operating costs.

The 1990s brought predictions that conventional distribution centres would disappear because of the increasing popularity of cross-docking centres. Today, the use of outsourcing to countries with low production costs makes it necessary to keep more inventories locally and the number of distribution centres is virtually exploding. In fact, investment in new distribution centres rose by 60% between 2001 and 2007 (Industry Canada, 2007). Examples of such centres are the new facilities of The Aldo Group, The Hockey Company, Alimentation Couche-Tard and Canadian Tire, and these are just the ones in Greater Montreal.

Again, according to Industry Canada (2007), barely 43% of Canadian companies that chose to outsource to countries with low production costs reported that they had successfully lowered the total delivered cost of their products as a result. To achieve this result, these companies adopted a number of best practices, presented in Table 4.

Table 4: Practical examples of companies that decreased their total delivered cost

Practice	Percentage of Companies Adopting Best Practices
Analysis of total logistics cost	84%
Allocation of dedicated human resources	79%
Establishment of secondary supply sources	79%
Use of air transportation	76%
Training of suppliers from low-cost countries	70%
Adding supplementary inventory	21%

Source: Industry Canada (2007)

First, the companies that succeed are the ones that know their costs. This may seem obvious, but many companies decide to outsource to low-cost countries solely on the basis of anticipated savings in labour costs. A good analysis of the total delivered cost can sometimes reveal surprises to companies that have underestimated factors such as increases in the cost of transportation, warehousing and poor quality, to name but a few.

Allocating dedicated resources to global sourcing and sending company staff to work onsite in a low-cost country are ways of ensuring the success of the operation, as doing so will mean, for example, that foreign suppliers are better trained. Despite these measures, there will be unexpected and emergency situations. In such cases, successful companies do not hesitate to use air transport and secondary supply sources in less risky countries. Although the company incurs additional costs, it avoids having to keep too much inventory on hand, which successful companies are reluctant to do. However, it is interesting to note that setting up supplementary inventory is a widespread practice in 85% of the companies whose total cost increased after they outsourced to low-cost countries.

4.4 Green logistics

There is increasing concern over environmental and sustainable development issues in our society. The transportation sector alone generated some 27% of greenhouse gas emissions (GGEs) in Canada in 2007 (Transport Canada, 2009). Logistics can therefore foster sustainable development through the design of supply chains that reduce transportation needs. We might also add that it is also advantageous for companies to create an environmentally friendly "green" image. This pressure can sometimes come in the form of a requirement to obtain environmental certification, such as the ISO 14,000 standard, to comply with the

requirements of certain clients or orderers. Also promoted is the green logistics concept, which is essentially aimed at reducing the harmful effects of logistics-related activities, such as hard-to-recycle packaging and air pollution.

In Canada, a recent study reveals that manufacturers who adopt green logistics practices report improvements that reduce energy consumption, GGEs, packaging and waste (Industry Canada, 2009). The study also reports that 80% of the highest-performing green logistics manufacturers observed a reduction of their distribution costs and a more loyal clientele. Moreover, 90% of these manufacturers reported improvements in their compliance processes. Other business advantages observed by these high-performing companies in terms of green logistics were improved risk management, greater access to foreign markets, increased sales and greater differentiation in distribution services (Industry Canada, 2009). In short, green logistics represents another opportunity for Canadian companies to improve their performance and make their mark in international markets.

5. Conclusion and government policy implications

5.1 Conclusion

In this chapter, we saw that Canada lagged behind other OECD member countries in terms of per capita GDP and labour productivity levels. The vast majority of countries that are doing better than Canada in this regard also perform better when it comes to supply chain management, both internationally and at the company level. Canada ranks 14th on the World Bank's international logistics performance index. Performance could be improved by addressing customs formalities, transportation infrastructure, and especially "ease of arranging competitively priced shipments," for which Canada ranks 32nd.

Generally speaking, it has been demonstrated that for companies, good logistics practices foster better organizational performance. We compared the performance of Canadian and American companies on the basis of logistics costs. Such costs for the Canadian companies were 12.5% higher in the manufacturing sector, 18% higher for wholesalers and 29.6% higher for retailers. To gain a better understanding of these differences, we identified the main best logistics practices adopted by companies known for their superior performance. It was demonstrated that 1) the rate of use of electronic systems for logistics was 30% higher for American companies than for Canadian companies; 2) American companies outsourced logistics activities to designated 3PL service providers much more than Canadian companies did; 3) the integration of electronic logistical systems was incomplete, especially in the case of SMEs; and 4) most companies outsourcing to low cost countries did not adopt best practices in this regard.

5.2 Implications for government policy

We will now examine the implications of these results on possible government policy or action by separating the more global issues from those more specifically affecting Canadian companies.

5.2.1 Global issues

Because Germany ranks first on the World Bank's Logistics Performance Index, it is a good idea to try to understand the reasons for its high performance. This country leads in infrastructure and ranks third for customs formalities, two criteria for which there is government involvement. The German government takes an active interest in logistics and has developed a master plan for freight transport and logistics (Tiedemann, 2009). The objectives of this plan are as follows:

- Optimize the use of infrastructure and make transportation more efficient;
- Eliminate unnecessary travel to facilitate mobility;
- Move more traffic to domestic rail and maritime routes;
- Promote clean, green transportation;
- Create good working conditions and training in the freight industry;
- Adopt measures to make Germany even more attractive as a logistics centre.

Canada's challenges are very similar to those facing Germany (globalization and global sourcing, increase in traffic and congestion, labour shortages, environmental protection and new logistics technologies). Canada could draw on the objectives and measures proposed in Germany's master plan. For example, to attract the flow of goods to or from North America through Canada, it would be helpful to align government policy with the environmental and technological logistics mandates of multinationals. To achieve this, the Canadian government could try to attract investment in logistics to Canada by facilitating the emergence of logistics centres like those in countries that have received high ratings from the World Bank. Another example from the Throne Speech and the 2010 budget is that the government has promised to develop a strategy to make Canada a leader in the global digital economy. Innovation in global supply chain management could be a pillar of this strategy.

Benchmarking is good practice in logistics, and, more generally, in management. The Canadian government should also practice benchmarking by analyzing the high logistics performance of countries such as Germany. In developing its master plan, the German government conducted numerous consultations with representatives from industry, academia, professional associations, unions, etc. In Canada, there is a similar initiative—Gateways and Trade Corridors—in Western, Central and Eastern Canada. In this context, it is helpful to take a look at some of the recommendations that came out of a workshop held at the University of Western Ontario in March 2008 concerning the Ontario-Quebec Continental Gateway and Trade Corridor (Cunningham, 2008).

- With regard to Canada's competitiveness in North America, recommendations included 1) setting up an agency that would coordinate policy through a number of jurisdictions, both within Canada and with the United States; 2) strengthening the free trade agreement with the United States to increase the flow of goods, services and capital; and 3) considering the concept of free trade zones like in Rotterdam, Netherlands.

- In terms of border-related issues, one of the criteria of the World Bank index, it was suggested that the focus should be on border congestion problems, identifying bottlenecks and investing in reducing them. Another suggestion was to expand the security perimeter to include the entire continent and not just to limit it to the borders. Last, it was suggested that customs formalities with Mexico and the United States be simplified. This last recommendation lines up with the concerns of freight agents that expressed their dissatisfaction with international shipments to Canada. This is consistent with the advice of numerous other experts in Canada who feel that Canada could play a bigger role as a continental port of entry and take advantage of NAFTA if the border-related issues could be mitigated and the regulations for various methods of transportation harmonized (see for example Brooks, 2006).
- In terms of infrastructure, another World Bank criterion, the report recommended adopting a continental approach for planning transportation systems and infrastructure. In fact, it is felt that road, rail, air and sea transportation corridors must be planned at the continental level to determine the extent and levels of current and future congestion. In particular, rail transportation requires consideration, given the growing need, particularly as a result of environmental pressures that are expected to further increase its popularity.
- Last, other relevant recommendations concerned issues such as harmonizing road transportation regulations between provinces, adopting an intelligent transportation systems policy and developing technologies to facilitate transportation and customs procedures and greater availability of statistical data on the flow of goods.

5.2.2 Company-related issues

Government policy would also be relevant with regard to companies. First, despite recent efforts by Industry Canada to better understand and support Canada's logistics sector, much remains to be done in terms of assessing and understanding the performance level of Canadian companies regarding supply chain management. Recent Industry Canada studies and surveys show that Canadian companies are lagging when it comes to deploying and integrating electronic systems for logistics and outsourcing. It also reveals that most companies that outsource to low-cost countries do not adopt best practices, and their total cost results are therefore negative.

That said, we do not know why Canadian companies lag behind in adopting better practices. Are they less well informed? Are their managers less well trained? Do they have the financial means for adopting and integrating the increasingly sophisticated systems being promoted in supply chain management? Are there concrete examples of companies that have successfully adopted best practices in terms of logistics and demonstrated leadership in their business line? How should this knowledge and these good practices be conveyed to companies that are having more difficulty? Should smaller companies that are taking longer to adopt best practices receive assistance? Does government policy on innovation also cover logistics issues? These are issues that call for some level of government involvement.

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