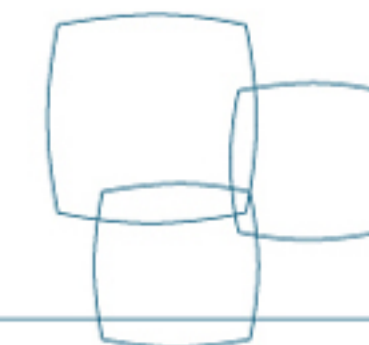
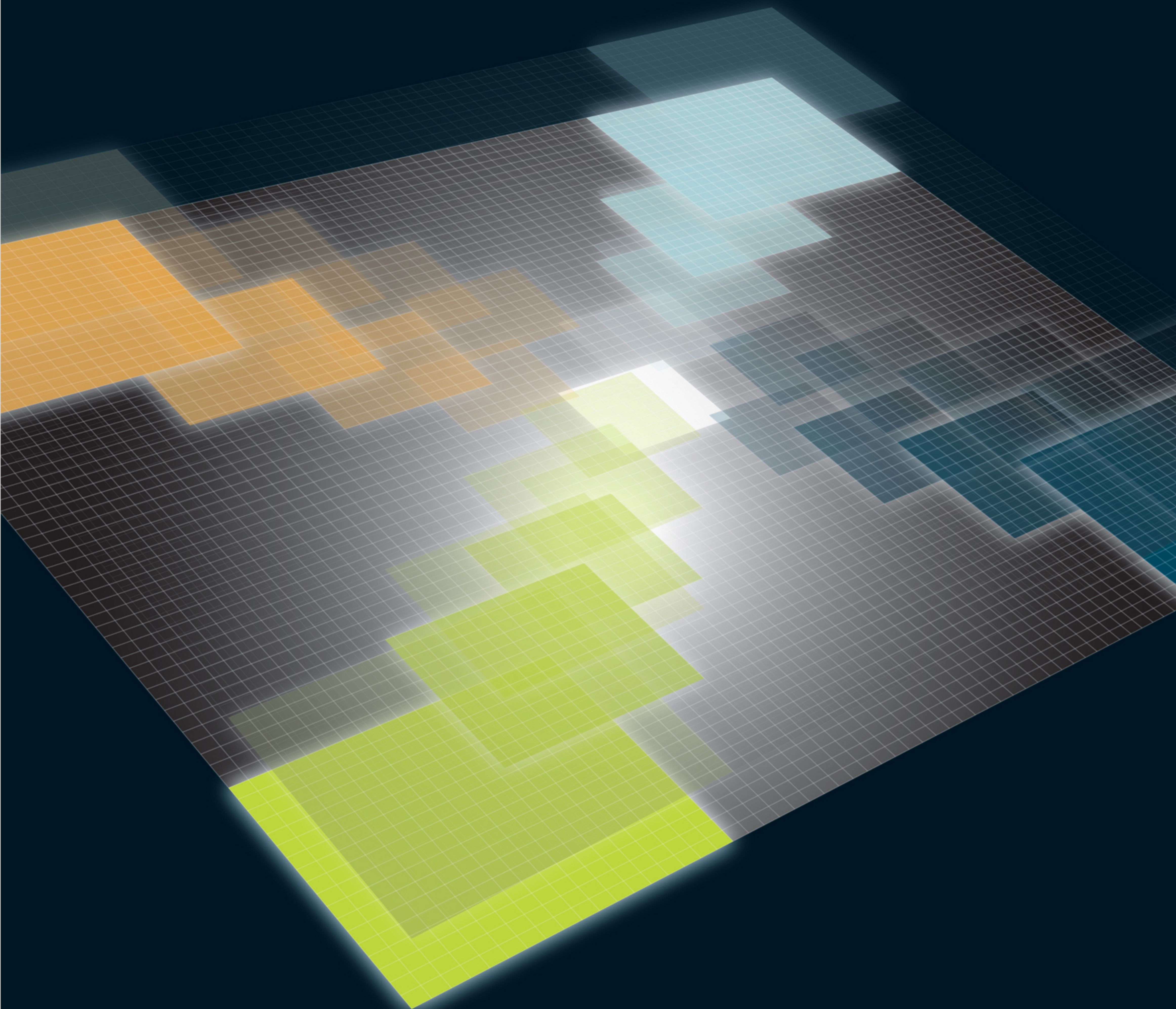


# GLOBAL BUSINESS STRATEGY AND INNOVATION



A CANADIAN LOGISTICS PERSPECTIVE



Canadian  
Manufacturers &  
Exporters

Manufacturiers et  
Exportateurs du  
Canada



SUPPLY CHAIN &  
LOGISTICS ASSOCIATION  
CANADA

ASSOCIATION CHAÎNE  
D'APPROVISIONNEMENT  
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Canada 

## **Global Business Strategy and Innovation: A Canadian Logistics Perspective**

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Perspective canadienne de la logistique**



# GLOBAL BUSINESS STRATEGY AND INNOVATION

A CANADIAN LOGISTICS PERSPECTIVE

# Highlights

**In the international marketplace, supply chain performance is an important competitive differentiator. Leading supply chain strategists claim that supply chain design, structure and sophistication are influenced by six main factors: globalization, increasing logistics\* complexity, rising risk, increasing labour costs in the developing world, sustainability, and growing volatility.<sup>1</sup> In this context, logistics has prospered over the last decade as the flow of information has become paramount to supply chain efficiency across industries.**

**Ongoing innovation in logistics has been a key enabler in the development of global value chains. Changing parameters in manufacturing, global sourcing, investment, technology and security requirements are compelling logistics executives to revise procurement and decision making processes. Over the last few years, a critical competitiveness factor for Canadian firms has been the ability to develop and implement logistics solutions that enhance agility and adaptability throughout the supply chain.<sup>2</sup>**

**Industry Canada has partnered with Canadian Manufacturers and Exporters (CME) and Supply Chain & Logistics Association Canada (SCL) to review the valuable core business function of logistics. By collecting insights from industry, academia and international research organizations, and using economic analysis conducted by Industry Canada, this industry-academia-government partnership has produced a complete profile of logistics innovation and global business strategies in Canada, summarized here in this report.**

\* Logistics is the management and coordination of transportation, inventory, strategic sourcing, global trade management, forecasting, compliance mandates and performance measurement across global value chain partners.

## Key Findings

- \ The sharp increase in international trade has propelled logistics activities to the forefront of business strategy.
- \ Manufacturers, retailers and natural resources industries are relying on their logistics networks to deliver seamless, integrated, secure, reliable and efficient solutions to leverage their global value chains.
- \ The use of continental logistics strategies is an emerging trend across numerous industries.
- \ A growing trend in logistics outsourcing is the use of long-term initiatives with dedicated facilities, personnel, processes and technologies.
- \ Firms are utilizing a mix of strategies within a 4 Tier global sourcing framework to balance the trade-offs between opportunities.
- \ Firms are seeking to establish dynamic, responsive, automated and low-cost distribution centres (DCs) that will support their logistics global business strategies.
- \ Investment in DCs in Canada has increased by 106% over the past five years (main areas of investment located in Ontario, Alberta, Quebec and British Columbia).
- \ Small and medium-sized firms are investing in DCs to better respond to customer mandates and to integrate further into global value chains.
- \ Logistics innovation is at the forefront of global value chain network integration.
- \ Supply chain mandates have a direct impact on innovation across value chains.
- \ The top 20% performers in total landed cost and on-time shipment are more likely to invest in logistics network strategies — such as capability to electronically collaborate with networks of key suppliers and customers — and supply chain modelling applications.

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## Background

As competition becomes more global and intensive, logistics innovation is expanding from the firm level to a supply-chain perspective. Competitive advantages are now being realized as value chain players synchronize their logistics activities. To remain competitive in the global market, Canadian firms are rethinking their logistics business models, investing in logistics, and implementing innovative tools and practices.

Logistics activities across industries have increased over the last decade as firms strive to manage the flow of both goods and information to increase supply chain efficiency. Put simply, logistics has become a strategic component of business plans.<sup>2</sup>

According to the World Bank, Canada's logistics network ranked 14<sup>th</sup> in terms of performance, ahead of such countries as the United States and France but behind Germany and Singapore. Compared to top-performing countries, Canada's logistics network strengths lie in the areas of timeliness, logistics quality and competence, but rank lower in the areas of customs clearance and tracking and tracing processes.<sup>3</sup>

This report is intended to help Canadian business executives and policy makers enhance their understanding of firms' global logistics business strategies that lead to improved domestic and international competitiveness. This report also highlights differentiating factors for specific industrial sectors.

This report provides insights on the following aspects of logistics:

- **Logistics business models**
- **Global sourcing**
- **Investment in distribution facilities**
- **Innovation trends and strategies**
- **Best-in-Class analysis**

# Logistics Business Models

With the fragmentation of manufacturing activities and growing international and intra-firm trade, logistics activities have become more global, complex and sophisticated. An unprecedented array of products are crossing borders using different modes and generating a multitude of interconnected logistics activities across various sectors, including natural resources, manufacturing and services.

Logistics activities are now integrated with day-to-day production processes through the global sourcing of inputs and worldwide distribution of components and finished goods to other production facilities, distribution centres (DCs) and customers. They are also central to the efficiency of after-sales support, including repair, maintenance and potential reverse logistics needs. Decisions about logistics activities are critical to supply chain performance, and ultimately, firm competitiveness.<sup>2</sup>

The key to successful logistics management is the judicious selection and coordination of activities that will optimize the overall process and achieve the lowest total landed cost.<sup>‡</sup> As logistics management is central to several core activities, a common strategy among leading firms is to create an executive-level position to manage the overall logistics component of the business. Managing the entire logistics network means streamlining operations and driving innovation to improve supply chain performance across business functions and with value chain partners. It includes developing a common vision in forecasting demand capabilities with marketing, distribution, transportation, global trade management, strategic sourcing and after-sales service groups. By integrating traditionally independent business functions at the executive level, firms can ensure their overall priorities are strategically aligned.<sup>2</sup>

The majority of Canadian firms, including 92% of manufacturing and 84% of mining firms, make decisions related to logistics in Canada.<sup>4</sup> For close to 25% of large manufacturing firms, logistics decisions are made by or jointly with the foreign parent, compared with 13% of medium and 5% of small firms.<sup>†,4</sup> The level of coordination with the foreign parent varies with the extent and type of activities that are carried out abroad, since direct connections with local service providers and markets can be critical. Also, large firms often have a dedicated team based at their head office in charge of major logistics decisions and negotiations, complemented by national and regional units to manage the process locally and resolve issues as they arise.<sup>2</sup>

When making decisions related to logistics large firms in sectors such as motor vehicle and motor vehicle parts manufacturing, many of which have subsidiaries and suppliers in several countries, report higher levels of collaboration with their foreign parents than firms in other sectors (Figure 1). Conversely, firms in the consumer products supply chain (i.e. retail, food and beverage, and clothing) generally make these decisions in Canada due to the fact that the domestic market plays a more prominent role.<sup>2</sup>

‡ Total landed cost comprises the actual cost of all goods, transportation costs, carrying costs, insurance and freight, custom duties and preferential rates, taxes, tariffs and any additional charges caused by depreciation and goods becoming obsolete.

† Small = 20-99 employees, medium = 100-249 employees, and large = at least 250 employees.

**Figure 1**



### Emerging Drivers in Logistics

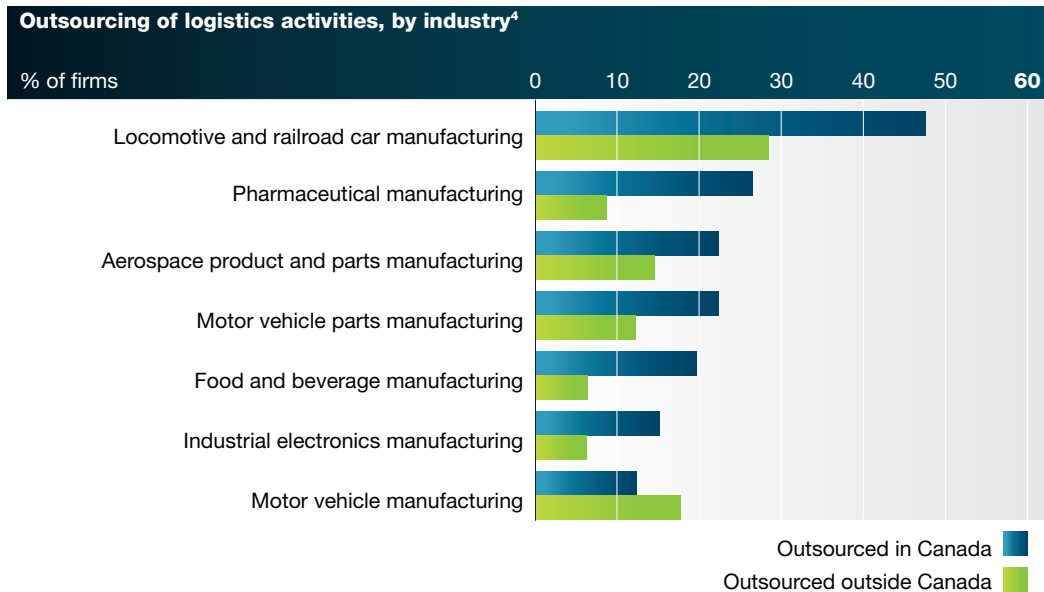
To better manage globalization and outsourcing challenges, sophisticated global logistics strategies are emerging. These strategies are supported by performance measurement metrics, information technology (IT) system standards and supplier relationship management practices. New logistics strategies enable many large firms to adopt a continental vision, centralize their decision making processes to take advantage of economies of scale, and leverage their negotiating power with logistics and transportation providers. With this approach, freight forwarders, third-party logistics (3PL)<sup>†</sup> service providers and marine carriers are selected by head offices using a global perspective, while ports of entry and service providers for national routing by truck, rail or air are selected on a local basis.<sup>2</sup>

During the recent economic downturn, a main objective of most businesses was to reduce total landed costs. Uncertainties about economic growth have pushed firms to run even leaner operations by re-evaluating the efficiency and effectiveness of every activity of their enterprise.<sup>2</sup> Inventory reduction due to fluctuations in demand, and significant increases in transportation costs added to the challenge. Focusing on logistics activities, many firms have either improved their internal operations efficiency or decided to outsource these services. Enhanced collaboration within firms and with logistics and transportation providers to improve logistics and streamline distribution has resulted in increased efficiency and lowered costs.<sup>2</sup>

<sup>†</sup> 3PL: Asset-based logistics services sub-sector consists of third-party logistics (3PL) service providers (storage and warehousing) that carry out physical logistics operations and manage systems to track shipments on behalf of the customer.

Canadian firms from the manufacturing sector are managing a strategic mix of in-house and outsourced resources to meet their logistics needs both in Canada and abroad (Figure 2). A main area of outsourcing of logistics activities is in non-asset-based logistics services (4-5PL).<sup>‡</sup> For example, the use of customs clearance and brokerage service providers by the locomotive and railroad car manufacturing sector for their made-to-order products contributes to their increased rate of outsourcing compared to other manufacturers.<sup>2</sup>

**Figure 2**



Traditionally, outsourcing of logistics activities focused on the movement and storage of goods through asset-based 3PL service providers. However, some firms perform asset-based logistics activities in-house to maintain a greater degree of control. For example, firms in the pharmaceutical industry cite a higher level of control in product tracking and tracing as a motivating factor in maintaining the activity in-house. Meanwhile, mass customization of finished products and the scarcity, complexity and high unit production cost of components drives the need for in-house asset-based logistics activities within the aerospace and industrial electronics manufacturing industries.<sup>2</sup>

A growing trend in logistics outsourcing activities is the use of long-term initiatives with dedicated facilities, personnel, processes and technologies. Logistics services are also outsourced in times of high demand to complement a firm's capacity and to provide access to specific expertise and innovation such as global trade management<sup>§</sup> and supply chain visibility.<sup>\*,2</sup>

<sup>‡</sup> 4-5PL: Non-asset-based logistics services offering services in 4PL (virtual 3PL) such as fleet management, supply chain and logistics information systems, shipment consolidation, carrier selection and logistics procurement services, rate negotiation, inventory management applications, distribution control, freight forwarding and customs clearance, and brokerage. The 5PL is an emerging sub-sector that includes logistics service providers who plan, organize, and implement logistics solutions on behalf of a contracting party (mainly information systems) by exploiting the appropriate technologies (conceptual level).

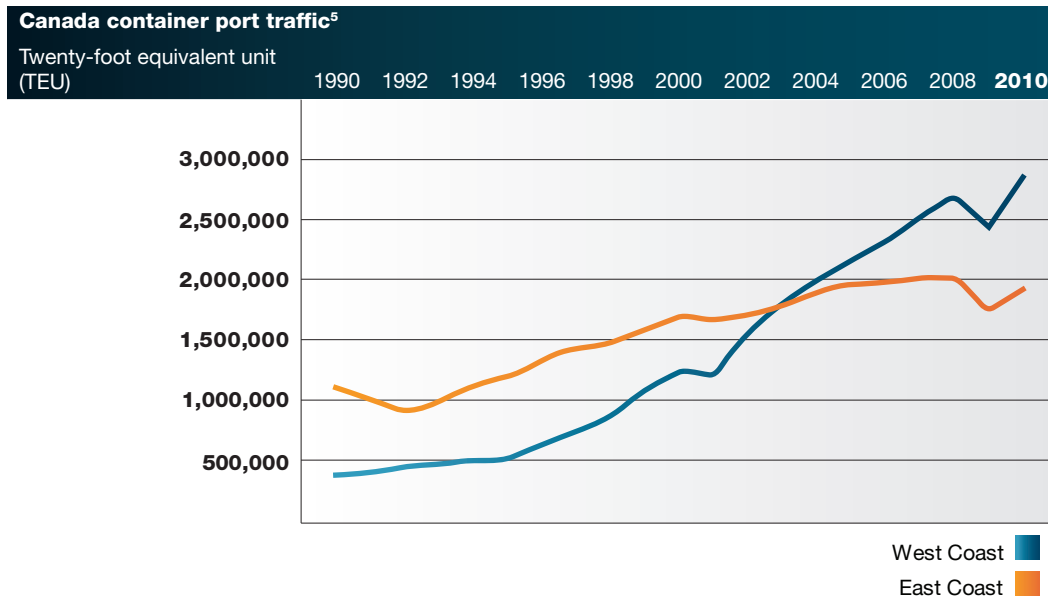
<sup>§</sup> Global trade management: harmonization of advance electronic cargo information requirements on all inbound, outbound and transit shipments, notably in cargo security, customs declarations and importer/exporter trade compliance.

<sup>\*</sup> Supply chain visibility: systems that allow organizations to monitor and manage events across the supply chain by providing alerts to individuals in the supply chain based on predefined resolution logic. When events fall outside of a set of predetermined parameters, the system provides notifications that enable companies to take action with the appropriate application.

## Global Sourcing

The sharp increase in international trade in Canada since the early 1990s has boosted the expansion of global supply chains and propelled logistics activities to the forefront of business strategy. This can be seen in Canada's West Coast container port traffic, which increased by 592% between 1990 and 2010, while Canada's East Coast port traffic grew by 83% (Figure 3).

**Figure 3**



As global customer service level requirements increase, lead-time variability, logistics costs and on-time shipments have become major factors for global sourcing activities. Firms are utilizing a mix of strategies within a 4 Tier global sourcing framework to estimate the trade-offs between opportunities in Canada/U.S., Europe, Mexico and China (Table 1).

**Table 1**

**4 Tier global sourcing framework<sup>2,6</sup>**

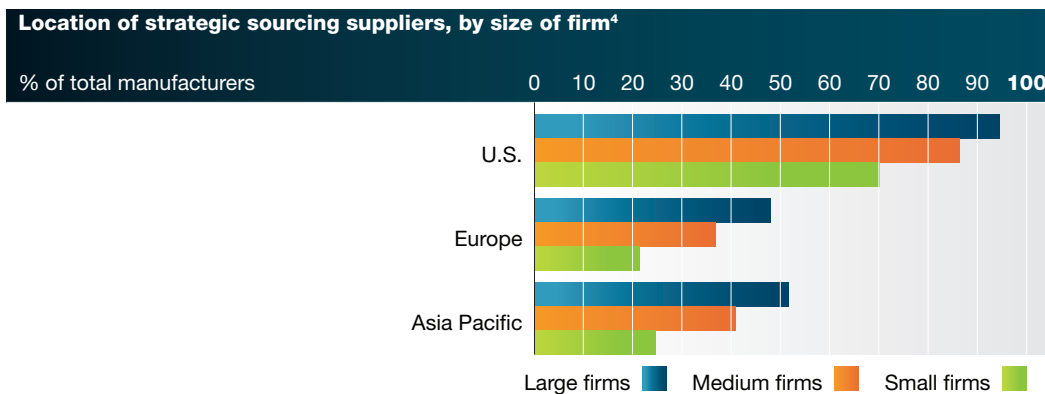
Location	Velocity / Agility	Production cost	Logistics cost
Canada / U.S.	High	High	Low
Europe	Medium	High	Medium
China	Low	Low	High
Mexico	Medium	Medium	Medium

Supply chain managers require a detailed picture of total landed cost beyond the costs of offshore wages and transportation. By incorporating a holistic approach, some firms have aligned their sourcing strategies to include velocity/agility factors that take into account inventory carrying costs (e.g., depreciation of obsolete goods), out-of-stock opportunity costs, customer service level responsiveness, production costs, and logistics costs (including reworking errors, managing product returns, and incremental financing) to better reflect the total landed cost reality. Where velocity and agility are a priority, products that were once profitably sourced in low production cost areas, such as China, might be moved to nearer shoring zones, such as Mexico and in some instances to Canada/U.S.<sup>2</sup>

Using secondary sources to supply critical production components from more agile regions/countries (having a supply base in North America) is another emerging trend for industrial goods manufacturers. Firms can also increase their agility by having the capability to use air transportation. This is especially important for sectors outsourcing high-value goods or products with time-sensitive and fluctuating demand.<sup>2</sup>

As expected, most manufacturers have strategic suppliers in the U.S. due to their proximity, variety, and agility (Figure 4). Overall, because of process complexity and headquarters locations, large manufacturers are more likely to have global suppliers than small or medium manufacturers. While the likelihood of a manufacturer having a strategic supplier in Europe is similar to having one in Asia Pacific, the method or approach to the relationship often varies by region. Canadian firms usually manage their strategic sourcing activities internally when procuring goods from the U.S., Europe and other developed countries; however, the strategy used for Asia Pacific sourcing differs. Due to differences in cultural and business practices, many Canadian companies seek support from specialized firms that provide global trade management services.<sup>2</sup>

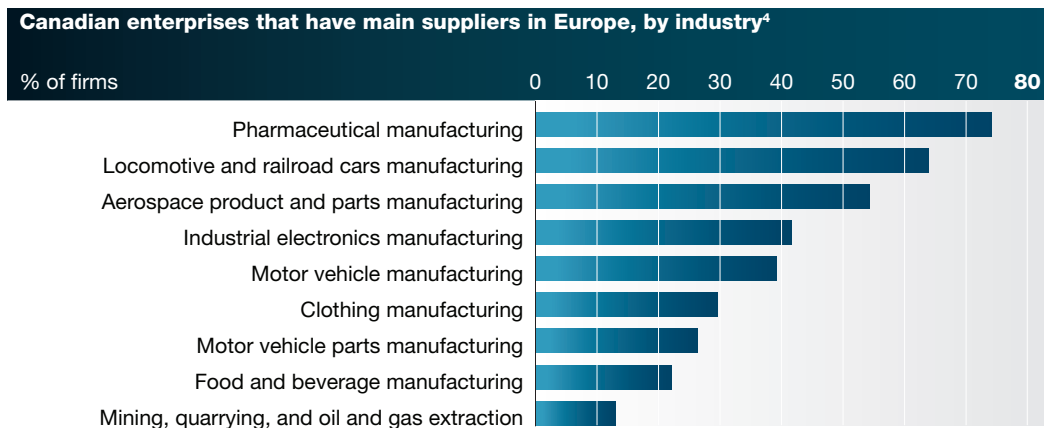
**Figure 4**



Many Canadian firms call on European companies to supply inputs to production, such as locomotive, aerospace, motor vehicle,<sup>‡</sup> and industrial electronics firms that mainly carry out the final assembly of products at the continental level (Figure 5). Meanwhile, pharmaceutical manufacturers often import finished products from Europe, which reflects headquarters' locations and their strategy to have dedicated global production facilities.<sup>2</sup>

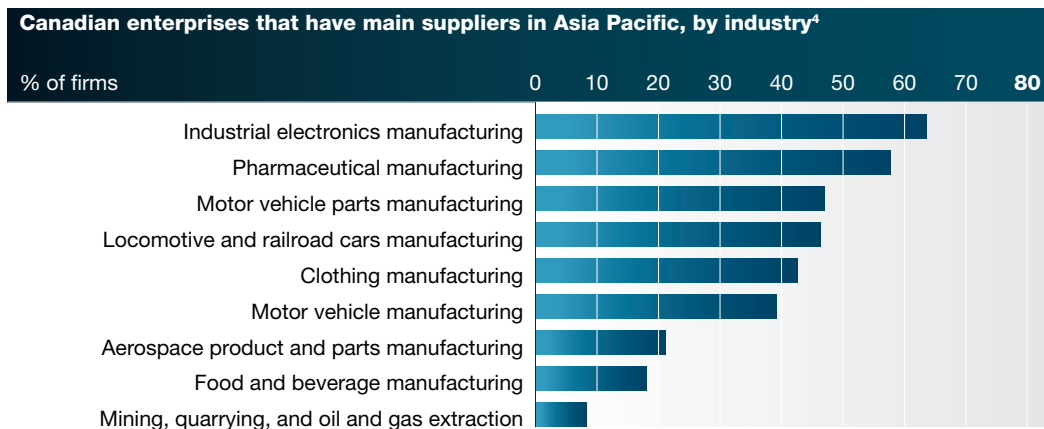
<sup>‡</sup> Motor vehicle manufacturers represent firms that have production cycles in Canada. Therefore, European manufacturers that do not have production facilities in Canada are not included in this definition.

Figure 5



Asia Pacific countries provide an important source of supply for 63% of industrial electronics manufacturing firms (electronic components as inputs into production) and for 57% of pharmaceutical firms (mainly packaging and inputs into production). Also, some aerospace manufacturers import electronic components for their North American production (Figure 6).

Figure 6



The strategy for sourcing auto parts from Asia Pacific can be broken down into two distinct strategies. The flow of inputs into North American production of either motor vehicles or motor vehicle parts is critical, and both the reliability and efficiency of the supply chain are of utmost importance. Meanwhile, the after-sales auto parts market requires less focus on supply chain agility factors because products are not used as inputs to production; rather, the sourcing strategy of the after-sales auto parts market is geared toward lower production and logistics costs. Finally, consumer products goods (CPG) manufacturers often source finished goods from Asia Pacific that are complementary to final products made in North America.<sup>2</sup>

## Global Sourcing Practices

Global sourcing is complex due to complicated processes, country-specific regulations and cultural considerations. This complexity makes additional steps necessary to ensure efficiency of the overall supply chain cycle. The key activity in strategic global sourcing is the implementation of a dedicated team to interact with internal and external stakeholders, and integrate a total landed cost approach. In addition, the development of specific practices such as project management, quality assurance, expediting, loading/unloading supervision, inspection, vendor assessment and failure analysis are essential for an efficient and effective global logistics network (Table 2).

**Table 2**

<b>Global sourcing practices<sup>2</sup></b>	
<b>Project management services</b>	Coordination of the review, verification, inspection, testing and approval steps in all phases of a project.
<b>Quality assurance and quality control</b>	Assures quality for customers with respect to defined standards and specifications. Includes assessment of suppliers and verification of materials, parts and final products through checks, audits, inspection and witnessing.
<b>Expediting</b>	Ensures the delivery of purchased goods to a pre-determined and promised delivery schedule or critical path network, and analyzes areas that might cause delays.
<b>Loading / unloading supervision</b>	During loading and/or unloading operations at the source and on arrival, assures that the goods are correctly presented, properly handled and secured on the means of transport and that quality and safety requirements are met.
<b>Industrial pre-shipment inspection</b>	Before shipping, assures compliance to agreed quality and quantity as well as to marking, packing and loading of industrial goods.
<b>Manufacturing technical inspection</b>	Entails the supervision and control of product tests, and the quality inspection of products. Aims to control the conformity of the manufactured products with purchase specifications, applicable drawings, codes and standards, and other relevant contractual documents.
<b>Vendor assessment / technical audit</b>	Involves a technical audit carried out at the vendor or supplier location to evaluate their ability to undertake a specific order according to the client's requirements.
<b>Failure analysis and failure prevention</b>	If a component or product fails in service or if a failure occurs during manufacturing, identifies and determines the cause of the failure to prevent future occurrences and/or improve the performance of the device, component or structure.
<b>Factory acceptance test</b>	Determines and documents whether the equipment or plant operates as intended and meets contractual specifications.

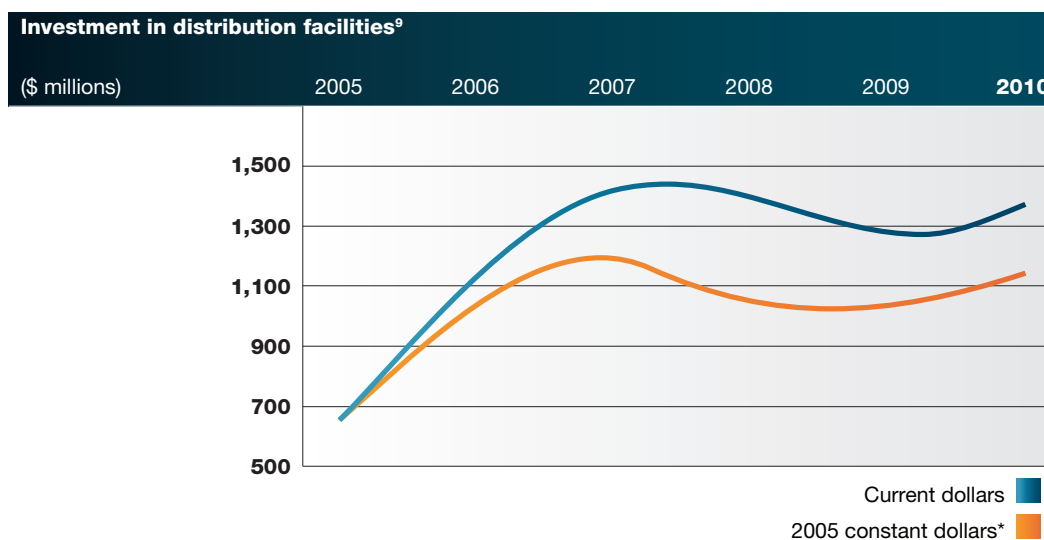


## Investment in Distribution Facilities

In recent years, firms have faced the challenge of integrating increasingly complex global sourcing processes while responding to heightened service level requirements. Consequently, manufacturers and retailers have improved their agility factors and reduced their respective inventory levels during the 2005–2009 period,<sup>7</sup> while focusing on minimizing total landed costs. With energy costs expected to increase,<sup>8</sup> the control of transportation costs remains a key focus for all players in the supply chain. These new realities are leading firms to develop new distribution investment strategies.<sup>2</sup>

Investment in distribution facilities in Canada has increased dramatically over the past five years. Between 2005 and 2010, total annual investment grew from \$674 million to \$1.39 billion, an increase of 106% over five years (69% adjusted growth using price index of non-residential commercial building construction) (Figure 7).

**Figure 7**

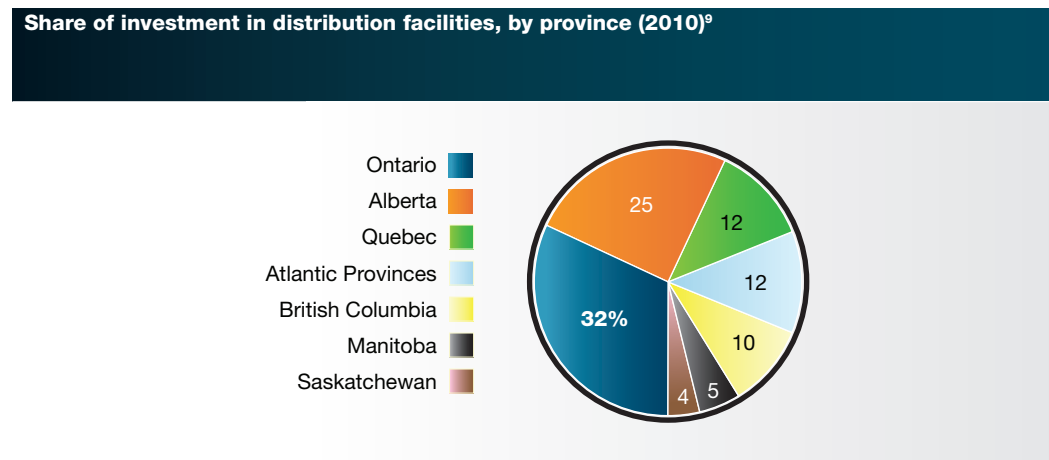


In 2010, the main areas of distribution facility investment were in Ontario (32% of total investment) followed closely by Alberta (25%), Quebec (12%) and British Columbia (10%). Distribution facility investment growth differs widely by province (Figure 8). To serve Western Canada and Northern U.S. markets on a daily replenishment schedule, distribution facility investment in Alberta grew by 187% between 2005 and 2010. Growth in Ontario (123%) and Quebec (83%) was driven by investments in continental and east coast distribution hubs, while growth in British Columbia (79%) was due to major investments in deconsolidation facilities.‡ Distribution facility investment in Manitoba, Saskatchewan and Atlantic provinces grew by close to 40% over the same period.<sup>10</sup>

\* Adjusted using price index of non-residential commercial building construction. (Price index is composite of seven largest census metropolitan areas; 2010 is based on first three quarters.)

‡ Deconsolidation facilities: arriving containers are received to a transload facility near the port, where they are stripped and the contents are reconsolidated into full trailer loads and transported to a customer or a regional distribution centre. The value-added in the process is in reconsolidating those goods according to updated demand. Improvements can be measured in time-to-market, customer service and inventory reduction.

**Figure 8**



Within firms, senior executives are seeking to establish dynamic, responsive and automated DCs that will operate at low cost and support their global logistics business strategies. Whether considering leasing facilities or investing in new buildings, executives are carefully evaluating their options and taking into account key criteria including cost, location, number of doors, height, and consolidation factors (Table 3).

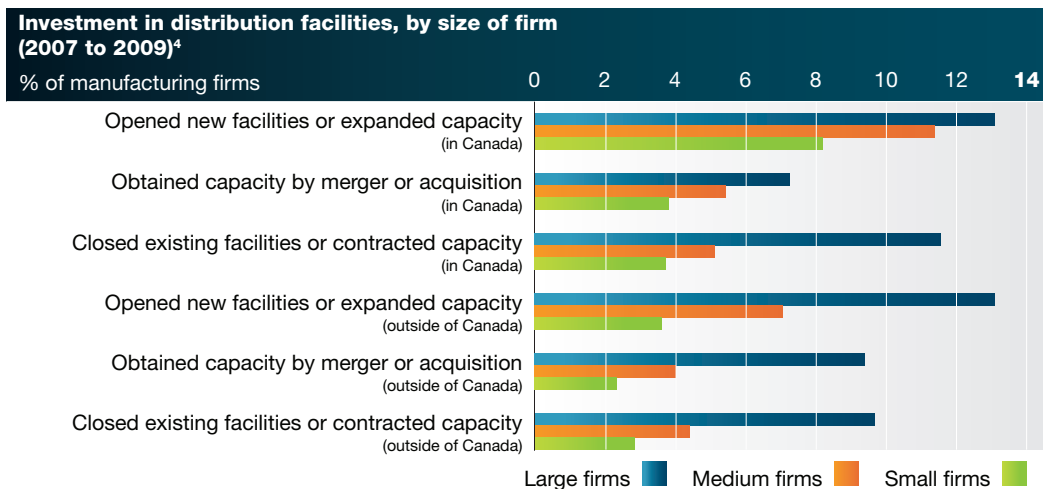
**Table 3**

<b>Distribution centres investment criteria<sup>2</sup></b>	
<b>Cost</b>	Investing in a new DC represents a significant financial commitment, and the commercial market is very price-sensitive. The price per square foot, development charges and operational expenses related to the property are taken into account against increased efficiency and return on investment that the new facility will generate.
<b>Location</b>	Being close to customers, main transportation and intermodal nodes are key criteria. Depending on the city and the industry, location can mean quick access to highways, borders, ports, rail yards or airports. Shorter transportation times lead to lower costs and increased efficiency, and can make up for a premium rate on prime property location.
<b>Number of doors</b>	Additional doors increase flexibility and enable shipping and receiving to be carried out simultaneously, providing fluid working conditions and increased productivity. Single item pallets enter the distribution centres while pallets containing customer-specific orders are being shipped.
<b>Height / clearance of the building</b>	While distribution centre were typically built with 18-ft to 24-ft clearance, some clients are now looking for facilities with 80-ft clearance. With the rising cost of land, the marginal cost of a higher building is compensated by substantially greater storage space for a similar footprint. However, these high facilities require specialized equipment, robotics and personnel with specific skills to operate and service the equipment.
<b>Consolidation</b>	Operating with fewer strategic located facilities is part of a trend to rationalize business activities. As a result, some firms are opting for a larger, strategically located DC run more efficiently, with specialized equipment and skilled workers to optimize their logistics operations.

A greater proportion of large manufacturers have opened new facilities and obtained capacity by merger or acquisition within Canada and abroad compared to their small and medium-sized counterparts (Figure 9). Mergers and acquisitions are attractive options to increase the distribu-

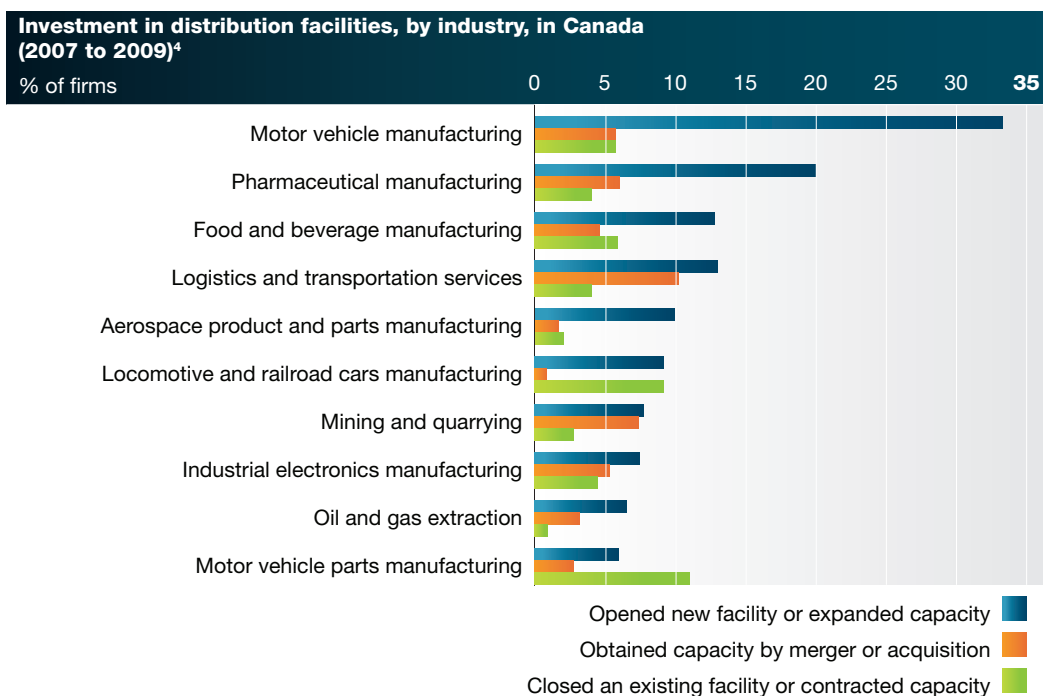
tion footprint of the firm. Also, large manufacturers have been more likely to close existing facilities or contract logistics capacity to consolidate their distribution networks. Meanwhile, small and medium-sized firms have invested in DCs to better respond to customer mandates<sup>‡</sup> and to integrate further into global value chains.<sup>2</sup>

**Figure 9**



The motor vehicle manufacturing industry is outpacing all sectors of the economy in terms of investment in new distribution facilities. This particular sector is becoming a logistics hub for its global value chain partners, notably motor vehicle parts manufacturing (Figure 10).<sup>2</sup>

**Figure 10**



<sup>‡</sup> Supply chain compliance mandate (SCCM): systems or departments within corporations that ensure supply chain participants are aware of and take steps to comply with a clearly defined specification and/or standard.

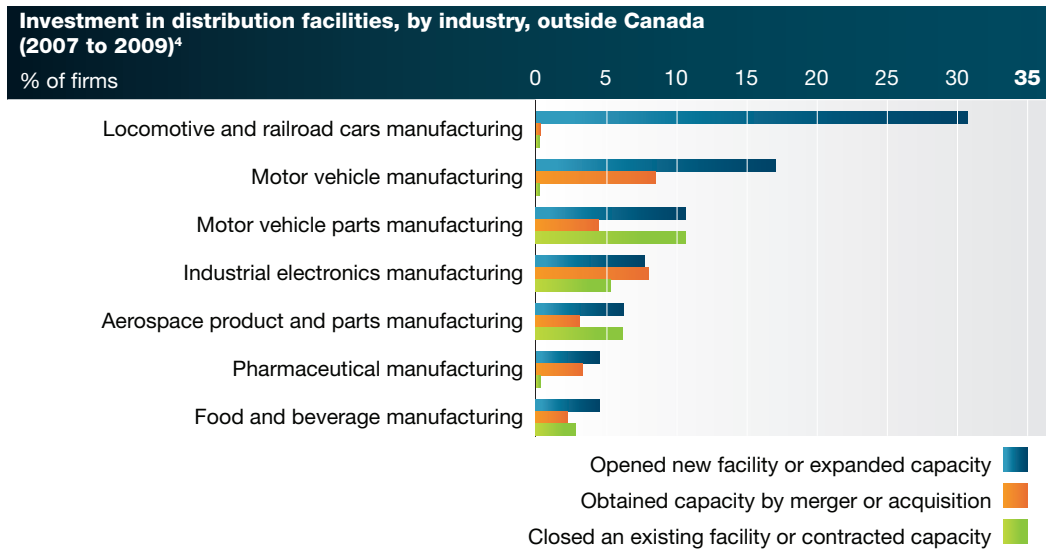
Other manufacturing sectors including pharmaceutical, and food and beverage, are investing in distribution facilities to respond to retailers' daily replenishment rotation systems. CPG manufacturers are also transitioning towards distribution facilities with business-to-consumer e-commerce capabilities. Firms in the retail sector are investing in deconsolidation facilities and distribution platforms to support their collaborative planning, forecasting and replenishment (CPFR)<sup>‡</sup> efforts.<sup>2</sup>

In the oil and gas extraction sector, storage and transportation of equipment represent a significant portion of upstream investment. Heavy equipment are kept in fewer yards located in more active areas, while tools and spare parts for oil and gas extraction and production are stored in DCs near major exploration sites. In the mining sector, the focus is on improving access to and efficiency in intermodal rail and trucking terminals that link mines to customers.<sup>2</sup>

In the aerospace sector, a new DC strategy is being implemented to increase agility and lower costs. For the production process, DCs located close to final assembly plants integrate the inbound flow of components imported from different countries. Rapid after-sales support in the sector is paramount; however, the cost of keeping a large amount of components readily available in inventory within proximity of every airport is not feasible. The new approach focuses on the development of fewer (one per continent being the initial trial), well stocked DCs strategically located near major air transportation hubs and offering direct air transport services for delivery throughout the continent.<sup>2</sup>

Compared to investment in distribution facilities in Canada, activity outside the country has been less pronounced for several industries. The locomotive and railroad cars manufacturing industry is leading in terms of opening new distribution and logistics facilities outside Canada (Figure 11).

**Figure 11**



<sup>‡</sup> Collaborative planning, forecasting and replenishment (CPFR): E-based system that enables all partners to establish mutually beneficial supply chain metrics along with common incentives and goals. Following a sales transaction, joint replenishment planning is coordinated into the production plans of manufacturers and the ordering process. For an in-depth look at CPFR, see Industry Canada's report entitled State of Retail: The Canadian Report 2010, available online at [www.ic.gc.ca/retail](http://www.ic.gc.ca/retail)

Fast, reliable and efficient service is also a key requirement to supply components or spare parts to the locomotive and railroad cars manufacturing sector. However, the local content production requirements of large-scale, multi-year public sector contracts are a significant consideration within the locomotive and railroad cars manufacturing sector. The industry is striving to consolidate its DC requirements while complying with regional and regulatory frameworks by strategically locating mass customization final assembly plants.<sup>2</sup>

For CPG manufacturers who aim to serve both the Canadian and U.S. markets, the quest to further improve the efficiency and competitiveness of their distribution network is connected to a continent-wide harmonization of stock-keeping units (SKUs). Harmonization of SKUs enables divisions of firms within continents to dispatch required product to clients from the closest DC, regardless of country.<sup>2</sup>

# Innovation in Logistics

Innovation in logistics aims to increase productivity, competitiveness at both the firm and supply chain levels. The innovative activities undertaken in logistics align with the Organisation for Economic Co-operation and Development's (OECD) definitions of the four types of innovation: organizational, process, marketing, and service.<sup>11</sup> Industrial sectors and the logistics service industry are leaders in incorporating all four types of innovation into logistics practices.

Organizational innovation is the implementation of a new method in a firm's business practices, such as supply chain mandates, green supply chain management,<sup>‡</sup> and new approaches to key performance indicator (KPI) measurement. Process innovation includes the implementation of new or significantly improved delivery methods, such as supply chain visibility, warehouse management system (WMS)<sup>†</sup> and transportation management system (TMS).<sup>§</sup> Linking logistics networks to CPFR is an example of marketing innovation in logistics, while service innovation is the introduction of a service that is new or significantly improved in its characteristics or intended uses. In logistics, this is demonstrated through the development and evolution of global trade management and e-business models.<sup>2</sup>

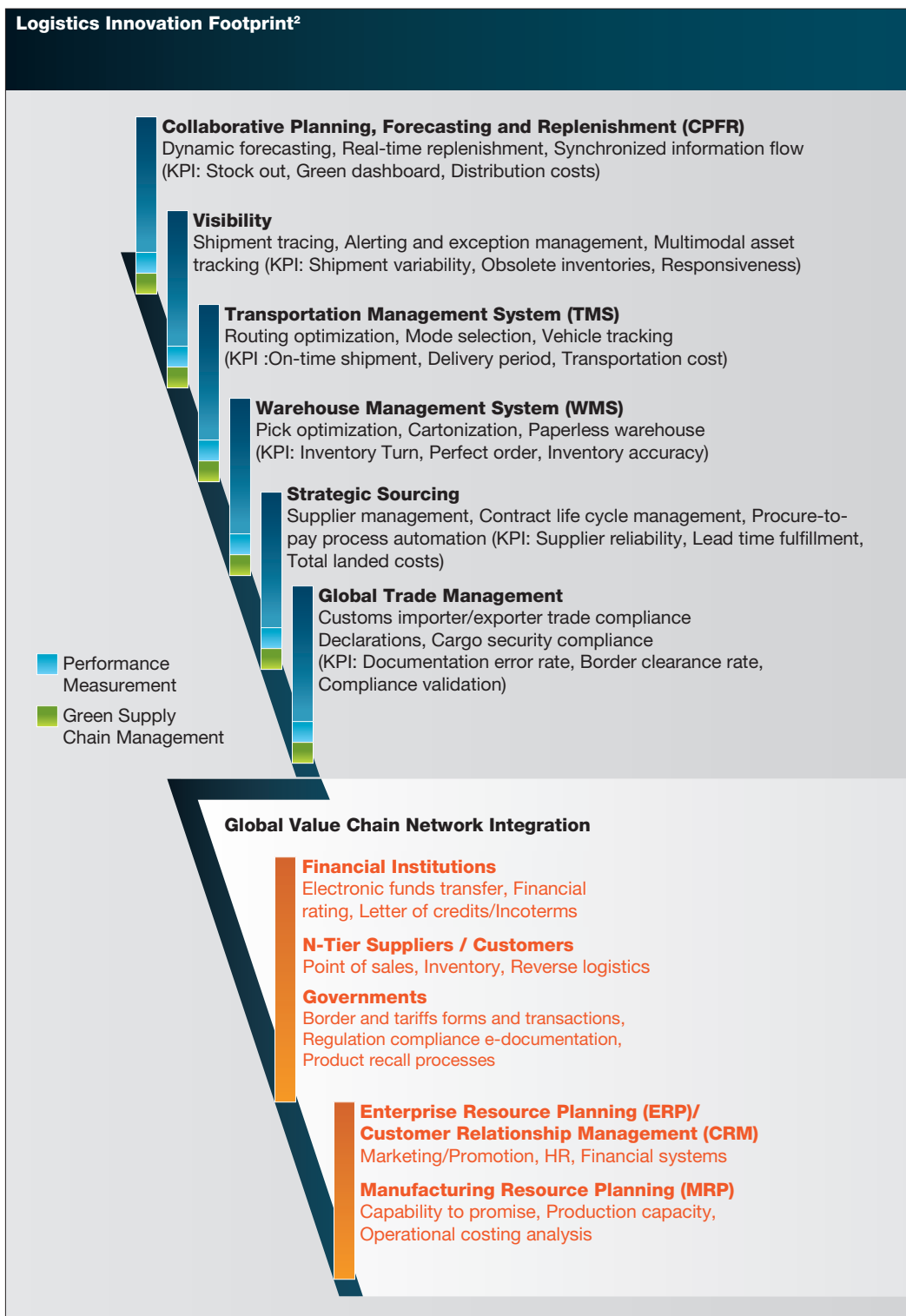
Logistics innovation is at the forefront of global value chain network integration. Linking internal information systems such as enterprise resource planning (ERP), customer relationship management (CRM) and manufacturing resource planning (MRP) systems with supply chain partners (i.e. financial institutions, suppliers, customers and governments) results in an efficient, agile and competitive network (Figure 12).

‡ Green supply chain management (GSCM): integrates environmental thinking into supply chain management (SCM), including the introduction of technical and innovative processes into materials sourcing and selection, delivery of the final product to consumers, and end-of-life product management. For an in-depth look at GSCM, see Industry Canada's reports on Green Supply Chain Management, available online at [www.ic.gc.ca/logistics](http://www.ic.gc.ca/logistics)

† Warehouse management system (WMS): provides a set of computerized procedures to handle the receipt of stock and returns into a distribution facility, models and manages the logical representation of physical storage facilities (e.g. racking, etc.), manages stock within the facility, and enables a seamless link to order processing and logistics management to pick, pack and ship products out of the facility.

§ Transportation Management System (TMS): defines the most efficient transport plan according to given parameters such as cost, transportation mode preferences, lead time, fewer stops, carbon footprint and on-time shipments.

Figure 12



The use of KPI measurements that have been specifically developed and tailored for each level of an organization (executive, tactical, and operational) can enhance employee commitment to their role in an enterprise (Table 4). Using KPI measurements where workers have a direct impact is key. For example, metrics that focus on quality, such as achieving perfect orders and on-time shipments, are suitable KPIs at the operational level. Tactical-level KPI measurements should emphasize efficiency of operational activities, including inventory turnover and lead-time fulfillment. Finally, KPI measurements at the executive level should aim at enhancing business performance, with specific metrics such as total landed cost and return on investment. KPI measurements of organizational innovation extend beyond internal metrics to include value chain partners through supply chain mandates — more specifically, the use of KPI dashboards and reward systems.<sup>2</sup>

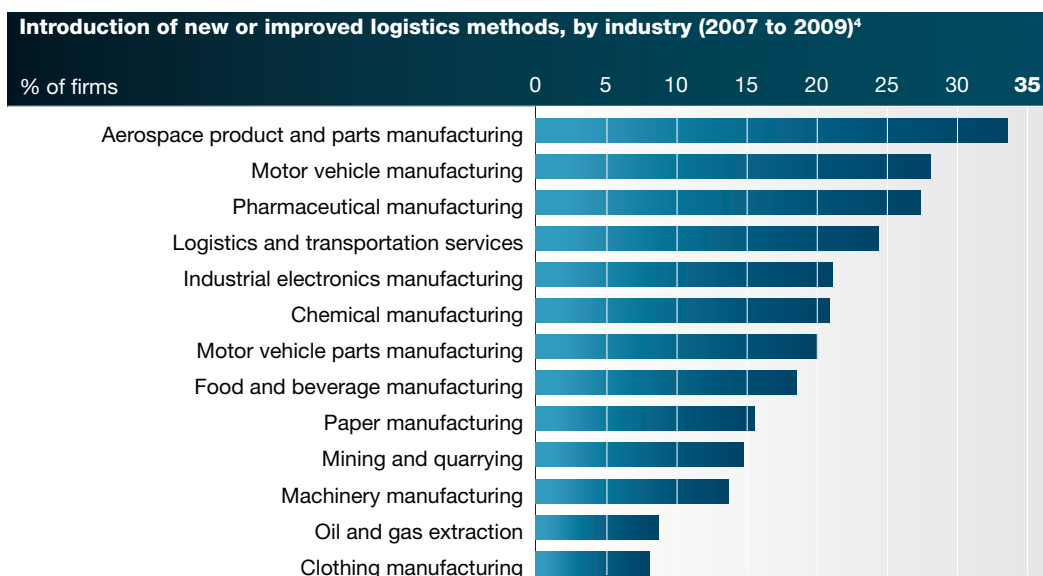
**Table 4**

<b>Logistics KPI measurement<sup>2</sup></b>	
<b>Executive</b>	Profitability and revenue KPIs (e.g., total landed cost, return on investment on innovation)
<b>Tactical</b>	Operational efficiency KPIs (e.g., inventory turn, lead time fulfillment)
<b>Operational</b>	Quality and service level KPIs (e.g., perfect order, on-time shipments)

Manufacturing, retail, and natural resources industries are relying on logistics innovation and networks to deliver seamless, integrated, secure, reliable and efficient solutions to leverage their global value chains (Figure 13). Canadian aerospace firms are shifting their priorities to improving supply chain agility and flexibility; for example, enhancing operational performance and shortening cycle times were identified as top drivers for aerospace logistics innovation.<sup>12</sup> Global trade management and the incorporation of CPFR concepts into their value chains are other key logistics developments taking place in this sector (Table 5).



Figure 13



The pharmaceutical supply chain is implementing innovations in unit-level traceability and visibility to improve response time, accuracy and overall efficiency of the supply chain while enhancing compliance with industry and government regulations.<sup>2</sup>

For Canadian automotive manufacturers, the implementation of just-in-time (JIT) and mass customization processes have already led to greater supply chain agility; however, one key improvement is the integration of point-of-sales information into CPFR-based replenishment systems with auto assemblers and parts manufacturers. Meanwhile, logistics innovation by industrial electronics firms focuses on synchronizing products with trading partners via web-based catalogs and exchanging information, through visibility systems, on firms' capabilities to promise<sup>‡</sup> and deliver products.<sup>2</sup>

Table 5

<b>Logistics innovation focus by industrial sector<sup>2</sup></b>	
<b>Aerospace</b>	Global trade management and incorporating CPFR concepts into value chains
<b>Pharmaceutical</b>	Unit level traceability and visibility to enhance compliance with the requirements resulting from industry and governmental regulations
<b>Automotive</b>	Integrate point-of-sales information into CPFR-based replenishment systems with auto assemblers and parts
<b>Industrial electronics</b>	Synchronise products with trading partners on web-based catalogs and exchange information through visibility systems on capability to promise and deliver products
<b>Retailers and CPG manufacturers</b>	Point-of-sales forecasting and data exchange and system compatibilities to enable visibility during transportation, and support linkages with CPFR systems
<b>Resource based industries</b>	Strategic asset location and global view on output with rail, marine and trucking capacity and schedules, taking into account customer demand projections

<sup>‡</sup> Capability to promise: a collaborative system that looks at inventory, proposed production, order status and master schedule to determine the capability to deliver a product according to a customer's time frame, cost and location factors.

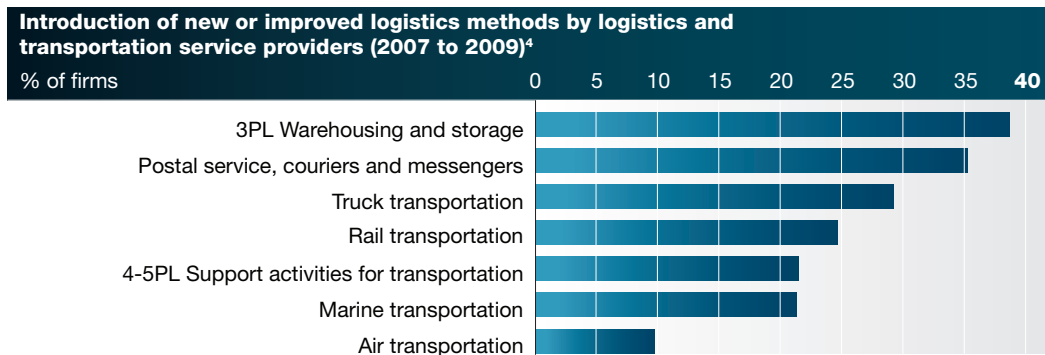
Retailers and CPG manufacturers have invested in data exchange and system compatibilities to enable visibility during transportation and support linkages with CPFR systems. These capabilities provide opportunities to initiate point-of-sales analyses to inform sales and replenishment forecasts. Also, the adoption of alert-based supply chain event applications enables the rapid resolution of issues that may arise along the supply chain.<sup>2</sup>

While the initial e-commerce model for retailers and manufacturers involved placing all product lines online, it now comprises a parallel operation that enables retailers to increase their market coverage beyond bricks-and-mortar locations. Today's e-commerce enables retailers and manufacturers to offer specialized products with high profit margins without disrupting the flow of distribution centres. Furthermore, e-commerce provides a channel to consolidate clearance items in one distribution centre while increasing product selection for consumers without exhausting floor space.<sup>2</sup>

In the natural resources sector, innovative tools and practices in logistics permit the integration of mining output with rail, marine and trucking capacity and schedules, taking into account customer demand projections. By having a global view of network capacity, these industries are increasing their service levels, competitiveness, productivity and opportunities to serve niche markets around the world.

Transportation and logistics providers are increasingly adopting advanced technologies and innovative processes to retain their competitive advantage (Figure 14). These new methods have taken different forms by sub-sector. The shift to technological innovation had the greatest impact on 3PL firms with the introduction of WMS, which includes picking automation and carousel and pallet configuration optimization, and on couriers and messenger firms adopting visibility and web-based solutions at item level. Global trade management and web-based applications for users are two key innovations adopted by 4-5PL firms that have great potential to increase the efficiency of supply chains.<sup>2</sup>

**Figure 14**

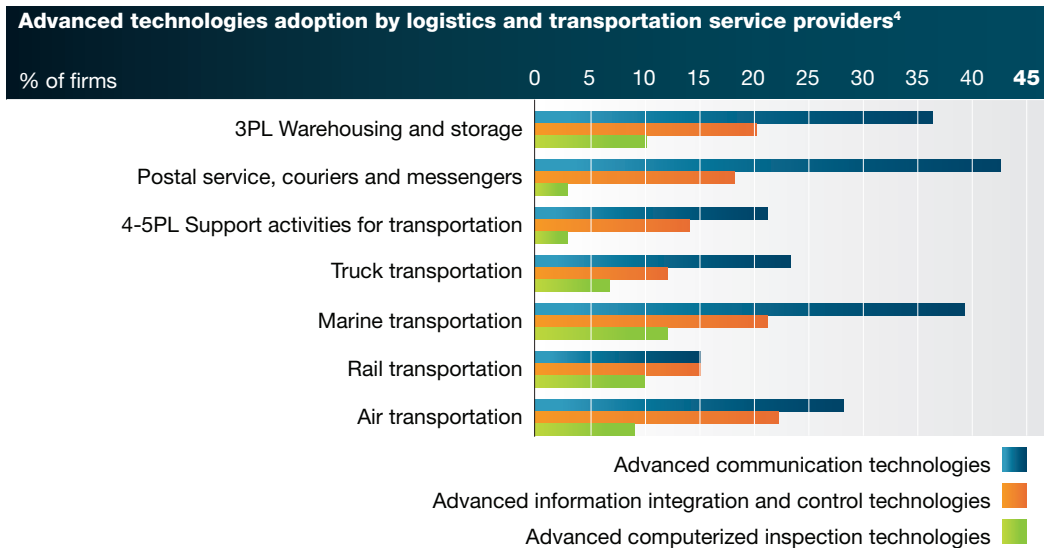




## Advanced Technology Adoption

Three main types of advanced technologies have been adopted by logistics and transportation services firms, namely, advanced communication, advanced information integration and control, and advanced computerized inspection technologies. The adoption rates, drivers and applications of each technology vary greatly between industries. Advanced communication technologies are the most widely adopted across all sub-sectors. Postal services, couriers and messenger firms are top adopters with 43% of firms, followed by marine transportation (39%) and 3PL warehousing and storage (36%). Between 15% and 25% of air, truck and rail transportation firms have also implemented these technologies (Figure 16).

**Figure 16**



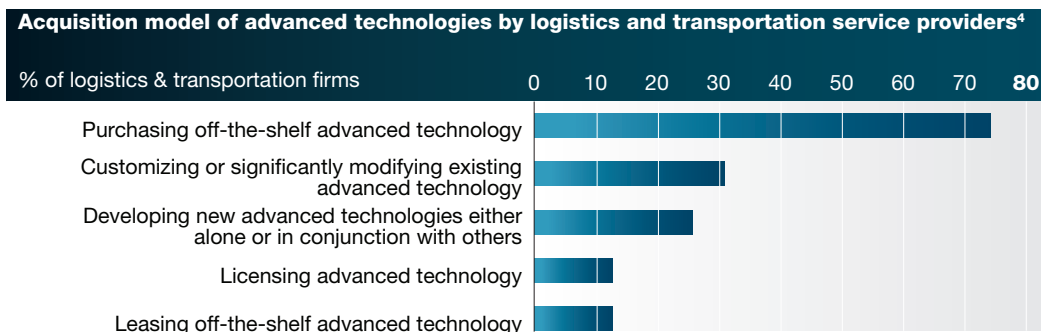
Information integration and control are the second most adopted advanced technologies. Most sectors have an adoption rate ranging from approximately 15 to 20%.<sup>4</sup> Adoption rates for advanced computerized inspection technologies vary more widely due to the nature of the specific industries (asset-based versus non-asset-based). Overall, the specific technologies implemented by logistics service providers vary by sector (Table 6).

Table 6

Advanced technologies utilized by logistics and transportation service providers <sup>2</sup>			
	Communication	Information integration and control	Computerized inspection
<b>3PL Warehousing and storage</b>	Voice recognition picking	WMS into customers' order processing	Tracking at SKU level in DC
<b>Postal service, couriers and messengers</b>	Mobile devices in delivery	ASP (application service provider) model for global visibility	Tracking at item level
<b>4-5PL Support activities for transportation</b>	—	Linking systems with financial institutions	Near-real-time reporting e-manifest
<b>Truck transportation</b>	Mobile devices in delivery	Delivery confirmation – alert-based systems	Scanning at pick-up and delivery
<b>Marine transportation</b>	Vessel location and loading plans	Link with port and customs authority	Container seals and scanning capability
<b>Rail transportation</b>	Multimodal visibility systems	Web-based application for customers	Container seals and scanning capability
<b>Air transportation</b>	Mobile devices in airport	Link to customers' systems for visibility	Automated inspection of parcels

The acquisition of advanced technologies calls for significant investments and may require reorganization within a firm as well as training and a period of adjustment for management and employees. When available, the purchase of off-the-shelf technologies is preferred and has been the model of acquisition selected by 74% of logistics and transportation firms. For over 30% of firms in this sector, significant modifications to an existing system often generate a solution to address their technological needs, while 25% of firms opt for development of a new system (Figure 17).

Figure 17



Cloud computing has brought a new dimension to technological advancement, enabling firms to access remotely hosted applications and data through a web interface. This removes the burden of running and maintaining applications that require frequent updates on systems that may quickly reach their limitations. Reducing capital expenditures is another factor in the adoption of cloud solutions, since usage-based fees qualify as operational expenses.<sup>2</sup>

Connecting multiple supply chain partners together is the main focus of logistics cloud solutions (licensing and leasing off-the-shelf advanced technology), notably for CPFR, global trade management, e-catalogs, visibility and traceability applications by users and logistics service providers. The majority of these specific types of applications require advanced in-house logistics applications that are connected to a web-based exchange network and are driven by large organizations.<sup>2</sup>

# Best-in-Class Analysis

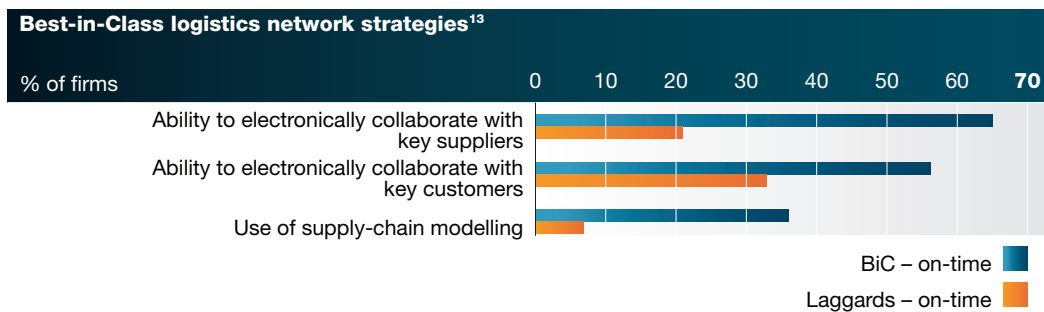
In logistics, organizational, process and product innovations are interconnected and can be implemented throughout the supply chain to garner the full benefits of the investment. A wide range of logistics technologies, tools and processes are adopted by firms across industries as they strive to remain current and efficient in an increasingly competitive global market.<sup>2</sup>

This section highlights the key innovations Best-in-Class (BiC) firms have implemented to position themselves as leaders in their logistics activities. These firms compete at the highest level in three key areas: logistic networks, DCs, and global transportation and visibility strategies.

BiC firms are North American businesses defined by their performance in logistics. BiC – on-time are the top 20% of firms based on their total landed cost and orders delivered complete and on time. The top 20% in picking and inventory accuracy are designated as BiC – accuracy, and BiC – efficiency refers to firms that are the top 20% performers in transportation spending ratio and shipment integrity. Meanwhile, the Laggards constitute the bottom 30% number in each performance metric respectively.<sup>13</sup>

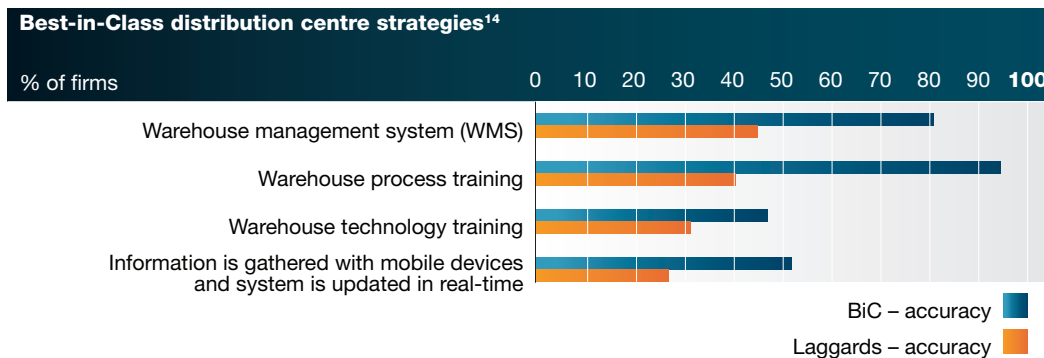
BiC – on-time firms are more likely to invest in the ability to collaborate electronically with networks of key suppliers (65%) of firms and key customers (56%) . These technologies give firms a competitive advantage, enhancing their efficiency and agility. Use of supply chain modelling supports BiC decision making in developing enhanced logistics network strategies (Figure 18).

**Figure 18**



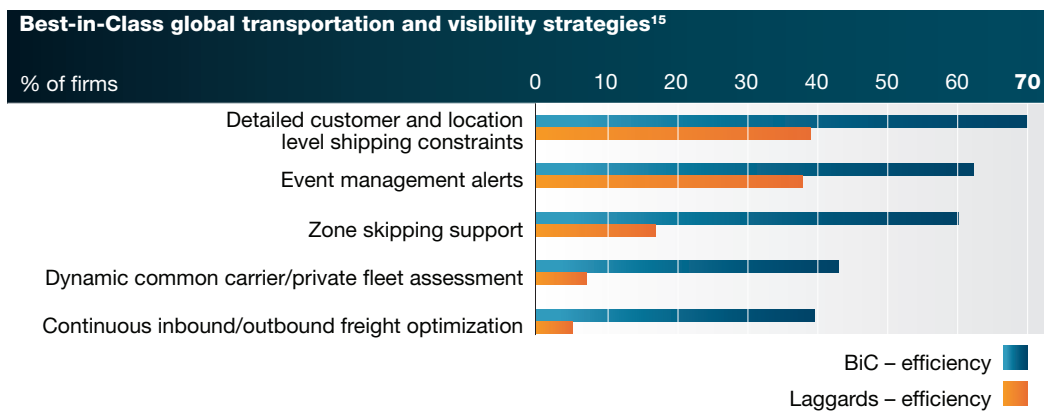
In support of logistics network strategies, more BiC – accuracy firms invest in software, training and advanced technologies than Laggards. WMS and integrated mobile devices are complementary BiC applications. While WMS is adopted by over 80% of BiC – accuracy firms, process training is strategically important to achieve operational excellence in DCs and has been implemented by 95% of top performing firms (Figure 19).

Figure 19



Performance in global transportation and visibility strategies can be measured with logistics metrics that assess transportation spending ratio and trend, and shipment integrity. More than 60% of BiC – efficiency firms have introduced technologies and processes to optimize network capabilities. Alert-based, advanced transportation management systems and zone skipping<sup>‡</sup> are key BiC – efficiency differentiating factors (Figure 20).

Figure 20



<sup>‡</sup> Zone skipping refers to a mechanism used by shippers to minimize shipping costs by trucking many shipments together to another shipping location that is closer to the ultimate destination. The individual shipments can then be sent via small parcel carriers to their ultimate destinations.

## Final Remarks

Overall, Canadian firms have considerable potential to continue enhancing their logistics performance by better integrating their corporate structures, global sourcing options, investments, and innovation. The findings presented in this report demonstrate that logistics plays a vital role in innovation and competitiveness across industries. Logistics enables firms of all sizes to be better integrated into global value chains.

The research also presents the important linkages between core processes in three key areas — logistic networks, distribution centres, and global transportation and visibility strategies — and their resulting business benefits. These connections can help inform a continued dialogue across businesses, governments and academia. This report also sets the stage for those interested in logistics, productivity, and innovation trends to pursue new research and analysis opportunities.



## Annex – Tables<sup>4</sup>

**Table A-1**

**Percentage of large enterprises with logistics activities indicating location  
of decisions related to logistics**

Logistics decisions made by  
or jointly with foreign parent

Manufacturing	24.7%
Food manufacturing and beverage manufacturing	11.2%
Food manufacturing	11.7%
Fruit and vegetable preserving and specialty food manufacturing	15.4%
Dairy product manufacturing	12.5%
Bakery and tortillas manufacturing	8.3%
Beverage and tobacco product manufacturing	7.1%
Beverage manufacturing	8.3%
Textile mills and textile product mills	41.4%
Clothing manufacturing	0.0%
Wood product manufacturing	19.5%
Paper manufacturing	38.5%
Pulp, paper, and paperboard mills	33.3%
Converted paper product manufacturing	44.4%
Printing and related support activities	15.0%
Chemical manufacturing except pharmaceutical manufacturing	49.6%
Resin synthetic rubber and artificial synthetic fibres and filaments manufacturing	71.4%
Pharmaceutical manufacturing	18.2%
Pesticide, fertilizer and other agricultural chemical manufacturing, soap, cleaning compound and toilet preparation manufacturing, and other chemical product manufacturing	63.7%
Plastics and rubber products manufacturing	26.0%
Plastic product manufacturing except motor vehicle plastic parts manufacturing	20.5%
Motor vehicle plastic parts manufacturing	11.1%
Non-metallic mineral product manufacturing	44.0%
Primary metal manufacturing	30.0%
Iron and steel mills and ferro-alloy manufacturing; steel product manufacturing from purchased steel; non-ferrous metal (except aluminium) production and process	28.6%
Fabricated metal product manufacturing	24.2%
Forging and stamping; cutlery and hand tool manufacturing; hardware manufacturing; spring and wire product manufacturing; other fabricated metal product manufacturing	33.4%
Architectural and structural metals manufacturing	18.8%
Machinery manufacturing	24.2%
Other machinery manufacturing*	23.3%
Mining and oil and gas field machinery manufacturing	37.5%
Ventilation, heating, air-conditioning, and commercial refrigeration equipment manufacturing	14.3%
Metalworking machinery manufacturing	0.0%
Industrial Electronics	17.7%
Communications equipment manufacturing	27.2%
Radio and television broadcasting and wireless communications equipment	12.5%
Semiconductor and other electronic components manufacturing	10.0%
Navigational and guidance instruments manufacturing	18.2%
Electrical equipment, appliance and component manufacturing	31.2%
Motor vehicle manufacturing	55.5%
Motor vehicle body and trailer manufacturing	11.1%
Motor vehicle parts manufacturing	39.5%
Aerospace product and parts manufacturing	16.7%
Furniture and related product manufacturing	16.7%
Miscellaneous manufacturing	17.7%
Medical equipment and supplies manufacturing	28.6%

\* Machinery manufacturing except mining and oil and gas field machinery manufacturing; sawmill and woodworking machinery manufacturing; rubber and plastics industry machinery manufacturing; ventilation, heating, air-conditioning, and commercial refrigeration equipment manufacturing; and metalworking machinery manufacturing.

**Table A-2****Percentage of enterprises that have main suppliers in Europe**

Manufacturing	25.6%
Animal food manufacturing	28.2%
Fruit and vegetable preserving and specialty food manufacturing	25.5%
Dairy product manufacturing	38.9%
Meat product manufacturing	12.2%
Seafood product preparation and packaging	15.7%
Bakery and tortillas manufacturing	10.4%
Textile mills	48.5%
Textile product mills	28.2%
Clothing manufacturing	29.0%
Leather and allied product manufacturing	54.8%
Sawmills and wood preserving	5.3%
Veneer, plywood and engineered wood product manufacturing	8.8%
Other wood product manufacturing	5.7%
Pulp, paper, and paperboard mills	33.6%
Converted paper product manufacturing	24.0%
Printing and related support activities	5.3%
Petroleum and coal product manufacturing	30.8%
Basic chemical manufacturing	50.9%
Resin synthetic rubber and artificial synthetic fibres and filaments manufacturing	30.6%
Pharmaceutical manufacturing	73.8%
Paint, coating and adhesive manufacturing	50.1%
Pesticide, fertilizer and other agricultural chemical manufacturing, soap, cleaning compound and toilet preparation manufacturing, and other chemical product manufacturing	38.8%
Plastic product manufacturing except motor vehicle plastic parts manufacturing	26.2%
Motor vehicle plastic parts manufacturing	24.7%
Rubber product manufacturing	43.6%
Non-metallic mineral product manufacturing	32.8%
Iron and steel mills and ferro-alloy manufacturing; steel product manufacturing from purchased steel; non-ferrous metal (except aluminum) production and process	16.3%
Alumina and aluminum production and processing	26.9%
Ferrous metal foundries	9.6%
Non-ferrous metal foundries	16.2%
Forging and stamping; cutlery and hand tool manufacturing; hardware manufacturing; spring and wire product manufacturing; other fabricated metal product manufacturing	21.5%
Architectural and structural metals manufacturing	24.1%
Boiler, tank and shipping container manufacturing	25.1%
Machine shops, turned product and screw, nut and bolt manufacturing	13.0%
Coating, engraving, heat treatment and allied activities	6.5%
Other machinery manufacturing*	40.4%
Mining and oil and gas field machinery manufacturing	37.7%
Sawmill and woodworking machinery manufacturing	28.3%
Rubber and plastics industry machinery manufacturing	52.5%
Ventilation, heating, air-conditioning, and commercial refrigeration equipment manufacturing	24.9%
Metalworking machinery manufacturing	18.0%
Industrial electronics manufacturing	41.2%
Electrical lighting equipment manufacturing	68.1%
Household appliance manufacturing	50.1%
Electric equipment manufacturing	51.9%
Other electrical equipment and component manufacturing	44.0%
Motor vehicle manufacturing	38.9%
Motor vehicle body and trailer manufacturing	22.8%
Motor vehicle parts manufacturing	26.2%

Aerospace product and parts manufacturing	53.9%
Locomotive and railroad car manufacturing	63.6%
Ship and boat building	26.9%
Other transportation equipment manufacturing	18.7%
Furniture and related product manufacturing	25.7%
Miscellaneous manufacturing	21.0%

\* Machinery manufacturing except mining and oil and gas field machinery manufacturing; sawmill and woodworking machinery manufacturing; rubber and plastics industry machinery manufacturing; ventilation, heating, air-conditioning, and commercial refrigeration equipment manufacturing; and metalworking machinery manufacturing.

**Table A-3**

**Percentage of enterprises that have main suppliers in Asia Pacific**

Manufacturing	29.2%
Animal food manufacturing	16.0%
Fruit and vegetable preserving and specialty food manufacturing	28.1%
Dairy product manufacturing	6.0%
Meat product manufacturing	10.6%
Seafood product preparation and packaging	24.4%
Bakery and tortillas manufacturing	7.3%
Beverage and tobacco product manufacturing	24.3%
Textile mills	62.1%
Textile product mills	32.1%
Clothing manufacturing	42.3%
Leather and allied product manufacturing	60.4%
Sawmills and wood preserving	3.3%
Veneer, plywood and engineered wood product manufacturing	2.8%
Other wood product manufacturing	15.0%
Pulp, paper, and paperboard mills	19.7%
Converted paper product manufacturing	28.9%
Printing and related support activities	11.2%
Petroleum and coal product manufacturing	19.4%
Basic chemical manufacturing	56.0%
Resin synthetic rubber and artificial synthetic fibres and filaments manufacturing	37.9%
Pharmaceutical manufacturing	57.2%
Paint, coating and adhesive manufacturing	28.0%
Pesticide, fertilizer and other agricultural chemical manufacturing, soap, cleaning compound and toilet preparation manufacturing, and other chemical product manufacturing	47.0%
Plastic product manufacturing except motor vehicle plastic parts manufacturing	37.3%
Motor vehicle plastic parts manufacturing	57.8%
Rubber product manufacturing	40.0%
Non-metallic mineral product manufacturing	11.2%
Iron and steel mills and ferro-alloy manufacturing; steel product manufacturing from purchased steel; non-ferrous metal (except aluminum) production and process	29.8%
Alumina and aluminum production and processing	13.4%
Ferrous metal foundries	20.1%
Non-ferrous metal foundries	28.4%
Forging and stamping; cutlery and hand tool manufacturing; hardware manufacturing; spring and wire product manufacturing; other fabricated metal product manufacturing	34.7%
Architectural and structural metals manufacturing	28.2%
Boiler, tank and shipping container manufacturing	18.6%
Machine shops, turned product and screw, nut and bolt manufacturing	10.5%
Coating, engraving, heat treatment and allied activities	7.2%
Other machinery manufacturing*	41.7%
Mining and oil and gas field machinery manufacturing	25.7%
Sawmill and woodworking machinery manufacturing	34.9%
Rubber and plastics industry machinery manufacturing	57.7%

Metalworking machinery manufacturing	24.0%
Industrial electronics manufacturing	63.0%
Electrical lighting equipment manufacturing	72.1%
Household appliance manufacturing	77.3%
Electric equipment manufacturing	43.6%
Other electrical equipment and component manufacturing	58.9%
Motor vehicle manufacturing	38.9%
Motor vehicle body and trailer manufacturing	20.6%
Motor vehicle parts manufacturing	46.7%
Aerospace product and parts manufacturing	21.1%
Locomotive and railroad car manufacturing	45.5%
Ship and boat building	5.5%
Other transportation equipment manufacturing	37.5%
Furniture and related product manufacturing	27.8%
Miscellaneous manufacturing	32.5%

\* Machinery manufacturing except mining and oil and gas field machinery manufacturing; sawmill and woodworking machinery manufacturing; rubber and plastics industry machinery manufacturing; ventilation, heating, air-conditioning, and commercial refrigeration equipment manufacturing; and metalworking machinery manufacturing.

**Table A-4**

**Percentage of enterprises indicating the location where logistics activities were undertaken**

	Within the enterprise in Canada	Outsourced in Canada	Within the enterprise outside Canada	Outsourced outside Canada
Manufacturing	70.6%	19.8%	8.6%	8.2%
Animal food manufacturing	80.2%	19.3%	13.7%	2.8%
Fruit and vegetable preserving and specialty food manufacturing	77.8%	24.7%	6.1%	11.2%
Dairy product manufacturing	91.1%	16.4%	3.0%	4.5%
Meat product manufacturing	69.0%	12.0%	0.0%	0.8%
Seafood product preparation and packaging	71.8%	23.0%	10.7%	9.4%
Bakery and tortillas manufacturing	68.4%	15.6%	5.4%	8.3%
Textile mills	74.2%	12.0%	10.7%	10.5%
Textile product mills	78.8%	25.2%	3.8%	9.1%
Clothing manufacturing	77.1%	8.9%	2.1%	5.2%
Leather and allied product manufacturing	72.1%	21.7%	7.5%	10.7%
Sawmills and wood preserving	66.4%	9.9%	1.4%	1.3%
Veneer, plywood and engineered wood product manufacturing	80.9%	1.2%	8.0%	0.0%
Other wood product manufacturing	75.7%	11.5%	4.6%	6.8%
Pulp, paper, and paperboard mills	75.5%	18.5%	14.0%	11.2%
Converted paper product manufacturing	74.6%	18.1%	8.2%	4.5%
Printing and related support activities	69.2%	21.7%	1.6%	2.8%
Petroleum and coal product manufacturing	88.5%	7.7%	19.3%	3.8%
Basic chemical manufacturing	85.6%	8.8%	27.8%	9.5%
Resin synthetic rubber and artificial synthetic fibres and filaments manufacturing	91.3%	13.5%	24.2%	4.9%
Pharmaceutical manufacturing	81.5%	25.2%	19.4%	8.6%
Paint, coating and adhesive manufacturing	63.3%	25.7%	10.7%	18.9%
Pesticide, fertilizer and other agricultural chemical manufacturing, soap, cleaning compound and toilet preparation manufacturing, and other chemical product manufacturing	84.5%	25.3%	23.4%	10.4%
Plastic product manufacturing except motor vehicle plastic parts manufacturing	69.4%	24.2%	11.4%	10.2%
Motor vehicle plastic parts manufacturing	71.1%	26.7%	5.6%	9.8%
Rubber product manufacturing	74.7%	14.8%	12.4%	10.1%

Non-metallic mineral product manufacturing	81.5%	11.8%	13.7%	7.0%
Iron and steel mills and ferro-alloy manufacturing; steel product manufacturing from purchased steel; non-ferrous metal (except aluminum) production and process	67.0%	26.6%	12.0%	19.5%
Alumina and aluminum production and processing	54.8%	18.1%	4.6%	4.6%
Ferrous metal foundries	59.8%	9.6%	16.2%	6.6%
Non-ferrous metal foundries	48.7%	21.8%	4.1%	13.0%
Forging and stamping; cutlery and hand tool manufacturing; hardware manufacturing; spring and wire product manufacturing; other fabricated metal product manufacturing	75.0%	24.6%	10.9%	16.0%
Architectural and structural metals manufacturing	66.7%	24.6%	2.1%	6.9%
Boiler, tank and shipping container manufacturing	71.3%	20.6%	2.0%	6.5%
Machine shops, turned product and screw, nut and bolt manufacturing	52.5%	18.1%	0.0%	5.1%
Coating, engraving, heat treatment and allied activities	66.9%	0.7%	1.5%	0.0%
Other machinery manufacturing*	70.7%	28.6%	22.6%	25.0%
Mining and oil and gas field machinery manufacturing	61.3%	28.2%	4.3%	14.7%
Sawmill and woodworking machinery manufacturing	65.9%	28.3%	12.9%	0.0%
Rubber and plastics industry machinery manufacturing	68.3%	15.7%	10.5%	10.3%
Ventilation, heating, air-conditioning, and commercial refrigeration equipment manufacturing	69.7%	8.8%	9.1%	8.8%
Industrial electronics manufacturing	71.5%	13.8%	16.1%	5.7%
Electrical lighting equipment manufacturing	85.6%	21.2%	0.0%	9.2%
Household appliance manufacturing	82.0%	22.7%	9.2%	0.0%
Electric equipment manufacturing	74.8%	19.5%	16.9%	12.3%
Other electrical equipment and component manufacturing	78.8%	19.5%	16.6%	10.2%
Motor vehicle manufacturing	94.4%	11.1%	16.7%	16.7%
Motor vehicle body and trailer manufacturing	68.9%	18.4%	8.8%	3.7%
Motor vehicle parts manufacturing	62.6%	21.1%	9.5%	11.6%
Aerospace product and parts manufacturing	65.9%	21.1%	14.0%	14.1%
Locomotive and railroad car manufacturing	81.8%	45.5%	9.1%	27.3%
Ship and boat building	64.4%	24.1%	5.5%	5.5%
Other transportation equipment manufacturing	62.5%	31.3%	12.5%	12.5%
Furniture and related product manufacturing	66.1%	27.4%	5.5%	5.7%
Miscellaneous manufacturing	70.1%	20.9%	4.4%	6.1%

\* Machinery manufacturing except mining and oil and gas field machinery manufacturing; sawmill and woodworking machinery manufacturing; rubber and plastics industry machinery manufacturing; ventilation, heating, air-conditioning, and commercial refrigeration equipment manufacturing; and metalworking machinery manufacturing.

**Table A-5**

**Investment in distribution facilities in manufacturing, by size of firm, in Canada (2007 to 2009)**

	Small	Medium	Large
Obtained capacity by merger or acquisition	3.7%	5.3%	7.1%
Opened new facility or expanded capacity	8.0%	11.1%	12.8%
Closed an existing facility or contracted capacity	3.6%	5.0%	11.3%

**Investment in distribution facilities in manufacturing, by size of firm, outside Canada (2007 to 2009)**

	Small	Medium	Large
Obtained capacity by merger or acquisition	2.3%	3.9%	9.2%
Opened new facility or expanded capacity	3.5%	6.9%	12.8%
Closed an existing facility or contracted capacity	2.8%	4.3%	9.5%

**Table A-6**
**Investment in distribution facilities, by industry,  
in Canada (2007 to 2009)**

	Obtained capacity by merger or acquisition	Opened new facility or expanded capacity	Closed an existing facility or contracted capacity
Oil and gas extraction	2.9%	6.4%	0.0%
Mining and quarrying	7.1%	7.5%	2.6%
Manufacturing	4.2%	8.9%	4.4%
Animal food manufacturing	17.0%	13.7%	6.1%
Fruit and vegetable preserving and specialty food manufacturing	8.6%	14.5%	6.4%
Dairy product manufacturing	4.6%	16.5%	1.5%
Meat product manufacturing	6.2%	10.3%	8.8%
Seafood product preparation and packaging	0.7%	3.6%	2.0%
Bakery and tortillas manufacturing	0.0%	11.6%	0.5%
Beverage and tobacco product manufacturing	8.3%	20.8%	4.4%
Textile mills	3.5%	7.0%	5.4%
Textile product mills	6.1%	2.0%	8.0%
Clothing manufacturing	1.7%	4.9%	1.6%
Leather and allied product manufacturing	0.0%	10.4%	0.0%
Sawmills and wood preserving	3.3%	3.3%	4.0%
Veneer, plywood and engineered wood product manufacturing	8.0%	16.4%	2.8%
Other wood product manufacturing	5.6%	13.0%	7.9%
Pulp, paper, and paperboard mills	15.7%	2.7%	2.8%
Converted paper product manufacturing	9.2%	4.4%	9.3%
Printing and related support activities	7.8%	9.7%	2.0%
Petroleum and coal product manufacturing	11.6%	3.9%	3.8%
Basic chemical manufacturing	5.7%	3.1%	0.0%
Resin synthetic rubber and artificial synthetic fibres and filaments manufacturing	3.2%	14.2%	2.6%
Pharmaceutical manufacturing	5.9%	19.9%	4.0%
Paint, coating and adhesive manufacturing	3.9%	12.6%	10.0%
Pesticide, fertilizer and other agricultural chemical manufacturing, soap, cleaning compound and toilet preparation manufacturing, and other chemical product manufacturing	6.0%	18.9%	3.3%
Plastic product manufacturing except motor vehicle plastic parts manufacturing	7.4%	10.4%	3.5%
Motor vehicle plastic parts manufacturing	9.1%	7.0%	10.6%
Rubber product manufacturing	4.6%	4.6%	4.6%
Non-metallic mineral product manufacturing	8.1%	13.3%	1.4%
Iron and steel mills and ferro-alloy manufacturing; steel product manufacturing from purchased steel; non-ferrous metal (except aluminum) production and process	0.0%	1.1%	2.5%
Alumina and aluminum production and processing	4.6%	4.6%	0.0%
Ferrous metal foundries	6.6%	3.5%	0.0%
Non-ferrous metal foundries	4.1%	4.1%	0.0%
Forging and stamping; cutlery and hand tool manufacturing; hardware manufacturing; spring and wire product manufacturing; other fabricated metal product manufacturing	6.1%	6.3%	3.3%
Architectural and structural metals manufacturing	0.2%	13.9%	5.6%
Boiler, tank and shipping container manufacturing	6.0%	7.1%	11.5%
Machine shops, turned product and screw, nut and bolt manufacturing	0.0%	5.1%	0.0%
Coating, engraving, heat treatment and allied activities	0.0%	2.9%	9.4%
Other machinery manufacturing*	3.5%	7.6%	0.4%
Mining and oil and gas field machinery manufacturing	4.6%	6.0%	0.0%

Sawmill and woodworking machinery manufacturing	15.8%	0.0%	3.3%
Rubber and plastics industry machinery manufacturing	5.2%	10.3%	0.0%
Ventilation, heating, air-conditioning, and commercial refrigeration equipment manufacturing	14.2%	16.1%	3.4%
Metalworking machinery manufacturing	0.0%	1.7%	7.8%
Industrial electronics manufacturing	5.2%	7.3%	4.1%
Electrical lighting equipment manufacturing	0.0%	13.2%	4.0%
Household appliance manufacturing	9.0%	0.0%	4.5%
Electric equipment manufacturing	3.0%	8.5%	4.0%
Other electrical equipment and component manufacturing	1.4%	7.6%	3.0%
Motor vehicle manufacturing	5.6%	33.3%	5.6%
Motor vehicle body and trailer manufacturing	4.4%	2.4%	3.7%
Motor vehicle parts manufacturing	2.4%	5.6%	10.9%
Aerospace product and parts manufacturing	1.5%	9.9%	1.9%
Locomotive and railroad car manufacturing	0.0%	9.1%	9.1%
Ship and boat building	0.0%	0.0%	0.0%
Other transportation equipment manufacturing	6.3%	6.3%	6.3%
Furniture and related product manufacturing	0.6%	4.5%	5.7%
Miscellaneous manufacturing	2.2%	10.1%	6.0%
Air transportation	12.2%	3.3%	0.0%
Rail transportation	0.0%	10.0%	5.5%
Water transportation	11.1%	19.1%	4.8%
Truck transportation	14.6%	15.8%	4.2%
4-5PL Support activities for transportation	7.7%	8.2%	4.9%
Postal service and couriers and messengers	15.6%	31.3%	0.0%
3PL Warehousing and storage	10.0%	31.4%	7.1%

\* Machinery manufacturing except mining and oil and gas field machinery manufacturing; sawmill and woodworking machinery manufacturing; rubber and plastics industry machinery manufacturing; ventilation, heating, air-conditioning, and commercial refrigeration equipment manufacturing; and metalworking machinery manufacturing.

**Table A-7****Investment in distribution facilities, by industry,  
outside Canada (2007 to 2009)****Canada, all enterprises with business activities outside of Canada**

	Obtained capacity by merger or acquisition	Opened new facility or expanded capacity	Closed an existing facility or contracted capacity
Manufacturing	3.4%	5.3%	3.9%
Fruit and vegetable preserving and specialty food manufacturing	5.0%	5.0%	5.0%
Dairy product manufacturing	12.6%	12.6%	12.6%
Meat product manufacturing	0.0%	0.0%	0.0%
Seafood product preparation and packaging	1.4%	0.0%	0.0%
Beverage and tobacco product manufacturing	4.4%	7.5%	0.0%
Textile mills	0.0%	10.0%	7.7%
Textile product mills	4.4%	0.0%	4.4%
Clothing manufacturing	9.4%	2.6%	2.9%
Leather and allied product manufacturing	0.0%	7.0%	6.7%
Sawmills and wood preserving	0.0%	3.3%	6.6%
Other wood product manufacturing	1.1%	2.2%	5.2%
Pulp, paper, and paperboard mills	13.3%	0.0%	11.3%
Converted paper product manufacturing	3.9%	0.0%	0.0%
Printing and related support activities	1.6%	1.6%	1.6%
Petroleum and coal product manufacturing	7.1%	7.1%	14.2%
Basic chemical manufacturing	3.3%	4.1%	8.3%
Resin synthetic rubber and artificial synthetic fibres and filaments manufacturing	0.0%	11.3%	3.4%
Pharmaceutical manufacturing	3.3%	4.5%	0.0%
Paint, coating and adhesive manufacturing	3.6%	6.3%	4.3%
Pesticide, fertilizer and other agricultural chemical manufacturing, soap, cleaning compound and toilet preparation manufacturing, and other chemical product manufacturing	2.8%	6.9%	4.1%
Plastic product manufacturing except motor vehicle plastic parts manufacturing	2.6%	4.0%	2.1%
Motor vehicle plastic parts manufacturing	6.8%	8.9%	11.3%
Rubber product manufacturing	3.5%	0.0%	5.2%
Non-metallic mineral product manufacturing	1.5%	2.3%	2.6%
Iron and steel mills and ferro-alloy manufacturing; steel product manufacturing from purchased steel; non-ferrous metal (except aluminum) production and process	6.0%	6.2%	3.8%
Alumina and aluminum production and processing	10.0%	0.0%	0.0%
Ferrous metal foundries	0.0%	0.0%	0.0%
Non-ferrous metal foundries	0.0%	5.8%	0.0%
Forging and stamping; cutlery and hand tool manufacturing; hardware manufacturing; spring and wire product manufacturing; other fabricated metal product manufacturing	2.2%	12.7%	3.4%
Architectural and structural metals manufacturing	0.4%	6.5%	0.4%
Boiler, tank and shipping container manufacturing	0.0%	1.7%	10.2%
Machine shops, turned product and screw, nut and bolt manufacturing	0.0%	0.0%	0.0%
Coating, engraving, heat treatment and allied activities	0.0%	0.0%	0.0%
Other machinery manufacturing*	8.2%	7.9%	3.8%
Mining and oil and gas field machinery manufacturing	7.3%	5.2%	5.2%
Sawmill and woodworking machinery manufacturing	8.5%	0.0%	4.4%
Rubber and plastics industry machinery manufacturing	0.0%	6.6%	6.6%



Ventilation, heating, air-conditioning, and commercial refrigeration equipment manufacturing	0.0%	7.3%	5.0%
Metalworking machinery manufacturing	0.0%	0.0%	4.7%
Industrial electronics manufacturing	7.8%	7.6%	5.2%
Electrical lighting equipment manufacturing	0.0%	0.0%	7.4%
Household appliance manufacturing	0.0%	0.0%	6.2%
Electric equipment manufacturing	5.0%	10.3%	2.5%
Other electrical equipment and component manufacturing	4.4%	4.5%	2.1%
Motor vehicle manufacturing	8.3%	16.7%	0.0%
Motor vehicle body and trailer manufacturing	5.5%	13.8%	1.3%
Motor vehicle parts manufacturing	4.4%	10.5%	10.4%
Aerospace product and parts manufacturing	3.1%	6.1%	6.1%
Locomotive and railroad car manufacturing	0.0%	33.3%	0.0%
Ship and boat building	5.3%	5.6%	5.6%
Other transportation equipment manufacturing	10.0%	10.0%	0.0%
Furniture and related product manufacturing	4.4%	2.3%	0.8%
Miscellaneous manufacturing	2.1%	9.5%	8.7%
Rail transportation	0.0%	0.0%	12.7%
Truck transportation	6.1%	0.0%	6.1%

\* Machinery manufacturing except mining and oil and gas field machinery manufacturing; sawmill and woodworking machinery manufacturing; rubber and plastics industry machinery manufacturing; ventilation, heating, air-conditioning, and commercial refrigeration equipment manufacturing; and metalworking machinery manufacturing.

**Table A-8**

**Introduction of new or improved logistics methods,  
by industry (2007 to 2009)**

Oil and gas extraction	8.7%
Mining and quarrying	14.6%
Total manufacturing	15.7%
Animal food manufacturing	17.5%
Fruit and vegetable preserving and specialty food manufacturing	23.3%
Dairy product manufacturing	24.4%
Meat product manufacturing	11.6%
Seafood product preparation and packaging	10.1%
Bakery and tortillas manufacturing	19.1%
Beverage and tobacco product manufacturing	26.0%
Textile mills	19.0%
Textile product mills	13.2%
Clothing manufacturing	8.1%
Leather and allied product manufacturing	22.1%
Sawmills and wood preserving	6.0%
Veneer, plywood and engineered wood product manufacturing	18.9%
Other wood product manufacturing	16.3%
Pulp, paper, and paperboard mills	18.5%
Converted paper product manufacturing	14.7%
Printing and related support activities	18.4%
Petroleum and coal product manufacturing	11.6%
Basic chemical manufacturing	24.5%
Resin synthetic rubber and artificial synthetic fibres and filaments manufacturing	26.4%
Pharmaceutical manufacturing	27.1%
Paint, coating and adhesive manufacturing	15.5%
Pesticide, fertilizer and other agricultural chemical manufacturing, soap, cleaning compound and toilet preparation manufacturing, and other chemical product manufacturing	17.7%
Plastic product manufacturing except motor vehicle plastic parts manufacturing	13.6%
Motor vehicle plastic parts manufacturing	20.4%
Rubber product manufacturing	18.3%
Non-metallic mineral product manufacturing	14.0%

Iron and steel mills and ferro-alloy manufacturing; steel product manufacturing from purchased steel; non-ferrous metal (except aluminum) production and process	16.7%
Alumina and aluminum production and processing	22.5%
Ferrous metal foundries	17.4%
Non-ferrous metal foundries	9.6%
Forging and stamping; cutlery and hand tool manufacturing; hardware manufacturing; spring and wire product manufacturing; other fabricated metal product manufacturing	13.0%
Architectural and structural metals manufacturing	23.5%
Boiler, tank and shipping container manufacturing	6.0%
Machine shops, turned product and screw, nut and bolt manufacturing	6.2%
Coating, engraving, heat treatment and allied activities	6.5%
Other machinery manufacturing*	10.9%
Mining and oil and gas field machinery manufacturing	17.4%
Sawmill and woodworking machinery manufacturing	15.8%
Rubber and plastics industry machinery manufacturing	31.3%
Ventilation, heating, air-conditioning, and commercial refrigeration equipment manufacturing	25.2%
Metalworking machinery manufacturing	11.3%
Industrial electronics manufacturing	20.8%
Electrical lighting equipment manufacturing	29.2%
Household appliance manufacturing	13.5%
Electric equipment manufacturing	13.9%
Other electrical equipment and component manufacturing	15.2%
Motor vehicle manufacturing	27.8%
Motor vehicle body and trailer manufacturing	6.8%
Motor vehicle parts manufacturing	19.8%
Aerospace product and parts manufacturing	33.2%
Locomotive and railroad car manufacturing	0.0%
Ship and boat building	5.5%
Other transportation equipment manufacturing	18.8%
Furniture and related product manufacturing	10.7%
Miscellaneous manufacturing	21.6%
Air transportation	9.7%
Rail transportation	24.5%
Water transportation	21.2%
4-5PL Support activities for transportation	21.4%
Postal service and couriers and messengers	35.2%
3PL Warehousing and storage	38.6%

\* Machinery manufacturing except mining and oil and gas field machinery manufacturing; sawmill and woodworking machinery manufacturing; rubber and plastics industry machinery manufacturing; ventilation, heating, air-conditioning, and commercial refrigeration equipment manufacturing; and metalworking machinery manufacturing.

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