STRATEGIC HUMAN RESOURCES STUDY OF THE SUPPLY CHAIN SECTOR

FINAL REPORT | **FALL 2005**

Canada

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Introduction

The findings of the Canadian Logistics Skills Committee's national supply chain strategic human resources study present a picture of a sector in need of a vision and strategic leadership. Survey data suggests that many human resources challenges could be overcome by connecting a fragmented sector, increasing awareness of supply chain occupations, and working with educators at all levels to develop supply chain programming that addresses the sector's evolving needs.

The Strategic Human Resources Study of the Supply Chain Sector, a report funded by the Government of Canada's Sector Council Program, builds upon, and continues the work initiated by, the Lean Logistics Technology Roadmap project. It is an in-depth national research study aimed at developing a common industry vision for, and a co-operative approach to address, the current and future human resources challenges of the supply chain sector.

This study was conducted under the guidance of the Canadian Logistics Skills Committee (CLSC), a national committee comprising industry, academic and provincial-government representatives, and in partnership with Human Resources and Skills Development Canada, Industry Canada and Transport Canada.

The CLSC is mandated to assess technologies, innovations and conditions that have the greatest impact on the supply chain sector, and to develop a strategic human resources action plan for Canadian industry and academia.

A review of the major human resources challenges in the sector reveals a limited pool of skilled employees and the need to develop skill sets to cope with emerging technologies and a global marketplace. In addition, the sector must overcome a general lack of awareness and understanding of the supply chain sector and its occupations. Students, new workforce entrants and those in career transition typically do not enter the supply chain sector by design – usually by accident – simply because they do not know it exists.

In order for the sector to attract, develop and retain the talent it requires, it must compete for attention in an environment where other sectors and industries have already, or are about to, initiate awareness and recruitment campaigns to address their talent shortage.

Attraction and retention of talent, particularly knowledge workers, are vital to the sector's ability to focus on improvements to the Canadian supply chain. This is of paramount importance, as supply chain performance directly impacts the costs and effectiveness of Canadian industry and, therefore, Canadian competitiveness on a national and global scale.

Study findings are based on input from a broad representation of supply chain sector participants, including employers, employees, academia, students and associations, as well as past studies and secondary sources of information. As such, the general approach to this study comprised both primary and secondary research components. Key data gathering activities included the following:

- Review of secondary research employing publicly available studies, articles and data;
- Interviews with Canadian Logistics Skills Committee members;
- Surveys administered to industry employers, employees, academic institutions and students;

- Focus groups and interviews with industry participants (employers and employees);
- Interviews with a selection of associations; and
- Roundtable discussions with industry and academic leaders.

The scope of topics covered ranges from general industry characteristics and trends to specific human resources challenges and practices. Key areas explored include:

- The current and future business environment of the supply chain sector;
- The impact of technology on the sector and human resources skills requirements;
- The current and future employment profile of occupations in the sector;
- The current and future skilled worker demand and supply;
- The current levels and types of supply chain training and future needs; and
- Current human resources strategies and practices.

In addition, the study investigates regional and organization size differences across various factors within the scope of the study in order to identify if any specific trends or needs are present.

Study results are summarized in the body of this report and structured around the following six modules:

- Module 1 – The Evolving Economic, Business and Regulatory Environment
- Module 2 – The Impact of Technology and other Change Drivers
- Module 3 – Employment Analysis
- Module 4 – Skill Demand and Forecast
- Module 5 – Recruitment, Training, Development & Retention
- Module 6 – Recommendations

It is intended that the findings of this study be used to create a human resources action plan for Canadian industry and academia, and provide small and medium-sized organizations with recommendations they can adopt independently.

Sector Overview

There are strong interdependencies between supply chain management and logistics management and thus it is difficult to identify precise boundaries. Furthermore, these boundaries are continuously moving to accommodate an integration of supply chain and logistics activities. Nevertheless, it is suggested that logistics is a sub-function of the supply chain. While logistics may be involved to some extent in an increasing number of supply chain activities, it will never include the complete supply chain spectrum. For example, functions such as sourcing, manufacturing, customer service and retailing involve logistics in their planning and scheduling in order to optimize the end-to-end supply chain, but their core operations are still distinct.

For the purposes of this study, the following definition of supply chain management from the Council of Supply Chain Management Professionals is employed:

> "Supply Chain Management encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all Logistics Management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third-party service providers, and customers. In essence, Supply Chain Management integrates supply and demand management within and across companies.

Supply Chain Management is an integrating function with primary responsibility for linking major business functions and business processes within and across companies into a cohesive and high-performing business model. It includes all of the Logistics Management activities noted above, as well as manufacturing operations, and it drives coordination of processes and activities with and across marketing, sales, product design, and finance and information technology."

An increasingly important component to the supply chain sector is the emergence of functional and process outsourcing, thus creating the need for businesses (third-party logistics providers, 3PLs) that are specialized in providing logistics services. As a result, the sector comprises two main groups – logistics/supply chain users and logistics/supply chain service providers – both of which participated in this study.

Based on the results of this study, the most common supply chain activities completed in-house focus on inventory management and customer service, including processing and fulfilling orders. Conversely, the most common outsourced activities focus on transportation of goods (i.e., outbound and inbound transportation, and freight forwarding), customs (i.e., brokerage and clearance) and, to a lesser degree, warehousing.

Industry Canada's **Logistics – Service Industries Overview Series** (2001) report estimates the total revenue for logistics-related firms in 2001 (including, but not limited to 3PL firms) to be $50 billion (42% of which is trucking). It is generally estimated that this accounts for approximately 60% of the supply chain sector activity within Canada, with the other 40% being conducted in-house by other organizations (e.g., within manufacturing or retailing organizations).

The annual revenue growth rate of the supply chain sector was 5.8% from 1991 to 1997, according to **Logistics and Supply Chain Management – Overview and Prospects**.

Focusing specifically on 3PLs, the gross revenue for the North American 3PL market (as per **The North American 3PL Market** report (2004)), was $65 billion in 2002. According to the same report, the 2004 growth rate for this market was 20%, with the annual growth rate for warehousing, transportation management, air/ocean freight forwarding, and dedicated carriage (four core logistics sections) being 15% to 25%.

The supply chain sector size in terms of employment was estimated at 635,530 employees (excluding truck drivers) in 2001 according to the **2001 Census** (see table below). It is estimated that as of 2004 the supply chain labour force had grown to 701,880 employees, based on **Labour Force Survey** data from 2001 to 2004. These employees are predominantly located in Ontario, Quebec, Alberta and British Columbia.

Supply Chain Sector Employees by Occupation

Sub-function	Occupation Category	NOC Code	Sample Position Titles	Number of Supply Chain Employees
Senior Management	Managerial	0016	Senior managers: goods, production, utilities, transportation and construction	6,620
Logistics Information Systems	Managerial	0213	Computer and information systems managers	9,240
	Tactical	2233	Industrial engineering and manufacturing technologists and technicians	14,635
		2172	Database analysts and data administrators	305
		2171	Computer analysts	9,415
		2175	Web/Internet site developers	665
Warehousing	Managerial	0721	Facility operations and maintenance manager: warehouse manager	24,570
		0132	Postal and courier service manager	4,660
		1214	Supervisors, mail and message distribution occupations	8,305
	Operational	7452	Material handlers	167,355
		9617	Labourers in food, beverage and tobacco processing: material handling, packaging	65,905
		1472	Store keepers and parts clerks: e.g., parts supplier, supply clerk	37,075
		7451	Longshore workers: e.g., dock worker, ship loader operator	6,935
Transportation	Managerial	0713	Transportation managers	26,135
	Tactical	1236	Customs, ship and other brokers	5,240
		1476	Transportation route and crew schedulers	3,820
		1475	Dispatchers and radio operators	2,245
	Operational	1471	Shippers and receivers	106,365
Inventory/ Material Control	Managerial	0114	Other administrative service managers: e.g., inventory control manager, support services	13,435
		1215	Supervisors, recording, distributing and scheduling occupations	20,725
	Tactical	1474	Purchasing and inventory clerks: e.g., inventory analyst, planner	38,655
		1122	Professional occupations in business services to management: consulting	820
Purchasing	Managerial	0113	Purchasing managers	9,055
	Tactical	1225	Purchasing agents and officers	28,025
		6233	Retail and wholesale buyers	22,190
Marketing and Sales	Managerial	0611	Sales, account and marketing managers	3,135
			TOTAL	635,530

Source: 2001 Census (NAICS: 11, 21, 22, 31-33, 41, 44, 45, 48, 49, 51-56, 61, 62, 71, 72, 91)

From a geographic perspective, the study found that supply chain-oriented organizations typically operate in multiple regions across the country and internationally. Only a few operate in one region alone. Within Canada, organizations most often operated in Ontario, Quebec, Alberta and British Columbia. Internationally, the most common area of operation was the U.S., followed by Europe and Asia Pacific.

Looking at how the supply chain function is incorporated within organizations, this study found that the supply chain function is generally centralized and headed by a senior manager.

Not only has the supply chain function evolved from strictly storage and transportation to an active integration with many other supply chain activities, but it is also shifting in terms of perception from being a common cost centre to playing a strategic competitive role. The nature of work in the sector is changing as the supply chain becomes more complicated and strategic, and organizations try to manage the full supply chain, rather than its individual parts.

Broad Findings

Policies and Regulations

Regulations cited by organizations as having an impact on their operations are reflective of current events and the global nature of the sector. Over 50% of respondents indicate that environmental and border-crossing requirements are currently having an impact on their business.

The most common regulatory areas having a significant impact over the last three years included:

- International regulations governing border crossing, customs, U.S. import security, and international trade;
- Provincial regulations (e.g., inter-provincial trade barriers, labour, and occupational health and safety);
- Sarbanes-Oxley (SOX);
- Environmental regulations (e.g., Kyoto Protocol);
- Food regulations (e.g., U.S. Food and Drug Administration (FDA) and Canadian Food Inspection Agency (CFIA) regulations);
- Municipal regulations; and
- Transportation regulations (e.g., hours of service, weights, material storage and dangerous goods).

Customs-Trade Partnership Against Terrorism (C-TPAT) and the North American Free Trade Agreement (NAFTA) were the most commonly cited specific regulations having an impact on the sector.

Trends

In an increasingly international market, global security, international trade, international competition and border-crossing requirements are all affecting the supply chain sector, and are expected to continue to do so over the next five years. Based on the current survey results, the most common business drivers currently impacting supply chain operations include increasing complexity, financial/cost pressures, and increasing speed and quality expectations.

Customers and competitors are exerting enormous pressure on supply chain logistics. More specifically, the link between supplier effectiveness, supply chain performance, and customer service has become critical. Having improved manufacturing efficiency and product quality in the past, suppliers now need to improve their collaboration with retailers and customers in order to respect

almost instantaneous delivery requirements. Increasing customer expectations/demands, in terms of speed and quality, place an increased focus on customer service.

Technology is clearly an important tool in a company's efforts to respond to ever-increasing customer expectations. Since technology can be costly, small and medium-sized organizations are often incapable of procuring the latest technologies required to remain competitive in their respective markets. Consequently, there has been a widespread increase in the number of third-party service providers, as well as their reliance on contemporary information system services.

Technology and the resulting information management requirements are identified as key business drivers currently impacting the supply chain function and are expected to maintain a presence in the future.

Technology

While process and production technology change has been profound, information management systems and related technology have evolved at a more rapid pace and have had a more profound impact on job design and skill requirements. As such, the technology portion of this study focuses on information technology and systems.

Based on feedback from study participants, most organizations are not prepared for the level of technological integration that will be required to compete successfully. In general, Canadian organizations lag in both investing in and implementing new technologies. While information management/technology is one of the most common activities reported as falling under the responsibility of the supply chain function, technology appears to be under-utilized. It is noted that the degree of technology use reported in this study could be understated, as a result of the use of ERPs and not stand-alone systems for specific functions.

Technology is most commonly employed for inventory and warehousing management. Looking forward, employers are considering employing technology for transportation, and customer and supplier relationship management. Not surprisingly, larger organizations have implemented more supply chain-related information systems than smaller ones. Interestingly, despite the number of organizations that indicate that technology is applied in their organization, few (<12%) indicate they currently have the requisite skills to fully employ technology.

Organizations are continually updating their technology to improve efficiency and indicate that their ability to keep pace with technological change is a challenge.

The introduction of technology is changing the nature of work for all occupational categories (i.e., managerial, operational and tactical), in terms of:

- Increased pace of work with less lead time; and
- More real-time information and an increased requirement to manage this influx of information.

As a result of technological change, software application and analytical and decision-making skills are rapidly replacing traditional manual processes and abilities. It appears that many employees have been able to adapt to this evolution.

There are divergent views with respect to whether employees possess technically adaptable skills. Despite the fact that employers state their employees do not have the requisite technical skills, employees indicate that they are provided with adequate training to make full use of technology, and academic institutions indicate teaching in the areas where employers employ technology. Employers are dealing with their skill gaps in the short term by focusing on in-house and on-the-job training. In the longer term, this has implications for more pro-active technical skill development and opportunity for industry/academic institution alliances.

As a result of technology introduction, going forward it is anticipated that there will be further emphasis on the importance of instantaneous adaptation to customer requirements, information management and general management skills.

Employment Profile

It is estimated that as at 2004, there were approximately 701,880 people working in the supply chain sector within Canada (excluding truck drivers) (**2001 Census** and **Labour Force Surveys**). Overall, the employment profile is predominantly full-time, male, 36 to 45 years of age, experienced and educated. The employment population is fairly diverse, with many females, members of diversity groups (aboriginal, visible minority, disabled) and employees hired from outside of Canada.

Supply chain employees work in all geographic areas within Canada, but tend to be most concentrated in Ontario, Quebec, Alberta and British Columbia.

Occupations

The sector covers a wide variety of occupations. Results from the study indicate that, generally, employment across all sub-functions of the supply chain is expected to either remain constant or grow, with particular emphasis on warehousing operational positions and logistics information systems tactical and operational positions.

The results of the employee survey also suggest a prevalence of the following emerging positions dedicated to the supply chain sector: instructor/trainers; sales, marketing and account managers; sales representatives and coordinators; and corporate service occupations with a supply chain management focus/specialization e.g., Finance, Human Resources and Information Technology positions.

Skills and Education

Skill requirements do not vary significantly by company size or region, which suggests that supply chain employees can move between regions with some degree of ease.

Employers indicate that communications and analytical skills are a requirement for all occupation categories across all sub-functions. Other common skill requirements include technology, interpersonal and customer service skills.

The majority of employees report having the priority skill requirements identified by employers. Employees also identify another set of skills that they feel they require much more of either now or in the next five years in order to be successful in their jobs. These skills and knowledge include:

- Financial planning
- Forecasting
- Cost analysis
- Knowledge of international business practices
- Knowledge of laws and regulations
- Knowledge of logistics functions and the supply chain

- Mechanical skills
- Optimization of workflow
- Knowledge of transportation
- General management and business
- Languages

An emphasis on broader business, financial and logistics/supply chain skills and knowledge is noted.

The following emerging skill requirements were highlighted by employees and employers.

Skills/Competencies by Occupation Category

Managerial	Tactical	Operational
• Contract administration and management • Regulatory knowledge • Negotiation skills • Vendor relations/ management • Performance measurement and quality management • Knowledge of currency markets and business implications, especially for purchasing/ procurement managers • Emerging emphasis on process and change management skills • Ability to work globally (e.g., working with other cultures)	• Analytical capability and process improvement (e.g., pending shortage of business analysts) • Systems applications and related knowledge • Regulatory knowledge • Planning and forecasting skill sets and process knowledge • Ability to seek out opportunities for cost savings and process improvements	• Process and systems knowledge • Data collection and systems input capability • Continued manual ability • Customer relationship and communication skills/competencies • A number of operational employees indicated a concern that they are generally not receiving business and analytical/problem solving training • Also a concern that supervisory staff need ongoing supervisory training, and in large part, do not receive it • However, occupational health & safety training deemed to be very strong across most companies/ organizations

Companies have generally developed skill sets internally. While there is an emerging trend to source entry-level planners, schedulers and analysts from universities and colleges, new graduates still require on-the-job training and experience.

66% of employers suggest that higher education with a logistics/supply chain management or related major is essential when considering new recruits. A comparison of employee education requirements identified by employers to the current education level of employees reveals that:

• A small proportion of supply chain managers possess an undergraduate degree, while the majority of employers require it for that level; and

• Tactical and operational employees tend to possess a higher level of education than the minimum required by employers for their levels.

A minority of employers indicated that certification was required. Employer responses suggest that certification is more desirable for managerial roles, with PLog and CITT being the most common. This is consistent with the most common certifications held by employees, with CITT being the most prevalent amongst all occupational categories (i.e., managerial, tactical and operational). Approximately 20% of surveyed employees possess a supply chain-related certification or designation. Overall, certification is viewed as an asset at the managerial and some tactical levels, and there is no apparent consensus as to a preferred certification.

Employee Engagement

Although satisfied, employees have a less-than-ideal commitment to the sector/profession. Overall, employees indicate that they are satisfied with their jobs and would recommend employment in supply chain management to others. However, the workforce does not appear to be committed to their current employers and, to a lesser extent, the supply chain sector in general. Common reasons cited for potentially leaving the sector include promotion/career growth; new opportunities, challenge or need for change; job stress and pressure; and compensation.

Demand and Supply of Supply Chain Talent

Demand for specific supply chain positions is predominantly expected to remain constant, with some growth predicted for positions in logistics information systems tactical and operational, warehousing operational, customer service tactical and transportation operational.

There was an overall increased reliance on knowledge-based positions (e.g., technical logistics knowledge, information technology knowledge, supply chain specialists) and customer service positions (sales, customer service, client management). Manager-level positions were commonly cited as difficult roles to fill (e.g., functional managers, general managers, project managers, etc.), with supervisor and analyst roles also identified as a challenge. Examples of specific jobs identified as difficult to fill include:

- Inventory (e.g., inventory analysts, planners, managers);
- Purchasing (e.g., purchasers, contractors, buyers);
- Logistics and supply chain specialists (e.g., supply chain and logistics analysts, planners and engineers); and
- Warehousing and operations (warehouse supervisors, managers, general warehousing and operational personnel).

Positions are typically filled from within the current sector-wide pool of supply chain employees, either through internal development and promotion or through the acquisition of supply chain employees from other organizations.

Employees leaving the workforce due to retirement do not appear to be an eminent challenge, as the most common age category for study participants was 36 to 45 years of age, with only 5% of the study participants being over the age of 55. However, a large number of employees indicate that they would consider leaving the supply chain sector, indicating that demand as a result of sector retention is a potential risk.

Other sources of supply chain talent currently being accessed include immigrants, who constituted approximately 20% of the Canadian workforce in May 2001 (**The Changing Profile of Canada's Labour Force (2001 Census: Analysis Series)**), and new graduates, of which over 90% of supply chain-related program graduates find employment in the field after graduation.

With stable and growing workforce demand, there is a need to attract new people to the supply chain sector, either new workforce entrants or experienced employees from other sectors or countries. The main efforts in this regard will focus around attraction, as academic institutions indicate that they have capacity in their supply chain-related courses and have difficulty attracting students to this area of study, the proportion of immigrants in the workforce is growing, and the Canadian employment participation rate is expected to increase in 2005 and 2006 (according to Conference Board of Canada's **Economic Forecast – Canadian Outlook (Spring 2005)**). The challenge will be to compete for attention in an environment where other sectors and industries have already, or are about to, initiate awareness and recruitment campaigns to address their talent shortage.

Sector Growth

The annual revenue growth rate of the supply chain sector was 5.8% from 1991 to 1997 (according to **Logistics and Supply Chain Management – Overview and Prospects**).

Growth in the supply chain sector is often the result of:

- Increasing strategic importance of the supply chain within organizations, driven by globalization of markets and a focus on cost reduction.
- Growth across industry segments that employ supply chain management either in-house or through the use of 3PLs.

Sectors experiencing economic growth (e.g., resource-based sectors such as oil and gas) will have a commensurate need for managerial leadership and tactical specialists in supply chain-related roles to lead and execute the increased logistical requirements to meet increasing demand.

In the end, the growth rate of other industries, especially logistics-intensive industries, drives growth rates for the supply chain sector. 3PL growth is also a reflection of the increasing sophistication of supply chain needs, as organizations employ and leverage experts.

Overall, the supply chain sector workforce is expected to grow annually by approximately 1.7% as a result of new job creation. Additional supply chain sector employees will also be required to fill existing positions that are predicted to become vacant as a result of retirements and turnover.

Based on the current sector population, the total annual demand for employees to fill new jobs, as well as anticipated vacancies resulting from retirements and turnover, is estimated to be approximately 86,330 employees annually, or 12.3% over the next three to five years.

While the overall growth rate is not dissimilar to the anticipated Canadian growth rate of 2% for 2006 (according to Conference Board of Canada's **Economic Forecast – Canadian Outlook (Spring 2005)**), what is different is the overall mix in type and nature of the roles and skills expected to be required. There is an increasing reliance on knowledge workers with business and technological skills, in combination with general supply chain knowledge and, in some cases, very specific knowledge/experience (e.g., freight forwarding, procurement). Specifically, it is anticipated that there will be increased demand for:

- Strategic business managers who can work at the executive table and lead and represent an increasingly important business function with a broad understanding of both the entire supply chain and business;
- Supply chain specialists, including planners and analysts, who can help run increasingly complex and strategic supply chains, through the use of new technologies, information management and understanding of all supply chain components, in order to meet increasing customer demands and cost pressures;
- Logistics information systems positions (e.g., systems and data); and
- Supply chain-specific customer/client-focused positions (e.g., in sales, account management and client management).

In order to meet future demand for skilled labour, the supply chain sector will need to broaden its workforce supply beyond the existing sector and invest in awareness and education initiatives.

Education and Training

Employers indicate that technical development courses are essential for supply chain personnel to stay current. The most common means of employee development are on-the-job training and external courses. For the most part, employees indicate that they are satisfied with the training they have received and that it has met their needs.

Generally, effective training investments, greater than the Canadian average, are made across the sector; however, investment in smaller organizations is less than optimal. The most common forms of

support provided to employees are tuition reimbursement, time off for external courses and the provision of in-house training. Work/study programs for supply chain employees are not widely used; however, all types are employed to some degree.

Internal training tends to be focused on technical supply chain and logistics development, interpersonal and people management skills (e.g., supervisory skills, team building, negotiations, leadership and coaching) and health and safety.

Colleges were more likely to offer dedicated logistics or supply chain management programs than the universities, and universities were more likely to offer a logistics or SCM specialization within another program. Industry alliances are a common mechanism to develop curriculum or work programs, and are less common for research activities.

There are mixed views from industry as to the usefulness of certification and specialized educational programs. While there are several courses and programs related to logistics and supply chain management being offered, approximately half of employer respondents indicate that technical training courses that meet the needs of supply chain personnel are difficult to find, and 40% indicate that professional development courses are difficult to find. Just under half of surveyed employers indicate that recent graduates of supply chain programs have the required skills to meet job requirements.

Despite employers indicating that finding required skills is a challenge, academic institutions indicate that they are offering content related to employers' main skill requirements. Perhaps the discrepancy is a reflection of the content within these areas that is being delivered (e.g., applicability, up-to-date, relevant tools, etc.) and the extent to which employers are aware of the educational programs that are available.

The majority of academic institutions indicate that demand for logistics courses appears to be increasing. All surveyed academic institutions reported that they had sufficient capacity to meet demand. The most common challenge faced by academic institutions in meeting increased demand is hiring sufficient qualified instructors.

Both employers and associations had mixed opinions as to the need for, and value of, a standardized national certification program for the sector. Some association programs that focus on a specialized technical area of the supply chain have recently been revised to include a general overview of logistics/supply chain management. While it is desirable for sector employees to have a basic understanding of most supply chain functions, there is also a need for specialized technical disciplines.

In summary, while there appears to be no shortage of sources of skill, education, and professional development opportunities, they are fragmented and not optimally aligned. There is agreement that there are a myriad to choose from, with no clarity as to the criteria to consider in selecting the most appropriate combination of formal education and professional development or certification. Employees and academic institutions are collectively of the view that they respectively have and are producing the core skills required by employers, while employers are not convinced that the content of some curricula addresses immediate and longer-term sector needs. There is also a concern that academic institutions may be under-funded and lacking qualified instructors to meet emerging demand.

Human Resources

Interview and survey results from industry participants indicate the following to be the main human resources issues facing the supply chain sector:

- Attraction;
- Education and training;
- Keeping pace with technology; and
- Succession and career planning.

Lack of a career path and succession planning are the most commonly cited human resources challenges, and there is an increasing need for succession and career planning. In terms of career progression, employers typically develop from within or hire experienced employees from other organizations. Most college graduates start employment at the tactical level, and university graduates at the supervisory/managerial level. The majority of positions held by employees, either with current or former employers, were in the supply chain field and, typically, operational and tactical employees hold an individual position for one to five years with their current organization.

Average base salary rates, as reported by employees, are comparable with other indicators of base salary compensation, considering related statistical error, and are good indicators of base salary compensation value across the broader supply chain sector. Only roughly a quarter of employers indicated that competitive total compensation is currently a challenge. While some salary differentials are observed between genders, they may be explained in the context of education, overall workforce composition, experience and job tenure.

Keeping pace with technology and the related challenges of information management is a common employer challenge. In contrast, employees indicate they receive adequate training to allow them to use technology. Continuous technological change contributes to human resources challenges (e.g., change management, job redesign, new skill requirements).

Attraction and Retention

Given that attraction is one of the most common human resources challenges being faced, and is expected to persist as such over the next five years, it is not surprising that employers also indicate encountering a variety of recruitment issues. The most common recruitment issue facing employers is finding employees with the skills required. This may be compounded by other common challenges, which include competition for resources, and lack of awareness of/interest in the supply chain sector.

Similar challenges are faced by organizations regardless of size, with organizations identifying 'finding employees with the skills required' as the most significant challenge. Manager and supervisor positions are commonly cited as difficult roles to fill, particularly employees with general managerial skills.

There is an urgent need to attract new qualified resources, as the current internal growth and development strategy is no longer providing a sufficient pool of qualified resources. Attraction to the supply chain sector is a function of interesting work, opportunity to solve problems, opportunities for learning and growth, diversity of tasks, and the role of the supply chain in an organization or industry.

Retention is anticipated by employers to be one of the main human resources issues, especially given that employees within the sector appear ready to explore new opportunities both inside and outside of the supply chain. The supply chain employee population is predominantly between the ages of 26 and 55. The risk of losing knowledge and experience as a result of retirement is not necessarily a pressing human resources challenge; however, strategies to develop the next set of leaders and to ensure a transfer of knowledge and experience are receiving more attention. The few employers making use of retention strategies are most commonly providing a career path and flexible work schedules.

Recommendations

Recommendations for consideration are structured according to the following five categories:

- Sector governance;
- Training and development/education;
- Marketing the sector and the "profession";
- Policy implications for governments; and
- Human resources processes and practices, both for sector-wide application and for small and medium-sized organizations.

The first four categories comprise sector-wide recommendations that address issues of common concern. The last category, Human Resources Processes and Practices, contains recommendations that apply across the sector and others that may be of particular interest to small and medium-sized organizations. While many of the large organizations consulted during the course of this study have defined human resources strategies and programs (and, in some cases, demonstrate best practices), this is generally not the case for small and medium-sized organizations. Accordingly, recommendations that address the specific needs of these organizations have been developed.

Sector Governance

1. Given the fact that the supply chain sector is rapidly becoming strategically important to most organizations across all industry sectors, and that it is a highly fragmented and disparate sector, it is recommended that a nationally focused integrating mechanism or sectoral forum be created. This integrating mechanism could take the form of a human resources sector council.

   The council must be unbiased and provide for full stakeholder access, and be national in scope, industry-driven and market-focused. Governance composition would ideally include representatives from all key stakeholders and provide for regional participation.

   Its initial mandate would be to articulate and implement a broad-based human resources strategy, including a national awareness campaign, for the national sector taking into account the needs of small, medium-sized and large Canadian organizations.

   This initiative will likely require government funding to initially capitalize and commence operations. With strategic and tactical success realized in the first one to two years, a combination of government funding and employer membership (and supporting fees) would be used to finance ongoing operations over the mid to long term.

   There is also an opportunity to expand the council's mandate in the future beyond human resources, taking on a broad secretariat function, forum for sectoral learning and growth, representation and leadership on issues and initiatives of common interest.

   The risks associated with not acting upon this recommendation are simply continued strategic fragmentation, less-than-optimal integration of stakeholder interests (e.g., across private- and public-sector employers, educational institutions, professional associations, unions, shareholders

and governments), and further diminished market awareness on the part of future workforce participants as competing industries aggressively promote their brand and employment opportunities. Accordingly, many of the subsequent recommendations are contingent on the establishment of a sector council.

2. As highlighted in this report, the supply chain is being significantly impacted by a dynamic regulatory environment in Canada and internationally. Accordingly, there is a need for more meaningful government/industry collaboration to ensure that government practically understands industry needs and that industry can be in a position to proactively stay abreast of anticipated and current regulatory developments. Government and industry relationships may also lead to the development or strengthening of public/private partnerships to further advance the sector.

3. There is also a need for ongoing collection and monitoring of labour market information for the supply chain sector in order to identify and understand changes, impacts and sector trends. This information may be employed to establish priorities for such items as the recognition of foreign credentials, development of essential skills, the creation of occupational standards and career awareness activities. This information will be essential for the supply chain sector to develop strategies to compete with other sectors that are increasingly taking a more proactive and aggressive approach to promote career opportunities and to attract similar talent and skill sets that are of interest to the supply chain sector.

Training and Development/Education

4. Again, assuming the creation of a sector council to integrate and promote a multi-stakeholder human resources strategy, it is recommended that this council initiate an effort to clarify and communicate educational and certification options within the sector. To facilitate this, it is recommended that a national integrating entity, possibly the sector council, create an informational repository of post-secondary academic programs and industry association certifications, and implement an enabling marketing strategy to provide web-based access and promotion to all of interest. Accessibility should be maximized by offering information in multiple languages and ensuring both urban and rural access.

5. Given the nature of supply chain management, and the growing complexity of the sector, there will be continued demand for specialist training and development in supply chain specializations (e.g., purchasing, customs). In order to minimize the fragmentation that many diverse offerings within a sector create, it is recommended that associations collaborate or partner to some degree to consolidate and deliver a common foundation upon which to build a specialization. Further, and as is the case between most universities and with some professional associations (e.g., CICA), that reciprocal arrangements and cross-recognition of certification standards and common bodies of knowledge be developed. This will serve to simplify the current array of fragmented and varying degrees of duplicative offerings and standards in the eyes of prospective applicants and candidates, and begin to create a common supply chain training and development "platform" for professional certification and recognition.

6. Assuming implementation of Recommendation #1, it is recommended that more effective coordination between post-secondary academic institutions and industry be encouraged and facilitated to determine, update and validate course/program content. While some localized best practices were noted, industry is not convinced that post-secondary programs are addressing content needs as well as they could. There is a need for industry or research group(s) to identify anticipated sector changes (e.g., international/globalization) and to have a forum or mechanism for feeding this information back to the appropriate stakeholders for incorporation into educational curriculum design.

7. Building on Recommendation #2, and supporting the delivery of Recommendations 4 to 6, there is an opportunity to develop or leverage stronger partnerships within the sector across various types of stakeholders (e.g., industry, associations, academia, governments). In this regard, there should be additional interaction and collaboration with academic institutions, for instance:

    o   Technology service providers and academic institutions need to collaborate to ensure adequate and timely education/training of emerging technology skill requirements;
    o   As noted earlier, colleges and universities (in the context of creating an integrated and common "professional platform") need to collaborate to more effectively cross-reference and

recognize credits and standard offerings for those employees and students who may need to be geographically mobile;

o Academic institutions should work with industry to increase the availability of work/field placements for students and to increase initial employment opportunities in the supply chain sector;

o Programs should be developed to address curriculum development and develop instructors; and

o Creative public/private partnerships should be employed to leverage and share existing practices and knowledge (e.g., between large-scale government institutions and industry).

It should be noted that some current best-practice partnerships have already been formed and may serve as potential models or success stories to encourage others (e.g., the Laurier Institute and its respective industry relationships). In order for these relationships and partnerships to develop, some or all stakeholders (e.g., industry, associations and government) need to promote the concept and provide incentive for this to happen. In addition, since education is governed provincially, there may be a role for the sector council to liaise with provinces in this regard to promote a much-needed national approach.

8. Building on a select number of best-practice examples, it is also recommended that those post-secondary institutions (in collaboration with industry) that envision themselves as emerging centres of expertise/excellence in local, regional or national marketplaces appoint functional or departmental heads and expand their proactive liaison with industry.

9. In the interest of developing a broader supply chain managerial cadre and addressing the current demand for strategic and managerial skills, more advanced professional/managerial training should be made available that will develop skills such as information management, change management, strategy development and relationship management.

Marketing the Sector and the "Profession"

10. In order to address current attraction challenges and the low awareness levels of the supply chain sector and its career opportunities, there is a need to better educate and promote the sector in target marketplace segments, with particular emphasis on those making career and education decisions (e.g., students and those interested in changing careers). Delivering this type of promotion to attract new talent will require national infrastructure, perspective, coordination and funding. Again this is another potential area of responsibility or role for a sector council. Some specific areas of focus for inclusion under this initiative include:

o Clarifying and communicating the definition of the supply chain sector, as well as its sub-functions and occupations.

o Stimulating stronger awareness and, more importantly, demand for education within the business community.

o Marketing potential career paths and longer-term career opportunities within the sector. Articulated career paths will support a number of human resources programs: for example, recruitment (prospective candidates and workforce entrants will see that the supply chain sector offers more than just a job and that a career is possible), learning and development (to identify gaps to be addressed through training), and succession planning.

o Working with career advisors and influencers, such as Career Services within universities and colleges, high school guidance counselors, associations (e.g., Canada Career Consortium, Canadian Association of Career Advisors (College and University)) and HRSDC career centres.

o Engaging alumni of post-secondary supply chain-related programs and association certification programs to promote employment opportunities and to encourage employers to develop field placements/work study programs and entry-level job opportunities.

o Increasing the focus on awareness activities directed at high school students to influence decisions related to post-secondary career and education. These awareness initiatives should include the use of interactive on-line tools aimed to engage youth.

o Building on the current practice at some locations, whereby intermediate-level students, in grade 8 or 9, are provided an opportunity to experience a week at a college or university during which they are exposed to potential areas of study and career options.

11. It is noted that the general lack of knowledge and understanding of the supply chain sector goes beyond students and career changers. It is suggested that a broader awareness and education campaign targeting, and in partnership with, specific stakeholders (e.g., Industry Canada, Regional Economic Development sections of local Chambers of Commerce) would be beneficial to increase appreciation for the diversity and complexity of the supply chain and its significance, not only as a business imperative but for its impact in effectively delivering on social and quality-of-life responsibilities (e.g., disaster-relief projects). While the initial focus of a sector council may be on human resources-related initiatives that are directed at attracting, retaining and developing talent, a broader mandate is also appropriate.

Policy Implications for Governments

12. With international hiring becoming more important, there are implications for government immigration policy and the recognition of foreign credentials. In this regard, there may be a role for government in facilitating the mobility of employees for Canadian companies operating internationally. Government assistance would serve to facilitate the competitive growth aspirations of Canadian companies.

13. With the exception of a few examples (e.g., Ivey School of Business, HEC, Van Horne Institute), industry/education alliances for the purposes of applied management research are not prevalent. Government promotion of research funding programs and mechanisms needs to be enhanced. One possibility would see increased involvement and collaboration from academia, Industry Canada, municipal and provincial governments and a sector council to create a Canadian Research Centre with regional centres of expertise (e.g., in Halifax, Montreal, Toronto, Calgary and Vancouver). Such focus would serve to enhance "thought leadership" and contribute to building a stronger employment brand in the marketplace. This Canadian Centre could also create alliances with other supply chain research centres, such as the Georgia Institute of Technology (U.S.), to provide research that capitalizes on the unique attributes of supply chain management in Canada and in conjunction with our most significant trading partners/parties.

14. Given the scope, complexity and cost of strategic investments in such things as recruitment/staffing, IT systems development and international marketing, many small and medium-sized businesses are challenged to identify and implement contemporary practices and related management protocols. As such, government advisory entities need to be more effectively identified and promoted in the marketplace as a source of information for such things as talent sourcing (recruitment) in foreign markets, small-business technology tool-kits, and export and financing advice.

Human Resources Processes and Practices

Sector-wide Recommendations

15. It is recommended to develop supply chain-specific occupational standards (e.g., tasks and skill sets) that will then set the standard for the development of educational curriculums applicable to the needs of supply chain occupations. National Occupation Classification (NOC) codes should be reviewed to eliminate those that are no longer valid and add new ones based on new and emerging supply chain jobs (e.g., logistics managers, supply chain analysts, marketing and sales specialists, and trainers). A sector council would be a good source of subject-matter expertise to assist with this review.

16. Given that sector organizations are at different stages of human resources strategy sophistication as a result of their maturity, business strategy and model, their ability to execute human resources solutions varies, despite the fact that the human resources challenges they encounter may be similar. To facilitate the development of better human resources practices across the sector, it is recommended that "best-practice information sharing" mechanisms be created. For example, a sector council could gather and promote, through its website, best-practice human resources processes, practices and tools. Having access to human resources best practices or services for the supply chain sector would be of particular benefit to small and medium-sized organizations.

17. With a sector council as a catalyst (Recommendation #1), it would be ideal if an industry-sponsored mentoring program could be established in target geographic locales with a primary

focus on advising and guiding the career interests of younger top-talent employees typically working in small or medium-sized organizations. An effective source of mentors could be retired supply chain professionals wanting to remain connected to the sector on a part-time basis. Program success would also be contingent upon company- or organization-specific commitment to provide employees with the time to participate in such meetings.

18. Based on the findings and observations presented in Module 5, it is recommended that all organizations examine their compensation policies, practices and processes to ensure that the principles of internal equity and pay equity are supported, and that compliance risks are mitigated. Further, and in the context of the growing strategic importance of supply chain management, and the fact that there is a relatively limited supply of both tactical and managerial competence, organizations in target geographical labour markets should conduct an annual market pricing review of internal/external total compensation practices and possibly consider supplemental base salary premiums for "near and dear" skill sets. This will serve to enhance retention and minimize the risk of losing supply chain professionals to competing interests for simply compensatory reasons.

Recommendations of Particular Interest to Small and Medium-sized Organizations

19. The findings of the study suggest that a more strategic approach to managing human resources in the sector is required. With the growth of the sector and the emerging focus on the supply chain function as a source of competitive advantage, it is increasingly important that individual organizations take a longer-term and more thoughtful approach to developing and deploying their current workforce and attracting new talent. The strategic nature and scope of an organization's human resources strategy sets the context for the design, implementation and management of its enabling human resources policies, practices and systems, especially those that are deemed to be strategic and proactive. It is recommended that organizations articulate a clear vision for people and organizational effectiveness and implement an enabling human resources strategy in the context of the organization's business strategy and economic foundation.

20. As noted in the findings section of Module 5, an emerging trend and opportunity for the sector is the growing number of new sector-specific occupations. Of primary importance in this regard is the emerging number of marketing, sales, account management, human resources specialists and trainers that are exclusively focused on the supply chain. This emerging trend provides employees with opportunities to expand their career beyond operational and tactical roles. Accordingly, it is recommended that organizations consider implementing more formalized human resources programs, such as job rotation, secondments and defined developmental projects, to create broader career opportunities for employees on the one hand, and to create greater breadth of knowledge and resource deployment flexibility on the other hand.

21. Consistent with identified best practices, it is recommended that, where practical, organizations implement a defined talent management program to identify critical supply chain positions and related high-potential employees, and then implement specific developmental programs to further expand the cadre of operational, tactical or managerial resource pools. In addition to being part of an effective succession and human resources planning strategy, this type of initiative will also serve to enhance organizational retention capability.

22. Organizational economics permitting, defined career paths, including skill and competency profiles, should be developed for operational and tactical employees. In this regard, existing best practices from academic, professional and employer organizations could be leveraged and shared.

23. In response to interest expressed by operational employees and given the increased emphasis on quality and customer satisfaction, organizations should consider developing education or information sessions for operational employees that will augment their understanding of the economics of the business and their role in this context. This would enhance employee engagement and, ultimately, performance by providing them with a line-of-sight and understanding of the broader supply chain.

24. Manager and supervisor positions are commonly cited as difficult roles to fill, supported by the fact that general managerial skills were identified as a current and future demand. Given this, and the need for 'career planning', 'opportunities' and 'succession planning', the development of managerial and supervisory skills should be a focus in order to provide employees with these opportunities and to fill future leadership roles.

25. In an effort to address a potential gap in leadership skills, organizations should consider a leadership development program in concert with succession planning efforts. A leadership development program regularly identifies and develops leaders and leadership competencies. Development programs should provide support, resources, information and learning opportunities that will systematically target and improve desired performance and behaviours. Typical program components include internal and external training programs, informal internal training (e.g., lunch and learns), mentorship, job rotations, stretch assignments, communications, and information management and diversity management programs.

26. In addition to providing training to ensure that technology is used effectively and appropriately, organizations should ensure that a comprehensive change management program designed to support employees through technological change is in place. A comprehensive program typically includes a readiness assessment of the target population to ensure that training, ongoing communications and technical support address the key areas of concern to support transition. Further it is recommended that organizations conduct a follow-up assessment to gauge the extent to which the technology is being employed effectively and as envisioned.

Implementation Considerations

There are two main areas for action to take these findings and recommendations forward:

A. The governance and infrastructure for addressing these findings and moving forward with the recommendations. There is a need to establish a sector council and clarify its role and governance model, and assuming business case funding, strategic and tactical priorities.

    In recognition that strategic leadership is a key success factor in addressing the human resources challenges facing the sector, industry roundtables demonstrated overwhelming support for creation of a sector council.

B. Roll-out:
    *   Create a strategy to roll out and promote these findings and recommendations across the sector, starting with organizations participating in this study.
    *   Develop appropriate communication and change management strategies to move this broad agenda forward.
    *   Host a sector-wide symposium once the governance and infrastructural business model have been determined and established.
    *   As part of a defined financial/funding strategy, develop appropriate business cases to secure funding and move the agenda forward.

Conclusion

The recommendations provided in this report essentially focus on the collective needs of an emerging and strategically important, but fragmented, sector in the Canadian economy and the micro-economic needs and opportunities that individual organizations can capitalize on to improve their related human resources practices and ultimately, their competitive position.

Fundamentally, however, strategic sector-wide progress (and enabling governance and infrastructure) will be the catalyst for both macro- and micro-economic development. The opportunity to make this progress happen will ultimately depend on the ability and commitment of key stakeholders to collaborate with each other and elevate and address the broader interests of the sector.

Introduction

Background

The Strategic Human Resources Study of the Supply Chain Sector is an in-depth national research study aimed at developing a common sector vision for, and co-operative approach to, the current and future human resources challenges of the supply chain sector. This endeavour builds upon, and continues the work initiated by, the Lean Logistics Technology Roadmap project. It is anticipated that the findings of this study will be used to create a human resources action plan for Canadian industry and academia.

This initiative is being conducted under the guidance of the Canadian Logistics Skills Committee (CLSC), composed of industry, academic and provincial-government representatives (see Appendix A for list of committee members), and in partnership with Human Resources and Skills Development Canada, Industry Canada and Transport Canada.

The purpose of this study is three-fold. First, to identify and analyze the impact of current and future market drivers (such as workforce supply and demand, technology, global security and environment regulations) on human resources requirements in the sector in Canada. Second, to develop and analyze the current workforce demographic profile (general and specific target groups) and identify gaps with the forecasted requirements for training, skill development and certification. Lastly, to evaluate current human resources management and business practices such as recruitment, retention, training and development in order to formulate recommendations to the sector on those issues.

The study explores the following six areas:

- The current and future business environment of the supply chain and logistics sector;
- The impact of technology on the sector and human resource skills requirements;
- The current and future employment profile of occupations in the sector;
- The current and future skilled worker demand and supply;
- The current levels and types of supply chain training and future needs; and
- Current human resource strategies and practices.

In addition, the study investigates regional and organization size differences across various factors within the scope of the study in order to identify if any specific trends or needs are present.

These areas of interest have been explored through primary and secondary research, the results of which are summarized in the body of this report. Main findings are structured around the following five modules:

- Module 1 – The Evolving Economic, Business and Regulatory Environment
- Module 2 – The Impact of Technology and other Change Drivers
- Module 3 – Employment Analysis
- Module 4 – Skill Demand and Forecast
- Module 5 – Recruitment, Training, Development & Retention

These modules are then tied together in a final Synthesis and Recommendations module (Module 6).

Approach

The general approach to this research study comprised both primary and secondary research components. Key data gathering activities included the following:

- Review of secondary research employing publicly available studies, articles and data (the results of which are available in the Strategic Human Resources Sector Study of the Logistics Industry - Literature Review document dated September 10, 2004);
- Interviews with Canadian Logistics Skills Committee members;
- Questionnaire surveys administered to:
  - Sector employers;
  - Sector employees;
  - Academic institutions; and
  - Students;
- Focus groups and interviews with sector participants (employers and employees); and
- Interviews with a selection of associations.

Results were then analysed and key findings and conclusions were summarized in this report. Based on findings and conclusions, recommendations with input from the Steering Committee were developed to address key gaps and areas for improvement.

Finally, industry roundtables were held in Montreal, Toronto and Calgary to validate research findings and gather feedback on recommendations. Roundtable participants included senior supply chain executives from industry and representatives of academic institutions.

In the end, input was gathered from over 1200 participants; refer to Appendices D, E, F, G and H.

Details on the study methodology and data gathering process are outlined in Appendix B.

Refer to the following appendices for copies of the data gathering instruments (i.e., interview guides, focus group guide and questionnaires):

Interview and Focus Group Guides

Appendix I – Employer Interview Guide

Appendix J – Employee Focus Group Guide

Appendix K – Association Interview Guide

Appendix L – Steering Committee Members Interview Guide

Survey Questionnaires

Appendix M – Employer Questionnaire

Appendix N – Employee Questionnaire

Appendix O – Educational Institution Questionnaire

Appendix P – Student Questionnaire

Module 1

Module Overview

Module 1, 'The Evolving Economic, Business and Regulatory Environment', is designed to provide an overview and profile of the supply chain sector. Its objectives are to:

- Provide a profile of the Canadian supply chain sector;
- Examine the policy and regulatory factors affecting the sector;
- Outline the trends and business drivers impacting the sector; and
- Discuss the Canadian context relative to international.

Content

1.1   Sector Profile

The main objective of this section is to present an understanding of the Canadian supply chain sector including a working definition, the structure of the sector, a breakdown of companies by size, the affiliated sector associations, the sector image and employment, and the sector's changing structure. This information serves as a foundation for the remainder of the study's research.

Establishing an outline of the Canadian supply chain sector allows us to agree on a clear definition and develop a general understanding of its particularities in Canada. As will be more precisely defined later, supply chain is about moving goods from source to end-user. This activity is an integral part of the everyday operation of most organizations across the Canadian private and public sectors.

1.1.1   Definition

Several studies and research initiatives have been conducted in the field of supply chain management and logistics, resulting in numerous sector definitions, with various data sources providing descriptions of the logistics sub-function and roles. For instance, the **Logistics Labour Market Information Study (Phase 1, 1996)** describes the logistics sector as follows:

- "Logistics is the business process concerned with the effective and efficient flow of materials and information from source to consumption."

The definition provided in the **Terms of Reference** for this study reflects an interesting evolution of the logistics sector over the last ten years:

- "Logistics is the universal thread or pipeline that plans and co-ordinates the delivery of products and services to customers all over the world. Logistics managers and operators/technicians co-ordinate activities in this global pipeline to ensure an effective and efficient flow of materials and information from the time a need arises until it is satisfied and beyond."

When compared to the definition of the 1996 study, it is interesting to note that the logistics has grown in scope with the addition of areas such as planning and other management oriented practices. Further, and relative to 1996, globalization is now a contextually relevant consideration.

Although the previously stated definition in the **Terms of Reference** provides a clear working description of the logistics sector's evolution, the definitions for both Supply Chain Management and

Logistics Management presented on the **Council of Supply Chain Management Professionals** (CSCMP) website are more reflective of the evolution of the sector's scope.

The definitions of supply chain and logistics that will be used for this study are the following:

CSCMP Definition of Supply Chain Management

"Supply Chain Management encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all Logistics Management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third-party service providers, and customers. In essence, Supply Chain Management integrates supply and demand management within and across companies.

Supply Chain Management is an integrating function with primary responsibility for linking major business functions and business processes within and across companies into a cohesive and high-performing business model. It includes all of the Logistics Management activities noted above, as well as manufacturing operations, and it drives coordination of processes and activities with and across marketing, sales, product design, and finance and information technology."

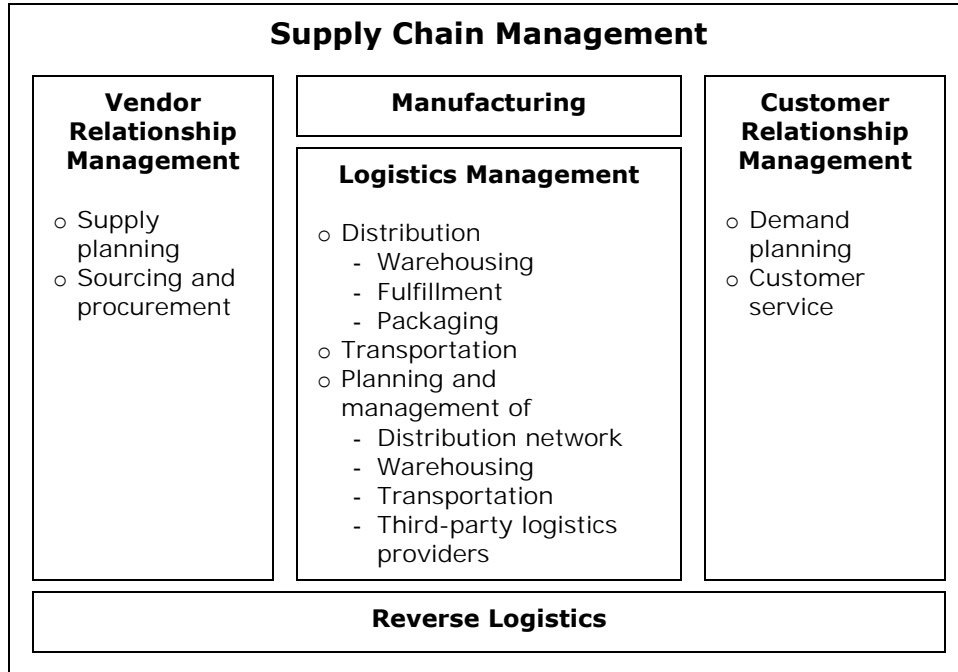### *CSCMP Definition of Logistics Management*

"Logistics Management is that part of Supply Chain Management that plans, implements, and controls the efficient, effective forward and reverse-flow and storage of goods, services and related information between the point of origin and the point of consumption in order to meet customers' requirements.

Logistics Management activities typically include inbound and outbound transportation management, fleet management, warehousing, materials handling, order fulfillment, logistics network design, inventory management, supply/demand planning, and management of third party logistics services providers. To varying degrees, the logistics function also includes sourcing and procurement, production planning and scheduling, packaging and assembly, and customer service. It is involved in all levels of planning and execution – strategic, operational and tactical. Logistics Management is an integrating function, which coordinates and optimizes all logistics activities, as well as integrates logistics activities with other functions including marketing, sales manufacturing, finance and information technology."

The value of these two definitions is not only their precision but also, more importantly, their ability to differentiate between supply chain management and logistics management. Given the strong interdependences between the two, it is very difficult to identify precise boundaries. Furthermore, these boundaries are continuously moving to accommodate an integration of supply chain and logistics activities. Nevertheless, even though the supply chain sector is continuously evolving relative to the requirements of client demands and technology, it is suggested that logistics is a sub-function of supply chain (see Figure 1.1). While logistics may be involved to some extent in an increasing number of the supply chain activities, it will never include the complete supply chain spectrum. For example, functions such as sourcing, manufacturing, customer service, and retailing involve logistics in their planning and scheduling in order to optimize the end-to-end supply chain, but their core operations are still distinct.

Figure 1.1: Supply Chain Management Functions


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┌─────────────────────────────────────────────────────────────────────┐
│                    Supply Chain Management                          │
│  ┌──────────────┐  ┌──────────────────────┐  ┌──────────────────┐   │
│  │   Vendor     │  │    Manufacturing     │  │    Customer      │   │
│  │ Relationship │  └──────────────────────┘  │  Relationship    │   │
│  │ Management   │  ┌──────────────────────┐  │   Management     │   │
│  │              │  │ Logistics Management │  │                  │   │
│  │ o Supply     │  │                      │  │ o Demand         │   │
│  │   planning   │  │ o Distribution       │  │   planning       │   │
│  │ o Sourcing and│ │   - Warehousing      │  │ o Customer       │   │
│  │   procurement│  │   - Fulfillment      │  │   service        │   │
│  │              │  │   - Packaging        │  │                  │   │
│  │              │  │ o Transportation     │  │                  │   │
│  │              │  │ o Planning and       │  │                  │   │
│  │              │  │   management of      │  │                  │   │
│  │              │  │   - Distribution network│               │   │
│  │              │  │   - Warehousing      │  │                  │   │
│  │              │  │   - Transportation   │  │                  │   │
│  │              │  │   - Third-party logistics│             │   │
│  │              │  │     providers        │  │                  │   │
│  └──────────────┘  └──────────────────────┘  └──────────────────┘   │
│  ┌──────────────────────────────────────────────────────────────┐  │
│  │                      Reverse Logistics                        │  │
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Source: Deloitte

1.1.2 Logistics/Supply Chain Activities

An increasingly important component to the supply chain sector is the emergence of functional and process outsourcing, thus creating the need for [third party logistics providers (3PL)] businesses that are specialized in providing logistics services. As a result, the sector is comprises two main groups, logistics users and logistics service providers; both of which participated in this study.

As illustrated in Figure 1.2, the most common logistics activities undertaken by organizations include an array of activities across the supply chain from storage to transportation, such as:

- Inventory management,
- Warehousing,
- Information technology,
- Order fulfillment,
- Shipment consolidation, and
- Outbound and inbound transportation.

Figure 1.2: Logistics Activities Reported by Organizations (n=160)
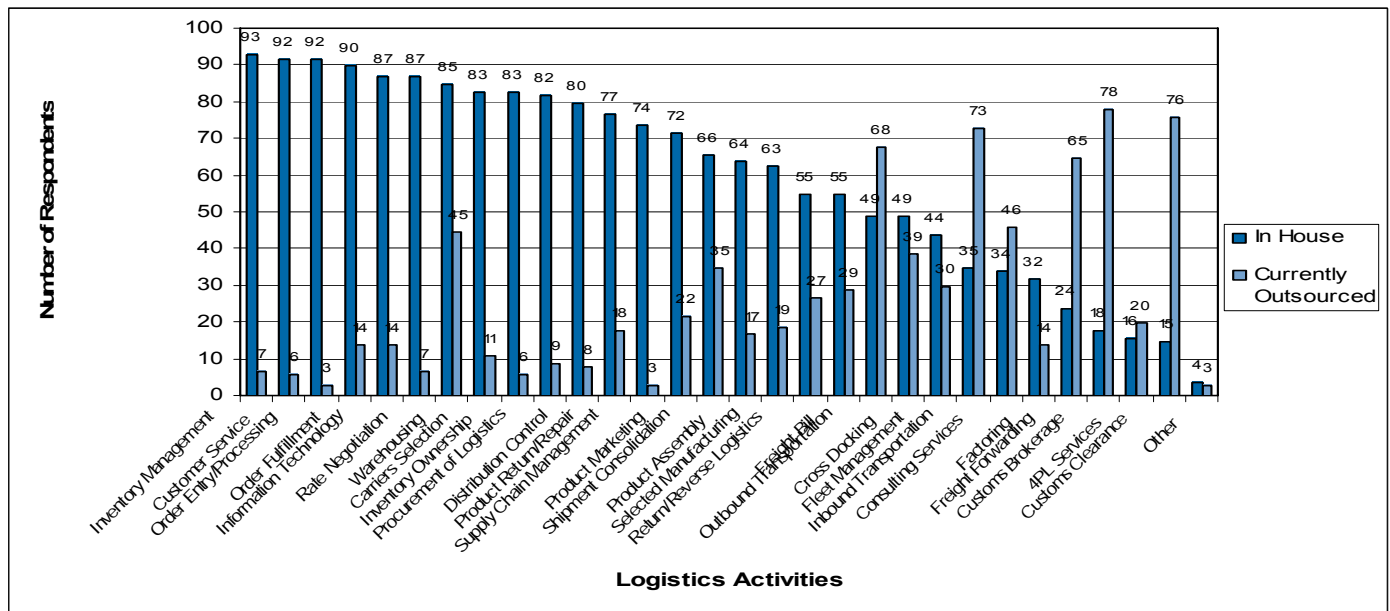
Source: Employer Survey

Based on the results of this study, the activities most commonly held in-house focus on inventory management and customer service, including processing and fulfilling orders. As illustrated in the figure above, the most common in-house activities were:

- Inventory management,
- Customer service,
- Order entry/processing, and
- Order fulfillment.

Conversely, the most common outsourced activities focused on transportation of goods and customs, and to a lesser degree, warehousing. As illustrated in the figure above, the most common outsourced activities were:

- Outbound and inbound transportation,
- Freight forwarding, and
- Customs brokerage and clearance.

Looking at the services provided by 3PLs (Figure 1.3), we find a focus on transportation activities, with the most common services cited being:

- Warehousing,
- In and outbound transportation,
- Consulting services,
- Shipment consolidation,
- Cross docking, and
- Carrier selection.

Figure 1.3: Services Provided by 3PLs (n=70)
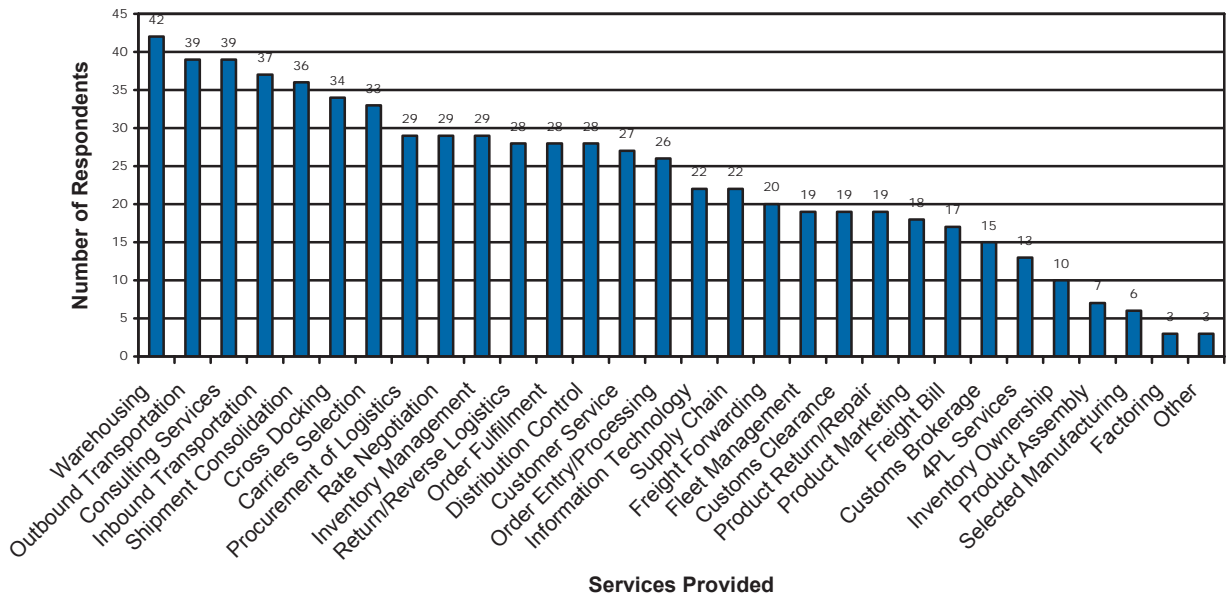
Source: Employer Survey

In-house logistics/supply chain functions vary in size and complexity much like their internal client companies. The size and scale of 3PL organizations operating in Canada is also reflective of the overall profile of the Canadian business landscape. For example, while a few large multinational warehousing and transportation companies serve a large share of the 3PL market, they are more apt to serve the large-scale business client. It should be noted however, that since the Canadian economy is essentially a mid-market economy, comprising a number of small and medium-size businesses, many of these organizations will employ small and medium-sized 3PL operations.

The only notable exception to this general rule is the mail and small parcel transportation services segment. Given Canada's vast geography and the importance of economies of scale, most enterprises, regardless of size, use the transportation services provided by one large Canadian player (Canada Post-Purolator-Progistix) and a few multinational players (UPS and FedEx). While these large-scale players are able to serve their smaller client segments for specific transportation services, they are not as competitive in the Less Than Truckload (LTL) and Truck Load (TL) transportation, warehousing and other logistics services.

That being said, both FedEx and UPS have a 'one-stop shopping' strategy and have been expanding their service offering through acquisition. FedEx purchased Viking and American Freightway ($1 billion plus revenue), making them one of the largest LTL carriers in the US with national capabilities. They have recently announced the construction of four new, and expansion of one, LTL carrier centres to accommodate their rapid expansion in this area.

Similarly, UPS purchased Menlo Worldwide Forwarding in Dec 2004 and Overnite Corporation in May 2005. This results in both FedEx and UPS emerging as major players in the 3PL business and analysts believe that this will place pressure on DHL to follow suit with few major players left to buy.

1.1.3 Sector Characteristics

Industry Canada's **Logistics – Service Industries Overview Series** (2001) report estimates the total revenue for logistics-related firms in 2001 (including, but not limited to 3PL firms) to be $50 billion (42% of which is trucking). It is generally estimated that logistics-related firms account for approximately 60% of the logistics sector activity within Canada, with the other 40% being conducted in-house by other organizations (e.g., within manufacturing or retailing organizations).

Historically, the annual growth rate of the supply chain sector has been 5.8% from 1991 to 1997, according to **Logistics and Supply Chain Management – Overview and Prospects**.

Figure 1.4 presents an overview of the distribution of revenue by sub-sector for 2002. As highlighted below, Truck Transportation is the most popular mode based on annual revenue. This observation is consistent with the fact that the foundational premise of the supply chain sector is based on the handling and transportation of materials through a supply chain. Historically, logistics and the distribution/transportation functions were often perceived as identical and used interchangeably.

Figure 1.4: Distribution of Logistics Revenues by Subsector, 2002
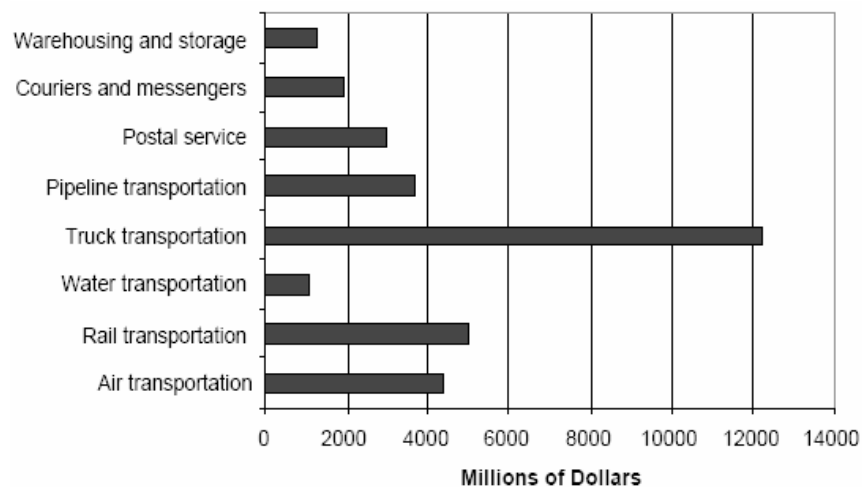
Source: Industry Canada – Strategis

Focusing specifically on 3PLs, the gross revenue for the North American 3PL market (as per **The North American 3PL Market** report (2004)), was $65 billion in 2002. According to the same report, the 2004 growth rate for this market was 20%, with the annual growth rate for warehousing, transportation management, air/ocean freight forwarding, and dedicated carriage (four core logistics sections) being
15-25%.

The supply chain sector size, in terms of employment, was estimated at 635,530 employees (excluding truck drivers) in 2001, according to the **2001 Census**. These employees occupy a variety of occupations distributed across a number of sub-functions. A distribution of supply chain sector employees by sector sub-function, occupational category (e.g., managerial, tactical and operational positions) and National Occupation Classification (NOC) code is provided in Figure 1.5 below.

**Figure 1.5:** Supply Chain Sector Employees by Occupation

Sub-function	Occupation Category	NOC Code	Sample Position Titles	Number of Supply Chain Employees
Senior Management	Managerial	0016	Senior managers: goods, production, utilities, transportation and construction	6,620
Logistics Information Systems	Managerial	0213	Computer and information systems managers	9,240
	Tactical	2233	Industrial engineering and manufacturing technologists and technicians	14,635
		2172	Database analysts and data administrators	305
		2171	Computer analysts	9,415
		2175	Web/Internet site developers	665
Warehousing	Managerial	0721	Facility operations and maintenance manager: warehouse manager	24,570
		0132	Postal and courier service manager	4,660
		1214	Supervisors, mail and message distribution occupations	8,305
	Operational	7452	Material handlers	167,355
		9617	Labourers in food, beverage and tobacco processing: material handling, packaging	65,905
		1472	Store keepers and parts clerks: e.g., parts supplier, supply clerk	37,075
		7451	Longshore workers: e.g., dock worker, ship loader operator	6,935
Transportation	Managerial	0713	Transportation managers	26,135
	Tactical	1236	Customs, ship and other brokers	5,240
		1476	Transportation route and crew schedulers	3,820
		1475	Dispatchers and radio operators	2,245
	Operational	1471	Shippers and receivers	106,365
Inventory/ Material Control	Managerial	0114	Other administrative service managers: e.g., inventory control manager, support services	13,435
		1215	Supervisors, recording, distributing and scheduling occupations	20,725
	Tactical	1474	Purchasing and inventory clerks: e.g., inventory analyst, planner	38,655
		1122	Professional occupations in business services to management: consulting	820
Purchasing	Managerial	0113	Purchasing managers	9,055
	Tactical	1225	Purchasing agents and officers	28,025
		6233	Retail and wholesale buyers	22,190
Marketing and Sales	Managerial	0611	Sales, account and marketing managers	3,135
			TOTAL	635,530

Source: 2001 Census (NAICS: 11, 21, 22, 31-33, 41, 44, 45, 48, 49, 51-56, 61, 62, 71, 72, 91)

It is estimated that as of 2004 the supply chain labour force has grown to 701,880 employees, based on **Labour Force Survey** data from 2001 to 2004.

As illustrated in Figure 1.6, the majority of the sector's workforce is found in the operational occupation category.

Figure 1.6: Supply Chain Employment by Occupation Category (n=701,880)
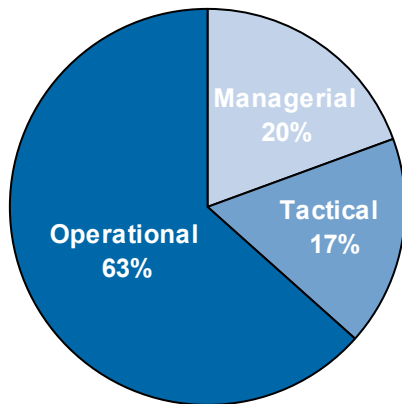
Source: derived from 2001 Census (NAICS: 11, 21, 22, 31-33, 41, 44, 45, 48, 49, 51-56, 61, 62, 71, 72, 91)

From a geographic perspective, the current study found that logistics organizations typically operate in multiple regions across the country and internationally. Only a few operate in one region only. Within Canada, organizations most often operated in Ontario, Quebec, Alberta and BC. Internationally, the most common area of operation was the US, followed by Europe and Asia Pacific.

An analysis of the Canadian supply chain population (both logistics service providers and users) by region reveals the relative importance of Ontario and Quebec compared to other Canadian provinces (Figure 1.7). Furthermore, an analysis of the Canadian supply chain population as by sub-functions highlights greater employment levels in core activities such as warehousing and transportation. It should be noted that these population statistics are also reflected in the profile of employee and employer survey participants for this study (see Appendix C for a breakdown of survey participants by sub-function and region). However our findings also show large supply chain employee populations in Alberta and BC, as well as in customer service sub-function. At the city level, Industry Canada's **Logistics/Supply Chain Management – Industrial Intelligence Profile (2004)** report also states that key Canadian logistics and supply chain companies are clustered in Toronto, Montreal and Calgary.

Figure 1.7: Canadian Logistics Service Providers by Province

Province	Number of Firms	Employment Level
Alberta	21	10,870
British Columbia	24	2,344
Manitoba	13	1,089
Newfoundland	7	107
Nova Scotia	5	112
Northern Territories	1	-
Ontario	121	44,275
Quebec	42	16,477
Saskatchewan	8	5,680
Total	**242**	**80,954**

Source: SourceCan: www.sourcecan.com

The current sector continues to experience alliances, mergers, consolidations and as previously mentioned, outsourcing. Between 36 and 46 percent of respondents indicate that these are current drivers influencing their business, with a similar percentage expecting these drivers to continue in the future. Forty-six percent of participants suggest that growth is also a factor that is influencing the structure of the sector.

Industry Canada's **Logistics/Supply Chain Management – Industrial Intelligence Profile (2004)** report states that: "Smart border compliance, outsourcing, global standards, off-shore manufacturing and new global technology requirements are driving complexity and innovation in logistics."

1.1.4   Affiliated Sector Associations

Affiliated sector associations play an important role across the broad functional sector. A preliminary list of affiliated associations is presented in Appendix Q. This includes a mix of regional, provincial, national and international associations related to different areas of supply chain management.

1.1.5   Structural Profile

Looking at how the supply chain function is incorporated within organizations, this study found that the logistics and supply chain function is generally centralized and headed by a senior manager. In this regard, over 50% of employers reported a centralized logistics function (Figure 1.8). Not surprisingly, small organizations were less likely to have a formal logistics function.

Figure 1.8: Number of Employer Respondents by Organization of the Logistics Function (n=160)

Organization of Logistics Function
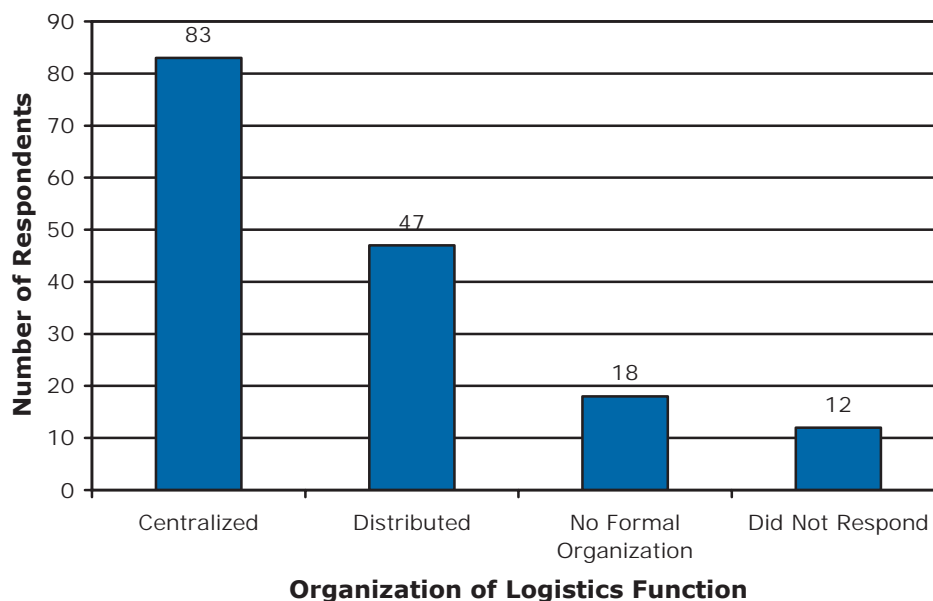
Source: Employer Survey

This finding is consistent with the results of the Quebec logistics sector study, **Analyse des besoins de formation en logistique au Quebec**, which as illustrated in Figure 1.9, also found that small organizations did not have formal logistics organizations, while larger organizations had logistics departments.

Figure 1.9: Organization of the Logistics Function

	Small	Medium	Large
No formal organization for logistics	53.1%	33.8%	15.0%
Logistics activities in several departments	27.8%	47.8%	41.9%
One department integrating several logistics activities	19.1%	18.4%	43.1%

Source: Analyse des besoins de formation en logistique au Quebec

Looking at the US, we find a similar functional structure within organizations. In a US study, **2003 Survey of Career Patterns in Logistics** by the Ohio State University, which profiles career patterns of senior executives in logistics and supply chain management and how logistics is incorporated into these organizations, study participants indicated that logistics was incorporated into their organization in one of four ways:

- A part of each division – 10% (note: has been decreasing);
- A separate logistics division – 8%;
- Centralized logistics staff – 48% (note: has grown in importance); and
- A combination of divisional and centralized activities – 31% (note: most widely used over last few years).

In terms of leadership for the logistics function, this study found that 39% of employer respondents indicated supply chain functionality was becoming more strategic and was being led by a senior manager representative (Figure 1.10). As may be expected by the nature of the roles within larger organizations, large organizations were more likely to have Vice-Presidents and Directors leading their supply chain function than smaller organizations (76% versus 37%).

Again, this study's findings mirrored those of the **Analyse des besoins de formation en logistique au Quebec** study, which found that of the participants with logistics departments/groups, the most common position was Director and that 31.3% of the large organizations had a Vice-President position.

Figure 1.10: Highest Management Level of the Logistics Function (n=160)
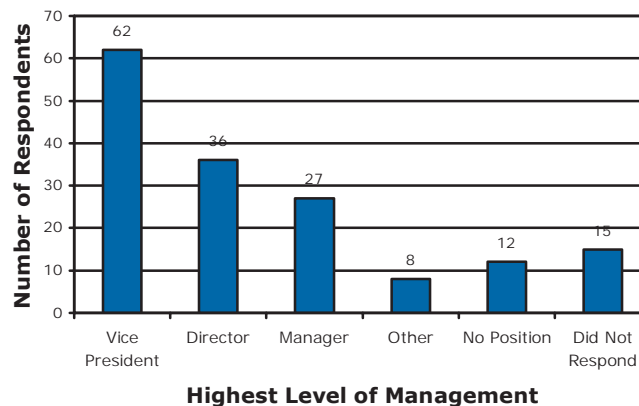
Source: Employer Survey

1.1.6   Strategic Evolution

Not only has the logistics function evolved from strictly storage and transportation to an active integration with many other supply chain activities, its financial perception is shifting from being a common cost centre to playing a strategic competitive role. As presented in Figure 1.11, however, 52% of organizations consider the logistics function to be a cost centre and only 25% view it as being a strategic differentiator.

Figure 1.11: How Organizations View Logistics/Supply Chain Management

Cost centre	52%
Service centre	15%
Strategic component	25%
Profit/revenue centre	6%
Other	2%

Source: VISIBIILITY, Tactical Solutions, Strategic Implications (US)

1.2   Policies and Regulations

This section presents an overview of current legislation impacting the sector such as trade restrictions, border crossing compliance and environmental restrictions.

Regulations were cited by many employers in this study as having an impact on supply chain operations. For example, 54% and 64% of respondents indicate that environmental and border-crossing requirements, respectively, are currently having an impact on their business.

While there is a vast array of regulations impacting organizations' supply chain functions, depending on the industry in which they operate, the mode(s) of transportation they employ, the extent to which they are global and the types of goods or services they provide, the most common regulatory areas cited by study participants as having a significant impact over the last three years included:

- International regulations governing border crossing, customs, US Import Security, and International Trade;
- Provincial regulations (e.g., Inter-provincial Trade Barriers, Labour, and Occupational Health and Safety (OH&S));
- Sarbanes-Oxley (SOX);
- Environmental regulations (e.g., Kyoto Protocol);
- Food regulations (e.g., US Food and Drug Administration (FDA) and Canadian Food Inspection Agency (CFIA) regulations);
- Municipal regulations; and
- Transportation regulations (e.g., hours of service, weights, material storage and dangerous goods).

With the most common specific regulations cited being:

- Customs-Trade Partnerships Against Terrorism (CTPAT), and
- North American Free Trade Agreement (NAFTA).

An overview of a selection of specific policies and regulations that have a significant impact on the supply chain function, especially for those involved in exporting, are outlined below under three categories:

- Regulations/Programs Driven By Security/Terrorism;
- Regulations Related to Transportation; and
- Product Traceability and Labelling.

These regulatory categories are contextually important for Canadian companies doing business with US companies and in the Unites States. It is noted that, in 2003, 83% of Canadian exports were to the US (**Statistics Canada**).

1.2.1 Regulations/Programs Driven By Security/Terrorism

The logistics of shipping to the US has been greatly impacted by September 11, 2001. The focus on global terrorism was instantly increased. Companies such as importers, transportation brokers, air carriers, sea carriers, land/rail carriers, air freight consolidators/ocean transportation intermediaries, NVOCCs (non-vessel-operating common carriers), U.S. Marine Port Authority/Terminal operators, exporting/importing manufacturers, and public warehouses have been identified as potential terrorist targets because they are a "link" in the supply chain.

Customs-Trade Partnership Against Terrorism (CT-PAT) (US Customs & Border Protection, US Department of Homeland Security) is the primary cross-border regulatory framework that was created to counteract terrorism in the US. As its name implies, CT-PAT is a Government-Industry program designed to increase security at U.S borders. Industry participation is on a voluntary basis. Through this initiative, Customs is asking businesses to ensure the integrity of their security practices and communicate their security guidelines to their business partners within the supply chain.

There are some concrete benefits to companies who participate in this program. Included in these are:

- Reduced customs inspections,
- Reduced border delays,
- Entitlement to a Customs Account Manager,
- Eligibility for account-based processes, and
- Participation in the war against terrorism.

The basic concept is that to realize the CT-PAT advantages, a carrier, a warehouse operation or a shipper must certify itself through a thorough demonstration that its process, operation and facilities are secure from being targeted by terrorists or unknowingly used as a covert base to execute a terrorist act. This certification requires both time and investment to secure equipment and buildings. This regulation creates a tangible barrier to entry to exporting to the US and thus favours those carriers that can meet these requirements.

The Free and Secure Trade (FAST) Program: The Free and Secure Trade (FAST) program is a joint Canada-US initiative involving the Canada Customs, Citizenship and Immigration Canada, the United States Bureau of Customs and Border Protection (CBP). FAST supports moving pre-approved eligible goods across the border quickly and verifying trade compliance prior to the border crossing.

It is a harmonized commercial process offered to pre-approved importers, carriers, and registered drivers. Shipments for approved companies, transported by approved carriers using registered drivers, will be cleared into either country with greater speed and certainty, and at a reduced cost of compliance.

In Canada, FAST builds on the Customs Self-Assessment (CSA) program and its principles of pre-approval and self-assessment, as well as increased security measures under the Partners in Protection (PIP) program. As a result of these protocols, all shippers (manufacturer, exporter, etc.) must consider the time required to document goods before contemplating shipment to the US. Similarly, carriers must make the effort of scrutinizing their drivers well before sending them to the border. While this is not an issue for most medium and large Canadian operations, it is an added burden for small Canadian businesses. It is also increasing the complexity of hiring of cross border truck drivers.

Operation Safe Commerce: Operation Safe Commerce (OSC) is a program involving three container "load centres" (the Ports of Los Angeles/Long Beach, Seattle/Tacoma and New York/New Jersey) in which technologies and processes to enhance the security of the international supply chain are identified and tested. OSC is jointly overseen by the Departments of Homeland Security and

Transportation and is administered by the Transportation Security Administration (TSA). For US bound shipments, this program provides an advantage to these ports over Canadian port entry.

ISPS Code: The US Coast Guard is the lead US agency for port and vessel security. A comprehensive new ship and port facility security regime, the International Ship and Port Facility Security (ISPS) Code, which includes measures to enhance security, entered into force on July 1, 2004. This code requires that each vessel whose flag state is a party to the IMO Convention for the Safety of Life at Sea (SOLAS) must develop and implement a ship security plan. Similarly, the Code requires each SOLAS port facility to develop and implement a facility security plan that is approved by the country in which the port facility is located.

This new regulation requires maritime shipping companies and ports, including those outside of the US, to establish processes and equipment to increase security. These added costs will to some extent, be transferred into increased maritime shipping costs worldwide.

Container Security Initiative (CSI) (US Customs & Border Protection, US Department of Homeland Security): CSI is a program through which Customs & Border Protection (CBP) negotiates bi-lateral cargo security agreements with the governments of U.S trading partners to establish procedures for screening and inspecting maritime cargo containers before they are loaded aboard vessels bound for the United States. There are CSI agreements covering 38 foreign ports, and CSI is currently operational in 18 ports, including Vancouver, Montreal, and Halifax.

Advance Electronic Cargo: The regulations require advance transmission of electronic cargo information to CBP for both arriving and departing cargo. The resulting protocols require all shippers (manufacturer, exporter, etc.) to ensure that cargo documentation is fully compliant and that it is transmitted electronically within prescribed timeframes. Again, this protocol adds an additional procedural burden for the small Canadian business sector, typically in the form of accurately and quickly reporting what is loaded in each shipment.

Similar regulations are in place for international logistics. For example, the **G7 Import One Step Release on Full Documentation (RFD)** is a service option that allows importers or agents to obtain the release of a shipment by submitting release and accounting information in a single Electronic Data Interchange (EDI) transmission, while deferring the payment of duties and taxes to a later date (usually on a monthly basis). Importers or agents can transmit the information either before, or when, the shipment arrives. If they have an established relationship with a known supplier, they can submit the release and accounting information to customs officials before the release of the goods. These importers or agents may be interested in the RFD process. Although the RFD process is a G8 Initiative, it is not restricted to shipments from G8 countries. This process enables more sophisticated logistics operations to execute border crossings more rapidly.

1.2.2   Regulations Related to Transportation

A recent study entitled "**Moving Forward, A Guide on the Importance of Transportation in Canada**" provides an overview of multi-jurisdictional responsibilities for specific modes of transportation, which is outlined in Figure 1.12.

Figure 1.12: Economic Regulation Responsibilities by Transportation Mechanism

	Municipal Governments	Provincial and Territorial Governments	Federal Government[a]
Air			X
Marine			X
Roads[b]	X	X	X
Rail		X[c]	X
Pipeline		X	X

a) Transportation of dangerous goods is under federal law and companion provincial acts and regulations.
b) Where a mode crosses provincial, territorial or national boundaries, it falls under federal regulation. In Canada, most transportation is a federal responsibility; provincial and local governments are involved mainly in roads. Federal responsibility for inter-provincial trucking and bus has been delegated to provincial and territorial governments.
c) Railways operating entirely within a province come under provincial regulation.

Source: Moving Forward, A Guide on the Importance of Transportation in Canada

Numerous and complex transportation regulations and policies in Canada have created a niche for Canadian transportation companies by virtue of the fact that "barriers to entry" face non-Canadian service providers. It should be noted, however, that similar complexities exist for American carriers based in the United States; as a result, very few transportation companies offer complete services on both sides of the border. This complexity is compounded by the fact that regulations reducing the hours of operations for trucking industry drivers have increased the planning, routing and scheduling functions for cross border shipments.

United States Hours of Service (Federal Motor Carrier Safety Administration (FMCSA)):
Implemented on January 4, 2004, this law stipulates that the Total On-Duty Hours (hours of work) should not exceed 14 consecutive hours and must meet a minimum number of cumulative Total Off-Duty Hours. Moreover, the Cumulative On-Duty Time must be less than 60 hours in 7 consecutive days or 70 hours in 8 days.

This law has had a major impact on freight costs throughout the US by virtue of the fact that additional drivers are required and that this demand in some areas was not properly fulfilled, escalating price pressures. All Canadian carriers moving goods in the US must also comply with this law.

In Canada, a similar **Motor Vehicle Transport Act (MVTA)** was amended in 2003. Under these new proposed regulations, provinces and territories must monitor the safety performance of all extra provincial motor carriers and extra provincial bus companies licensed in their jurisdiction. They must maintain a complete safety compliance profile of each motor carrier and bus company, using input from all jurisdictions in which they operate. A carrier rated "Unsatisfactory" could be prohibited from operating on Canadian roads. The target date for implementing the new Motor Carrier Safety Fitness Certificate Regulations is January 1, 2005.

Of particular concern with regard to the proposed new hours of service rules, was the outcome of the ministers' deliberations over a proposal from Transport Canada that would extend the proposed "working window" from 16 hours to 18 hours. The expected impact of this new Act would also increase cost and demand for drivers, but to a lesser extent than in the US.

1.2.3   Product Traceability and Labelling

Similar to escalating transportation regulations, new policies and regulations related to product traceability and labelling have emerged in industries such as food and health care. Product traceability, inventory visibility, and labeling requirements are already being enforced and will become more popular in the future. For example, the United States Food and Drug Administration (FDA) and the U.S. Bureau of Customs and Border Protection (CBP) issued **FDA & Bioterrorism (FDA) Compliance** policy guide for maintaining an uninterrupted flow of food imports while improving their safety in accordance with the **Public Health Security and Bioterrorism Preparedness and Response Act of 2002 (Bioterrorism Act)**.

The policy guide deals with the enforcement of the Bioterrorism Act's requirement, which became effective on December 12, 2003, and requires that the FDA receives prior notification of all human and animal food, drinks and dietary supplements imported or offered for import to the US. Another requirement of the Bioterrorism Act mandates that all facilities that manufacture, process, pack or hold food for consumption in the US, be registered with the FDA. This registration requirement for foreign facilities will be primarily enforced through the prior notice provision. Among other requirements, the prior notice must be received by FDA between two and eight hours -- depending on the mode of transportation -- before each shipment's arrival at the US border.

The FDA may require that manufacturers track certain devices from their manufacture through the distribution chain. The purpose of device tracking is to ensure that manufacturers of certain devices establish tracking systems that will enable them to promptly locate devices in commercial distribution. Tracking information may be used to facilitate notifications and recalls ordered by FDA in the case of serious risks to health presented by the devices. Information on implementation of the Medical Device Tracking Regulation along with the current list of devices that FDA has ordered to be tracked can be found in the following guidance "Guidance for Industry and FDA Staff; Guidance on Medical Device Tracking, January 24, 2000". Tracking augments FDA's authority to order mandatory recalls and require notification of health professionals and patients regarding unreasonable risk of substantial harm associated with a device. Manufacturers of a tracked device must establish a written standard operating procedure (SOP) that includes a method for tracking the device throughout distribution and a quality assurance program including audit procedures.

Environmental concerns are increasingly evident in legislation governing transportation. **Hazardous Materials Safety (HAZMAT) Compliance (U.S. Department of Transportation Research and Special Programs Administration (RSPA)):** The Office of Hazardous Materials Safety, in the United States Department of Transportation's Research and Special Programs Administration, is responsible for coordinating a national safety program for the transportation of hazardous materials by air, rail, highway and water**.**

RSPA's Office of Hazardous Materials Safety participates in a number of international forums as part of the ongoing process of harmonizing the US Hazardous Materials Regulations with international standards and regulations. Participation ensures that US interests are communicated and considered in the development of international standards. The objective is to establish and maintain a global system of hazardous materials transportation regulations that will enhance the free and safe movement of hazardous materials. Harmonization with international standards enhances safety, compliance and free trade while minimizing regulatory burden on the public.

The fact that organizations must consider all of these regulatory constraints adds complexity to the supply chain sector. Organizations must maintain knowledge and awareness of initiatives designed to enhance the free flow of goods, while addressing concerns related to security, terrorism, the environment, and labour practices. Consequently, the supply chain sector will require a different labour profile with specific competencies. For example, traceability addressed by newer technology such as radio frequency identification (RFID) requires specialized labour with an understanding of these technologies and their implications.

In addition to the numerous previously stated policies and regulations, certain emerging environmental pressures are also creating logistics limitations with which companies will have to manage. For example, the supply chain sector transportation activities would be heavily affected by a reduction in fuel consumption, such as the Kyoto Protocol.

1.3   Trends

This section presents an overview of general trends (e.g., increased technology, increasing customer demands, globalization) affecting the supply chain sector, and consequently the skills and human resources requirements within the sector.

Based on the current survey results, the most common business drivers currently impacting supply chain operations include:

• Increasing complexity,

- Financial/cost pressures,
- Increasing speed expectations, and
- Increasing quality expectations.

However, as depicted in Figure 1.13, many other factors are currently affecting supply chain operations.

Figure 1.13: Current Business Drivers (n=160)
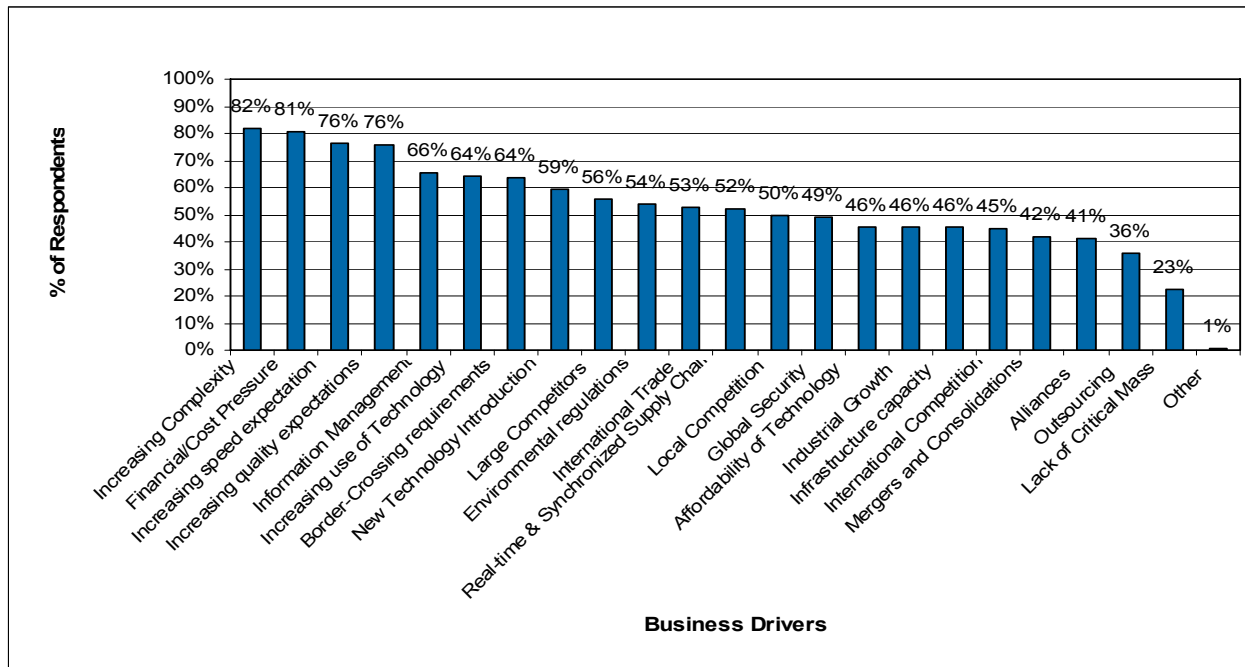
Source: Employer Survey

Regardless of size, organizations report being impacted by similar business drivers.

Looking forward, overall, employers indicated that the majority of these business drivers would continue to impact their logistics operations over the next five years. However, employers expressed mixed opinion as to whether or not local and international competition would continue to have an impact.

A comparison of these findings to the results of the **Logistics Labour Market Information Study (1996)** reveals some consistencies and some changes. First, the 1996 study concluded that the most important predicted trend at the time was the increasing utilization of information technology. While this is still expected to be a significant business driver, 'increasing use of technology' and 'new technology introductions' were not identified as the most significant drivers impacting logistics in this current study.

Second, the 1996 study identified the continuously changing structure of the supply chain sector as a major trend for the logistics market, while the current study found that while still a business driver, alliances, mergers and consolidations are not having as significant an impact as they once were.

Lastly, the 1996 study found that the increasing importance of supply chain cost reductions while improving customer service levels would most likely initiate a different set of relationships and collaboration partners between suppliers, producers, clients, and even competitors. The current study found that cost pressures, as well as increased customer speed and quality expectations were among the main business drivers being faced by the logistics sector, indicating that these drivers are still a factor almost a decade later.

Looking forward, most participants felt that increasing complexity and cost pressures, as well as increasing quality and speed expectations would continue impact their operations over the next five years. Technology introduction was also anticipated as a key business driver over the next five years.

A number of studies published in 2002 and 2003 identify many interrelated supply chain trends, many of which relate to customer expectations. More specifically, trends such as increasingly demanding, informed, and service valued customers confirm that strategies such as "produce to sell" are being replaced by "respond to demand", and that economic clout is transferring from suppliers to clients. More than ever, customers have access to increasing sources of information. Consequently, the customer is continuously demanding more streamlined supply chain services (one-stop shop) with higher service levels at lower costs.

With the emergence of global trading blocks, the power of technology and the speed of information, globalization has become an extremely important trend affecting supply chain. The most immediate impact is price competitiveness and the resulting implications for various cost drivers, including labour (e.g., compensation strategies).

Technology is clearly an important tool in a company's efforts to respond to ever increasing customer expectations. Since technology can be costly, small and medium-sized organizations are often incapable of procuring the latest technologies required to remain competitive in their respective markets. Consequently, there has been a widespread increase in the number of third-party service providers, as well as their reliance on contemporary information system services.

Customers and competitors are exerting enormous pressure on supply chain logistics. More specifically, the link between supplier effectiveness, supply chain performance, and customer service has become critical. Having improved manufacturing efficiency and product quality in the past, suppliers now need to improve their collaboration with retailers and customers in order to respect almost instantaneous delivery requirements. Better collaboration in demand forecasting, promotions, and replenishment planning translate into lower inventory throughout the supply chain, greater manufacturing effectiveness and quality, better product availability, reduced last minute orders, and increased sales. Customer demands also impact the transportation of goods in terms of delivery frequency and timeliness, necessitating increased flexibility.

Preliminary research indicates that:

- Most companies are optimizing their supply chain logistics on a local basis (e.g., by function, facility, product, country, or continent) rather than seeking larger efficiencies by taking a global network view;
- The focus of supply chain collaboration continues to be on the back end (with suppliers) rather than on the front end (with customers), where many of the biggest rewards await manufacturers;
- Few supply chain logistics are ready to deliver on rapid-fire new product introductions;
- Flexibility is getting more difficult as supply chain activities grow more complex; and
- The problem of managing risk is growing (both in terms of the product as well as the larger "customer experience").

1.4   International Analysis

This section provides an overview of how the global economy impacts the supply chain sector, as well as Canada's ability to compete internationally, and related business drivers.

As illustrated in Figure 1.14, employers participating in the current study operate in multiple international locations. This is believed to be indicative of the degree of international operations in the sector. Not surprisingly, the US is the main area of international operations.

Figure 1.14: International Geographic Distribution of Operations (n=160)

International Geographic Distribution of Operations
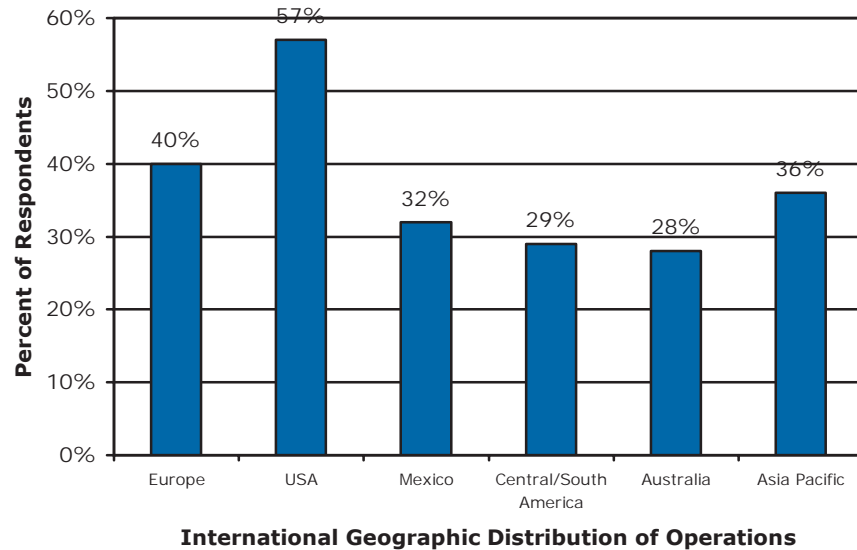
Source: Employer Survey

In an increasingly international market, global security, international trade, international competition and border-crossing requirements are all business drivers affecting the supply chain sector (Figure 1.15). While fewer participants indicate that they expect these to be their 'top' drivers in the next five years, they are still present. The influence of international trade, security and border-crossing are reflected in the regulations cited as having a significant impact on the logistics sector over the last three years. The degree of challenge that international business presents and the technical skills that are required to complete the activities may be a contributing factor to the outsourcing of customs clearance and brokerage.

Figure 1.15: 'Top' Business Drivers (n=160)

Business Driver	Currently a Business Driver	Anticipated Business Driver (in Next Five Years)
Global Security	49%	39%
International Trade	53%	37%
International Competition	45%	35%
Border-Crossing Requirements	64%	40%

Source: Employer Survey

Interestingly, 'international business' and 'laws and regulations' were not cited as the top five skill requirements by employers, but were among the priority areas in which employees indicated that they required additional skills now and in the future.

1.4.1   Worldwide Logistics

Worldwide demand for logistics services is driven by the globalization trend. World trade has grown from 1950 through 2001 at an average rate of 6.3%. For 2004, it is expected to grow by 7.5%, while the global gross product is expected to reach 3.5%. This growth rate of 7.5% was in fact recuperation for the impact of the severe acute respiratory syndrome (SARS) outbreak of 2003. Over the long term, the world trade growth may slow down due to the rising cost of fuel and the higher consumer demand in emerging countries that will eventually slow export capacity.

World trade implies moving goods over great distances. International transportation capabilities have never been more important. On a regular basis, the total shipping demand in certain parts of the world is higher than shipping capacity. This under-capacity, coupled with the increasing cost of oil, are serving to drive up transportation costs by a range of 5 to 15% overall for the goods delivered to Europe and America (according to CSCMP **15th Annual State of Logistics Report**). In addition, as supply sources geographically expand, required reserve stocks have had to significantly increase. To compensate for these rising costs, retailers that import and multinational manufacturers are now relying on better information technology that will increase the overall efficiency of their supply chain.

Since importing goods from overseas is a highly complex operation, there are only a few very large retailers (such as Wal-Mart) and multinational manufacturers that can afford to 'in-source' the operation and management of this part of their supply chain. Most retailers rely on large multinational freight forwarders and overseas warehouse operations. Over the last few years, these service providers have merged to form a limited number of large multinational overseas shipping, trucking and warehousing operations. These players are dominating the import logistics services market. In 2003, roughly 100 3PLs controlled almost a third of the $US 270 billion spent worldwide on outsourced logistics services (according to CSCMP **15th Annual State of Logistics Report**). Further, from 1994 to 2003, their growth in the US has surpassed the growth of the US economy (according to CSCMP **15th Annual State of Logistics Report**). Sector interviews suggest that international courier companies, such as FEDEX, UPS, DHL/DANZAS, may pose a threat to conventional 3PL service providers.

The majority of worldwide players in global supply chain have their head office located in either Europe or the United States. The historical reason for this is that European industries tended to rely on 3PLs for transporting goods across the many European borders, in contrast to what many American and Canadian companies have experienced. However, the sheer size of the US market was a good foundation from which the major American 3PLs built their worldwide operations.

Sector interviews offered the following observations as contributing factors to Canada's ability to compete internationally:

- Absence of Canadian-based multi-nationals;
- Small to medium-sized organizations;
- High labour costs;
- European educational programs have stronger links with industry and government;
- US and some European countries benefit from a critical mass of competent workforce;
- Europe is more advanced in terms of implementing technological changes;
- Foreign 3PLs have greater financial resources and are better positioned to attract top talent; and
- More effective entry level and middle management training in some European regions (e.g., Germany, Netherlands and Denmark).

1.4.2   North American Logistics

As previously described, the supply chain sector can be divided in the two following segments: the classic core storage and transportation operations and the newer integrated management activities. The prosperity and growth projections regarding the classic core storage and transportation operations

within Canada are fairly flat. In the context of North American logistics volume, the Central and North-East United States regions are home to the majority of storage and transportation operations. Consequently, there is a risk that the Canadian marketplace will be limited to local warehousing and transportation industries because of its greater distances, smaller volumes, strength of unions, and multi-linguistic requirements, which are not immediately attractive to larger American organizations.

Conclusions

- Supply chain/logistics is increasing in strategic importance and is becoming a key cost and profitability consideration in business strategies and models.
- The supply chain sector is highly fragmented and diverse.
- The scope of logistics activities has widened and the geographical coverage has become worldwide.
- The supply chain business function is generally centralized and headed by a senior manager.
- Regulations cited by organizations as having an impact on their operations are reflective of current events and the global nature of the sector. Primary areas of regulatory impact include international trade, customs, and cross border security (specifically CTPAT and NAFTA). Also cited are environmental, food regulations and SOX.
- The most commonly outsourced activities are those that are impacted by regulatory change (outbound/inbound transportation, freight forwarding, custom brokerage and clearance).
- The third-party logistics service provider market has been growing and is expected to continue to grow.
- The nature of work in the sector is changing as supply chain and logistics becomes more complicated and strategic, and organizations try to manage the full supply chain, rather than its individual parts.
- In an increasingly international market, global security, international trade, international competition and border-crossing requirements are all business drivers affecting the supply chain sector now and are expected to continue over the next five years.

Module 2

Module Overview

Module 2, 'The Impact of Technology and other Change Drivers', provides a description and insights on technology trends and developments, as well as related human resources skill implications.

Content

2.1   Application of Existing Technology

This section identifies the supply chain sector's capabilities and application of existing technologies.

Technology and the resulting information management requirements are identified as key business drivers currently impacting the logistics sector and expected to maintain a presence in the future. As noted in Figure 2.1, new technology introduction, increasing use of technology, and information management are identified most often as currently having an impact.

Figure 2.1: Current and Expected Technology Related Business Drivers (n=160)

	Currently Affecting Logistics Operations	**Expected in the Next Five Years**
New Technology Introduction	59%	55%
Increasing use of Technology	64%	53%
Affordability of Technology	46%	47%
Information Management	66%	51%
Real-time & Synchronized Supply Chain	52%	53%

Source: Employer Survey

While process and production technology change has been profound, information management systems and related technology have evolved at a more rapid pace and have had a more profound impact on job design and skill requirements. As such, information technology and systems are the focus of this Module.

2.1.1   Current Application –General

Based on industry interviews, current technology investments are considered to be a crucial business requirement for long-term organization development, and ultimately sustainable performance. It was also suggested, however, that most organizations are not prepared for the level of technological integration that will be required to compete successfully. Canadian organizations appear to lag in both implementing and investing in new technologies (particularly in railroad). Common reasons cited were budget restrictions and lack of capital to hire skilled technologists, while others refer to the slow adaptation to change and the lack of interest within the sector. This is also supported by the findings of the Conference Board of Canada's **How Can Canada Prosper in Tomorrow's World? – Performance and Potential 2004-05** report, which suggests that in general, Canadian firms are

slower to adopt and implement new technologies than are Americans and Europeans. With this in mind, a US report, **Operations Excellence, The Transition from Tactical to Adaptive Supply Chains** (2003), found that only 58% of study participants had formal technology strategies for logistics and supply chain management.

Current survey findings indicate that Information Technology is one of the top five most common activities falling within the logistics function (63%), however, technology appears to be under-utilized within organizations. As noted in Figure 2.2, the two main areas where technology is employed are in:

- Inventory management, and
- Warehousing management.

Figure 2.2: Areas of Technology Deployment (n=155)

	Currently Use	Consider Using	Currently Have Skills
Demand Resource Planning	38%	20%	9%
Materials Resource Planning	39%	16%	8%
Warehouse Management System	55%	20%	12%
Transportation Management Systems	38%	25%	9%
Advanced Planning and Scheduling	33%	19%	6%
Customer Management System	33%	26%	12%
Inventory Management	68%	11%	11%
Supplier Relationships Management	29%	27%	9%
Other	2%	0%	1%

Source: Employer Survey

It is interesting to note, that despite the number of organizations employing technology, relatively few indicate that they currently have the requisite skills to employ the technology.

When analyzing survey results, it should be noted that information systems' definitions and possible interpretations are widespread. For example, in the case of warehouse management systems (WMS), depending on the age and degree of sophistication of the organization's application, a survey respondent may answer as having implemented anything from a simple excel-based stock locator to a complete and "best of breed" warehouse management system. Furthermore, systems are being integrated within one all encompassing enterprise resource planning (ERP) system. For example, an ERP may include a WMS and transportation management system (TMS) in its standard package.

Deloitte research on the use of technology in manufacturing organizations has found that the only pervasive system was ERPs, with 83% of respondents having implemented some form of ERP system (note that less than one-third were considered 'extensive implementations'). While the current study did not investigate the use of ERPs explicitly, several qualitative comments were made which indicate that ERPs are employed in the sector and several of the technology systems referenced in the current study may exist, as previously mentioned, within organizations as a module or component of an ERP system.

Similar findings were found in a joint survey conducted by the Computer Sciences Corporation and Supply Chain Management Review, **The Second Annual Global Survey of Supply Chain Progress**, which also found that ERPs were the top technology in place (61%). This global survey's findings also align with the current study's findings, as the top four technologies employed as per the study also included both inventory and warehouse management systems.

Figures 2.3 and 2.4 highlight the extent of application of various types of technologies from both of these studies.

Mastering Innovation, Exploring Ideas for Profitable Growth Deloitte Research	*The Second Annual Global Survey of Supply Chain Progress* Computer Sciences Corporation and Supply Chain Management Review
For Manufacturing Organizations: **Figure 2.3:** Lack of Technology Source: Deloitte Research	**Figure 2.4:** Technologies Employed to Advance Supply Chain Evolution and Drive Results Source: The Second Annual Global Survey of Supply Chain Process

From an international perspective, **The Second Annual Global Survey of Supply Chain Progress** study found that Europeans appear to rely more heavily on ERPs than North Americans and that "North American respondents reported a comparatively greater use of e-procurement and inventory planning and optimization tools".

2.1.2 Current Application –Size Relationship

There appears to be a relationship between the size of an organization and its ability to implement different types of information technology. As expected, larger organizations have implemented more logistics-related information systems than their smaller competitors (Figure 2.5). This is likely a function of the fact that small and medium-sized companies do not have the required financial capacity to purchase and implement the latest and most effective information systems. Similar results were found in the **Analyse des besoins de formation en logistique au Quebec** study of the logistics sector in Quebec (Figure 2.6).

Figure 2.5: Areas of Technology Deployment by Organization Size (n=155)
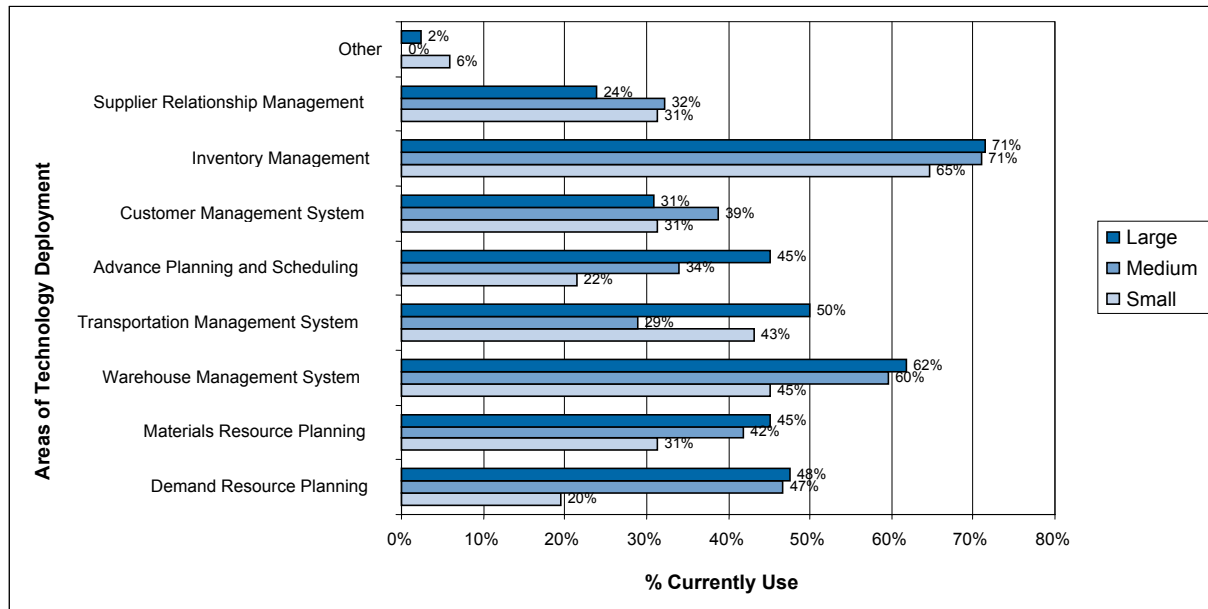
Source: Employer Survey

Figure 2.6: Technologically Enabled Activities by Organization Size

	Small	Medium	Large
Resource management (ERP)	33.7%	45.0%	61.9%
Inventory management	57.4	83.0	87.3
Warehouse management (WMS)	34.4	45.7	64.6
Materials resource planning (MRP)	30.6	44.4	62.5
Demand resource planning (DRP)	17.9	28.0	50.3
Production scheduling (APS)	29.2	40.0	55.6
Customer Order Processing	70.3	79.0	91.7
Transportation management (TMS)	16.0	23.3	41.0
Maintenance management (MMS)	17.1	31.1	54.5
Product tracking	37.2	48.6	61.8
Dashboard (Key Performance Indicators)	19.6	26.9	49.0

Source: Analyse des besoins de formation en logistique au Quebec

2.1.3 Current Application –Web-based Applications

Another important sector characteristic, as previously mentioned in Module 1, is the utilization of web-based applications in conjunction with logistics information systems, which is becoming a sector standard. The logistics sector is relying increasingly on the Internet due to growing global deals, e-procurement and web sourcing; dealing with real-time information is now the "price of entry" (see figure below). These web-based applications are often utilized in order to facilitate communications between inter-organizational partners (B2B), between independent supply chain players such as suppliers, manufacturers and customers (B2B) and between retailers or manufacturers and their consumers (B2C). This rapidly emerging technological foundation promotes complete visibility of supply chain activity to all participating players, and therefore, facilitates demand forecasting and the outsourcing of different administrative activities.

E-commerce Overview Series: Web-based Supply Chain Management (Industry Canada), states that firms are adopting web-based supply chain technology to help simplify their supply chain operations. Web-based technology is used to share information between various organizations within the supply chain. Common items of interest include product description catalogues, order status information and inventory data. The prevalence of this information sharing in the manufacturing, transportation and warehousing, and retailing industries is outlined in Figure 2.7.

Figure 2.7: Use of Supply Chain Technology over the Internet
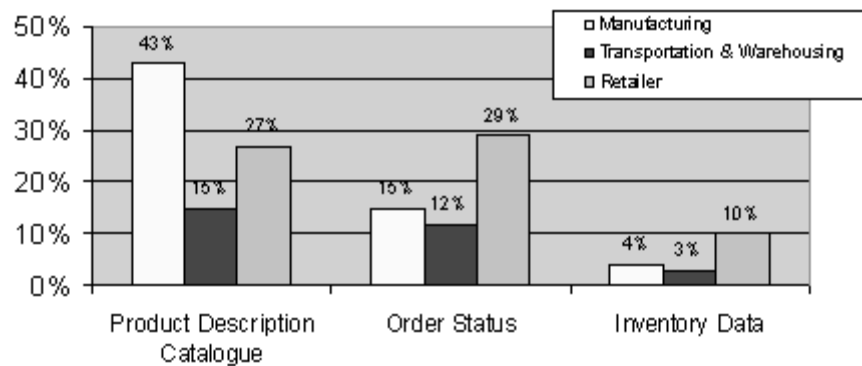
Source: E-commerce Overview Series: Logistics (2004), and Who's Sharing What With Whom?, Statistics Canada, March 2003

The result of these information exchanges is increased collaboration and visibility between supply chain participants.

2.1.4 Current Application –Use of Third Party Logistics Providers

According to a study by Capgemini, **Third-Party Logistics – Results and Findings of the 2003 Eighth Annual Study**, over 50% of North American respondents indicated that they rely on 3PL suppliers for IT leadership. Looking at the types of technology services that are outsourced, this study shows that North America and Europe are reasonably similar with respect to the volume of information system services available through third-party service providers (Figure 2.8). Furthermore, North America and Europe tend to use third-party service providers for core operation support systems such as WMS (warehouse management systems). Asian-Pacific appears to be outsourcing significantly fewer information system services than North America and Western Europe, with the exception of transportation management systems where it surpasses both North America and Europe.

Figure 2.8: IT-Based Services Currently Available through 3PL Providers
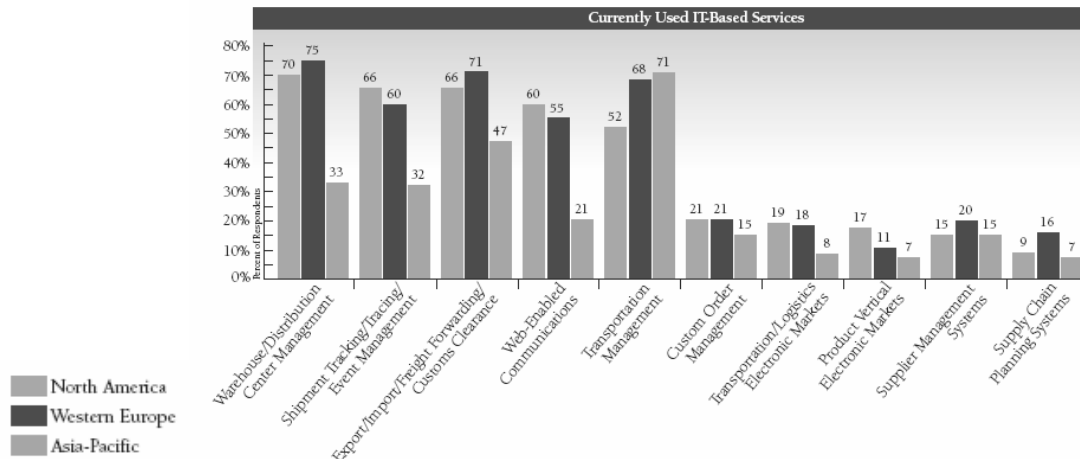
Source: Third-Party Logistics – Results and Findings of the 2003 Eighth Annual Study by Capgemini

2.1.5 Future Application

The current study found that organizations are considering employing technology in various supply chain areas in the future. Areas considered for future implementation include:

- Transportation management,
- Customer management, and
- Supplier relationship management.

Other secondary studies indicate that software and technology are areas for future investment. For example, 42 % of survey participants in **The Second Annual Global Survey of Supply Chain Progress** indicated that supply chain software and technology is an area of projected future supply chain investment in the next three years.

Looking forward, the current study findings show some similarity with the future requirements of IT-based 3PL services, which are focused on newer and more innovative solutions such as supplier management and electronic markets (Figure 2.9). As mentioned in Module 1, the evolution of the supply chain sector is predominantly focused on non-core activities such as management and integrated planning.

Figure 2.9: Future Requirements of IT-Based 3PL Services
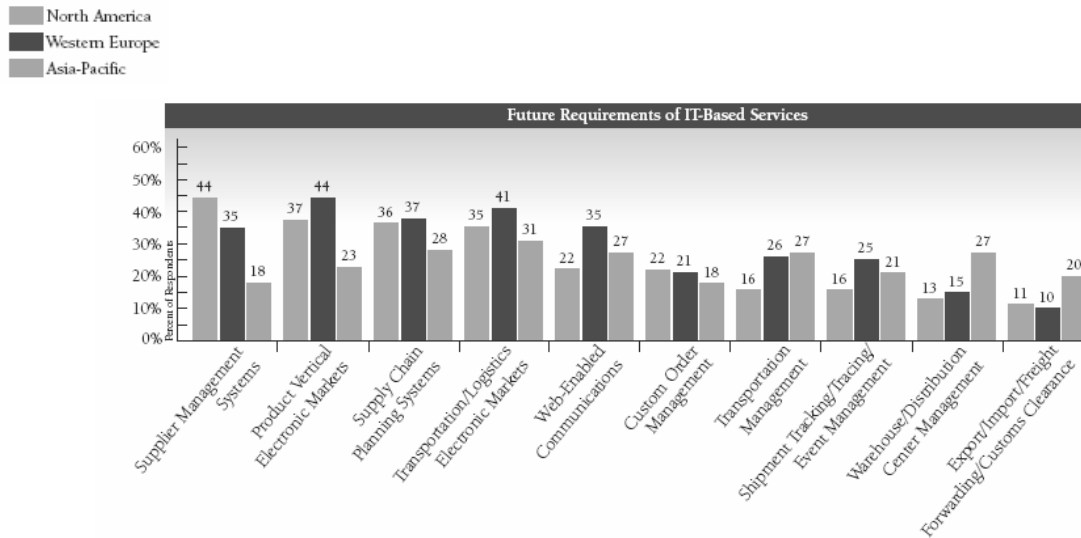
Source: Third-Party Logistics – Results and Findings of the 2003 Eighth Annual Study by Capgemini

2.2 Emerging Technologies and Their Impact

This section presents an overview of technological developments that are impacting job and work design, as well as operational procedures and practices.

2.2.1 Emerging Technologies

Industry interviews found that nearly all respondents identified technological changes as a crucial driver for change within the sector. It was also noted that technological changes are constant, rapid, unpredictable and difficult to maintain across various supply chain functions (with an emphasis in product design and manufacturing) and that new initiatives such as bar codes, WMS, SAP and RFID are now becoming a core requirement. Being able to cope with technological change, despite these challenges, is paramount. Effective use of technology expedites an organization's ability to be ever more competitive in the global marketplace.

Employers participating in the current study identified the ability to keep pace with technological change as a challenge that they are currently facing. Information management systems and related technology are evolving at a rapid pace and are having a profound impact on job design and skill requirements. As noted in Figure 2.10, the most common aspects of technology impacting employers were:

- Information management, and
- Increasing use of technology.

Looking forward, there is expected to be new technology introductions and increasing use of technology, as well as real-time and synchronized supply chains.

Figure 2.10: Current and Expected Technology Related Business Drivers (n=160)

	Currently Affecting Logistics Operations	Expected in the Next Five Years
New Technology Introduction	59%	55%
Increasing use of Technology	64%	53%
Affordability of Technology	46%	47%
Information Management	66%	51%
Real-time & Synchronized Supply Chain	52%	53%

Source: Employer Survey

Secondary data sources identify several new and emerging technologies:

- For instance, based on the findings of the **Lean Logistics Technology Roadmap** study (2002), the following new and emerging technology trends were identified in the Canadian Logistics sector:
  - Data exchange standards (HTML, XML, WAP, etc)
  - Internet (Electronic Data Interchange, File Transfer Protocol, Virtual Private Network)
  - Multi-dimensional bar codes
  - Electronic item ID tags
  - Wireless connectivity
  - Data clouds
  - Web-Based applications
- As listed in Figure 2.11, the **Terms of Reference** also identifies several leading-edge technologies and processes for the logistics and supply chain sector.

Figure 2.11: Leading-edge Technologies and Processes

Technology	Processes
• Production scheduling • Demand Resource Planning • Materials Resource Planning • Warehouse Management System • Transportation Management System • Inventory Management • Resource Management	• Continuous Replenishment • Performance Indicators • Just-in-Time • Bar Codes (RFID) • Partnership • Vendor Managed Inventory • Visibility • Web-visibility • Collaborative Planning and Forecasting Relationship

Source: Terms of Reference

- In addition to general sector technology trends, the **Lean Logistics Technology Roadmap** study (2002) also states that SMEs have a specific need for Supply Chain Inventory Visibility (SCIV), Supply Chain Event Management (SCEM), Available to Promise (ATP), and Demand Planning.
- A joint survey conducted by the Computer Sciences Corporation and Supply Chain Management Review, **The Second Annual Global Survey of Supply Chain Progress**, found that 54% of their respondents had no plans to implement RFID and concludes that companies may be taking a 'wait-and-see' approach to RFID technology.

2.2.2 Impacts of Technology

The introduction of technology also creates several challenges for organizations (**Lean Logistics Technology Roadmap** study (2002)), such as:

- Investment costs (hardware and software),
- Data integrity,
- Interoperability between systems,
- Cross-border issues,
- Need to promote awareness with stakeholders, and
- Critical skills advancement.

As technology continues to evolve, some of today's logistics trends will rapidly become tomorrow's necessities, such as RFID (radio frequency identification) and TMS (transportation management systems). As a result, there will be an increased emphasis on more specialized knowledge and skills in the workplace. For example, vendor managed inventory (VMI) systems are increasingly being utilized due to the growing complexity of order preparation and inventory planning. This impacts vendor customer service personnel, who can no longer limit themselves to taking orders, but are now obligated to manage the inventories of each of their VMI customers. This role expansion requires that customer service personnel not only possess selling skills, but also, and more importantly, possess a certain level of inventory management and information technology skills.

Information management was another area that employers indicated they are currently and anticipate facing challenges. This is likely the result of increased use of technology and customer/client expectations for real-time information.

Technology is anticipated to impact the nature of employees' work at all levels (e.g., managerial, operational, tactical) and is expected to persist with the introduction of new technologies. Some of the ways in which technology has or is expected to change the nature of employee's work are:

- Less face-to-face communication;
- Increased workload with fewer staff and decreased timelines;
- Faster response demands and pace of work (e.g., just-in-time, lead times);
- Process development (e.g., change/simplification);
- More paperless information and enabling process and record keeping;
- Automation of tasks and processes; and
- Online transactions, decision-making and approvals.

Section 2.4 provides more details with respect to specific skill implications and requirements.

2.3   Trends Driven by Technology

This section presents the trends that are driven by technology, or more specifically, the supply chain sector trends that are related to the utilization or implementation of new information system technologies.

In addition to being a trend in itself, technology seems to be a catalyst for many other sector trends, including continuously increasing customer expectations, instantaneous response to demand, precision of information, real-time sharing of information, and globalization. The 2002 study of the logistics sector in Quebec, **Analyse des besoins de formation en logistique au Québec,** confirms these trends. Technology driven logistics trends concentrate around the sharing of information throughout the supply chain, and effectively organizations must leverage this visibility in response to increasing customer expectations.

It is interesting to note that the above noted information system driven trends contrast somewhat with those identified in a 1996 **Logistics Labour Market Information Study**. With the exception of customer service, the trends identified in the 1996 study focus on efficiency, cost reduction and competitiveness.

In aggregate, the 1996 and 2002 studies suggest the following trends and implications for the logistics sector and its human resources:

Figure 2.12: Trends and Implications for the Supply Chain Sector

Logistics Process*

- Sustainable development improvement by creating logistics chains that reduce transport needs
- Introduction of new logistics procedures based on electronic business opportunities
- Changes to almost all aspects of Logistics, from the "sophistication of advanced modeling techniques, manufacturing control, transport communication systems, to inventory control"
- Smoothes inventory levels in supply chain
- Increased subcontracting
- Systems integration

Information Sharing*

- Sharing of technical and financial information between enterprises
- Knowledge management systems
- Reduction of cost of goods and information flow (e.g., through EDI)

Interaction Between Parties*

- Development of business relations and partnerships with third parties
- Creation of a virtual network, gathering manufacturer, sub-contractors, suppliers, carriers, distributors and logistics providers

Human Resources

- "Logisticians need to be able to manage business units not just people"*
- Increased pace of work; less lead time
- Change management requirements

    *Sources: Analyse des besoins de formation en logistique au Québec and Logistics Labour Market Information Study

The current study identified information management as one of the key impacts of technology that employers are facing. In this regard, a presentation by Oracle delivered at the European 3PL Summit 2004, "**Assessing and Adopting New Technology for Competitive Advantage**", highlighted real-time automated data management as a major trend in the sector with an array of impacts and implications. With the advent of real-time data management comes several new information challenges and activities that must be addressed:

- "Analyze the data and events in real-time to provide business intelligence and business activity monitoring for continuous improvement"
- "Access the information anytime, anywhere by all the appropriate people, applications and business processes"
- "Respond to events and information automatically and allow for people to manage by exception"
- "Capture appropriate, filters information from a variety of different readers and sensors"
- "Manage the explosion of data and events in a scalable, reliable and secure single source of truth" – Business activity monitoring (performance, trends, real-time event-driven processes, adapt to business requirements)

The application of technology is helping to increase the ease and effectiveness of collaboration, through information sharing allowing for coordination and synchronization within and across customers, products and supply chains.

2.4   Human Resources and Skill Development Implications

This section provides an initial perspective on the skill requirement implications associated with current and emerging developments in information technology.

Current study employer participants identified the ability to keep pace with technological change as a challenge that they are currently facing, and few organizations indicated that they currently have the requisite skills to employ these technologies (Figure 2.13).

Figure 2.13: Current and Expected Areas of Technology Deployment (n=155)

	Currently Use	**Currently Have Skills**
Demand Resource Planning	38%	9%
Materials Resource Planning	39%	8%
Warehouse Management System	55%	12%
Transportation Management Systems	38%	9%
Advanced Planning and Scheduling	33%	6%
Customer Management System	33%	12%
Inventory Management	68%	11%
Supplier Relationships Management	29%	9%
Other	2%	1%

Source: Employer Survey

As technology becomes an integral component of logistics operations, employees at all levels will require a general understanding of technology applications and processes. With the implementation of various systems to track and record data, employees will require the ability to convert data into information and effectively manage that information. Senior level logisticians will also need to be able to think strategically about the application of technology in order to identify how best to employ technology as a competitive advantage.

At a more technical level, employees involved in the selection, implementation and operation of technology-based systems and practices must be knowledgeable of the continuously changing applications and their respective opportunities, and have general supply chain training in order to properly identify and leverage the different information system functionalities in conjunction with the organization's overall strategies and objectives. To date, the supply of specialized labour to support these emerging technologies has come from the retraining and professional development rather than continuous replacement via recruiting from colleges and universities.

Employee participants in the current study identified the following changes to the skills required for their positions as a result of technology:

Figure 2.14: Changes in Required Skills

New Skills Required	• Computer skills • Software skills • Communications
Skills Increasing in Importance	• Computer Skills • Communications • Analytical and decision-making skills
Skills Decreasing in Importance	• Writing (e.g., hand writing and use of typewriters) • Paper work and paper documentation • Manual activities, such as ledger, calculations, data entry, bookkeeping, typing
Skills No Longer Required	• Manual and clerical activities, such as filing, tracing

Source: Employee Survey

When compared with the skill and responsibility implications of increased use of information and communications technologies (ICT) identified by the Quebec **Analyse des besoins de formation en logistique au Quebec** study (Figure 2.15), we note that skill requirements are similar in that they focus on the ability to use technology (e.g., computer and software) as well as the ability to manage information (which was cited in the current study as a key business driver). The additional skill requirements identified in the Quebec study focus on management of the technology itself (e.g., selecting and implementing technology), which the current study did not inquire about.

Figure 2.15: Skill Requirements

Strategic and Tactical Employee Level	Operational Level
• ICT knowledge and decision-making (benchmarking, technological changes) • Ability to supervise ICT implementation within the organization • **Ability to use** ICT for strategic purposes • Ability to manage the increasing **flow of information**	• Ability to be an expert ICT **user** • Ability to contribute to the selection of adequate tools for the organization • Ability to manage ICT implementation projects

Source: Analyse des besoins de formation en logistique au Quebec

The **Analyse des besoins de formation en logistique au Quebec** study also outlined the skill requirements that result from the increased use of e-commerce, identifying the following skill implications:

Figure 2.16: Skill Requirements Resulting from the Use of E-Commerce

Strategic and Tactical Employee Level	Operational Level
• Awareness and knowledge of industry trends and client needs relating to electronic business • Familiarity with relevant technologies • Ability to be innovative • Select business partners adequately	• Adaptable to change • Client service focus • Ability to discriminate when necessary: which market segments are targeted and which are not • Evaluate client satisfaction and retention

Source: Analyse des besoins de formation en logistique au Quebec

Technology skills were cited by employers and employees as one of the top five requirements, however approximately 40% of employees still said they needed additional technology skills/knowledge and only 2% indicated that technology skills were not applicable to their role. In addition, when listing additional skill requirements, employees commonly noted skills directly related to computer, software and technology. Looking forward, over 80% of employees identified that the technology skill/knowledge requirements would remain the same or increase (51% same; 32.7% increase). These findings were consistent when examined by region, size and occupation category.

Technological change not only impacts skill requirements, but it also impacts the types of positions required. Analysis of survey results indicates that:

- Two of the primary areas for predicted growth in the supply chain sector, in terms of number of positions, were LIS tactical (44.4%) and LIS operational (50%) positions; and
- No change was expected by most participants for managerial LIS positions (70%).

In addition, depending on the extent to which technology and automation are employed within an organization, the number and type of positions required may be affected. For example, the **Radio Frequency Identification (RFID) Beyond Customer Mandate – Guidance Document (2005)**, suggests that the introduction of RFID could result in a reduction in the number of operational occupations in the retail and distribution areas (e.g., inventory counters).

2.4.1 Technology Training

The growing importance of technology and information management skills has a direct impact on training and development requirements. Industry interviews reveal a technological knowledge gap between younger (i.e., more recent hires) and older (i.e., 25 to 40 years experience) workforce segments. Organizations need to proactively facilitate technology integration and make it accessible to the entire workforce. To do so, they will need to harmonize this gap through training and development programs, which will become a growing priority. In addition to basic technical training, several interviewees stressed the importance of implementing formal learning processes in order to adapt to the latest technological trends and stay competitive.

Employer participants identified keeping pace with technological change as a current challenge and few indicated that they have the requisite skills to employ these technologies.

Conversely, 70% of employees indicated that they were *"provided adequate training in order to make full use of technology"*. These results were consistent across occupation categories (e.g., managerial, tactical and operational). As noted in Figure 2.17, some differences were apparent across regions, with those located in the Maritimes, BC and Alberta being the least likely to agree.

Figure 2.17: Adequate Training by Province (n=753)

Region	Adequate Training			
	Strongly Agree	Agree	Disagree	Strongly Disagree
Maritimes	10.3%	46.2%	35.9%	7.7%
Quebec	15.1%	57.5%	24.5%	2.8%
Ontario	9.4%	62.4%	23.9%	4.3%
Central	13.2%	69.8%	13.2%	3.8%
Alberta	12.1%	53.3%	29.9%	4.7%
B.C.	10.0%	52.5%	37.5%	0%
Total	**11.1%**	**59.3%**	**25.6%**	**4%**

Source: Employee Survey

Employers appear to be investing in training in order to meet requisite technology skill requirements. As a result, it appears that through this investment, employees are confident that they possess the required skills. The fact that employers reported that they do not currently possess the required skills to employ technology, may be an indication that their organization has not yet fully applied the full capabilities of the technology.

When comparing what technology is currently employed by organizations with what is taught at academic institutions, there appears to be alignment. The most commonly employed technology reported by employers are also those reported by surveyed academic institutions as technology included in the curriculum (Figure 2.18). Further consultation across the sector suggested that although the subject is listed on the curriculum the content and the amount of time devoted varies and is not always current.

Figure 2.18: Tools/Systems Currently Used by Employers (n=160) vs. Academic Institutes that Teach These Tools/Systems (n=25)

Tools/Systems	Employer Currently Using	% of Institutes that Teach this Area
Inventory Management	**68%**	**68%**
Warehouse Management System	**55%**	**56%**
Materials Resource Planning	**39%**	**68%**
Transportation Management Systems	38%	48%
Demand Resource Planning	38%	40%
Customer Management System	34%	40%
Advanced Planning and Scheduling	33%	32%
Supplier Relationship Management	29%	56%

Source: Employer Survey and Academic Institution Survey

2.4.2   3PLs

One option for satisfying or supplementing technological skill requirements is outsourcing. According to a study by Capgemini, **Third-Party Logistics – Results and Findings of the 2003 Eighth Annual Study**, over 50% of North American respondents indicated that they rely on 3PL suppliers for IT leadership. As a result, it is critical that 3PLs ensure their staff have the technical skills required by the marketplace. However, the study indicates that there may be a gap in this area, as third-party information system services do not appear to be keeping up with customer demands. More precisely, over 95% of North American respondents reported that IT capabilities are necessary for 3PL suppliers, and that having the right software is critical, but only 75% of respondents indicated that they were satisfied with 3PL supplier's IT capabilities.

A US study, **The Use of Third Party Logistics Services by Large American Manufacturers (2002)** found that the following three IT abilities were indicated as 'must have' for 3PL providers by over 40% of participants (participants were 3PL users):

- Ability to implement new software and systems;
- Ability to operate client's software and systems; and
- Ability to integrate client's software and systems with that of other supply chain partners.

In order to provide these 'must have' services, 3PL employees will require a certain level of IT skills and capabilities. Interestingly, these skills appear to be focused around the implementation and operation of existing market technology, which is consistent with the fact that 'ability to design client's software and systems' was rated by 74% of users as 'not important'.

The high popularity of third-party information system services can be related to the fact that few organizations can continually afford to implement the latest technologies in-house, and the specialized labour that is capable of selecting and implementing logistics information systems is difficult to find.

Small and medium-sized organizations that cannot afford the complete logistics system package require specialized information technology experts who can find and configure specific software that fulfills the company's needs in a cost effective manner. Not all organizations, especially small and medium-sized enterprises, require or will realize the full benefits of a complete and best-of-breed logistics system. However, most small and medium-sized Canadian companies will need to somehow evaluate their technology requirements and the risk of lagging technological leaders in their core market segments.

Conclusions

- Technology is generally underutilized across the sector.

- Organizations indicate that their ability to keep pace with technological change is a challenge.

- The introduction of technology is changing the nature of work for employees, in terms of:
    – Increased pace of work with less lead time, and
    – More real-time information and an increased requirement to manage this influx of information.

- Software application and analytical and decision-making skills are rapidly replacing traditional manual processes. It appears that many employees feel they have been provided with the training to adapt to this evolution.

- There are divergent views with respect to whether employees possess technically adaptable skills. Employers are dealing with this in the short term by focusing on in-house and on-the-job training. In the longer-term, this has implications for more pro-active technical skill development and opportunity for industry/academic institution alliances.

- Employees involved in the selection, implementation and operation of technology-based systems and practices must be knowledgeable of the continuously changing applications and their respective opportunities, and have general supply chain training in order to properly identify and leverage the different information system functionalities in conjunction with the organization's overall strategies and objectives. To date, the supply of specialized labour to support these emerging technologies has come from the retraining and professional development rather than continuous replacement via recruiting from colleges and universities.

- There is an increased emphasis on the importance of instantaneous adaptation to customer requirements, information management and general management skills.

Module 3

Module Overview

Module 3, 'Employment Analysis', describes the employment profile of supply chain occupations, assesses shifts in occupations, and assesses how the skill base of employees will change over time.

Content

3.1   Current Employment Profile

As stated in Module 1, it is estimated that there were approximately 635,530 people working in the logistics and supply chain management field within Canada (excluding truck drivers) in 2001 (**2001 Census**). Figure 3.1 illustrates the distribution of these supply chain sector employees across sub-functions and occupation categories. It is estimated that as of 2004 the supply chain labour force has grown to 701,880 employees, based on **Labour Force Survey** data from 2001 to 2004.

Figure 3.1: Supply Chain Sector Employees by Occupation

Sub-function	Occupation Category	NOC Code	Sample Position Titles	Number of Supply Chain Employees
Senior Management	Managerial	0016	Senior Managers: Goods, production, utilities, Transportation and Construction	6620
Logistics Information Systems	Managerial	0213	Computer and Information Systems Managers	9240
	Tactical	2233	Industrial engineering and manufacturing technologists and technicians	14635
		2172	Database Analysts and Data Administrators	305
		2171	Computer Analysts	9415
		2175	Web/Internet Site Developers	665
Warehousing	Managerial	0721	Facility operations and maintenance manager: warehouse manager	24570
		0132	Postal & Courier Service Manager	4660
		1214	Supervisors, Mail and Message Distribution occupations	8305
	Operational	7452	Material handlers	167355
		9617	Labourers in food, beverage and Tobacco processing: material handling, packaging.	65905
		1472	Store keepers and parts clerks: parts supplier, supply clerk…	37075
		7451	Longshore workers: dockworker, ship loader operator…	6935
Transportation	Managerial	0713	Transportation managers	26135
	Tactical	1236	Customs, ship and other brokers	5240
		1476	Transportation route and crew schedulers	3820
		1475	Dispatchers and Radio Operators	2245
	Operational	1471	Shippers and receivers	106365
Inventory/Material Control	Managerial	0114	Other administrative service managers: inventory control manager, support services…	13435
		1215	Supervisors, recording, distributing and scheduling occupations	20725
	Tactical	1474	Purchasing and Inventory Clerks: inventory analyst, planner…	38655
		1122	Professional occupations in business services to management: consulting	820
Purchasing	Managerial	0113	Purchasing managers	9055
	Tactical	1225	Purchasing Agents and Officers	28025
		6233	Retail and Wholesale Buyers	22190
Marketing and Sales	Managerial	0611	Sales, account and marketing managers	3135
			TOTAL	635530

Source: 2001 Census (NAICS: 11, 21, 22, 31-33, 41, 44, 45, 48, 49, 51-56, 61, 62, 71, 72, 91)

Results from the current study, indicate that generally, employment across all sub-functions of supply chain is expected to either remain constant or grow, with particular emphasis on warehousing operational positions and logistics information systems tactical and operational positions. Overall, the employment profile is predominantly male, experienced and educated.

Region

While survey results indicate that logistics employees work in all geographic areas within Canada, the population tends to be more concentrated in Ontario, Quebec and Alberta/BC (Figure 3.2).

Figure 3.2: Location of Logistics Employees by Region (n=160)
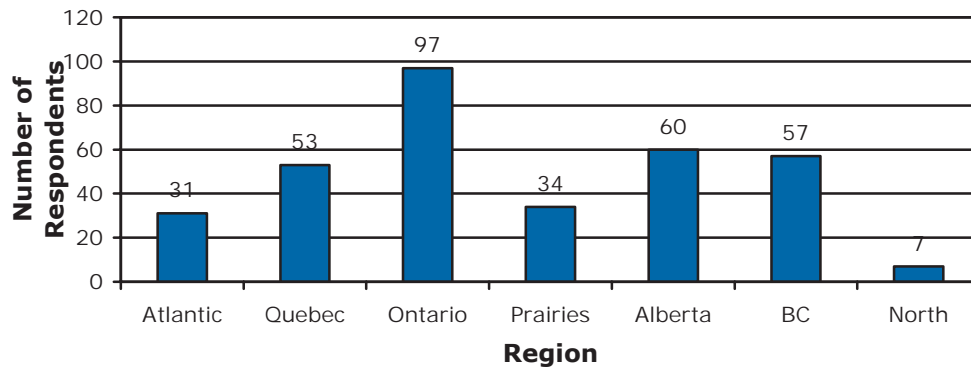
Source: Employee Survey

Employment Status

The employment status profile of supply chain employees suggests a very strong reliance on a full-time and fixed cost employment model. However, there also appears to be use of contractors (excluding the use of third-party providers of outsourced services) for the purposes of meeting temporary or seasonal demand requirements, fill a skill gap and/or manage payroll and benefits costs.

Age

The average age of employee participants is approximately 39, with the largest segment of employees being between 36 and 45 years of age (Figure 3.3). This is characteristic of the general NOC profiles in which these positions fall. The majority of NOC code profiles in which supply chain employees are categorized have either 35-39 years or 40-44 years as its largest age segment based on **2001 Census** data.

Figure 3.3: Number of Respondents By Age Category (n=743)
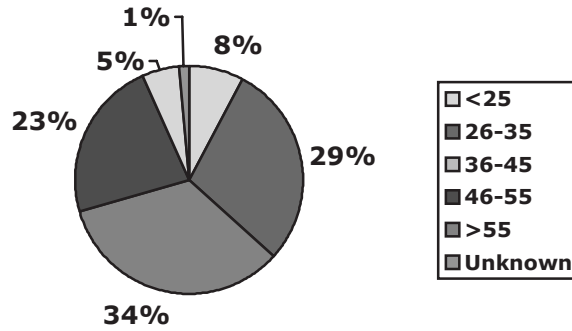
Source: Employee Survey

As illustrated in Figure 3.4, managerial level employees tend to be older, with the greatest concentration being between the ages of 36 and 55, while tactical and operational employees tend to be between the ages of 26 and 45.

Figure 3.4: Average Age by Occupation Category (n=620)

Occupation Category	Age Category					
	<25	26-35	36-45	46-55	>55	Total
Managerial	2	61	109	83	17	272
Tactical	26	69	58	23	8	184
Operational	22	50	60	27	5	164
Total	**50**	**180**	**227**	**133**	**30**	**620**

Source: Employee Survey

Experience

The employee participant group is fairly experienced, as approximately 31% of employee participants have more than 15 years of experience in supply chain (Figure 3.5).

Figure 3.5: Years of Supply Chain Experience (n=680)

**% of Employee Respondents by
Years of Logistics Experience**
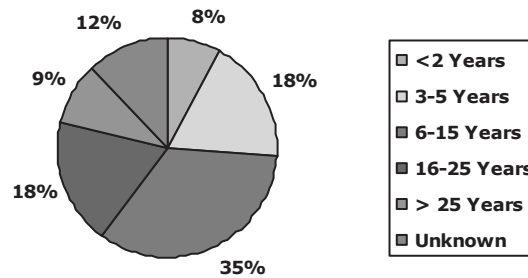
Source: Employee Survey

Gender

As illustrated in Figure 3.6, the majority of employee respondents were male (59%).

Figure 3.6: Gender Distribution (n=753)
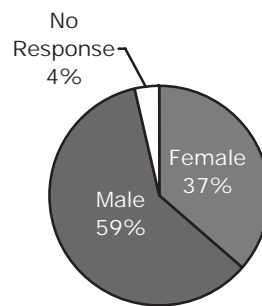
Source: Employee Survey

As noted in Figure 3.7, females occupy positions in all three occupation categories, and while fairly equally spread, are concentrated slightly more at the tactical level. Over 50% of the male respondents are at the managerial level. This may also be a function of the fact that females had a statistically significantly lower education level than males.

Figure 3.7: Occupation Category by Gender (Female n=275, Male n=450)

	Occupation Category		
Gender	**Managerial**	**Tactical**	**Operational**
Female	30.7%	39.8%	29.4%
Male	51.6%	23.3%	25.1%
Total	**43.8%**	**29.5%**	**26.7%**

Source: Employee Survey

These findings are similar to those found in 1997 in the **Logistics Labour Market Information Study: Phase 2**, indicating that there has not been a significant shift in gender roles in the sector. The **Logistics Labour Market Information Study: Phase 2** reported that women are 'reasonably represented' in logistics jobs, however, that women tend to occupy lower level positions, are slightly younger and are not as well educated. This is confirmed in the current study. Figure 3.8 provides a breakdown of education by gender.

Figure 3.8: Highest Level of Education by Gender (n=741)

Gender	Education						
	No High School	High School	CEGEP	Some College	Diploma/ Certificate	Undergrad-uate Degree	Graduate Degree
Female	6.1%	11.4%	0.4%	29.6%	28.6%	15.7%	8.2%
Male	7.7%	13.0%	1.8%	25.6%	16.6%	22.5%	12.8%
Total	**7.1%**	**12.4%**	**1.2%**	**27.1%**	**21.1%**	**19.9%**	**11.1%**

Source: Employee Survey

Unionization

As noted in Figure 3.9, unionization becomes less prevalent the more senior the position. Unions mentioned included Public Service Alliance of Canada (PSAC), Communications, Energy & Paper workers (CEP), Canadian Auto Workers (CAW) and Manitoba Government and General Employees Union (MGEU).

Figure 3.9: Unionization by Occupation Category (n=127)

Unionized	Managerial	Tactical	Operational
% of Respondents	3.9%	12.5%	25.2%

Source: Employer Survey

Diversity

Excluding gender, 17% of participants self-identified as members of a diversity group. Of this group, the majority were visible minorities:

- Aboriginal   1.4%
- Visible Minority   15.0%
- Disabled   0.6%

With the exception of disabled employees, this profile is representative of the Canadian workforce (**2001 Census**: aboriginal 2.4%; visible minority 12.4%; disabled 9.9%).

In addition, 21.3% of employers indicated that some of their logistics employees are hired from outside of Canada, which suggests a culturally diverse workforce.

While few in number, all of the disabled participants occupied managerial positions. Visible minority participants are distributed across all occupational categories. Aboriginals, who were also few in number, were fairly well distributed across categories, with slightly lower representation at the managerial level (Figure 3.10).

Figure 3.10: Diversity Groups by Occupation Category (n=115)

	Occupation Category		
Diversity	Managerial	Tactical	Operational
Aboriginal	22.2%	44.4%	33.3%
Visible Minority	37.2%	26.6%	36.2%
Disabled	100%	0%	0%

Source: Employee Survey

In terms of education, the majority of all of the diversity groups had some level of post-secondary education. Thirty percent of the aboriginal participants and 44% of the visible minority participants have an undergraduate or graduate degree.

Education

The employee participant group is fairly well educated, as the majority of employees have some form of post secondary education (Figure 3.11).

Figure 3.11: Highest Level of Education (n=672)

% of Employee Respondents by Highest Level of Education
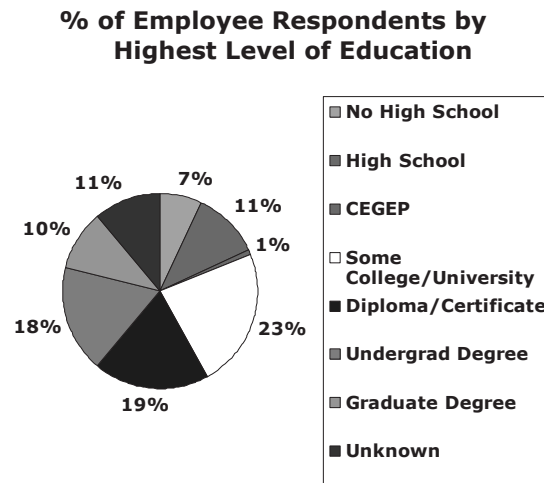
Source: Employee Survey

As illustrated in Figure 3.12, managerial and tactical employees have a higher degree of post-secondary education than operational employees. Both tactical and managerial employees appear to have some level of college and/or university education.

Figure 3.12: Highest Level of Education by Occupation Category (n=670)

	Education						
Occupation Category	No High School	High School	CEGEP	Some College	Diploma/ Certificate	Undergraduate Degree	Graduate Degree
Managerial	6.4%	9.0%	1.1%	28.8%	18.4%	21.7%	14.6%
Tactical	1.6%	8.6%	0.5%	25.3%	26.3%	25.8%	11.8%
Operational	11.7%	21.5%	3.1%	20.2%	20.9%	15.3%	7.4%
Total	**6.3%**	**12.2%**	**1.5%**	**25.5%**	**21.4%**	**21.3%**	**11.9%**

Source: Employee Survey

The Canadian Professional Logistics Institute (CPLI) [The Logistics Institute] and the Trent Applied Social Research (TASR) study, **Canadian Logistics Practitioners Type and Level of Formal Education**, also found a high degree of post-secondary education among all levels of supply chain employees. The study also found that the most common discipline was business administration/commerce rather than a logistics/supply chain specialty. The emphasis on business administration has remained consistent (and increased slightly) over the last seven years, when data is compared to the results of the 1997 **Logistics Labour Market Information Study: Phase 2**.

Females have a statistically significantly lower education level than males. These findings may help to explain an observed sector-wide pay equity differential.

Certification

Approximately 20% of participating employees possess logistics/supply chain related certification or designation. The two most common certifications held by all occupational categories (i.e., managerial, tactical and operational) were CITT and PLog. A higher prevalence of certification is noted at the manager level. The most common certifications held by employees are noted in Figure 3.13.

Figure 3.13: Most Common Certifications or Designations

Managerial	Tactical	Operational
• CITT • PLog • CCS & Customs Professional • CPP • CPIM	• CITT • PLog • CIFF • CCS • CPP	• CITT • PLog • CIFF • CCS

Source: Employee Survey

3.2   Logistics Occupations

At the outset of this study, the 35 NOC codes, listed in Figure 3.14, were identified as potentially relevant to the supply chain sector. Of these 35 NOC codes originally believed to be of relevance, 22 of these codes emerged as being more prevalent in the sector based on survey participation. These 22 codes are shaded in Figure 3.14.

Figure 3.14: Supply Chain Sector National Occupation Classification Codes

Sub-Function	Occupation Category	NOC Code	Sample Job Titles
Senior Management	Managerial	0016	Senior managers: goods, production, utilities, transportation and construction
		0132	Postal and courier services managers
		0013	Senior manager, financial, communications and other businesses: COO
Logistics Information Systems	Managerial	0213	Computer and information systems managers
	Tactical	2172	Database analysts and data administrators
		2173	Software engineers
Warehousing	Managerial	0721	Facility operations and maintenance manager: warehouse manager
		1215	See Inventory/Material Control
	Tactical	1422	Data entry operator
	Operational	7452	Material handlers
		9617	Labourers in food, beverage and tobacco processing: material handling, packaging
		1472	Store keepers and parts clerks: parts supplier, supply clerk
		7451	Longshore workers: dock worker, ship loader operator
Transportation	Managerial	7222	Supervisors motor transport and other ground transit operators
		0713	Transportation managers
	Tactical	1236	Customs, ship and other brokers
		1475	Dispatchers and radio operators
		1476	Transportation route and crew schedulers
	Operational	1431	Accounting and related clerks: freight rate clerk
		1471	Shippers and receivers
		7437	Air transport attendants: cargo attendant, air transport
Inventory/Material Control	Managerial	1214	Supervisors, mail and message distribution occupations
		0114	Other administrative service managers: inventory control manager, support services
Inventory/Material Control	Managerial	0911	Manufacturing managers: operations manager
		1215	Supervisors, recording, distributing and scheduling occupations; supervisors of purchasing and inventory clerks; supervisors of purchasing and inventory clerks
	Tactical	1122	Professional occupations in business services to management: consulting
		1473	Production clerks: expediter, material estimator. Traffic control clerk
		1474	Purchasing and inventory clerks: inventory analyst, planner
		2233	Industrial engineering and manufacturing technologists and technicians
Customer Service	Managerial	6216	Supervisors of ticket and cargo agents and related clerks in this unit group
	Tactical	1453	Customer Service information
		6433	Airline sales and service agents: airline cargo agent, load planner airline
	Operational	6434	Tickets agents, cargo service representative and related clerks
Purchasing	Managerial	0113	Purchasing managers
	Tactical	1225	Purchasing agents and officers
		6233	Retail and wholesale buyers
		1215	See Inventory/Material Control

These NOC codes map across various sub-functions and occupational categories (i.e., managerial, tactical and operational). Based on survey responses, supply chain staffing levels across all sub-functions are generally expected to remain constant or increase. As illustrated in Figure 3.15, areas expecting the greatest increase are:

- Warehousing operational,

- Logistics information systems tactical and operational,
- Customer service tactical, and
- Transportation operational.

Figure 3.15: Future Expectations by NOC

		Growth	Decline	No Change
Senior Management	Managerial (n=100)	26.0%	4.0%	70.0%
Logistics Info Systems	Managerial (n=68)	26.5%	2.9%	70.6%
	Tactical (n=54)	44.4%	3.7%	51.9%
	Operational (n=48)	50.0%	4.2%	45.9%
Warehousing	Managerial (n=67)	33.8%	3.0%	64.2%
	Tactical (n=46)	28.3%	1.7%	19.0%
	Operational (n=65)	53.9%	9.2%	36.9%
Inventory/Material Control	Managerial (n=116)	25.5%	6.4%	68.1%
	Tactical (n=44)	22.7%	6.8%	70.5%
	Operational (n=49)	30.6%	8.2%	61.2%
Customer Service	Managerial (n=54)	25.9%	11.1%	63.0%
	Tactical (n=46)	34.8%	8.7%	56.5%
	Operational (n=48)	33.3%	10.4%	56.3%
Purchasing	Managerial (n=55)	29.1%	3.6%	67.3%
	Tactical (n=39)	20.5%	2.6%	76.9%
	Operational (n=47)	34.0%	4.3%	61.7%
Transportation	Managerial (n=63)	22.2%	7.9%	70.0%
	Tactical (n=49)	26.5%	2.0%	71.4%
	Operational (n=53)	35.9%	7.6%	56.6%

Source: Employer Survey

In addition to the NOC codes that were identified at the outset of the study, the results of the survey suggest the presence of the following jobs is increasing in the supply chain sector:

- Instructor/trainers,
- Sales, marketing and account managers,
- Sales representatives and coordinators, and
- Corporate service occupations with a supply chain management focus/specialization e.g., finance, human resources, and information technology.

Marketing and sales and positions were also identified by the **Analyse des besoins de formation en logistique au Quebec** study as one of the professions within the supply chain sector for manufacturing organizations at all levels and for transportation organizations and consultants/3PLs at the strategic planning level.

Over time, it is noted that there is a continued prediction of growth within the IT and customer/client areas, as this finding was also present in the 1997 **Logistics Labour Market Information Study: Phase 2** findings.

In addition, the **Logistics Labour Market Information Study: Phase 2** found that traditionally structured management functions specific jobs (e.g., purchasing, distribution) were declining. Supporting the continued realization of this finding, the current study noted numerous survey respondents in general logistics and supply chain specialist/manager positions that were not readily aligned with one particular logistics sub-function and many survey respondents indicated that they worked in more than one sub-function. In addition, the **Analyse des besoins de formation en logistique au Quebec** identified general logistics and supply chain management positions within its list of professions within the supply chain sector.

3.3 Skill Requirements

Skills

This study investigated various types of skill and knowledge requirements that apply across the supply chain sector. The specific list of skills assessed was identified by combining the skill sets identified in previous studies and in consultation with sector experts.

Based on survey responses and summarized in Figure 3.16, employers indicate that communications and analytical skills were amongst the most important (top 5) requirements for all occupation categories across all sub-functions. Other common skill requirements include:

- Technology, as a requirement across all areas at the operational and tactical levels and in certain sub-functions, at the managerial level;
- Interpersonal skills are a requirement for manager level positions across almost all sub-functions; and
- Customer service is also a requirement that appears frequently.

Figure 3.16: Top Five Skills and Knowledge Requirements by Sub-functions and Occupation Category

Skill	Senior Mgmt	Logistics IS	Ware-housing	Trans-portation	Inventory/ Material Control	Customer Service	Purchas-ing
Communication	✓	✓	✓	✓	✓	✓	✓
Technology		✓	✓	T/O	✓	T/O	T/O
Mechanical			O	O			
Customer Relations	✓			✓	O	✓	✓
Analytical	✓	✓	✓	✓	✓	✓	✓
Negotiation	✓					M	✓
Interpersonal	✓	O	M/T	M	M	M/T	
Time Management		✓					
Operational Planning							
Financial					M		M
International Business							
Optimization of Workflow		T	T				
Transportation Systems				M/T			
Law and Regulations							
Logistics Function			O				

✓ =All Roles, M=Managerial Only, O=Operational Only, T=Tactical Only, M/T= Managerial and Tactical, T/O = Tactical and Operational

Source: Employer Survey

Overall, the majority of employees (ranging from 58-77%) report that they have the skills identified by employers as being the priority skill requirements. While the majority of respondents indicated that they 'have' technology and interpersonal skills, the percent was lower, with many employees indicating that they needed to acquire somewhat more of this skill.

Other skills that employees commonly identified as current skill/knowledge requirements for which they possessed the skills were:

- Computer,
- Customer service, and
- Customs knowledge.

For the NOC codes, where sufficient data was collected, business, financial management, cost analysis, and forecasting skills/knowledge were identified as being critical. For a list of skill requirements by NOC codes, refer to Appendix T.

As illustrated in Figures 3.17 and Figure 3.18, employees indicate that they require much more of the following skills or knowledge now, or in the next five years:

- Financial planning
- Forecasting
- Cost analysis
- Knowledge of international business practices
- Knowledge of laws and regulations
- Knowledge of logistics functions and supply chain
- Mechanical skills
- Optimization of workflow
- Knowledge of transportation
- General management and business
- Languages

Figure 3.17: Current Skills/Knowledge (n= 753)

Skills	Much More Needed	More Needed	No More Needed	N/A
International Business	**17.6**	**38.4**	**18.4**	**25.7**
Laws & Regulations	**14.9**	**46.0**	**28.2**	**10.9**
Logistics & Supply Chain	**12.1**	**44.2**	**39.2**	**4.5**
Cost Analysis	**10.4**	**37.1**	**28.3**	**24.1**
Financial Planning	**9.3**	**36.1**	**28.2**	**26.4**
Forecasting	**8.6**	**34.0**	**33.7**	**23.8**
Transportation System	7.6	37.3	44.4	10.7
Optimization of Workflow	7.4	39.1	37.9	15.6
Documentation & Analysis	6.9	37.9	43.8	11.5
Negotiation	5.9	34.4	51.0	8.6
Operational Planning	5.4	31.0	42.8	20.9
Mechanical	5.2	16.5	25.2	53.1
People Management	4.6	38.4	46.4	10.6
Time Management	3.5	30.9	62.3	3.4
Communication	2.8	18.7	77.4	1.1
Technology	2.8	37.0	58.3	1.9
Interpersonal	2.8	28.7	65.8	2.7
Customer Relations	2.3	17.8	74.3	5.7
Analytical	2.3	20.1	75.9	1.8
Math	2.1	12.2	84.0	1.6
Decision Making	1.9	20.6	75.9	1.9
Reading	1.5	8.9	88.5	1.2

Source: Employee Survey

Figure 3.18: Skills/Knowledge Needed in 5 Years (n=753)

Skills	Much More Needed	More Needed	Same	Less Needed	Much Less Needed	N/A
Financial Planning	20.2	16.0	35.9	25.3	1.0	1.7
Cost Analysis	19.2	18.9	34.4	24.8	1.1	1.5
International Business	19.0	23.7	37.1	17.2	1.2	1.8
Forecasting	18.2	17.7	36.9	24.5	1.1	1.7
Operational Planning	15.5	17.0	36.4	28.5	1.2	1.4
Mechanical	14.9	13.9	22.2	43.6	1.2	3.8
Optimization of Workflow	10.7	18.0	41.5	27.4	1.5	1.0
Knowledge of Transportation	10.0	18.3	39.6	29.9	1.0	1.2
Knowledge of Laws	9.5	23.4	43.3	22.1	1.0	0.7
Project Management	9.1	19.9	43.2	26.3	0.6	1.0
Negotiation	8.8	20.6	38.2	30.2	1.7	0.8
Process Analysis	8.3	17.4	38.5	34.3	1.2	0.3
People Management	6.6	18.9	39.4	33.9	0.6	0.7
Knowledge of Logistics	5.5	24.8	45.6	23.0	0.4	0.7
Customer Relations	3.3	16.8	39.6	39.4	0.5	0.4
Time Management	2.9	20.7	46.1	29.8	0.4	0.1
Interpersonal	2.5	18.8	40.0	37.6	0.7	0.4
Mathematical	2.2	9.4	27.1	59.0	1.8	0.6
Reading	1.2	10.0	21.8	65.5	1.1	0.4
Analytical	1.2	20.1	44.8	33.1	0.5	0.3
Communication	1.1	14.5	34.2	49.2	0.8	0.3
Technological	1.1	31.6	51.0	15.2	0.8	0.3
Decision Making	0.7	19.6	42.3	36.4	0.7	0.3

Source: Employee Survey

No significant variance is observed when examined by company size, except that small companies anticipate an increased requirement for analytical and decision making skills. No significant variance is observed when comparisons are made from a regional perspective.

Comparisons by occupation category indicate that operational and tactical employees are seeking additional skills in the areas of finance and international business.

While employers did not emphasize the same skill and knowledge requirements as did employees, this is not to say that they are not required as survey respondents were limited to selecting the five most important. Emerging skill requirements identified by employees were highlighted by employers during interviews and focus groups (Figure 3.19).

Figure 3.19: Skills/Competencies by Occupation Category

Managerial	Tactical	Operational
• Contract administration and management • Regulatory knowledge • Negotiation skills • Vendor relations/ management • Performance measurement and quality management • Knowledge of currency markets and business implications, especially for Purchasing/ Procurement Managers • Emerging emphasis on process and change management skills • Ability to work globally (e.g., working with other cultures)	• Analytical capability and process improvement (e.g., pending shortage of Business Analysts) • Systems applications and related knowledge • Regulatory knowledge • Planning and forecasting skill sets and process knowledge • Ability to seek out opportunities for cost savings and process improvements	• Process and systems knowledge • Data collection and systems input capability • Continued manual ability • Customer relationship and communication skills/competencies • A number of operational employees indicated a concern that they are generally not receiving business and analytical/problem solving training • Also a concern that supervisory staff need ongoing supervisory training, and in large part, do not receive it • However, occupational health & safety training deemed to be very strong across most companies/ organizations

Source: Employee Survey, Employer Interviews and Focus Groups

The emphasis on broader business, financial and supply chain skills and knowledge was also noted in previous studies. It is interesting to note that this skill requirement is noted by all categories, including operational, which suggests an interest on the part of employees in understanding the broader business and their role within it. It is also reflective of a potential higher degree of integration across the supply chain sector.

The **Logistics Labour Market Information Study: Phase 2** (1997) reported that logistics jobs may require greater functional integration and that logistics employees working across cultures, must possess:

• Language skills,

• Knowledge of foreign regulatory regimes, and

• Adeptness at quality control processes and audit.

Figure 3.20 summarizes some of the key future skill requirements outlined and highlighted by other studies.

Figure 3.20: Skill Requirements

Logistics/Supply Chain Skill & Labour Market	This study found that:
	• Senior level managers will require development in the following areas:
	  o Management of information systems technology
	  o Logistics systems integration and supply chain management
	  o International trade
	  o Business strategy
	• Current skills are predominantly technical or tactical, future skills requirements are expected to be more focused on general business skills (e.g., information management, interpretation and technology)

Logistics Labour Market Information Study: Phase 2 1997	This study identified the following future task and skill requirements: • Information management, interpretation and technology • Business management, corporate & supply chain strategy and logistics integration • Higher demand for 'international' skill sets such as language and culture awareness • Logistics/technical • Higher demands for information system management and integration skills • Need for employees to have broader skills

Source: Logistics/Supply Chain Skill & Labour Market and Logistics Labour Market Information Study: Phase 2

Education and Certification

As illustrated in Figure 3.21, the most common level of education required was found to increase with the level of position:

- **Managers** typically require an undergraduate or graduate degree. The requirement for post-graduate education is most prominent at the **senior manager** level.

- Overall, college and CEGEP are the main requirements for **tactical** positions, with the exception of warehousing and customer service tactical positions where high school is often acceptable.

- Most common educational requirement for **operational** positions is high school. Except in the case of logistics information systems operational positions, which more frequently require an undergraduate degree.

Figure 3.21: Employer Education Requirements by Occupation Category (n=127)

	High School	**College & CEGEP**	**University (Undergraduate)**	**University (Post Graduate)**
Managerial	9.6%	20.4%	60.7%	9.3%
Tactical	30.3%	55.4%	13.1%	1.1%
Operational	57.9%	35.0%	6.1%	1.0%

Source: Employer Survey

Education and certification requirements by sub-function and occupation category are summarized in Appendix U.

At the senior manager level, the current study found that 89% of employer participants indicated that an undergraduate or graduate degree was required. This is comparable to the results found by a recent study conducted by the Canadian Professional Logistics Institute (CPLI) [The Logistics Institute]

and the Trent Applied Social Research (TASR), **Canadian Logistics Practitioners Type and Level of Formal Education**, which asked study participants to indicate whether a university degree was generally required for their job. This study found that 100% of upper management respondents generally required a university level education.

When the employer requirements of the current study are compared to the level of education that employees surveyed currently possess (Figure 3.22, Figure 3.23 and Figure 3.24), it is noted that:

- A small proportion of logistics managers have undergraduate degrees, while the majority of employers require it; and
- For tactical and operational positions, employees tend to have a higher level of education than required by employers.

Figure 3.22: Skill Required by Employer vs. Employee Possess: Managerial

Degree	Employer Require (n=127)	Employee Possess (n=272)
High School	9.6%	9.0%
CEGEP/College/Diploma	20.4%	48.3%
Undergraduate	60.7%	21.7%
Post Graduate	9.3%	14.6%

Source: Employer Survey and Employee Survey

Figure 3.23: Skill Required by Employer vs. Employee Possess: Tactical

Degree	Employer Require (n=127)	Employee Possess (n=184)
High School	30.3%	21.5%
CEGEP/College/Diploma	55.4%	44.2%
Undergraduate	13.1%	15.3%
Post Graduate	1.1%	11.8%

Source: Employer Survey and Employee Survey

Figure 3.24: Skill Required by Employer vs. Employee Possess: Operational

Degree	Employer Require (n=127)	Employee Possess (n=164)
High School	57.9%	8.6%
CEGEP/College/Diploma	35.0%	51.9%
Undergraduate	6.1%	25.8%
Post Graduate	1.0%	11.8%

Source: Employer Survey and Employee Survey

The current study found that 91% of employer respondents indicated that professional development and experience could substitute for a university degree. This is similar to what is reported on the **Logistics Industry profile section of Human Resources and Skills Development Canada**'s website (based on Logistics Labour Market Information Study - 1997) which indicates that "Employers seem willing to accept both professional development and technical training to substitute for university degrees".

A minority of employers indicated that certification was required. Figure 3.25 lists the most commonly cited certifications by occupation category.

Figure 3.25: Most Commonly Citied Certifications by Occupation Category

Managerial	Tactical	Operational
PLog	CITT	CPP
CITT	PLog	CITT
CPP	CPP	CPIM
CPIM	CPIM	

Source: Employer Survey

Certification appeared more desirable for managerial positions with PLog and CITT being the most common. This is consistent with the most prevalent certifications held by employees, with CITT being the most common for all levels (i.e., managerial, tactical and operational). In addition, a higher prevalence of certification is noted among survey participants at the manager level. More details on certification requirements by sub-function and occupation category can be found in Appendix U.

Figure 3.26 lists the most common certifications possessed by employee respondents by occupation category.

Figure 3.26: Most Common Certifications or Designations

Managerial	Tactical	Operational
• CITT • PLog • CCS & Customs Professional • CPP • CPIM	• CITT • PLog • CIFF • CCS • CPP	• CITT • PLog • CIFF • CCS

Source: Employee Survey

3.4   Work Environment

This section profiles aspects of the work environment and employee attitudes to gain a better perspective on the nature of the working conditions and employee satisfaction.

Hours of Work

There is an equal distribution between those that report working less than 50 hours per week and those that do not (Figure 3.27).

Figure 3.27: "I regularly work 50 hours a week or more?" (n= 753)
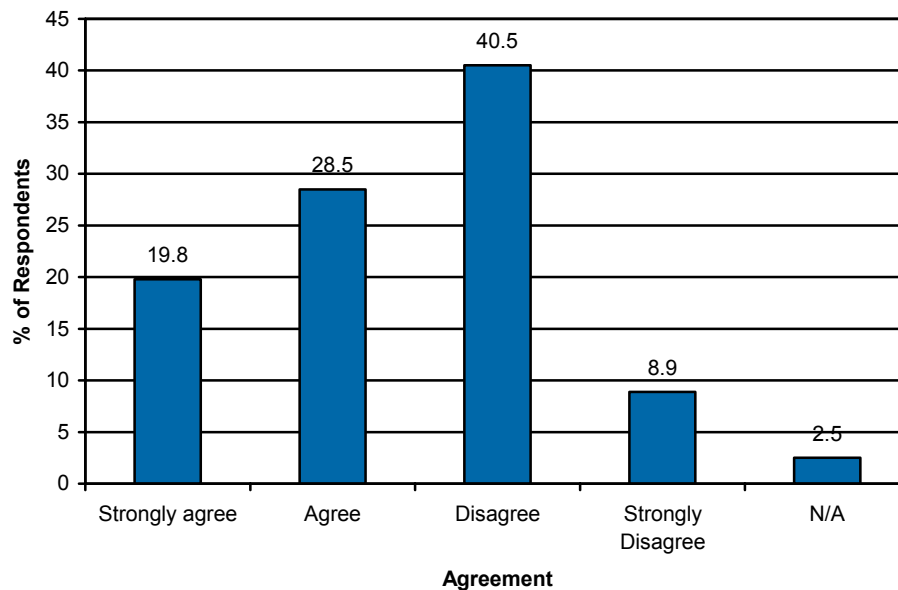
Source: Employee Survey

When examined by occupation category, it is found that managerial employees are more likely to work 50 or more hours per week (Figure 3.28).

Figure 3.28: Percent that Agree or Strongly Agree

Occupation Category	Agree or Strongly Agree
Managerial (n=272)	60.2%
Tactical (n=184)	42.7%
Operational (n=164)	35.7%

Source: Employee Survey

This increasing scale of hours worked by position was also found in other studies. For instance, study results on the Canadian Transportation and Logistics website in two articles entitled Personal Benchmarks (February 2002) and, Human Resources Management: Taking Measure Part II (2003), stated that the average number of hours worked during a typical week is approximately 50 hours, with 57% of respondents indicating that they work 50 or more hours a week. Figure 3.29 breaks down the hours worked per week by position:

Figure 3.29: Hours Worked Per Week by Position

	2002	2003
Support Staff	43.8	45.8
Supervisors	47.8	46.2
Managers	48.8	47.7
Senior Managers	53.4	51.1
Executive Managers	54.8	53.2

Sources: Personal Benchmarks (February 2002) and Human Resources Management: Taking Measure Part II (2003)

While 24/7 coverage was mentioned as a concern by some participants, overall it was not ranked as a major human resources concern relative to other challenges.

Satisfaction

Overall employees indicated that they were satisfied with their job and would recommend a career in logistics to others. The key statements or drivers of employee satisfaction in order from strongest to weakest were:

- "My manager creates an environment in which employees can be successful"

- "I am compensated fairly for the work that I do"

- "Top management understands the potential of logistics to add competitive advantage other than cost savings"

- "I am provided adequate training in order to make full use of technology"

- "I work in an environment where management treats employees with respect"

A two-way analysis of variance shows that company size and region do not have a statistically significant effect on employee satisfaction.

The only area where a statistically significant difference was noted was that employees of small companies are more satisfied with the respect they are given by management and the use of technology to improve performance.

The State of Logistics in Quebec presentation (based on **Analyse des besoins de formation en logistique au Quebec**) suggests a fairly high level of satisfaction, based on survey responses that indicated "in general, respondents are quite satisfied with the way their enterprise manages logistics activities".

Recent study results on the Canadian Transportation and Logistics website in an article called **Human Resources Management: Taking Measure Part II (2003)**, also found high satisfaction rates, with an average satisfaction rate in the logistics sector of 63%. This study also found that males have a satisfaction rate of 64%, as compared to the female satisfaction rate of 60%. Figure 3.30 outlines the satisfaction findings by level of position.

Figure 3.30: Satisfaction by Position Level

	% Satisfied	% Not Satisfied
Executive Managers	75%	4%
Senior Managers	66%	3%
Managers	60%	8%
Supervisors	57%	12%
Support Staff	57%	12%

Sources: Human Resources Management: Taking Measure Part II (2003)

Only 30% of employers indicated that employee satisfaction was a human resources challenge they were currently facing. That ranked it 7th out of 13 human resources challenges they were asked to assess.

Commitment

While satisfied, the workforce appears to be less committed to their current employer and to a lesser extent the logistics sector in general, as 70.6% of employees indicated that they plan to explore *other* logistics opportunities and 45.6% of employees plan to explore opportunities outside of logistics.

Operational and tactical employees appear less committed as they were more likely to indicate plans to explore other opportunities either *within or external* to logistics (Figure 3.31 and Figure 3.32).

Figure 3.31: Plan to Explore *Other* Logistics Opportunities
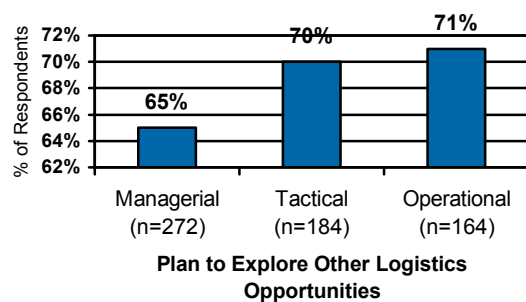
Figure 3.32: Plan to Explore Opportunities *Outside* Logistics
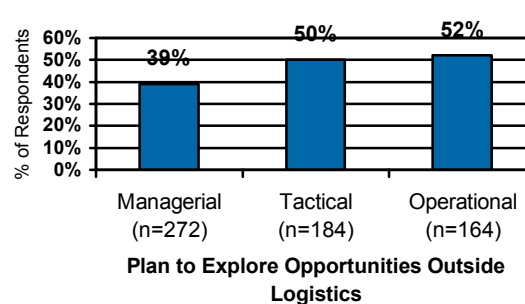
Source: Employee Survey

When employees were asked "If you were to consider leaving the logistics function, what would be the main reason for this?", the most common responses centred around:

- Promotion and career growth,
- Compensation,
- Job stress and pressure,
- Better or new opportunities,
- New challenge or need for a change, and
- Retirement.

Consistent with a desire for career growth, it would seem that employees are seeking growth and challenge, and would be satisfied attaining this in either a logistics role or non-logistics role.

General Work Environment Opinions

Employee opinions related to work-life balance, working environment and other qualitative work factors appear to be generally positive with no average score greater than 2.5 (on a scale of one (1) to four (4), where one is strongly agree and four is strongly disagree) (Figure 3.33). It is noted that employees indicate that they work in a high-pressure environment.

Figure 3.33: Employee Opinions with Respect to General Work Environment (n=753)

Question	Average Rating
I work in a high-pressure environment	1.7-1.9
I work in a safe environment	1.7-1.9
I work in an environment in which management treats employees with respect	1.8-2.0
I work in an environment where any employee, regardless of race or ethnic background can be successful	1.6-1.8
I usually have the time I need to do my work effectively	2.2-2.4
I work in an environment in which I am able to balance the demands of my work and personal life	2.2
In my work place we continually strive to improve our knowledge and capabilities	1.8-2.0
In my workplace, we are given the opportunity to rotate jobs to gain experience	2.3-2.5
I am compensated fairly for the work that I do	2.1-2.4
My manager creates an environment in which employees can be successful	1.9-2.2

Source: Employee Survey

The Recruitment and Retention section of Module 5 discusses other qualitative aspects of the supply chain sector, in terms of what attracts and deters employees and students from careers in the supply chain sector.

3.5 Career Path Model

A US study, **Careers in Logistics,** conducted by the Council of Supply Chain Management Professionals (1998), concluded that there does not appear to be a single career path for logistic employees. In addition to the multiple sub-functions within the supply chain, that a career path could focus on (e.g., transportation management, warehousing, production planning, purchasing, information systems, customer service, etc), career paths are also influenced by the size, type, geographic scope, and organizational structure of organizations. For example, in some organizations:

- A position may have responsibility for multiple supply chain functions, while in other organizations positions may be more specialized or focused on one particular function.
- Logistics/supply chain responsibilities may not be centralized, but spread throughout other departments in the organization (e.g., manufacturing, operations, marketing), resulting in a career path that may include positions unrelated to supply chain.
- Career paths may be vertical within a particular supply chain sub-function (e.g., purchasing officer, purchasing supervisor, purchasing manager, etc) or move across various supply chain sub-functions.

In the end, taking into consideration the diversity and fragmentation of the sector, there are numerous potential career paths.

A potential career path map for various positions within a manufacturing organization is outlined in the **Careers in Logistics** document and provided in Figure 3.34 as a sample career path model.

Figure 3.34: Manufacturing Career Path Model
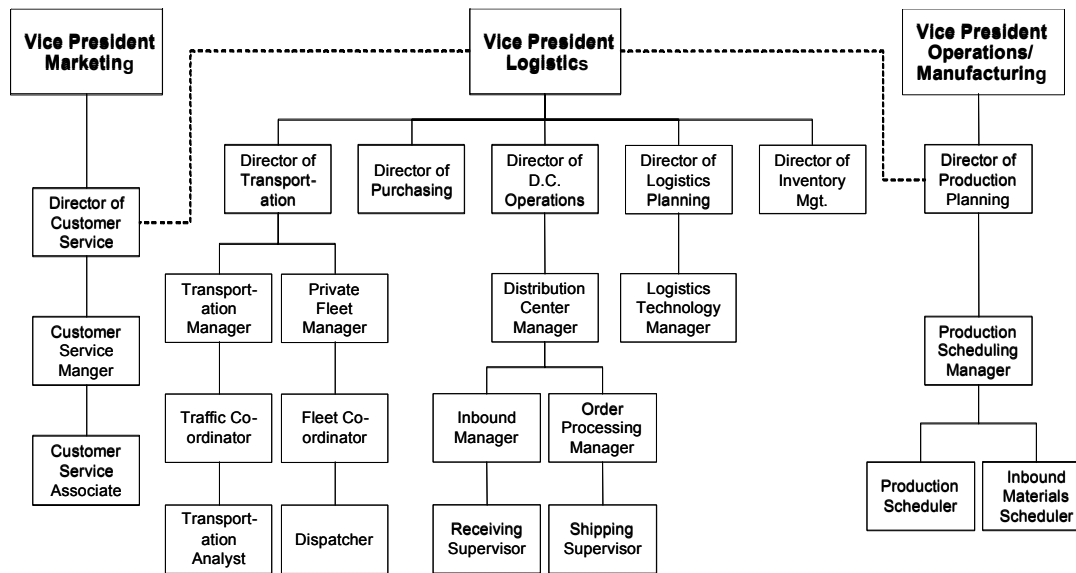
Source: Careers in Logistics

Many secondary sources provide career path information, however, rather than showing career progressions in a map or flow diagram format, they tend to focus on either:

A. The broad education and experience required to progress between occupation categories (e.g., operational, tactical, managerial), as do the following two studies:

    –   The **Logistics Labour Market Information Study: Phase 2** (1997) created a model to define/describe "success" and to articulate how it can be achieved. This model was structured around three dimensions: logistics business functions, career levels and industry sectors, and provides detailed career path information including: tasks, skills and features of each level of position, as well as entry age at each level, time spent at that level, education, experience and skill/ability requirements, and transitional skills, knowledge and abilities and mechanisms.

    –   In addition, **Logistics/Supply Chain Skill & Labour Market**, outlines the requirements to enter the logistics field and move through the levels. The paper suggests that entry into logistics is best at the lower management level and typically requires a Bachelor's degree and 3 years of experience. In order to advance beyond middle management, there is a requirement for breadth of experience across logistics functions at lower levels (5 years). At a senior level, there is a need for 8 years of experience and in-depth knowledge in 2 functions.

B. A focus on a specific position, in the form of a job profile, that indicates the type of experience and educational requirements that would be required, as well as the typical tasks and duties. Two sources of these types of profiles, which cover the full spectrum of supply chain functions, are outlined below.

    –   Position profile career path information can be found in the **Careers in Logistics** report. It provides job profiles for 17 logistics positions.   Each profile lists relevant previous positions or experience that is required and subsequent positions to which a successful person could aspire.

    –   A more robust Canadian career profile repository was created by the Calgary Board of Education (**www.careersinlogistics.ca**) and covers over 150 positions at the management, operations, support and technical levels in each of manufacturing and retail, transportation, and warehouse and distribution areas. In addition to general position description information, each career profile contains a table outlining an advancement career path and the average years of experience at each level. For example, Figure 3.35 and Figure 3.36 outline the potential career paths for a Material Handler and Customs Broker Analyst.

Figure 3.35: Material Handler Career Levels/Years of Experience

Career Levels	Position	Average Experience	
		From	**To**
10	Site Manager	7 years	10 years +
9	Operations Manager	5 years +	6 years
8	Cross Functional Trainee	4 years +	5 years +
7	Area/Department Manager	4 years +	5 years +
6	Manager Trainee	4 years	5 years
5	Team Leader (Supervisor)	3 years	4 years +
4	Team Leader Trainee Roles	2 years	4 years
3	Cross Functional	3 months	3 years
2	Clerical	3 months	2 years
1	Material Handler		1 year +

Source: www.careersinlogistics.ca

Figure 3.36: Customs Broker Analyst Career Levels/Years of Experience

Career Levels	Position	Average Experience	
		From	**To**
7	Vice President	7 years	10 years +
6	Director	5 years +	6 years
5	Manager	4 years +	5 years +
4	Manager Trainee	3 years +	4 years
3	Coordinator/Supervisor	2 years +	3 years
2	Supervisor Trainee	2 years	3 years
1	Customs Broker Analyst	1 year	2 years

Source: www.careersinlogistics.ca

Survey and interview participants reported a myriad of paths that led to their current position, mostly supply chain related jobs and experience. While there has been some good groundwork in capturing career paths, no one model has emerged.

Conclusions

- The sector consists of a variety of occupations with a fairly diverse workforce.

- Supply chain employees tend to be located in Ontario, Quebec, Alberta and BC.

- Supply chain employee population is predominantly between the ages of 26 and 55 (only 5% over 55), therefore the retention of knowledge and experience as a result of retirement, does not appear to be a pressing human resources challenge. However, succession planning is becoming a pressing issue for many employers.

- The supply chain employee profile suggests a well-educated employee with significant experience and some certification.

- Certification is viewed as an asset at the managerial and some tactical levels and there is no apparent consensus as to a preferred certification. For aspiring managerial and tactical employees, it is not readily apparent which certification they should pursue.

- Traditionally structured management function specific jobs (e.g., purchasing, distribution) are declining. The current study noted numerous survey respondents in general logistics and supply chain specialist/manager positions that were not readily aligned with one particular logistics sub-function and many survey respondents indicated that they worked in more than one sub-function.

- There is a growing emphasis on broader business, financial and logistics/supply chain skills and knowledge. It is interesting to note that this skill requirement is noted by all categories, including operational, which suggests an interest on the part of employees in understanding the broader business and their role within it. It is also reflective of a potential higher degree of integration across the supply chain sector.

- Skill differences do not vary by company size or region, which may suggest that logistics/supply chain employees can move between regions with some degree of ease.

- Although satisfied, employee commitment to the sector/profession is less than ideal.

- While there has been some good groundwork in capturing career paths, no one model has emerged.

Module 4

Module Overview

Module 4, 'Skill Demand and Forecast', provides a profile of current and forecasted skilled worker demand for the supply chain sector, with a focus on current and potential skills shortages and sources to fill identified gaps. This module seeks to answer the following key questions:

- Where are the current skills shortages in the supply chain sector? Why do these shortages exist? Are there current sources to draw from that are not being tapped into?

- What are the anticipated skills shortages over the next five years? Why do we anticipate that these shortages will either persist or emerge? What are the potential sources to be drawn from or policy implications to increase the availability of skilled workers in the future?

Content

4.1 Historical Sector Growth

Historically, the annual revenue growth rate of the supply chain sector has been 5.8% from 1991 to 1997, according to **Logistics and Supply Chain Management – Overview and Prospects**. This same study noted growth in several logistics sub-functions:

- Trucking average growth of 9.1% in the 1990s;
- Warehousing average growth of 4.5% in the 1990s; and
- 3PL growth rate is estimated to be in the double-digits.

According to **The North American 3PL Market** report (2004), gross revenue for the North American 3PL market was reported to have grown 6.9% between 2001 and 2002: from $60.8 billion in 2001 to $65 billion in 2002. The report also stated that in 2004, the current growth rate was 20%, with the annual growth rate for warehousing, transportation management, air/ocean freight forwarding, and dedicated carriage (four core logistics sections) ranging from 15 to 25%.

Other reference indicators for sector growth included the **Scoping Study for the Development for a Technology Roadmap for Logistics Industries and Users of Logistics Technologies (2002)** that reported there was an 8% change in the rate of employment in transportation and storage industries from 1991 to 2000. In 2004, the Conference Board of Canada's **Economic Forecast - Canadian Outlook (Spring 2005)** report indicated that employment in Canada grew across all sectors (except for agriculture). Of particular relevance to the supply chain sector, transportation and warehousing made strong employment gains in 2004 of 2.6%, compared to the Canadian average of 1.8%. Hiring in manufacturing was not as strong as a result of a strong Canadian dollar, increased international competition and weaker demand for goods. However, it should be noted that manufacturing employment is expected to be relatively stable in 2005 and then increase to about 2% in 2006.

Additionally, and as noted below in Figure 4.1, one of the largest increasing areas of employment has been professional, scientific and technical services, which includes technology-focused employees (**Canadian Labour Market at a Glance**). This is expected to drive increased competition for technical and technology employees, both of which are predicted areas of growth for the supply chain sector.

Figure 4.1: Changes in Employment, by Industry, from 1987-2003
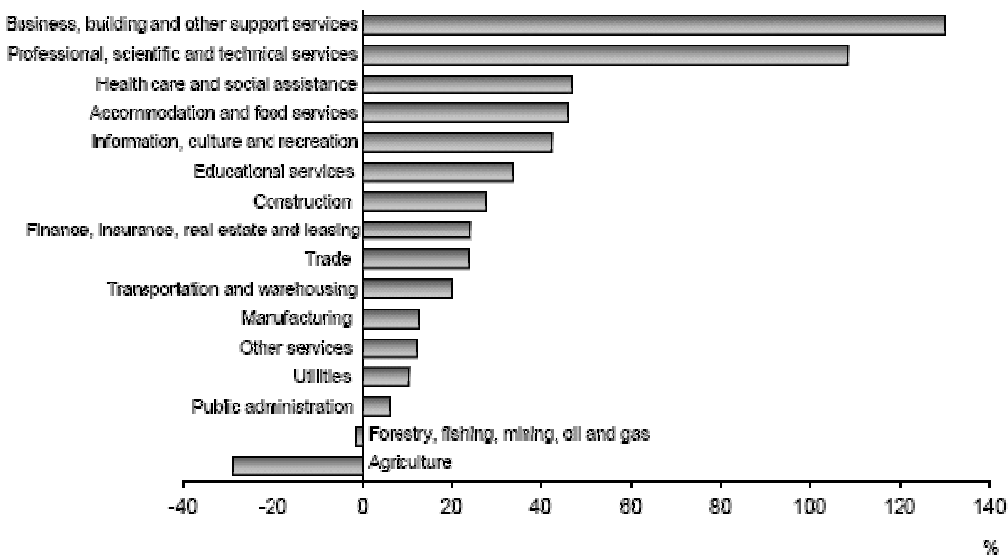
Source: Canadian Labour Market at a Glance

4.2   Anticipated Employment Demand

Demand for supply chain sector employees is broadly influenced by three factors:

- Sector employment growth (i.e., new job creation),
- Retirements, and
- Turnover.

Each of these factors is reviewed within this section.

4.2.1   New Job Creation

New job creation is influenced by many factors, such as macro-economic variables (e.g., strength of the Canadian economy, GDP, exchange rates), as well as changes to the sector itself (e.g., expansion of sector definition and increasing use of automation).

The rate of supply chain sector growth is also impacted by several qualitative drivers, most notably:

- The increasing strategic importance of the supply chain within organizations to drive performance and results;
- Expanding and globalizing markets within which to operate and deliver goods;
- Continued emphasis on cost reduction in order to better compete, and drive organizational growth; and
- Growth across all industry segments that employ supply chain management, either in-house or through the use of 3PLs.

Increasing Demand for Occupations

As mentioned in Module 3, and as illustrated in Figure 4.2, employers identified that supply chain staffing levels across all sub-functions are generally expected to remain constant, with growth noted in a few areas. Areas expecting the greatest increase are:

- Warehousing operational,
- Logistics information systems tactical and operational,

- Customer service tactical, and
- Transportation operational.

Figure 4.2: Anticipated Demand by Sub-function and Occupation Category

		Growth	Decline	No Change
Senior Management	Managerial (n=100)	26.0%	4.0%	70.0%
Logistics Info Systems	Managerial (n=68)	26.5%	2.9%	70.6%
	Tactical (n=54)	44.4%	3.7%	51.9%
	Operational (n=48)	50.0%	4.2%	45.9%
Warehousing	Managerial (n=67)	33.8%	3.0%	64.2%
	Tactical (n=46)	28.3%	1.7%	19.0%
	Operational (n=65)	53.9%	9.2%	36.9%
Inventory/Material Control	Managerial (n=116)	25.5%	6.4%	68.1%
	Tactical (n=44)	22.7%	6.8%	70.5%
	Operational (n=49)	30.6%	8.2%	61.2%
Customer Service	Managerial (n=54)	25.9%	11.1%	63.0%
	Tactical (n=46)	34.8%	8.7%	56.5%
	Operational (n=48)	33.3%	10.4%	56.3%
Purchasing	Managerial (n=55)	29.1%	3.6%	67.3%
	Tactical (n=39)	20.5%	2.6%	76.9%
	Operational (n=47)	34.0%	4.3%	61.7%
Transportation	Managerial (n=63)	22.2%	7.9%	70.0%
	Tactical (n=49)	26.5%	2.0%	71.4%
	Operational (n=53)	35.9%	7.6%	56.6%

Source: Employer Survey

In addition to those noted above, the current study also revealed several emerging positions in the supply chain sector:

- Instructor/trainers,
- Marketing and account managers, and
- Sales representatives and coordinators.

As well, the emergence of supply chain sector-specific corporate services/support expertise and competence (e.g., human resources) is noted.

Looking at both the growth positions and the types of positions that organizations appear to have within their supply chain function, the following key observations can be made:

- With the increasing prevalence of technology use in the supply chain sector, it is not surprising that logistics information systems is a primary area of future growth;
- Based on areas of expected growth, as well as the emerging positions that were identified through the study, there appears to be an increased focus on supply chain specific customer/client-focused positions (e.g., sales, account management, client management, etc); and,
- There appears to be an increasing number of logistics and supply chain specialist positions that possess knowledge of many or all aspects of the supply chain, consisting of positions that address the entire supply chain (e.g., supply chain specialists, logistics managers) and technical supply chain positions (e.g., analysts, planners, specialists).

A time comparison against the findings of the **Logistics Labour Market Information Study: Phase 2** (1997), outlined in the figure below, reveals that the expected areas of growth and key findings noted above, are fairly similar, indicating continued growth in these areas, specifically:

- Information systems positions,
- Technical positions (e.g., analysts, planners, logistics specialists), and
- Customer/client positions.

Both the current study, and the **Logistics Labour Market Information Study: Phase 2** (1997) (Figure 4.3), anticipate a decline in clerical positions as a result of technology introduction. However, the results of the current study do not anticipate the decline in warehousing and inventory jobs that was forecast in the previous study; this may be the result of technology not being implemented as quickly as had previously been expected.

Figure 4.3: Jobs that Are Expected to Increase or Decline

Increasing	Declining
- Process design and management (integrated logistics supply chain design and analysis) - Information systems management and technology jobs - Customer service jobs (e.g., client service representatives replacing sales; relationship managers) - Data security analysts - Cross-functional project managers - Inventory planning (whole supply chain) - Business analysts - Client service - International service providers (e.g., regulation interpreters, international network co-ordination, contract negotiators, intellectual property etc)	- Clerical jobs (e.g., traffic control clerks replaced by data entry technology) "Skill specific" jobs (e.g., inventory control, traffic supervisor) - Traditionally structured management function specific jobs (e.g., purchasing management, distribution management, transportation management, etc) - Inventory planning and control (single commodity, inventory counting, cycle counting) - Warehousing jobs

Source: Logistics Labour Market Information Study: Phase 2

Overall, these findings indicate an increasing number of knowledge-based positions (e.g., technical logistics knowledge, information technology knowledge) and customer service positions (sales, customer service, client management). This shows a continued trend from the findings of the **Logistics Industry profile section of Human Resources and Skills Development Canada**'s website (based on **Logistics Labour Market Information Study** - 1997) which indicates an increasing need for logistics 'knowledge' jobs that require higher levels of analytical skills, multi-logistics function skills/knowledge (e.g., general supply chain knowledge) and fewer lower level data and information processing positions.

Positions Currently Difficult to Fill – Current Unmet Demand

In addition to the positions that are expected to grow in number, employers also identified a range of positions that they are currently experiencing challenges filling, indicating unmet current demand.

Positions identified by employers as difficult to fill can be broadly grouped into the following categories:

- Inventory (e.g., inventory analysts, planners, managers);
- Purchasing (e.g., purchasers, contractors, buyers);
- Logistics and supply chain specialists (e.g., supply chain and logistics analysts, planners and engineers); and

- Warehousing and operations (warehouse supervisors, managers, general warehousing and operational personnel).

Of the positions identified, manager-level positions were the most commonly cited as difficult roles to fill (e.g., functional managers, general managers, project managers, etc). Other types of positions that were also broadly identified as being a challenge to fill include supervisors and analysts. This suggests that some of the anticipated growth areas are already posing a challenge for organizations (e.g., specialists, technical analysts and planners, general logistics and supply chain positions).

The current and anticipated position challenges are similar to the findings of the Quebec study (Figure 4.4), **Analyse des besoins de formation en logistique au Quebec**, which analysed positions difficult to fill by organization size and found that customer service positions, production planner positions and managerial positions in larger organizations were difficult to fill. By organizational size, the most difficult challenges were:

- Small: customer service and production planners
- Medium: customer service and material handlers
- Large: logistics managers, followed by production planners and then other types of managers (e.g., transportation, warehousing, procurement, managers)

Figure 4.4: Positions Difficult to Fill by Organization Size

	Small	Medium	Large
Procurement Managers	20.8%	23.9%	26.6%
Purchasers	16.1%	26.1%	25.3%
Production Planners	31.7%	28.0%	28.9%
Storekeepers	15.3%	15.7%	9.6%
Warehouse Managers	11.0%	12.9%	26.2%
Material Handlers	25.7%	30.0%	19.7%
Transportation Managers	9.3%	14.9%	27.0%
Long Distance Drivers	5.6%	7.5%	7.3%
Local Delivery Drivers	14.3%	16.6%	12.6%
Import/Export Specialists	11.2%	12.4%	15.2%
Customer Service Managers	25.9%	25.2%	26.3%
Customer Service Representatives	30.0%	32.9%	24.0%
Logistics Managers	14.9%	18.7%	31.1%
International Logistics Experts	9.9%	11.9%	20.5%

Source: Analyse des besoins de formation en logistique au Quebec

As summarized in Figure 4.5, according to the **Logistics/Supply Chain Skill & Labour Market** discussion paper, 20-30% of enterprises have difficulty filling certain positions with competent people. The discussion paper highlighted a number of differences based on company size. For example, large companies were most commonly faced with the difficulty of filling logistics manager positions, while small and medium-sized companies were primarily faced with the challenge of filling production planner positions.

Figure 4.5: Firms Experiencing Difficulties in Filing Some Logistics Positions

Firms experiencing difficulties in filling some logistics positions
(% with respect to size of enterprises)

(Source: IFGTL - 2002)
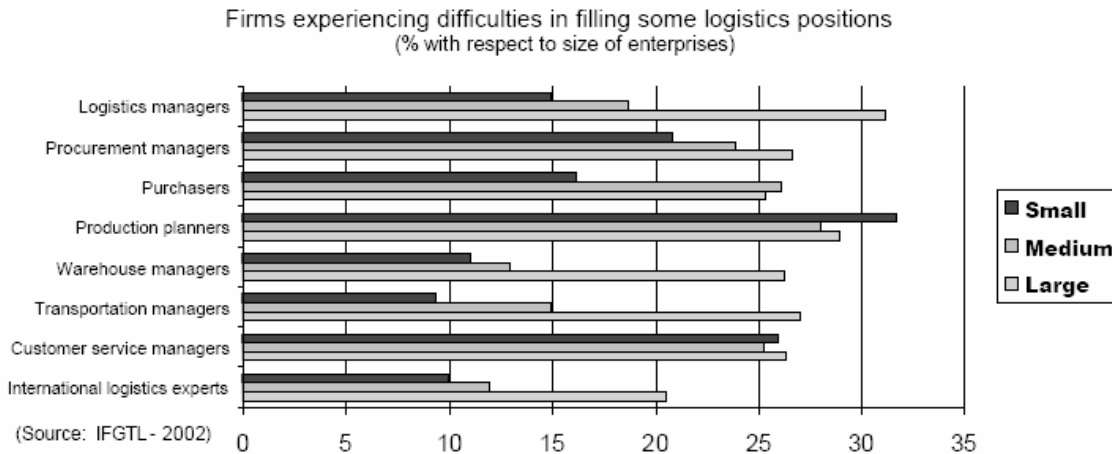
Source: Logistics/Supply Chain Skill & Labour Market

Forecasted Demand

Sectors that are experiencing economic growth (e.g., resource-based sectors such as oil and gas, mining, etc.) will require additional effort and performance across many segments of the organization in order to enable the growth. Of specific relevance will be their commensurate need for managerial leadership and tactical specialists to lead and execute the increased logistical and supply chain management requirements to meet increasing demand. As a result, the growth rate of industries, especially logistics intensive industries, will drive the growth rates for the supply chain sector. 3PL growth is also a reflection of the increasing sophistication of supply chain needs, as organizations employ and leverage experts.

Based on a general understanding of the requirements of growing organizations and the study finding that additional managerial and tactical employees are required, a review across all industries, including high growth, low growth and 3PL specific organizations, the demand for supply chain employees by occupational category (e.g., managerial, tactical, operational) is estimated below in Figure 4.6.

Figure 4.6: Level of Employment Demand by Occupation Category

	Growth Oriented Industry Sectors	Low Growth/Static	3PL
	Examples: oil and gas, professional services, resources	*Examples: manufacturing, some commodities e.g., forestry*	
Managerial	H	L-M	M-H
Tactical	H	L-M	M-H
Operational	L-M	Static	L-M

With medium growth calibrated to the predicted Canadian employment growth rate of 2% in 2006 (Conference Board of Canada's **Economic Forecast - Canadian Outlook (Spring 2005)**), the following scale has been established for analytical purposes:

- Low: <1.5% employment growth rate
- Medium: 1.5 – 2.5% employment growth rate
- High: >2.5% employment growth rate

Based on these predictions and the 2004 employment levels for each of the occupation categories, a sector-wide annual growth rate of approximately 1.7% is anticipated (Figure 4.7).

Figure 4.7: Employment Growth Rate by Occupation Category

	Current Employment Level*	Employment Growth Rate	Number of New Jobs
Managerial	137,240	3%	4,117
Tactical	120,370	3%	3,611
Operational	444,270	1%	4,443
Sector-wide	701,880	1.7%	**12,171**

* Source: 2001 Census and Labour Force Surveys

In terms of overall magnitude, while the sector is expanding, the growth rate is not expected to be significantly different from the anticipated average Canadian growth rate over the next couple of years. However, what is changing is the overall mix in type and nature of the roles and skills, specifically:

- The need for strategic business managers that can work at the executive table and lead and represent an increasingly important business function with a broad understanding of both the entire supply chain as well as the business model; and,
- Supply chain specialists, including planners and analysts, that can help run increasingly complex and strategic supply chains, through the use of new technologies, information management, knowledge of all supply chain components, understanding of the global nature of the business, all in order to meet increasing customer demands and cost pressures.

4.2.2 Retirement

Attrition as a result of retirement does not appear to be a pressing issue for this sector with the most common age category of study participants being 36-45 years of age and only 5% of study participants being over the age of 55. The age profile [by NOC] of the study participants is reflective of the age profile of the broader sector population based on **2001 Census** data.

While this data implies that retirement is not a pressing challenge, a comparison of the number of people under the age of 24 in the workforce (Figure 4.8) shows that there are fewer younger employees in this sector than the broader workforce, indicating that finding new labour to replace those retiring may be an issue.

Figure 4.8: Comparison of Workforce Age Distribution

Years of Age	Current Study Participants (n=753)	General Canadian Workforce
15-24	8%	15%
25-54	86%	74%
>55	5%	11%

Source: Employee Survey and Job Futures website

For analytical modeling purposes, it is assumed that the workforce over the age of 55 will retire within the next 5 years and those 46-55 years of age will retire over the next 10 years, with some employees reaching the age of 65 and others taking early retirement, at a constant rate. Figure 4.9 below presents the percent of each occupation category population that falls within these two age groups (e.g., 31% of managerial employees are 46-55 years of age). Using the assumptions outlined above, the annual retirement rate for each occupational category has been calculated below.

For example, with 6% of the managerial workforce over the age of 55, and the expectation that all of this group will retire over the next 5 years, it is anticipated that 1% of the managerial population will retire per year. Similarly, it is assumed that the 31% of managerial employees aged 46 to 55 will retire over the next 10 years, which on an annual basis equates to an estimated 3.1% retiring annually. Therefore, the overall managerial retirement rate is expected to be 4%.

Figure 4.9: Annual Retirement Rate by Occupation Category

	Age 46-55		>55		Total Annual Retirement Rate
	Population Distribution	**Annual Retirement Rate**	**Population Distribution**	**Annual Retirement Rate**	
Managerial	31%	3.1%	6%	1.2%	4.3%
Tactical	13%	1.3%	4%	0.9%	2.2%
Operational	16%	1.6%	3%	0.6%	2.2%

As summarized in Figure 4.10, applying these annual retirement rates to the current supply chain sector population results in an estimated sector retirement rate of 2.6%, equivalent to the need for 18,323 replacement workers per year.

Figure 4.10: Annual Number of Retirements by Occupation Category

	Current Employment Level*	**Retirement Rate**	**Number of Retirements**
Managerial	137,240	4.3%	5,901
Tactical	120,370	2.2%	2,648
Operational	444,270	2.2%	9,774
Sector-wide	701,880	2.6%	18,323

* Source: 2001 Census and Labour Force Surveys

4.2.3 Turnover

In 2002, the Canadian national turnover rate was 8.8% for the private sector and 7.4% for the public sector (**Building Tomorrow's Public Service Today Challenges and Solutions in Recruitment and Retention** (*2002*)). Given that the supply chain sector crosses all industries, a forecasted turnover rate of 8% is assumed.

4.2.4 Summary Demand Forecast

In summary, considering all three contributing factors described above, the forecasted sector demand for new and replacement employees is estimated at 12.3% per year over the course of the next three to five years, as depicted in Figure 4.11.

Figure 4.11: Sector Demand per Annum

	Sector Employment Demand (per annum)
New Job Creation	1.7%
Retirement Rate	2.6%
Turnover Rate	8%
Total Annual New Employee Demand Growth Rate	**12.3% or 86,330 employees**

Based on the current population of approximately 701,880, annual demand is estimated to be approximately 12.3% or 86,330 employees to fill new and vacant positions.

As illustrated by the breakdown of employment demand by occupation category in Figures 4.12 and 4.13, a greater proportion of this demand is expected to be at the managerial level given that sector growth predictions are focused more at the managerial level and that older employees tend to occupy more senior positions (note: 57% of the participant employees over the age of 55 and 62% of the employees between the ages of 46 and 55 occupied managerial positions). It is also assumed for these calculations that the turnover rate is equal across all occupational categories.

Figure 4.12: Total Employment Demand by Occupation Category

	Employment Growth Rate	Retirement Rate	Turnover Rate	Total Employee Demand
Managerial	3%	4.3%	8%	**15.3%**
Tactical	3%	2.2%	8%	**13.2%**
Operational	1%	2.2%	8%	**11.2%**
Overall Population	**1.7%**	**2.6%**	**8%**	12.3%

Figure 4.13: Total Number of Positions to Fill by Occupation Category

	Total Employment Demand Rate	Number of Current Employees*	Total Number of Positions to Fill (new and existing)
Managerial	15.3%	137,240	20,998
Tactical	13.2%	120,370	15,889
Operational	11.2%	444,270	49,758
Overall Population	**12.3%**	701,880	**86,330**

* 2001 Census and Labour Force Surveys

4.3   Workforce Supply

4.3.1   Current Supply

The current study found that 62% of employers reported that supply chain employees are typically developed and promoted from within rather than hired from outside of the organization. However, when recruiting, employers most often recruit supply chain employees from the logistics/supply chain functions of other organizations (Figure 4.14). An exception is Customer Service managerial and operational employees and Purchasing operational employees, who tend to be recruited from within the organization but from outside of the supply chain function.

Figure 4.14: Sources of New Recruits (n= 127)

		Educational Institutions	External within Logistics	External Outside Logistics	Internal Outside Logistics
Senior Management	Managerial	11	54	17	23
Logistics Information Systems/Processes	Managerial	8	29	16	16
	Tactical	10	25	14	15
	Operational	10	20	10	13
Warehousing	Managerial	4	37	9	13
	Tactical	5	24	11	15
	Operational	7	31	23	25
Transportation	Managerial	3	40	3	14
	Tactical	6	26	8	14
	Operational	5	25	10	20
Inventory/Material Control	Managerial	3	30	7	13
	Tactical	5	22	7	18
	Operational	7	24	13	21
Customer Service	Managerial	4	23	16	26
	Tactical	8	22	14	21
	Operational	8	15	17	22
Purchasing	Managerial	7	33	15	21
	Tactical	5	22	9	18
	Operational	5	19	11	25
Other	Managerial	1	2	1	0
	Tactical	1	3	1	0
	Operational	1	0	2	0

Source: Employer Survey

As a result, it appears that positions are typically filled from within the current pool of supply chain employees, whether through internal development and promotion or through the acquisition of supply chain employees from other organizations. Given the fact that, as previously outlined in this Module, the number of supply chain positions are generally expected to remain constant or grow, there will be a need to hire from outside of the current pool of supply chain employees in order to meet future demand. Accordingly, potential sources of new talent include:

- New workforce entrants (i.e., recent graduates/students);
- Employees from outside Canada; or
- Employees from other sectors (i.e., general Canadian labour force).

4.3.2   Recent Graduates/Students

It is interesting to note that academic institutions are the least common source of talent. **The State of Logistics in Quebec** presentation (based on **Analyse des besoins de formation en logistique au Quebec**), reported that:

- 38% percent of study [employer] participants indicated that they intended to hire college graduates to fill logistics positions;
- 31.5% indicated that they intended to hire people with undergraduate degrees to fill logistics positions; and
- 7% intended to hire people with post-graduate degrees to fill logistics positions.

While study findings indicate that academic institutions are the least common source of supply chain employees, academic institutions report that over 90% of their supply chain-related program

graduates find employment in a supply chain function after graduation; a finding that suggests that the vast majority of available new graduates for the supply chain workforce are being hired. Based on the responses from academic institutions (Figure 4.16), these new graduates tend to find employment in the following areas:

- Inventory/material control,
- Purchasing, and
- Transportation.

According to academic institutions, students graduating from CEGEP supply chain related programs tend to enter into operational positions, whereas college graduates tend to enter into tactical positions and university graduates into supervisory/managerial positions (Figure 4.15).

Figure 4.15: Level of Graduates'
First Position

Figure 4.16: Function of Graduates'
First Position

	CEGEP	University	College	Total
Senior Management	0	1	1	**2**
Logistics Information	0	2	1	**3**
Warehousing	2	4	3	**9**
Transportation	3	5	4	**12**
Inventory/ Material Control	1	4	10	**15**
Customer Service	1	3	4	**8**
Purchasing	2	4	7	**13**
Other	0	0	3	**3**
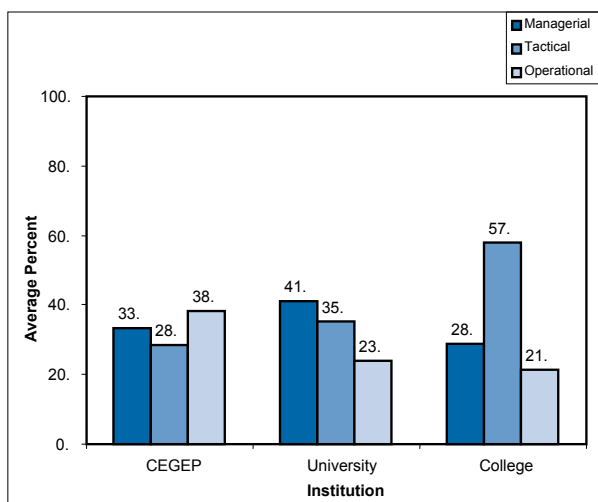
Source: Educational Institution Survey; n=25

When the source of employees is compared to the demand requirements previously identified, it is noted that:

- The main sub-functions that new graduates are entering (i.e., inventory/material control, purchasing and transportation) are areas in which employers either expect growth or are experiencing challenges filling.
- Customer service and purchasing positions, which employers indicated as a growth area and a challenge to fill respectively, are roles that employers are currently hiring from outside of the supply chain function. Many non-supply chain intensive businesses have requirements for these types of roles, suggesting that there is likely to be additional competition for these roles. Conversely, the pool of experienced and qualified people may be broader than that for other supply chain roles.
- While graduates from supply chain programs do not appear to be entering the information technology function, it is likely that these roles are filled with graduates from business or IT-focused programs that were not included in this study.
- It is unclear whether graduates are meeting the need for increasing supply chain specialist and analytical positions.
- As university graduates are more likely to enter the managerial level than other recent graduates, and this level is a current area with requirements, increased attention may be required to develop managers through this avenue.

Looking forward, Human Resources and Skills Development Canada's **Future Needs of the Canadian Labour Market (2004)** presentation indicates that job growth in Canada is focused on higher

educated areas (e.g., requiring a post-secondary education), making recent graduates from colleges and universities a desirable source of talent.   The **Future Needs of the Canadian Labour Market (2004)** also states that people leaving school will be the largest source of supply to the workforce with 610,000 new 'school leavers' per year entering the labour force over the next 10 years.

4.3.3   New Canadians

In addition to students as a source of new talent outside of the existing Canadian supply chain workforce, new Canadians are another source of employees; 21.3% of employers indicated that some of their supply chain employees are hired from outside of Canada. This is consistent with the fact that **2001 Census** data shows that between 70 and 80% of employees working in supply chain-related NOC positions are born within Canada.

The **Future Needs of the Canadian Labour Market (2004)** presentation states that immigrants are becoming more highly educated, and therefore, are a source to help fill the Canadian supply chain sector demand for more knowledge intensive and technical roles. Over the next ten years, it is estimated that 120,000 immigrants per year will join the labour force (**Future Needs of the Canadian Labour Market (2004)**).

4.3.4   General Canadian Labour Force

Since there is a need to grow the supply chain workforce beyond its existing population in order to meet increasing demand, there will be a need to attract talent from the broader Canadian workforce into the supply chain field. A potential source of talent are those employed in the similar occupations as supply chain employees, but outside of the sector, as they would have similar education and skill backgrounds. It is assumed that employees with general business, engineering, IT and general labour skills could be sourced from outside of the sector and trained on specific supply chain requirements.

Changes in Employment Participation Rates

A broad assessment of the Canadian labour market (according to **Canadian Labour Market at a Glance**), indicates that employment levels have increased over the last 20 years, with an increasing presence of women in the workforce and increasing employment rates for older workers.

As noted in Figure 4.17, the Conference Board of Canada's **Economic Forecast – Canadian Outlook (Spring 2005)** suggests that the Canadian employment participation rate is expected to increase in 2005 by 260,000 people, or 1.6%. While this growth rate is a decrease from a rate of 1.8% in 2004, the growth rate for 2006 is expected to increase to 2%. While the rate of growth has fluctuated over time and decreased from 2003 to 2005, overall, the number of Canadians with employment, or looking for employment, has been growing, and between 1997 and 2004 grew by approximately 14%.

Figure 4.17: Employment Growth
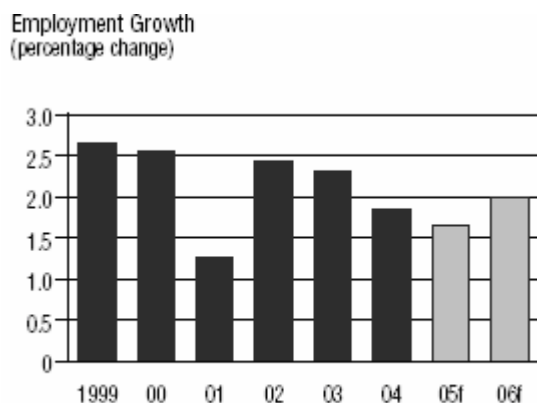
f = forecast

Source: The Conference Board of Canada, Statistics Canada

Slower labour force growth as explained in the **Future Needs of the Canadian Labour Market (2004)** report, is a result of low fertility rates, retiring baby boomers and increasing life expectancy. In addition, immigration is becoming a more important component of labour force growth.

From an industry perspective, according to the same Conference Board of Canada's **Economic Forecast - Canadian Outlook (Spring 2005)** report, employment in Canada grew across all sectors in 2004 (except for agriculture). While logistics and supply chain activities are a component of most sectors, those sectors that are more directly associated, e.g., transportation and warehousing, made strong employment gains in 2004 of 2.6%, compared to the Canadian average of 1.8%. Hiring in manufacturing was not as strong, as a result of the strong Canadian dollar, increased international competition and weaker demand for goods. However, it should be noted that manufacturing employment is expected to be relatively stable in 2005 and then increase to about 2% in 2006.

Demographic Shifts

One factor contributing to trends in employment participation rates is the increasing participation of older people in the workforce. As noted in the Conference Board of Canada's **Economic Forecast – Canadian Outlook (Spring 2005)**, of the 14% growth in employment participation from 1997 to 2004, 33% of this was attributed to people between the ages of 55 and 64. Rising participation rates among older Canadians have been observed since 1996, and in particular for older women. Baby boomers moving into the 55-64 age cohort in the near term will continue the trend of an increasing proportion of the workforce made up of older workers.

In the longer term, these older workers will start to retire and create vacancies in the marketplace. According to a Deloitte study, **It's 2008, Do You Know Where Your Talent Is?**, retirement of baby boomers will start in 2008, when the first baby boomers turn 62 (the average retirement age in large developed economies).

Anticipated Canadian Labour Shortages

According to the Deloitte research study, **It's 2008, Do You Know Where Your Talent Is?**, a combination of an aging population and a shrinking supply of youth poses challenges for the global labour market. Four industries in particular are expected to experience a significant 'exodus': manufacturing, health care, energy, and the public sector.

The following framework (Figure 4.18) was used in Human Resources and Skills Development Canada's **Future Needs of the Canadian Labour Market (2004)** presentation to compare demand increases to supply increases in order to identify where excess demand or supply exists.

Figure 4.18: Projected Increase in Demand and Supply, 2004-2013 by Overall Skill Level
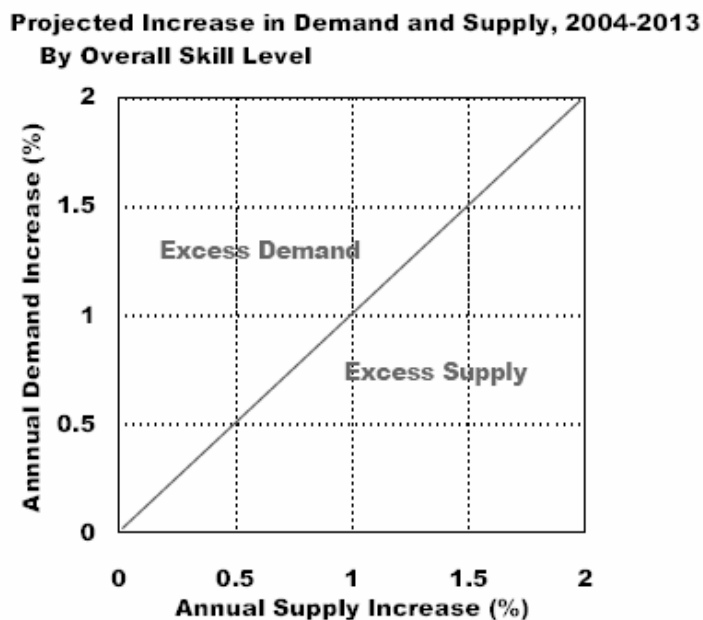
Source: Future Needs of the Canadian Labour Market (2004); HRSDC

Based on this form of analysis, the **Future Needs of the Canadian Labour Market (2004)** presentation predicted excess supply for many occupational domains (3 digit NOC codes) from 2004 to 2013. However, it was also found that some of the more technical and specialized areas, such as engineering, were expected to experience excess demand (Figure 4.19). This latter finding poses a challenge for the supply chain sector as technical, specialized and knowledge-intensive roles are expected to increase in demand.

Figure 4.19: Projected Increase in Demand and Supply, 2004-2013 by Occupational Domain
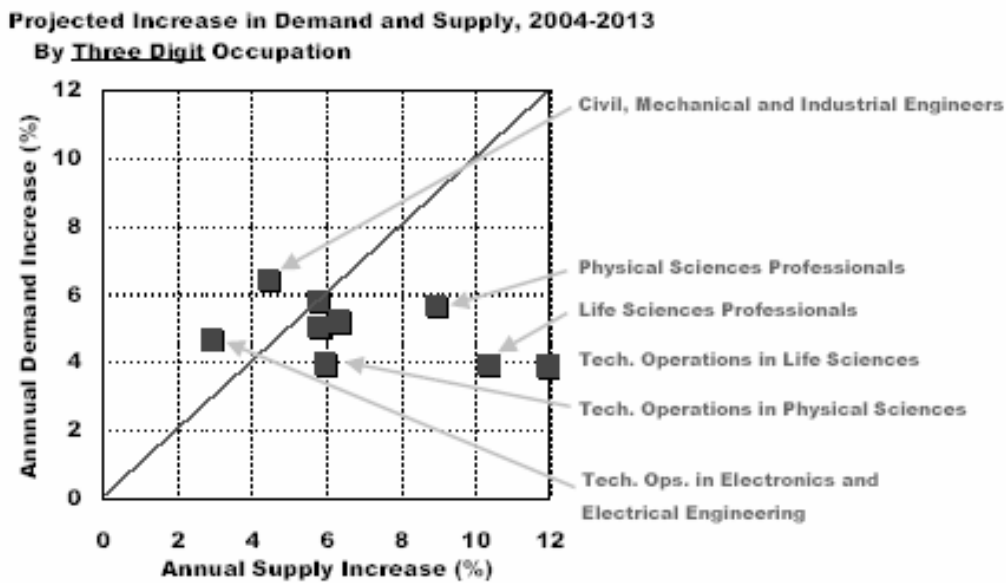
Source: Future Needs of the Canadian Labour Market (2004); HRSDC

Looking more broadly at occupational groups (2 digit NOC codes), many areas were identified as expecting an excess in demand for a variety of skilled occupations (Figure 4.20). Of specific relevance to the areas identified in the current study are sales occupations and managerial positions.

Figure 4.20: Projected Increase in Demand and Supply, 2004-2013 by Occupation Group
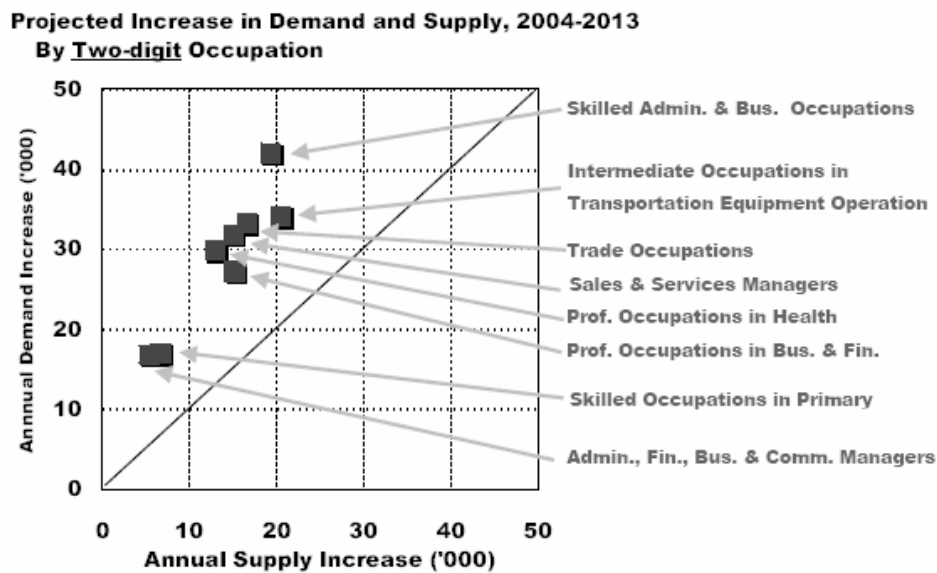
Source: Future Needs of the Canadian Labour Market (2004); HRSDC

Skill and Education Gap

As illustrated below in Figure 4.21, according to Human Resources and Skills Development Canada's **Future Needs of the Canadian Labour Market (2004)** presentation, in most industries, job growth will be in those areas that require higher education (e.g., requiring a post-secondary education). It is noted that Canadians and immigrants are becoming more highly educated, and therefore, should be able to meet the demands of the job market.

Figure 4.21: Labour Force Entrants by Source and Educational Attainment
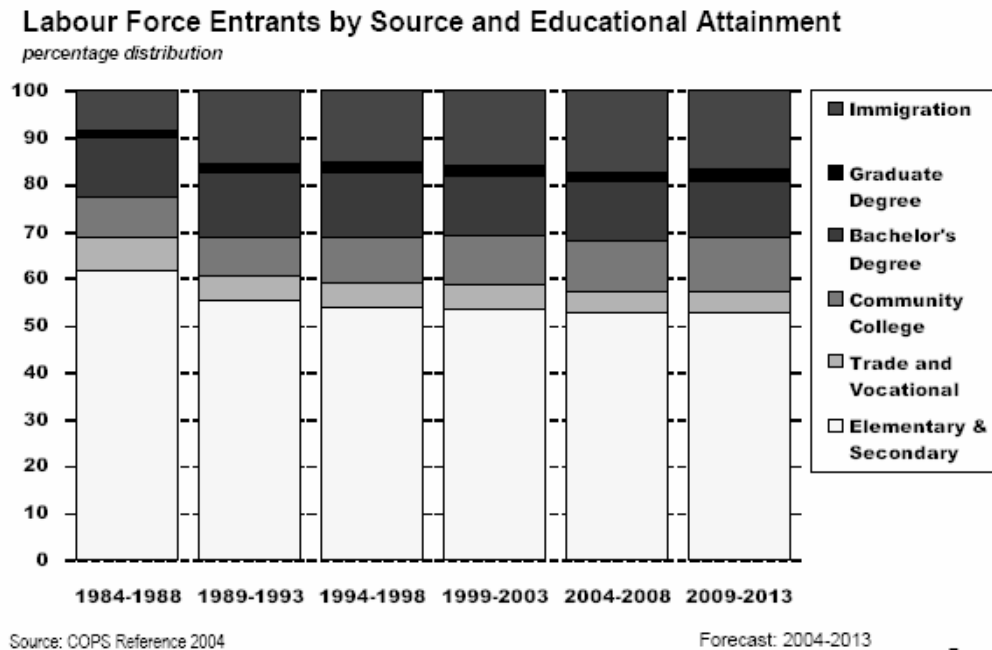
Source: Future Needs of the Canadian Labour Market presentation (2004); HRSDC

It's 2008, Do You Know Where Your Talent Is?, a global research report by Deloitte, indicates major skill gaps, especially in the science and engineering groups. This finding supports the anticipated excess demand for technical engineering roles previously mentioned as projected by **Future Needs of the Canadian Labour Market (2004)**. Globally, the challenge filling the gaps is a combination of student interest, institution capacity, and the quality of education, resulting in an insufficient number of students pursuing an education in science and engineering. This report found that in some areas of specialization, such as information technology, academic institutions cannot meet demand and are experiencing faculty shortages. In addition, schools are not keeping pace with increasing complexity and rapidly changing technology. Results of the Deloitte global talent study suggest that fewer and less qualified workers will be available in the future, leaving employers to fill skill gaps themselves through the use of such initiatives as in-house training and developmental assignments.

Summary

Based on Canadian labour market trends, it is anticipated that in the short-term (1-3 years) there will be a relatively stable pool of talent to draw upon, with the Canadian labour force participation rate expected to rise, older workers remaining in the workforce longer than previously anticipated and the continued addition of women to the workforce. However, over the medium-term (e.g., 3-5 years) demographic shifts in the Canadian labour pool will start to manifest and result in a shrinking workforce.   At the same time, ongoing competition for certain skills and jobs will escalate and continue between industries and sectors. This increased competition for scarce resources is resulting in many sectors/industries actively marketing their industry, and related employment opportunities to the broader Canadian workforce and more specifically targeting youth (e.g., Home Builders Association, Oil and Petroleum Sector). Competition will continue to increase and the supply chain sector, which is already faced with low awareness and interest levels, will need to more effectively engage the marketplace in order to attract and retain the right talent.

Conclusions

- Sector anticipating some growth over the next five years. Main areas of growth focus on managerial and tactical levels, with an emphasis on logistics information systems is a primary area of future growth.
- Sector employment growth in terms of new jobs is anticipated to be approximately 1.7% for 2005/06, very close to projected overall Canadian employment growth rate for 2006.
- Based on a sector population of 701,880 in 2004, annual demand to fill new and vacant positions resulting from growth, retirements and turnover, over the course of the next three to five years, is estimated to be 86,330 employees, or 12.3%.
- There will be a need to hire from outside of the current pool of supply chain employees in order to meet future demand. There will be a change in the mix of positions and skill sets required rather than large scale growth, with emphasis on:
  – Strategic business managers;
  – Technical positions, such as supply chain specialists, planners and analysts
  – Logistic information systems positions (e.g., systems and data); and
  – Supply chain-specific customer/client-focused positions (e.g., sales, account management, client management, etc).
- There is an increasing reliance on knowledge workers with business and technological skills, in combination with general supply chain knowledge and, in some cases, very specific knowledge/experience (e.g., freight forwarding, procurement and foreign regulatory).
- Finding the required specialized skills/experience cited by employers as a common recruitment challenge.
- Demand for employees with diplomas and degrees in logistics programs appears to be strong, as over 90% graduates find employment in a logistics function after graduation.
- Competition will continue to increase and the supply chain sector, which is already faced with low awareness and interest levels, will need to actively engage the marketplace in order to attract and retain the right talent.

Module 5

Module Overview

Module 5, 'Recruitment, Training, Development & Retention' provides an overview and assessment of current education and development activities, as well as human resources challenges and practices.

Content

5.1   Current Development Programs/Training Practices

There are many different mechanisms for attaining the required level of education, certification and training with respect to the logistics and supply chain management field. Education and training may be attained through in-house courses and seminars, external certification programs, courses offered through sector associations and academic institutions, and external courses and degrees from universities and colleges. This section outlines the main sources of education for the supply chain function, including details on some of the core sources and programs, and a summary of organizational training practices.

Of these sources of education and training, the most common means of development, as illustrated in Figure 5.1, are on-the-job training and external courses (no differences are noted based on company size).

Figure 5.1: Developing Required Skills (n=127)
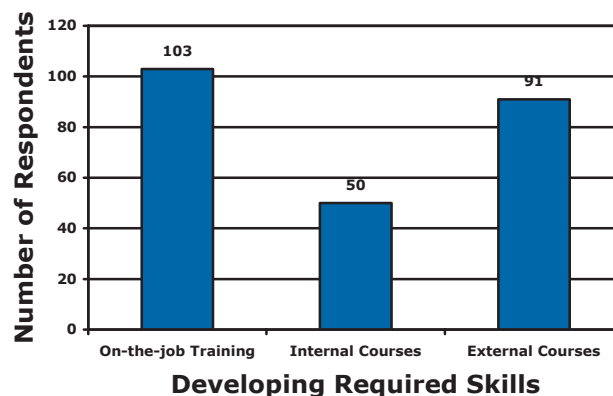
Source: Employer Survey

Based on employer feedback, it is evident that with the increasing need for more specialized skill sets, post-secondary education and, to some degree, certifications are becoming more important.

5.1.1   In-House Training

In-house training is provided in the form of internal courses or through on-the–job training. Both employer and employee feedback indicate that on-the-job training is the most common form of

training. It was also found that on-the-job training is commonly used and required to fill the 'experience' gap.

For the most part, employees indicate that they are satisfied with the training they have received and that it has met their needs (Figure 5.2). It is interesting to note that employees of larger organizations indicate a higher degree of satisfaction with the training, than employees of smaller organizations.

Figure 5.2: Training in Last 3 Years (n= 753)

Skills	Percent Received Training	Percent On-the-Job Training	Percent Training Meets Needs
Communication	40.7	69.8	92.1
Reading	**17.6**	**63.1**	84.1
Math	20.1	**59.2**	87.9
Technology	57.5	83.2	90.0
Mechanical	**6.1**	84.7	81.0
Customer Relations	30.1	87.2	90.2
Analytical	28.3	75.7	91.8
Decision Making	27.7	82.3	91.7
Negotiation	25.2	72.5	90.8
Interpersonal	37.9	80.8	**66.5**
Time Management	26.0	76.6	93.6
Project Management	23.4	72.3	**63.8**
People Management	34.7	73.8	92.2
Operational Planning	**17.8**	77.8	91.5
Financial Planning	**16.2**	74.0	87.2
Forecasting	**16.6**	72.2	88.9
Cost Analysis	**18.4**	69.1	85.9
International Business	**19.4**	**60.5**	84.8
Optimization of Workflow	**19.6**	85.1	87.8
Transportation System	30.4	73.5	88.8
Laws & Regulations	34.1	70.9	91.3
Process Analysis	23.6	90.5	85.6
Logistics & Supply Chain	34.9	66.3	91.4

Source: Employee Survey

Based on employer interviews, internal development and enabling training strategies are a predominant area of focus for employers. In this regard, the development of customized [internal] development programs, as well as "in-house" certification programs, appear to be growing in popularity and becoming more prevalent.

With respect to internal courses, based on study results, only 20.5% of employers offer internal courses, making it the least common method of training. However, there appears to be an increasing reliance on bringing in external specialists to train in-house and increasing use of training partnerships and alliances, e.g., with universities or with co-op programs to source emerging and graduating specialists.

Internal training tends to be focused on technical supply chain and logistics development and on interpersonal and people management skills (e.g., supervisory skills, team building, negotiations, leadership and coaching). These findings are consistent with those of the Quebec study, **Analyse des**

besoins de formation en logistique au Quebec, which reported that employers offer general, technical and teamwork training internally. In addition, the current survey indicates that there appears to be an emerging interest in hiring university and college graduates in commerce and engineering, and then through internal development and job rotation programs, building supply chain management specialists. One organization interviewed has recently successfully launched an internship program whereby new graduates are hired and placed in a two-year development program that involves rotational assignments throughout the organization, supplemented with training.

In addition to internal training, graduating and novice specialists are being sourced externally or from outside of the logistics area, and developed internally through the use of various work-study programs. According to the employer survey and illustrated in Figure 5.3, all of internships, co-op programs and apprenticeships are employed to some degree by organizations for logistics employees. No one work-study program appears to be extensively prevalent based on survey responses, this is an area that employers have indicated they plan to explore further. This pattern is consistent regardless of company size.

Figure 5.3: Participation in Work-Study Programs (n=127)
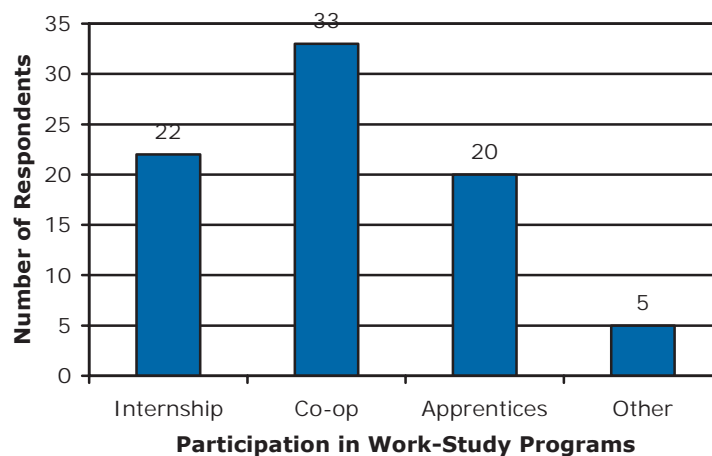
Source: Employer Survey

With respect to other in-house employee development programs, responses provide mixed results as to whether employees are provided the opportunity to rotate jobs to gain experience. This clearly suggests that some employers employ job rotation as a standard practice, while others do not, however, the majority (67%) of employers promote multi-skilling and cross-training for logistics positions.

5.1.2   Training/Education Support

Interview results indicated that ongoing education and training is encouraged by companies of all sizes and that significant investments are made. Various forms of financial and non-financial support/investment are provided by employers for the development of their employees. In this regard, the average number of [expenditure-based] training days per employee per annum is 6 days and the average per capita spend per employee is $4,789. As expected, 'Established and Growing' organizations spend more on training ($5,678 vs. sector aggregate of $4,789) (Figure 5.4).

When considering both training and professional development employees indicate that they receive an average of 14 days training per year. This is consistent with the observation of the 1997 **Logistics Labour Market Information Study: Phase 2**, which characterized the sector as having a learning culture.

Figure 5.4: Training Investment

	Per Capita Spending (n=52)	Average Number of Training Days (n=71)
Emerging	$1,211	8
Established and growing	$5,678	4.9
Mature and stable	$4,260	6.3
Aggregate	**$4,789**	**6**

Source: Employer Survey

The majority of organizations appear to offer some form of training support. As noted in Figure 5.5, the most common means of support are tuition reimbursement, time-off for external courses and the provision of in-house training.

Figure 5.5: Support Received from Employers to Meet Training Goals (n=127)
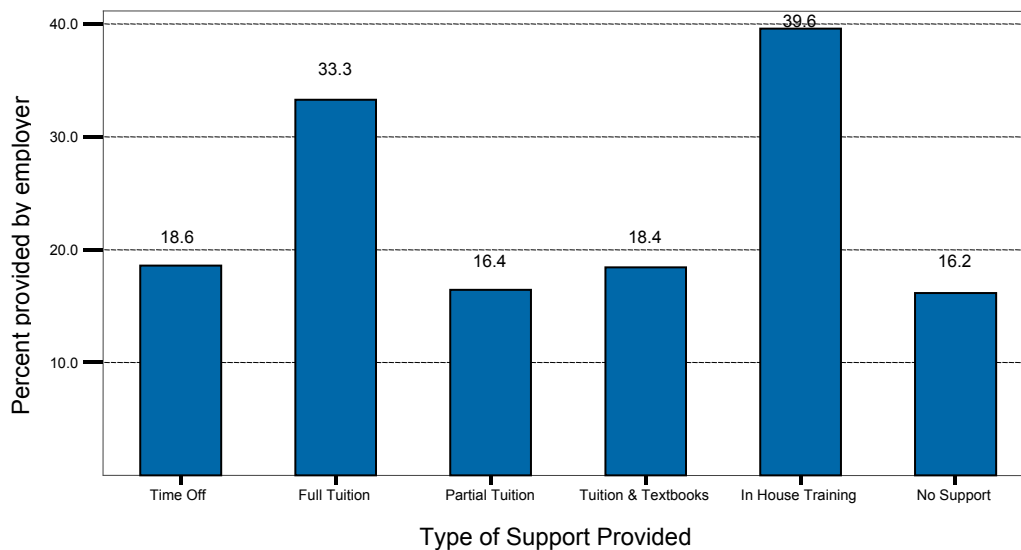
Source: Employer Survey

From a size perspective, small organizations tend to rely more on full-tuition, while on-the-job training is clearly supported by large employers and not as much with smaller organizations, as depicted in Figure 5.6 below.

Figure 5.6: Type of Support by Organization Size (n=127)
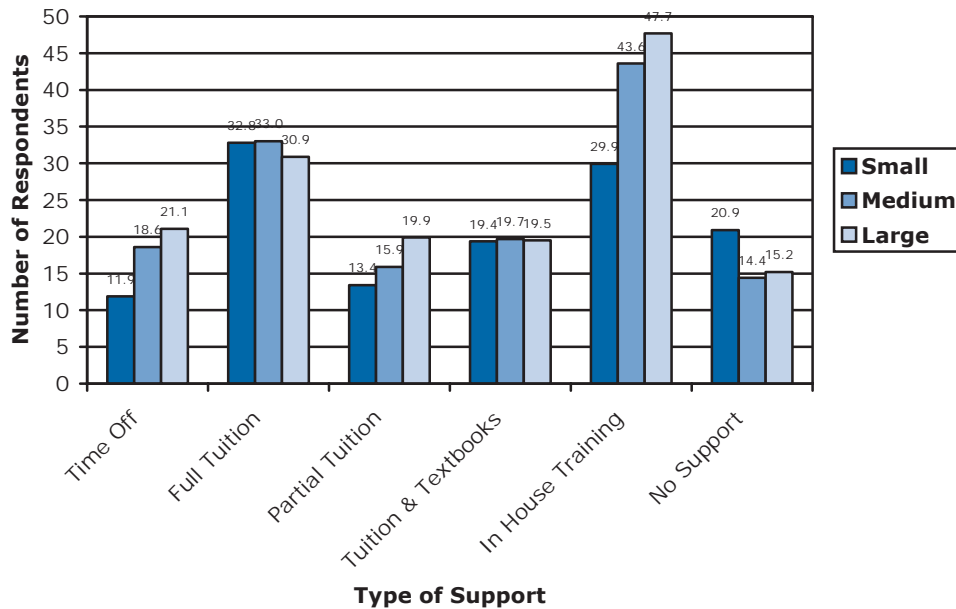
Source: Employer Survey

The State of Logistics in Quebec presentation (based on **Analyse des besoins de formation en logistique au Quebec**) also reported that when asked whether organizations intended to send employees on logistics training within the next three years; 46% indicated that they intended to send employees to college, 25% to an undergraduate program and 5% to a graduate program.

5.1.3   University and Academic Institution Education

Canadian universities and colleges offer various educational options related to the field of logistics and supply chain. Depending on the institution and program, there are varying degrees of depth and specialization in terms of the related educational options available (e.g., there are individual courses, dedicated degrees and diplomas, specialized streams within another degree or program).

A greater proportion of the colleges surveyed offer more dedicated logistics or supply chain management programs than the universities (54% of colleges vs. 33% of universities surveyed) and universities were more likely to offer a logistics or supply chain management specialization within another program (67% of universities vs. 23% of colleges surveyed). An inventory of the main courses, programs and degrees offered by Canadian universities and colleges is available for reference in Appendix V.

As noted in Figure 5.7, undergraduate programs are the most common form of supply chain-related education, with limited executive development being offered for the supply chain sector. Continuing education has a moderate presence and is more prevalent at CEGEPs and colleges than universities.

Figure 5.7: Educational Providers (n=25)
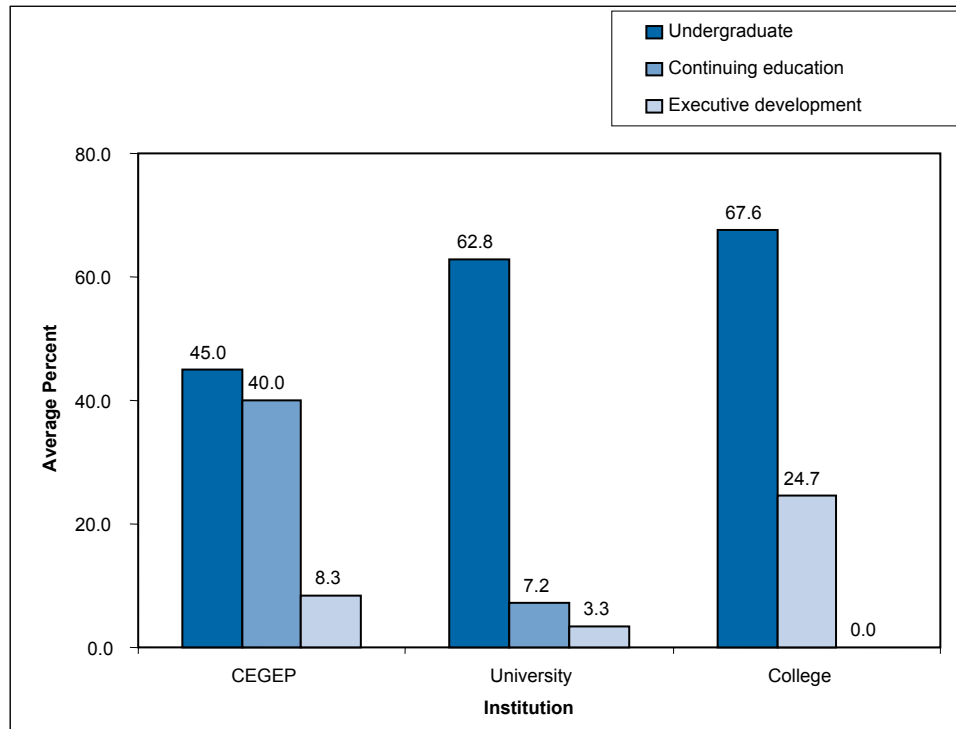
Source: Academic Institution Survey

Industry alliances are also a common activity undertaken by academic institutions to help develop curriculum or work programs. In this regard, relative to universities, colleges appear to be more active in terms of industry alliances. Over 50% of colleges indicated that they had industry alliances for co-op and apprenticeship programs, curriculum input, and with professional associations, while few indicated the same for job placement and research/best practices. Across all institution types, minimal industry alliances appear to exist for the purpose of research/best practices. However, academic institution interviews indicate that universities and affiliated centres are the predominant drivers of applied research, and are starting to build private/public alliances on topical research initiatives (e.g., University of Calgary/Van Horne Institute, HEC's Distribution Research Chair and Ivey's Purchasing Managers Index in partnership with PMAC).

Looking at program content, the following figure highlights the degree to which educational institutions teach the skills and knowledge areas assessed in this study as part of their logistics or supply chain management programs. Where over 80% of academic institutions teach a particular skill, it is circled in Figure 5.8.

The skills that are most often taught (i.e., over 80% of institutions) cover a vast array of topic areas including:

- Logistics and operations knowledge,
- Softer skills (e.g., interpersonal and communications), and
- More technical skills (e.g., forecasting, analytical skills and technology skills).

Figure 5.8: Skills and Knowledge Area Taught (n=25)

		CEGEP	University	College	Total
Communication	Communication Skills	3	8	12	23
	Reading Skills	2	3	5	10
	Math Skills	3	5	8	16
	Technology Skills	3	8	11	22
	Mechanical Skills	1		2	3
Analysis, Making, and Problem Solving	Customer Relation Skills	3	2	10	15
	Analytical Skills	3	9	10	22
	Decision-Making Skills	3	5	11	19
Interpersonal Skills	Negotiation Skills	3	2	6	11
	Interpersonal Skills	3	7	12	22
	Time Management Skills	2	2	8	12
	People Management Skills	3	3	9	15
	Operational Skills	3	9	10	22
Finance	Financial Planning	1	4	8	13
	Forecasting	3	8	9	20
	Cost analysis	3	8	7	18
	International Business	3	4	9	16
Workflow & Optimization	Optimization	2	6	9	17
	Transportation Systems	3	9	10	22
	Laws and Regulations	3	5	10	18
	Documentation and Analysis	3	3	7	13
	Logistic Functions & Supply Chain	3	8	9	20

Source: Academic Institution Survey

To some degree, all of the types of academic institutions report that they teach each of the supply chain related technical tools or systems that were assessed in this study (listed in Figure 5.9). With one exception, participating universities do not teach Customer Relationship Management tools or systems, while this appears to be on the agenda for colleges. Inventory Management and Materials Resource Planning were the most common tools/systems taught and are among the most frequently employed by employers.

Figure 5.9: Logistics Related Technical Tools/Systems Taught (n=25)

	CEGEP	University	College	Total
Number of Respondents	3	9	13	25
Advance Planning & Scheduling	1 33.3%	4 44.4%	3 23.1%	8
Demand Resource Planning	1 33.3%	4 44.4%	5 38.5%	10
Materials Resource Planning	2 67.7%	7 77.8%	8 61.5%	17
Warehouse Management Systems	2 67.7%	4 44.4%	8 61.5%	14
Transportation Management System	3 100.0%	4 44.4%	5 38.5%	12
Inventory Management	2 67.7%	8 88.9%	7 53.8%	17
Customer Management System	3 100.0%	1 11.1%	6 46.2%	10
Supplier Relationship Management	3 100.0%	6 66.7%	5 38.5%	14

Source: Academic Institution Survey

University and college curriculums have evolved over time in response to changes in the skill and knowledge demands of the sector. Over the past 5 years, 4 colleges and 2 universities report having

added new programs focusing on supply chain management. In addition, other academic institutions have added new subject areas to their curriculum. New subjects appear to be focused on technology and general logistics and supply chain management. Industry consultation would suggest a mixed view as to whether or not the content of these courses are addressing the needs of industry.

For an inventory of Canadian college and university logistics-related programs see Appendix S.

5.1.4   Association Certifications and Education

Canadian logistics and supply chain related associations offer several different forums of education, most notably certifications, courses and seminars. Based on a review of 10 Canadian logistics and supply chain related associations, it was found that 8 offered formal certification(s) or designation(s) programs:

- American Production and Inventory Control Society (APICS)
- Canadian Institute of Traffic and Transportation (CITT)
- Canadian International Freight Forwarders Association (CIFFA)
- Canadian Society of Customs Brokers (CSCB)
- Materials Handling and Management Society (CAMH)
- Purchasing Management Association of Canada (PMAC)
- The Logistics Institute
- The Packaging Association of Canada (PAC)

Attainment of certifications and designations typically requires the completion of several courses or modules and passing of one or multiple exams (typically one exam per course/module). The length of time to obtain a certification varies, with the shortest observed being some of the packaging certifications (e.g., 6 or 14 days). It is difficult to estimate the length of time to attain a designation as many are self-paced distance learning. Some certifications are attained through a combination of on-line distance education and face-to-face instruction (e.g., CITT), while others offer both forms, depending on the certification levels (e.g., APICS). Enrollment in some programs requires a minimum level of education (if mentioned, typically high-school), and others require a prescribed number of years experience.

Of the 8 associations, 2 are general, while the remainder focus on a specific sub-function (e.g., purchasing, freight-forwarding). It was observed that the majority of associations are reviewing programs and are making adjustments to ensure the content has at least a component that covers the overall function or full range of supply chain management.

An inventory of the main certifications, courses and seminars offered by associations in Canada is available for reference in Appendix R.

All of the associations consulted had some form of relationship, or association, with other organizations:

- **Educational Institutions** – predominant relationships focused on assisting educational institutions with curriculum development and some with delivery of association certification program.
- **Industry** - approximately half of the associations interviewed indicated that they worked with industry to understand industry needs.
- **Government** - approximately half of the associations work with government, including DND, Industry Canada and Transport Canada.
- **Other Organizations** - several were also affiliated with other organizations, such as a US association or community college.

5.2 Assessment of Education and Training

While there are several courses and programs related to logistics and supply chain being offered, 52.2% of employer respondents indicate that technical training courses that meet the needs of logistics personnel are difficult to find. Fewer indicate that professional development courses are difficult to find (39.6%). In addition, only 45% of employers indicate that recent graduates of logistics programs have the required skills to meet job requirements. In the end, both employers and employees cite education and training as one of the most common human resources challenges.

In addition, the most common recruitment issue for employers is finding required skills. While the cause is unknown, this may be a result of the required material not being taught, or too few qualified people in the market as a result of lack of interest and awareness in the sector and intense competition for scarce resources.

Associations have focused on the working professional and the manager who require a basic understanding. While academic institutions focused more on new workforce entrants. Their programs are broader in nature and they are increasingly offering courses in evening hours. While there is no apparent overlap, a closer examination of course content will probably reveal opportunities for synergies between certification and academic institution programs.

There are mixed views from industry as to the usefulness of certification and education programs, although there is agreement that there are too many to choose from. Some organizations indicate that training and education sources are indeed plentiful:

- Universities,
- Colleges,
- Management Associations (e.g., CMA),
- Learning Centres,
- System and software companies (e.g., SAP), and
- Professional Associations.

However, others indicated that they relied on internal or customized development programs. This speaks to the fragmented nature of the training landscape.

Feedback from all industry representatives describe the state of education and skill development in the sector as:

- Lack of focused courses;
- Lack of supply chain management programs;
- Lack of awareness of programs; and
- The need to get involved at the high school level.

The following findings and observations with respect to education and training are grouped around three categories: internal training, educational institutions and associations/certifications.

5.2.1 Internal Training

Internal training is typically on-the-job training rather than internal courses; however, in-house, basic business and compliance-based training (e.g., health & safety, material handling, dangerous goods, etc.) is becoming best practice (e.g., two-day core business and regulatory training course as part of a one-week orientation program for new operational supply chain management staff). A minority of employers indicated that company specific and on-the-job training for supply chain managers was outstanding.

Employers also indicate that cross-training (supported by skill-based pay) of operational staff is becoming increasingly important as a mechanism to strengthen operational responsiveness and to motivate longer-term operational staff.

5.2.2 Educational Institutions

The demand for technical development courses appears to be strong, as approximately 85% of employers indicate that they are essential for logistics personnel to stay current. 66% of employers suggest that higher education with a logistics/supply chain management or related major is essential when considering new recruits.

Despite the fact that employers identified finding required skills as a challenge, academic institutions indicate that they are offering content in the employer's top skill requirement areas within their logistics programs (although fewer in the area of Customer Relations skills) (Figure 5.10). Perhaps the discrepancy is a reflection of the content within these areas that is being delivered (e.g., applicability, up-to-date, relevant tools, etc) and the knowledge of employers as to what educational programs are available.

Figure 5.10: Top Skills Required by Employer and Percent of Institutions that Teach this Area (n=25)

Top 5 Skills Required by Employer	% of Institutes that Teach this Area
Communication	92%
Technology	88%
Customer Relations	60%
Analytical	88%
Interpersonal	88%

Source: Employer Survey and Academic Institution Survey

Conversely, while some academic institutions are addressing some of the employee's top skill needs within their logistics programs, many are not (with the exception of Logistics and Supply Chain knowledge) (Figure 5.11). However, some of these subjects may be addressed elsewhere in the institution, such as within business programs.

Figure 5.11: Top Skills Required by Employees and Percent of Institutions that Teach this Area (n=25)

Top 5 Skills Employees Indicate they Need More of	% of Institutes that Teach this Area
International Business	64%
Laws & Regulations	72%
Logistics & Supply Chain	80%
Cost Analysis	72%
Financial Planning	52%

Source: Employee Survey and Academic Institution Survey

The top three areas in which employers indicated technology was employed in their organizations are also the most predominantly included in the curriculum taught by academic institutions indicating a general directional alignment in priorities (Figure 5.12). In addition, while not referring specifically to external training programs, 70% of employees indicated that they were provided adequate training in order to make full use of technology in their jobs. Whether from external or internal sources, this indicates that training needs are being met with respect to technical tools and systems.

Interestingly, employers suggest that they do not have the requisite skills to employ technology. This may refer to the organization's ability to develop and implement applications, rather than the ability

to train employees to use the application. This observation may also suggest that organizations do not achieve the desired longer-term adoption of the technology and that a more robust change strategy (i.e., more than just training) is needed to sustain full technology adoption.

Figure 5.12: Tools/Systems Currently Used by Employer and Percent of Institutions that Teach this Area

Tools/Systems	Employer Currently Using (n=160)	% of Institutes that Teach this Area (n=25)
Inventory Management	68%	68%
Warehouse Management System	55%	56%
Materials Resource Planning	39%	68%
Transportation Management Systems	38%	48%
Demand Resource Planning	38%	40%
Customer Management System	34%	40%
Advanced Planning and Scheduling	33%	32%
Supplier Relationship Management	29%	56%

Source: Employer Survey and Academic Institution Survey

Based on the survey results from academic institutions, the majority indicate that demand for logistics courses appears to be increasing (60%), while remaining constant for approximately a third (36%). Those experiencing an increase in demand for logistics courses cited the following reasons:

- Increasing awareness of the programs;
- International students see opportunities in Canada; and
- Positive response to marketing campaigns (by college and industry).

One organization indicated demand decreasing. When asked why, enrollment cost, lack of student awareness/interest, and inadequate financial assistance cited as most significant reasons.

All surveyed academic institutions reported that they had sufficient capacity to meet demand. During further consultations, academic institutions also noted that it was a challenge to attract students to courses/programs in supply chain.

Employers are of the view that there is an inadequate number of supply chain management specialty programs within commerce or engineering programs. While a minority also noted that despite the absence of specific supply chain curriculum, Canada has a solid educational system.

Employers expressed a significant concern about the appropriateness of existing training and education programs, some specific comments include:

- Educational/training programs are outdated and overly theoretical; they do not target specific needs of the sector, such as technical skill in freight, documentation, regulatory and legal.
- Educational programs are too general. In Europe and US, they focus on specific areas.
- Many courses are being offered, but they are fragmented and non-cohesive.
- Supply chain training in business schools is generally restricted to transportation.
- It is difficult to attract international professionals due to the absence of a recognition process and format (i.e., panel, exam, case study, associations, education).

Academic institutions noted a focus on the supply chain/logistics needs of local/regional economies/sectors and generally not nationally or internationally (at least not beyond needs of local/regional industry sectors). In this regard, there was a concern that industry supply chain needs are too fragmented along sectoral lines, and accordingly, it is difficult for academic institutions to build national programs.

There was a managerial concern that university and college graduates, and to a lesser extent certified specialists, do not think globally nor have much exposure to global supply chain/logistics trends and practices. In response, companies are developing their own responsive development practices to fill this void.

5.2.3 Associations/Certifications

Both employers and associations had mixed opinions as to the need for and value of a standardized national certification program for the sector. While all people in the sector require a basic understanding of most supply chain areas, there are some specialized technical disciplines which require a much deeper level of knowledge than would be required by the broader supply chain employee-base. Currently for these areas there are some specialized technical certifications that provide detailed technical education in specialized fields (e.g., purchasing, customs).

Some of the associations that focus more on a specialized technical area of logistics have recently made revisions to programs to include an overview of logistics/supply chain management.

While it is recognized that certification programs are becoming more important, there is a concern that they are not contemporary with respect to evolving regulatory requirements across other national jurisdictions. Employer interview feedback suggests that certification bodies/institutions need to better coordinate around jurisdictional trends and practices.

Academic institutions noted that as post-secondary and certification programs gain industry eminence, the challenge will be to ensure effective marketing strategies (focused on awareness) to reach high school, immigration and other channels and networks. It is unclear in the sector, whose responsibility this would be.

5.3   Barriers to Training

Despite the fact that educational programs are available, there are some challenges and barriers with respect to delivering and obtaining training.

For those academic institutions that indicated that demand was increasing, (60%), respondents indicated the following challenges in meeting increased demand:

- Hiring sufficient qualified instructors (44%);
- Securing sufficient funding (28%);
- Meeting scheduling needs of mature and/or working students (28%);
- Lack of financial aid for students (24%);
- Competition from other educational institutions (16%); and
- Designing courses that meet student needs (12%) (for colleges only).

From the employee's perspective, the most common obstacle preventing them from obtaining additional training is time (Figure 5.13). This is common across all sized organizations, however cost is a greater challenge for small organizations than for larger ones and time is slightly more of a challenge for larger organizations.

Figure 5.13: Obstacles Preventing Employees from Getting Training (n= 753)
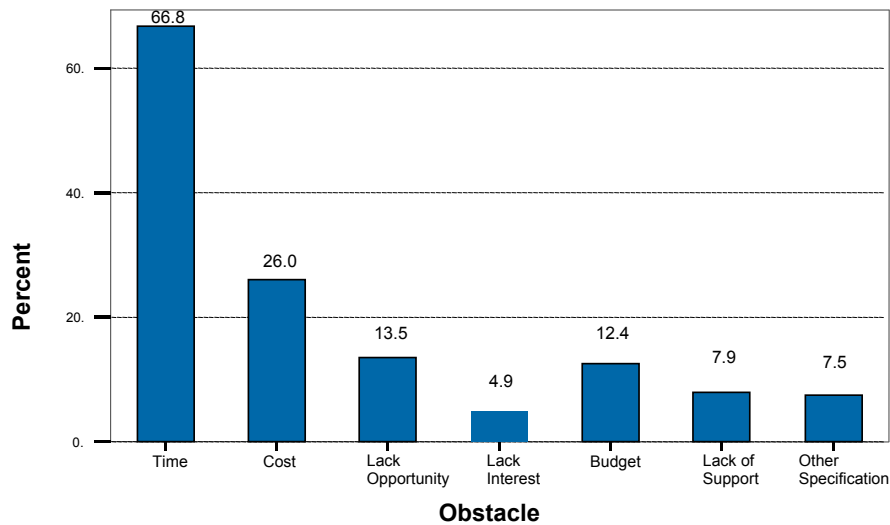
Source: Employee Survey

Some of these findings echo the findings in the Quebec-focused, **Analyse des besoins de formation en logistique au Quebec** study, conducted in 2002, in that 'time' (in terms of 'employees are too busy') was a significant factor preventing employers from letting their employees take training (Figure 5.14). In addition, emphasis on in-house training was also prominent in the Quebec study results and, as previously mentioned, was found by the current study as the main source of employee development.

Figure 5.14: Factors Preventing Employers from Letting their Employees Take Training

I don't know which programs are available	53.4%
Employees are too busy	50.4%
I prefer in-house training	48.3%
We don't need to train employees in logistics	30.7%
Freeing employees is too costly	26.1%
College training is not adequate	11.9%
My employees are not interested	10.6%
University training is not adequate	8.9%

Source: Analyse des besoins de formation en logistique au Quebec

Participants of the **Analyse des besoins de formation en logistique au Quebec** study also indicated that the top three activities that could help make employees available for training were providing financial assistance to help train employees, government assistance to compensate for free time given to employees, and term papers that focus on company improvements.

5.4   International Practices

Internationally, there are many bodies that offer various forms of education certification and support. Some noticeable differences from Canadian practice include:

- In the US, some programs are largely subsidized by the state and others are supported by private enterprise (**Analyse des besoins de formation en logistique au Quebec** study).
- In leading edge logistics countries, formal training and continuing education are "managed by a national skill strategy" (**Logistics/Supply Chain Skill & Labour Market** discussion paper).
- Also in leading logistics countries, a "governing body sets educational standards, coordinates on-going training requirements, makes the bridge between industry and academia and develops national supply chain skill strategy" and provides a description of their main mission. (**Logistics/Supply Chain Skill & Labour Market** discussion paper).

A detailed study of international training practices was conducted in 2003. The results of this study are summarized in the **International Best Practices Discussion Paper**, which provides an overview of organizations that have deployed sector councils and educational best practices in logistics. This study identified the Institut Supérieur de Logistique Industrielle (France-Bordeaux) as an educational institution best practice.

Many organizations are actively involved in European and American logistics education, providing services such as educational standards, conferences, and resource development. Based on information from the **International Best Practices Discussion Paper** and the **Commission Nationale de la Certification Professionnelle (CNCP)** website, the following is a synopsis of key organizations that are actively involved in European and American logistics education:

- **APICS** (US-based) has three certifications and 70,000 certified members from around the world. They have recently introduced a certification maintenance program where every five years certified members must demonstrate having enough 'points' to maintain their certification.

- **CSCMP** (US-based), through their Logistics Education Material Project, developed materials to be taught by marketing instructors and included in marketing text books to increase exposure of logistics to business students; developed the training resource: the CSCMP Toolbox for in-house and classroom use.

- **CSCMP** and **APICS** both focus on management levels and do not address training at the tactical and operational levels.

- **ELA** sets European Logistics Education Standards and has a Vocational Qualification procedure to enable pan-Europe acceptance.

- **ELA** offers European certification through their European Certification Board of Logistics, which enables the mobility of logistics employees throughout Europe.

- **ELA** hosts an annual European Educators conference.

- **AFT**-**IFTIM** (France) develops professional training and continuous education for the logistics sector, both in terms of degrees from universities and colleges and 'titles' (like a certification). Programs managed through AFT-IFTIM range from high school to PhD and number more than 200. Titles can be obtained through training or work experience credits. Requirements are reviewed regularly and updates to curriculum are applied.

- **In France**, employers encourage continuous development and must pay 0.4% of their salary cost to continuous development.

- **ILT** (UK) offers qualifications programs recognized worldwide.

- **CNCP** is a national committee (France) responsible for the development and maintenance of a national directory of professional certifications, conducting research studies, and providing advice and knowledge to certification providers in order to adapt to changing labour market trends and workforce requirements (note: the scope of CNCP is not restricted to the Logistics sector).

- A list of universities, mainly American, that offer programs specializing in logistics is available from the Council of Supply Chain Management Professionals (CSCMP), formerly CLM, at www.cscmp.org.

Based on the **International Best Practices Discussion Paper**, a sample of certifications is provided in Figure 5.15.

Figure 5.15: Sample of International Certifications

CSCMP	• CPIM (Certification in Production and Inventory Management) • CFPIM (Certification Fellow in Production and Inventory Management)
ELA	• EMLog (European Master Logistician) • ESLog (European Senior Logistician) • EJLog (European Junior Logistician)
ITL	• ILT Introductory Certificate • ILT Certificate • ILT Diploma • ILT Advanced Diploma • MSc in Logistics Management
Institut Supérieur de Logistique Industrielle	• 16 month MSc in Global Logistics Management, includes internships

Source: International Best Practices Discussion Paper

5.5   Human Resources Issues

5.5.1   Human Resources Issues

Interview and survey results from industry participants indicate the following to be the main human resources issues, from a list of 15 items, facing the logistics sector:

• Attraction;

• Education and training;

• Keeping pace with technology; and

• Succession and career planning.

Interviews provided an opportunity to understand human resources challenges in more detail. Figure 5.16 provides a summary of some of the more specific human resources challenges:

Figure 5.16: Human Resources Challenges

Human Resources Challenge Area	Sample Specific Human Resources Challenges
Attraction and Retention	• Attracting and retaining younger, skilled employees • Aging workforce • Senior level experienced specialist roles (e.g., purchasing – sourcing, quotation, valuing bids etc.) can be difficult to fill • Difficult to fill processing positions – skills of transitioning product from raw form to end product quickly
Education and Training	• Questionable job-readiness of recent graduates
Career Path	• General lack of clearly defined careers paths and enabling developmental programs
Succession Planning	• Succession planning/knowledge transfer to ensure that valuable experience is not lost with retirement or for smaller organizations, with turnover
Other	• Morale • Seasonality, with respect to training staff • Language constraints when operating globally • Internal equity – having to hire externally at higher rates for senior positions

Source: Employer Interviews and Employee Focus Groups

In order to better understand the priority of the various human resources challenges, Figure 5.17 illustrates the number of respondents that indicated a particular human resources issue was currently a challenge for their organization.

Figure 5.17: Current Human Resources Challenges (n=119)
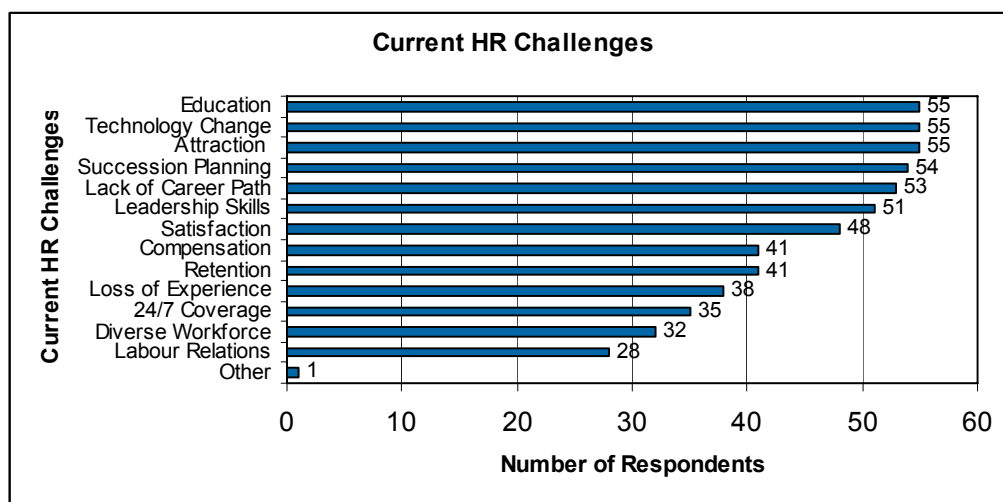
Source: Employer Survey

The top three current human resources challenges by size of organization are highlighted below in Figure 5.18. Note that compared to the supply chain sector-wide top human resources priorities, leadership skills and succession planning are more significant issues for large organizations, although to a lesser extent, leadership skills are also a challenge for medium-sized organizations. Conversely, lack of career path was a more significant issue for small and medium-sized organizations. Compensation is noted as a greater issue for smaller organizations than other sized organizations.

While not in the top three for all-sized organizations, attraction is a common challenge faced by organizations regardless of size.

Figure 5.18: Current Human Resources Challenges By Organization Size

Organization Size	Large	Medium	Small
Most Common Top 3 Human Resources Challenges	• Succession planning • Technology change • Leadership skills	• Lack of career path • Education • Attraction, satisfaction and leadership skills	• Attraction • Technology change • Lack of career path and compensation

Source: Employer Survey

Figure 5.19 provides a breakdown of the percent of respondents by organization-size that indicated that they were currently facing the particular human resources challenge.

Figure 5.19: Current Human Resources Challenges by Organization Size (n=119)
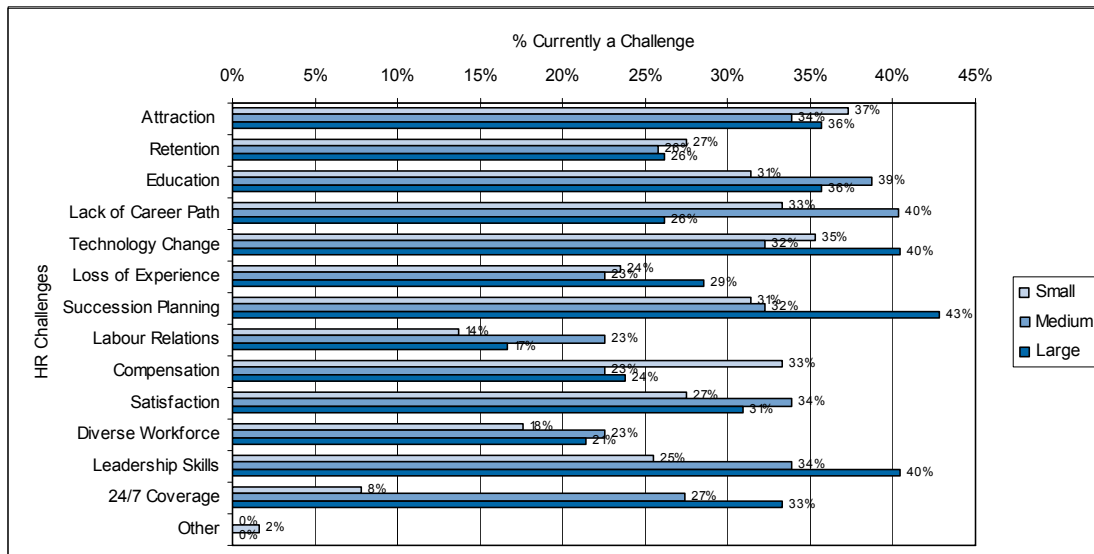
Source: Employer Survey

From the employees' perspective, the following challenges were most frequently cited as the ones being faced by employees in the logistics sector:

- Speed and pace of change, particularly technological change;
- Training and education;
- Customer service;
- Cost and budgetary pressure;
- Communication;
- Pace of work; and
- Workload.

Looking forward, Figure 5.20 illustrates the number of respondents that indicated that particular human resources issues were expected to be present in the future. Note that attraction is currently and is expected to remain a human resources challenge, and that more employers are anticipating challenges around retention and succession planning in the future than currently.

Figure 5.20: Anticipated Human Resources Challenges (n=119)

Anticipated HR Challenges

Challenge	Number of Respondents
Succession	59
Retention	56
Attraction	55
Education	52
Satisfaction	51
Lack of Career Path	50
Compensation	48
Loss of Experience	48
Leadership Skills	47
Technology Change	46
24/7 Coverage	38
Diverse Workforce	31
Labour Relations	25
Other	1
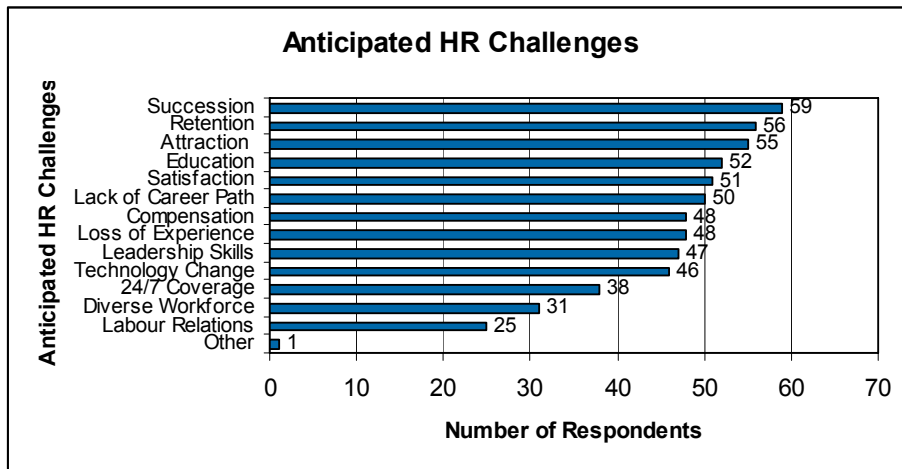
Source: Employer Survey

5.6 Recruitment and Retention

5.6.1 Recruitment

Given that attraction is one of the top human resources challenges being faced, and expected to persist over the next five years, it is not surprising that employers also indicate encountering a variety of recruitment issues. The most common recruitment issue facing employers is finding employees with the skills required. This may be compounded by other common challenges, which include competition for resources, and lack of awareness and/or interest in supply chain.

The following figure provides a comparison of the recruitment issues currently being faced by employers.

Figure 5.21: Current Recruitment Issues (n=119)

Current Recruitment Issues	Number of Respondents
Difficulty Finding Required Skills	69
Competition for Resources	45
Lack of Awareness of the Logistics Function	44
Lack of Interest in Entering Logistic Function	38
Uncompetitive Compensation Packages	20
No Issues	16
Other	3
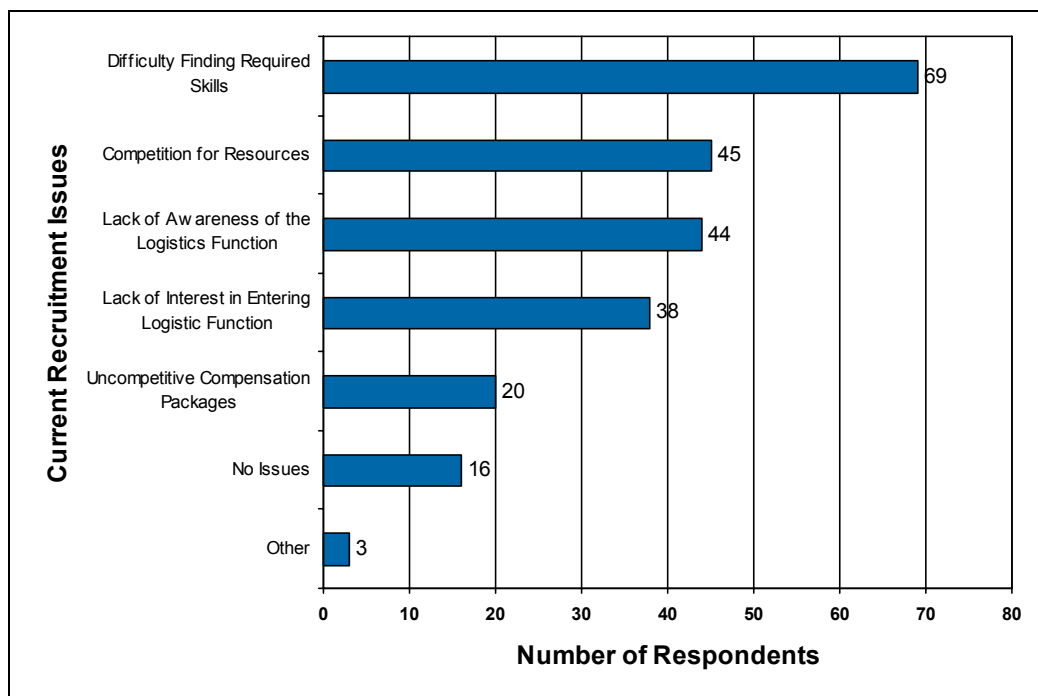
Source: Employer Survey

Similar challenges are faced by organizations regardless of size, with all sizes of organizations identifying 'finding employees with the skills required' as the most significant challenge (Figure 5.22).

Figure 5.22: Current Recruitment Issues by Organization Size (n=119)
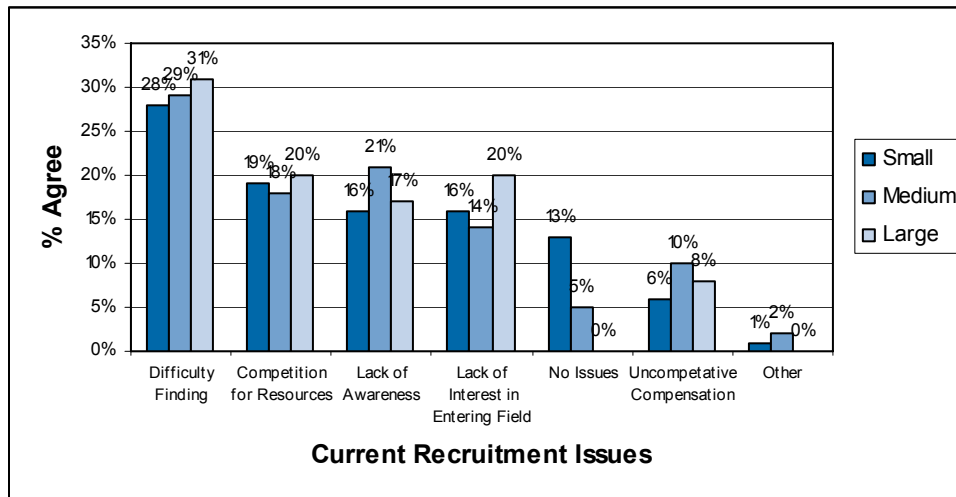
Source: Employer Survey

Interviews with industry participants provide further insight into attraction and recruitment issues and practices:

- Attraction is an emerging priority for most, especially for experienced specialists and managers.
- Sourcing is predominantly based on hiring from other companies and developing existing resources.
- Turnover of shift workers continues to be a challenge for most companies.
- Due to demographic and workforce trends, many companies cited the need for better access to pools of immigrant labour, especially for operational/manual-type jobs.
- International hiring is becoming more important; however, concerns were expressed by many about timeliness of processing work permits/visas, etc.
- Employers recognize the fact that the broad labour market, including students at secondary and post secondary educational institutions, has very limited awareness of supply chain career opportunities.

Awareness & Perceptions

Attraction and recruitment issues are exacerbated by the fact that students have limited to no knowledge of most supply chain functions. As outlined in Figure 5.23, the most common area of full knowledge is the customer service sub-function.

Figure 5.23: Student Knowledge of Logistics (n= 196)

	Warehousing	Purchasing	Transportation	Customer Service	Inventory/ Material Management	Logistics Information
No Knowledge	37.2%	28.1%	31.1%	12.2%	31.6%	44.9%
Limited Knowledge	53.1%	49.5%	55.6%	48.5%	48.0%	45.4%
Full Knowledge	9.7%	22.4%	13.3%	39.3%	20.4%	9.7%

Source: Student Survey

When employees were asked how logistics is perceived by those outside of the function, responses centred around:

- Minimal awareness and understanding of the complexity of logistics (e.g., some think it is only about trucking); and
- It can be viewed as a highly stressful profession.

Employees indicated that young people might hold the following perceptions related to a career in supply chain:

- Shift work can be a deterrent;
- Lack of awareness of the complexity/diversity of skill sets required (seen as labour intensive); and
- Not recognized as a distinct function, with no defined career path.

Many employees indicated that they knew little of the logistics/supply chain field when they first entered it, with many indicating that they 'fell into the area'.

Attraction

Very few employees specifically sought work or a career in the supply chain sector. Many either heard about their positions through word-of-mouth or were promoted from within. Prior to entering their supply chain positions, very few employees had specific supply chain training or experience.

The following attributes are what employees indicate attracted them into a career in supply chain:

- Interesting work;
- Problem-solving – the ability to improve business operations and be creative in finding solutions; and
- Opportunities for learning and growth, the diversity of tasks.

Similarly, when students who were interested in a supply chain career were asked what factors were contributing to their attraction, interesting work was a major factor, second only to the role logistics plays in an organization or industry (Figure 5.24).

Figure 5.24: Attraction to Logistics (n=73)

Bar chart showing Number of Respondents by Attraction Factors:
- Role in Logistics: 61
- Interesting Work: 58
- Opportunity: 48
- Pay: 47
- Reputation: 38
- Hours of Work: 34
- Prestige of Role: 34
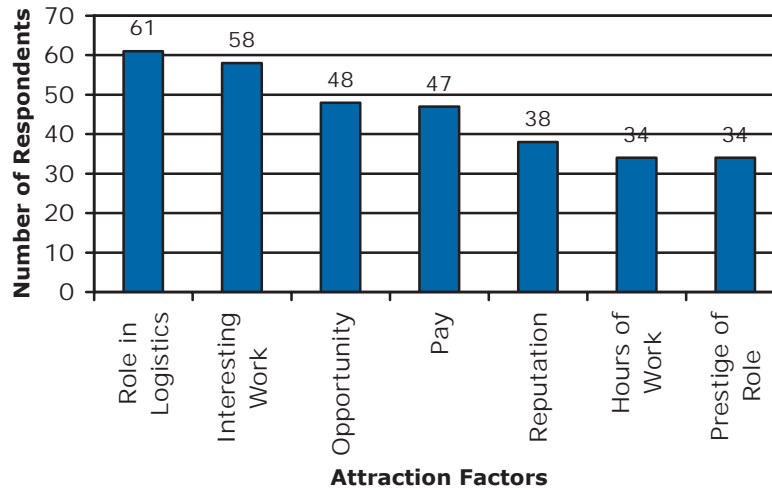
Source: Student Survey

Conversely, employees identified the following drawbacks to working in logistics:

- Insufficient pay;
- Uncertainty and ambiguity – changing rules and regulations, unstable conditions; and
- Increasing demands and expanding roles – difficult to balance operations and customer service.

Career Awareness Activities

Career awareness activities were indicated to be undertaken by few employers (11%). This finding is consistent across small, medium and large organizations.

Organizations that indicate that they engage in career awareness activities outside of their organization, tend to focus on universities and colleges, rather than high schools and may conduct these activities in conjunction with other associations and organizations (Figure 5.25). An example of a successful joint program directed at high schools was found in Calgary, where the Calgary Logistics Council and the Calgary Board of Education launched a "Careers in Logistics" web site, targeted at youth and parents, that provides information on the supply chain sector and its opportunities (www.careersinlogistics.ca).

Small and medium-sized organizations are more likely to conduct career awareness activities in conjunction with other organizations and associations.

Figure 5.25: External Career Awareness Activities (n=119)
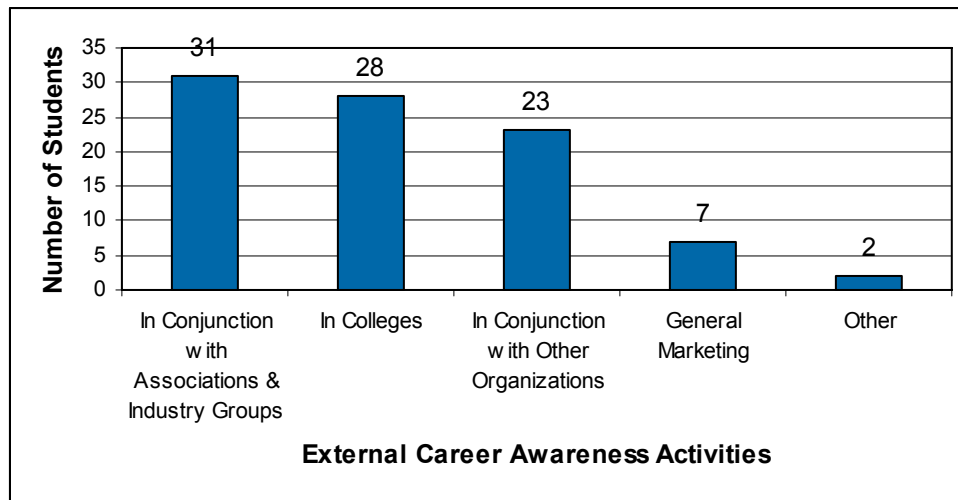
Source: Employer Survey

5.6.2 Retention

As previously mentioned, retention is anticipated to be one of the main human resources Issues in the future. Given that attraction is also a current and anticipated challenge, retention strategies become even more important to maintaining the critical level of workforce required and manage the amount of recruitment activity required.

The degrees to which some common retention issues are faced by employers in the supply chain sector are highlighted in Figure 5.26. As can be seen in the figure, the main recruitment and retention challenge is competition amongst organizations for resources, as the most common retention and turnover issues are competitors actively recruiting employees in other organizations, and employees going to the supply chain function of other organizations.

Figure 5.26: Retention and Turnover Issues (n=119)
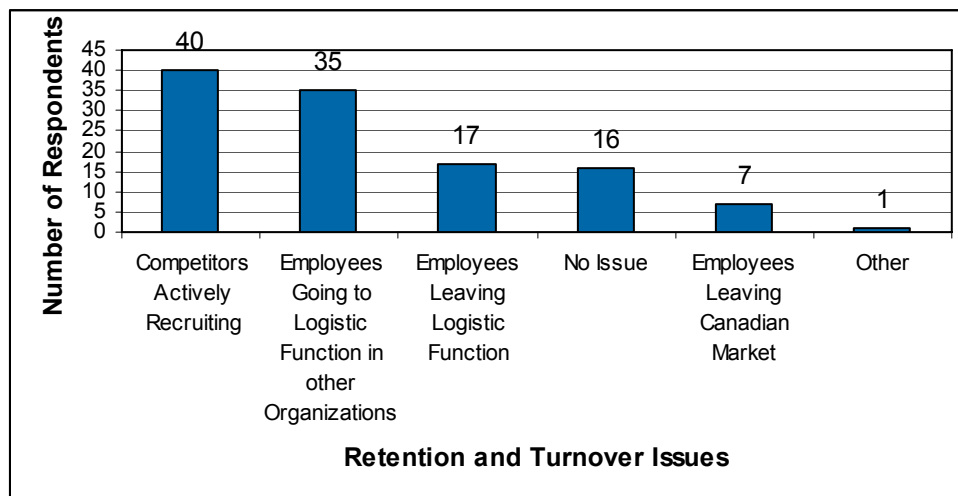
Source: Employer Survey

Competitors actively recruiting their supply chain employees is a greater concern for small organizations, while losing employees to the supply chain function of other organizations is the most common concern for medium sized organizations (Figure 5.27).

Figure 5.27: Retention and Turnover Issues by Organization Size (n=119)
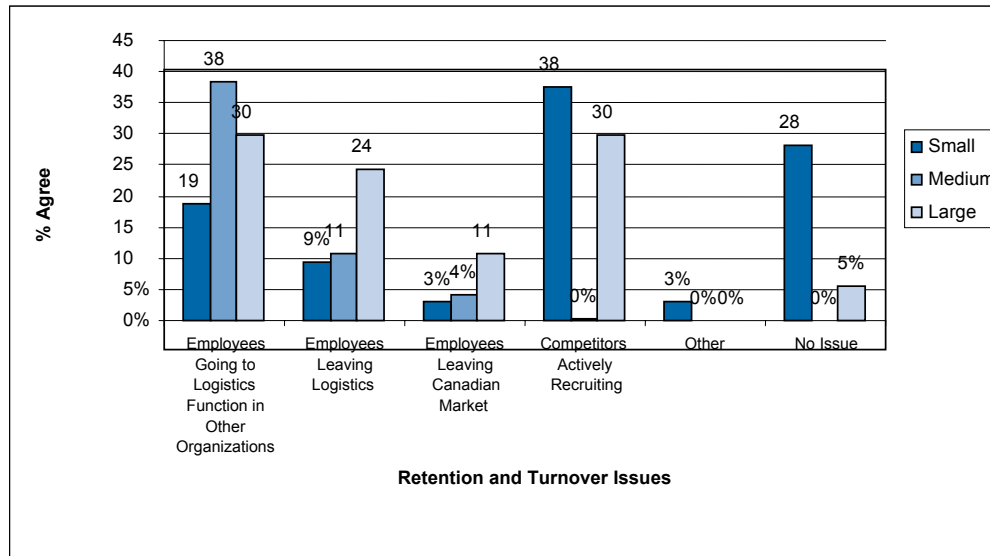
Source: Employer Survey

This competition for resources is a significant issue, given that employees within the function appear to be ready to explore new opportunities both inside and outside of logistics. In this regard, 70.6% of employees indicated that they plan to explore *other* logistics opportunities and 45.6% of employees plan to explore opportunities outside logistics. Operational and tactical employees were more likely to indicate plans to explore new opportunities (either *within or external* to logistics) (Figure 5.28 and Figure 5.29).

Figure 5.28: Plan to Explore *Other* Logistics Opportunities

Figure 5.29: Plan to Explore Opportunities *Outside* Logistics
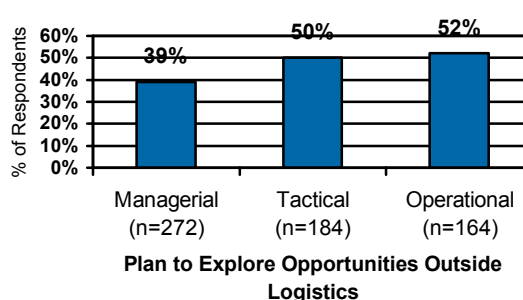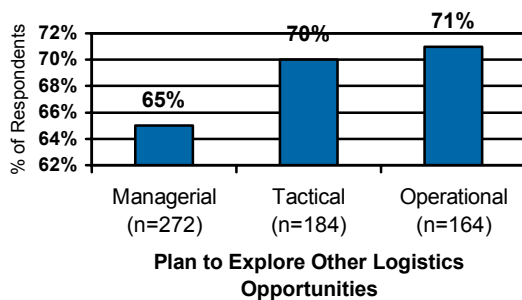
The most common reasons cited by employees for why they would consider leaving the logistics function focused around:

- Promotion and career growth;
- Better or new opportunities;
- New challenge or need for a change;
- Compensation;
- Job stress and pressure; and
- Retirement.

This is similar to what a 2002 study, summarized in the **Personal Benchmarks (February 2002)** article, found that the most common themes related to attraction were 'opportunity', 'growth', 'career' and 'challenge' (Figure 5.30).

Figure 5.30: Attraction to Current Employer

Opportunity for career advancement	40%
Growth potential of company	32%
Challenge of position	37%
Reputation of company	29%
Location	23%
Pay and benefits package	23%

Source: Personal Benchmarks (February 2002)

Some employers appear to be making attempts to resolve these retention issues, with the most common retention strategies being providing a career path and flexible work schedules for employees. Specific activities currently being undertaken by survey participants are illustrated in Figure 5.31.

Figure 5.31: Retention Strategies (n=119)
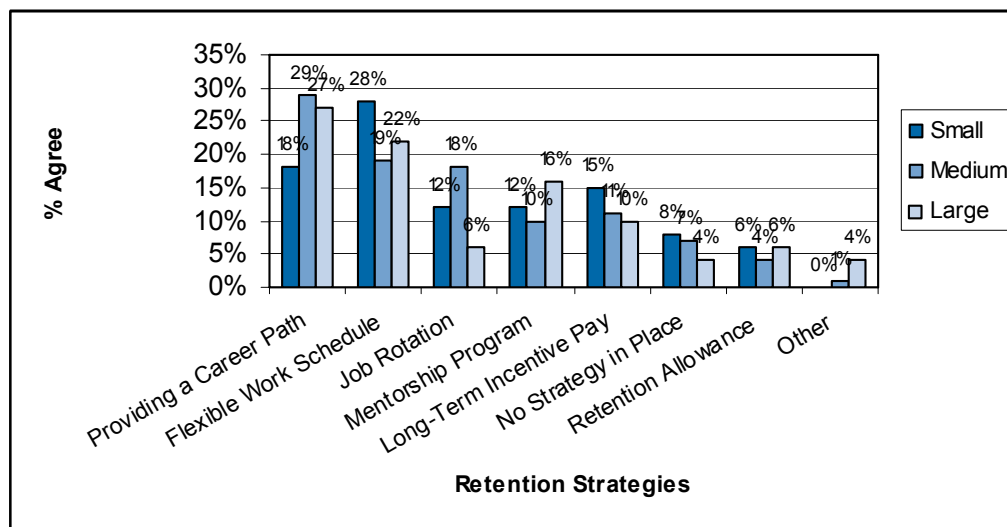
Source: Employer Survey

From a size perspective, the most common activity for small organizations is providing a flexible work schedule, while for medium and large organizations it is providing a career path.

It should be noted that relatively few participating employers indicated that they had recently implemented any initiatives specifically targeted at attracting and/or retaining supply chain employees. Of those that did, the types of initiatives implemented included:

- Various types of training,
- Incentives, and
- Student placements (e.g., co-op).

5.7   Compensation

An important and basic "driver" of attraction and retention in any industry is compensation, particularly annual base salary.   Twenty-six percent (26%) of employers in this study indicated that competitive total compensation is currently a challenge and 30% thought that it would be a challenge in the future.

Educational institutions indicated that the average starting annual salary of graduates from their supply chain-related programs is between $32,000 and $35,000. The educational institutions further indicated that starting salary rates for supply chain-related program graduates have increased at a [marginally] faster rate over the last three years relative to other types of [non-supply chain] graduates.

In the context of the broader supply chain sector workforce, Figure 5.32 below highlights the average [national] base salary research findings for each of the three key occupation categories – managerial, tactical and operational. It should be noted that while the differentials between the three categories are directionally valid, the employee survey process of "category self-selection" likely resulted in some degree of role/level confusion between the tactical and operational occupation categories. While these findings are generally consistent with proprietary Deloitte compensation reference points at the broad category level, they do indicate some degree of relative compression between tactical and operational, and arguably understated average base salary findings of $48,713 for the tactical category of employees and $64,912 for the mid-managerial cadres (by 10 to 12%).

Figure 5.32: Base Salary by Occupation Category

Occupation Category		Average Base Salary
Managerial	Senior Manager (n=65)	$99,243
	Manager (n=289)	$64,912
Tactical (n=184)		$48,713
Operational (n=161)		$42,053

Source: Employee Survey

Further examination of position-specific base salary trends [proprietary Deloitte] indicate that median base salary practices for operational positions, such as Material Handler and Shipper/Receiver, are in fact comparable, and in some cases slightly less than the average base salary rate of $42,053. Conversely, position-specific trends for tactical positions indicate slightly higher base salary practices (in the order of 4.9%) than the $48,713 noted above. Position-specific managerial (e.g., Purchasing Manager, Warehouse Manager, Logistics Manager and excluding Senior Managers) trends indicate slightly higher market practices (10 to 12%) than the overall average of $64,912 found in this study.

As summarized below in Figure 5.33, further data analysis of average base salary trends by region indicated that Quebec and then Ontario-based employers offered the highest relative levels of base salary for the broad managerial cadre. Similarly, Quebec-based employers appear to offer the highest levels of base salary remuneration for both the tactical and operational categories. Atlantic and Prairies-based employers appear to offer the lowest relative levels of base salary remuneration for both tactical and operational employees. These trends are generally consistent with "all-industry" regional compensation trends across Canada (Deloitte).

Figure 5.33: Base Salary by Region

	BC	Alberta	Prairies	Ontario	Quebec	Atlantic	National
Managerial (n=267)	$68,833	$63,455	$64,740	$71,110	$78,913	$70,183	$70,968
Tactical (n=184)	$53,125	$51,493	$43,385	$48,308	$53,993	$39,048	$48,713
Operational (n=161)	$50,238	$36,900	$35,000	$40,065	$52,000	$38,018	$42,053

Source: Employee Survey

As highlighted in Figure 5.34, a material base salary differential is observed between male and female employees from a sector-wide perspective. With an average [national] base salary rate of $62,560 for male employees and $47,903 for female employees, it would appear that on "face value", a material equity differential of 30.6 % may exist. However, when these findings are examined in the context of such variables as education, overall workforce composition, workforce composition by broad category (e.g., more men occupy managerial and senior managerial positions than women), and experience and job tenure, it is concluded that a significant portion (but not all) of the differential can be explained by these factors (Figure 5.35). It should be noted that these findings are also consistent with similar studies conducted over the course of the last ten years. For example, the **Logistics Labour Market Information Study: Phase 2** (1997), reported that women [were] 'reasonably represented in logistics jobs, but tended to occupy lower level positions'…and found that on average, women earned approximately 20% less than men.

Figure 5.34: Base Salary by Gender

Gender	Salary
Male (n=450)	$62,560
Female (n=275)	$47,903

Source: Employee Survey

Figure 5.35: Salary by Gender and Occupation Category

Occupation Category	Female	Male
Managerial	$62,560	$74,070
Tactical	$43,425	$55,100
Operational	$39,798	$43,540

Source: Employee Survey

Finally, it should also be noted that the research results indicated a similar gender differential with respect to short-term incentive or variable-pay practices. For instance, the findings revealed that average variable pay rewards for men (18 % of base salary) are almost twice that of women (9.5 % of base salary) across the managerial and tactical cadres. Again, while a number of the above-noted variables may account for much of this difference, some degree of residual "equity" differential and related risk is apparent.

In conclusion, while these average and median base salary profiles appear to be meaningful indicators of current sector-wide practices, they are not extraordinarily competitive relative to other emerging professional and managerial occupations (e.g., accounting and information technology). As a result, organizations employing these base salary practices may not be able to use compensation as an effective retention mechanism for employees being sought out by larger and more strategically oriented employers.

5.8   Career Progression

Lack of a career path and succession planning were two of the most common human resources challenges/issues identified by employers as a current challenge. These challenges were also expected to persist over the next three to five years, with succession planning being the most commonly anticipated human resources challenge for the future. As a result, workforce planning and career progression are areas that will be top of mind for human resources professionals and managers in the supply chain sector.

As summarized in Module 3, there have been many articulations of supply chain-related career paths over the years. With numerous sub-functions and potential career path options, it is difficult to articulate a single standard career path for all of supply chain, so work in this area has typically focused on the general skill, experience and education requirements to progress between levels (e.g., managerial, tactical and operational) rather than specific job titles and organization chart progressions.

This section outlines the typical structure and general career progression as per current and previous research study findings.

Structure

As previously stated in Module 1, logistics functions are generally centralized and continue to move to that model, lead by a senior management position.

In 1997, the **Logistics Labour Market Information Study: Phase 2**, found that the logistics function was "flattening and changing in shape enabling logistics personnel to work in team and process environments."

There is an increasing number of generalist logistics and supply chain specialist positions within the sector.

Entering the Sector

Study results indicate that managers typically develop employees from within and are looking for experienced employees from other organizations, rather than hiring new recruits from colleges and universities. This being said, organizations still do hire from colleges and universities (over 90% of new graduates from logistics programs find employment in the logistics field) and also offer work-study programs for new recruits (e.g., co-op placements, internships) to start the employment process and develop employees.

Most post-secondary graduates start employment at the tactical or managerial levels (tactical is more common for college graduates and managerial for university graduates). As previously mentioned, the most common sub-functions that recent graduates enter after completion of a logistics related program are:

- Inventory/material control;
- Purchasing; and
- Transportation.

College graduates appear to find employment in Inventory/Material Control and Purchasing.

The **Logistics Labour Market Information Study: Phase 2** (1997) also found that older employees, rather than having entered the field early, tend to have previously held more positions outside of the supply chain field before entering the area. As such they found that older respondents entered the supply chain workforce at a later age (~31), while the youngest respondent category had an entry age of approximately 22.

According to the **Logistics/Supply Chain Skill & Labour Market** discussion paper, the typical entry into the supply chain field is a person around 35 years of age with a bachelor's degree and three years of experience entering the sector at a lower management level.

Length of Supply Chain Experience

Once in the field, the typical employee has worked in the supply chain sector for 6 to 15 years over the course of their career.

By NOC code, we find that there is a wide range of type and years of experience for employees. The career history of survey respondents shows that the majority of positions held with the current employer were in the supply chain sector, indicating that they entered the organization within this sector and then moved around within it. Previous work experience outside of their current employer also tended to focus on supply chain-related roles, supporting the finding that employers tend to recruit from the supply chain function of other organizations.

By occupational category it can be noted that a typical manager has 6 to 15 years of supply chain experience over the course of their career, with many also having 16 to 25 years of experience. Senior Managers were noted as having a greater amount of experience than other Managers. Operational and tactical employees both tend to have up to 15 years of experience. A breakdown of years of experience in the logistics function by type of position is provided in Figure 5.36.

Figure 5.36: Years in Logistics Career

Sub function	Occupation Category	NOC #	Years in Career				
			<2	3-5	6-15	16-25	>25
Senior Management	Managerial (n=65)	0016	6.3%	1.6%	27.0%	33.3%	31.7%
Logistics Information Systems/ Processes	Managerial (n=24)	0213	4.2%	8.3%	33.3%	33.3%	20.8%
	Tactical (n=46)	2233	20.0%	20.0%	40.0%	15.6%	4.4%
Warehousing	Managerial (n=29)	0721	0.0%	9.3%	31.5%	35.2%	24.1%
	Operational (n=48)	7452	13.6%	34.1%	31.8%	18.2%	2.3%
Transportation	Managerial (n=54)	0713	0.0%	9.3%	31.5%	14.6%	0.0%
	Tactical (n=42)	1236	2.4%	39.0%	43.9%	14.6%	0.0%
	Operational (n=70)	1471	20.3%	33.3%	37.7%	7.2%	1.4%
Inventory/ Material Control	Managerial (n=56)	0114	3.6%	17.9%	30.4%	30.4%	17.9%
	Tactical (n=21)	1474	21.1%	26.0%	36.8%	5.3%	10.5%
Purchasing	Managerial (n=22)	0113	0.0%	9.1%	54.5%	22.7%	13.6%
	Tactical (n=21)	1225	14.3%	33.3%	23.8%	19.0%	9.5%
Other (Sales and Marketing manager)	Managerial (n=33)	0611	0.0%	9.4%	59.4%	25.0%	6.3%

Source: Employee Survey

Looking over the course of an employee's career, typically operational and tactical employees hold an individual position for 1-5 years with their current organization, and typically 1 to 10 years within a position with previous employers. The length of tenure within a position for managers is higher and up to 25 years.

Career Progression

The **Logistics Labour Market Information Study: Phase 2** (1997) found that in general an employee will spend 3 years at the operational level,5 years at the lower/supervisory level, and 8 years and the middle management level.

In order to advance within the supply chain sector, Figure 5.37 summarizes the high level requirements to move to the next level based on information from both the **Logistics Labour Market Information Study: Phase 2** and **Logistics/Supply Chain Skill & Labour Market** studies.

Figure 5.37: Required Skills to Progress to the Next Level

Level	Required to Progress to the Next Level
From Lower Management to Middle Management	• Further education is required • Prior to entry: university requirements • Prior to entry: experience in the business arena • Extensive experience over key logistics/supply chain functions at early stage of responsibility • Ideally about 5 years of experience across supply chain functions • Integration with the supply chain community (e.g., association membership/participation) • High technical skills and emerging business management, communication and human resources skills • Knowledge of strategic level work of next level • Aptitude for one or two supply chain functions, cross-functional teams
From Middle Management to Upper/Top Management	• Operate a logistics/supply chain business unit profitably/ Track record of business success • Post-graduate qualifications/ Graduate degree • Executive sets: communication and visioning • A greater breadth of experience within supply chain is required • About 8 years of experience at the middle level • Functional depth in certain areas • Cross-functional team experience • Business unit management experience • Strategic and systems integration skills

Source: Logistics Labour Market Information Study: Phase 2 & Logistics/Supply Chain Skill & Labour Market

5.9   Emerging Human Resources Strategies

Interviews and focus groups revealed an emergence of several human resources practices in the following areas: training, workforce planning and recruiting, and strategic human resources. Some examples are outlined below:

Training

- In-house basic business and compliance-based (health & safety, material handling, dangerous goods, etc.) training programs are becoming best practice (e.g., two-day core business and regulatory training course as part of a one-week orientation program for new operational supply chain management staff at one mid-sized food distributor).
- Cross-training (supported by skill-based pay) of operational staff becoming increasingly important as a mechanism to strengthen operational responsiveness and to motivate longer-term "operational" staff.
- Company-funded one-year diploma programs for operational employees.
- Such companies are now planning and measuring the outcome and impact of increasing levels of developmental investment.

Workforce Planning and Recruiting

- In response to an aging workforce and emerging skill requirements, human resources and workforce planning are becoming key business practices for large-size employers.

- Recruitment Referral Bonus program was cited by one distributor as key to its ability to attract operational staff.

- Best practice supply chain human resources practices include branding and promoting supply chain "careers" rather than "jobs". This however, requires more sophisticated human resources practices such as having defined career paths and enabling [development] practices.

Strategic Human Resources

- For many small and some mid-sized companies, proactive human resources strategies and practices (e.g., enabling human resources infrastructure, defined Training Strategy, using dedicated Training Managers, career paths and development strategies, performance management, etc.) are only now being considered. Although, a number of small and medium-size companies are starting to become creative with recruitment efforts – career days, college/university alliances, etc. For example, the Calgary Board of Education has developed a Career Pathways program in collaboration with post-secondary academic institutions and industry, designed to help students progress from school into a career. This program provides career guidance, practical learning through internships, and courses and curriculum to expose high school students to various career options.

Conclusions

Training and Development

- On-the-job training is the most common form of training and development. Opportunities for maximizing this strategy need to be pursued.

- On average, the data suggests effective training investments are made across the logistics and supply chain sector.

- While not extensively employed by the sector, work-study programs (e.g., co-op, apprenticeships) represent future opportunities.

- From a scale perspective, training strategy investment in smaller organizations is less than optimal.

- Small and medium-sized organizations are finding competition for appropriately skilled resources a challenge; limited capacity to offer a career path; and less money for training and to invest in technology.

- For highly specialized and experienced skill sets, education and training were cited as a human resources challenge by many employers.

Education Providers

- Logistics and logistics-related programs are available at colleges and universities.

- While there are exceptions, relative to universities, colleges have strong industry alliances, gathering industry input for curriculum development and working with industry to develop the experience of their students through co-ops and apprenticeships (e.g., of linkages with industry, such as École des hautes études commerciales (HEC), Humber College Institute of Technology and Advanced Learning, Wilfrid Laurier University, University of Calgary).

- Overall, while there appears to be no shortage of sources of skill, education, and professional development opportunities, they are fragmented and not optimally aligned.

- In the context of companies working nationally or internationally, there may be a need for more effective national integration, and consistency of development and certification programs.

- Employees and academic institutions are collectively of the view that they respectively have and are producing the core skills required by employers.

- While demand for supply chain courses in emerging areas is increasing, there is a concern that educational providers may be under-funded and lacking qualified instructors to meet this emerging demand.

Supply Chain Career Awareness

- Students have a limited awareness/knowledge of the logistics sector. This is significant as it is likely a factor contributing to the attraction and recruitment challenges faced by the sector.
- College and university courses are cited as the main source of information about the logistics sector and should be leveraged as a mechanism to increase the awareness and knowledge of the sector.
- Career awareness activities focus on university and college students, rather than high schools, thus not taking full advantage of career study programs in high schools.

Talent Management (Attraction, Recruitment, Career Planning)

- Attraction is currently, and is expected to remain, a human resources challenge. This is likely compounded by limited awareness of the sector and the fact that relatively few organizations have implemented any specific initiatives targeted at attracting and retaining supply chain employees.
- Career opportunities were identified as an attraction to the sector for entry level recruits and for those currently employed within the sector.
- Succession and career planning are cited as key human resources challenges. Some organizations appear to have started working on this, as the most common retention strategy reported is "defining a career path". While large-scale employers are employing better practices in this regard, small sized employers generally are not.
- The main recruitment and retention challenge is competition amongst organizations for resources. This implies that demand for supply chain employees may be exceeding supply and that effort should be directed toward developing the supply of qualified and interested potential supply chain employees.
- Manager and supervisor positions are commonly cited as difficult roles to fill, particularly employees with general managerial skills.
- Given the emerging strategic importance of supply chain to most organizations' business model, those that do not use effective talent management strategies to retain and develop employees, are at risk of losing their experienced employees and not being able to attract new talent.

Human Resources Issues and Practices

- Sector average and median base salary profiles are not competitive relative to other professional and managerial occupations in demand. As a result, organizations employing these base salary practices will not be able to use compensation as an effective retention mechanism for employees being sought out by larger and more strategically oriented employers.
- Research results clearly indicate possible pay equity and internal equity risks.
- Keeping pace with technology was cited by employers as a common human resources challenge, however, employees, for the most part, indicate that they receive adequate training to allow them to use the technology.
- Technological change is expected to be ongoing and will continue to contribute to human resources challenges (e.g., change management, job redesign and new skill requirements). In the short term, employers are addressing immediate needs through training.

Module 6

Key Human Resources Challenges

Based on the primary and secondary research findings, subsequent analysis and related working sessions with the Steering Committee and "industry roundtables", the following key human resources challenges have been highlighted for strategic consideration:

Fragmented Sector/Sector and Related Human Resources Implications

- Despite the fact that supply chain functionality is rapidly becoming of strategic importance to most organizations across all industry sectors, research findings and validation with sectoral leadership clearly indicates that the supply chain/logistics sector is fragmented and lacking an integrated and visionary positioning with respect to the broader Canadian economy. This in turn, poses significant implications and challenges for human resources strategy and effectiveness of related programs and practices.

Lack of Awareness and Understanding of the Sector

- There is a general lack of sector awareness amongst future workforce participants (students), guidance counsellors and new entrants. Minimal awareness campaigns and activities have been undertaken. Those that exist are generally geographically localized.

Attracting, Developing and Retaining Supply Chain Specialists an Emerging Priority

- Technological and regulatory change is influencing supply chain/logistics business models and human resources needs (e.g., regulatory and trade knowledge in short supply for growth-oriented companies).

Emerging Occupations/Specialist Skill Sets

- The nature of the occupation within the sector is changing with the emergence of new jobs related to supply chain specialists, as well as diminishing jobs that specialized in one specific supply chain area. In addition, there has been an emergence of supply chain sector-specific corporate services/support expertise and competence. The challenge will be that human resources strategies will need to be adaptable to suit a variety of types of jobs ranging from semi-skilled (operational) to professional (tactical) to executive level (managerial).

- There is an increasing need for knowledge workers with the advent of globalization, technology, information management and analysis.

- Business acumen is increasingly being noted as a fundamental knowledge area for many roles, including operational ones. This has implications for the experience level, and to some degree the educational requirements, to progress in the logistics sector.

Limited Use of Talent Management Strategies

- Given the emerging strategic importance of supply chain to most organizations' business model, those that do not use effective talent management strategies to retain and develop employees, are at risk of losing their experienced employees and not being able to attract new talent.

- There are emerging human resources best practices in larger organizations in the areas of succession planning and career paths.

- Limited use of coop and work programs in small and medium-sized organizations.

- Smaller organizations have unique human resources needs and are experiencing challenges with respect to technological change and attraction.

- Given the emerging strategic priority being given to supply chain functionality and roles and the relative limited supply of experienced tactical and managerial staff, compensation prices are gradually being bid up in the marketplace as mid and large-sized organizations source their needed talent. This is beginning to put undue pressure on smaller organizations.

- Succession planning and knowledge transfer are key to ensure that valuable experience is not lost with retirement or for smaller organizations, with turnover.

Sector and Training/Education Highly Fragmented

- There is a lack of a common definition or ability to articulate the scope of supply chain and its occupations.

- Sources of education and certification programs are fragmented and localized (e.g., not nationally integrated).

- On-the-job training and internal development programs are commonly used and required to fill the 'experience' gap.

- Ongoing education and training is encouraged by companies of all sizes.

- Business programs are available and necessary for those in management roles.

- Industry, academic, association and government alliances are weak and not leveraged nationally.

Current Pool of Appropriately Skilled Talent is Limited in Size

- Organizations within the logistic sector are competing with each other for the same talent, rather than focusing on growing new talent or broadening the scope of the talent pool.

- Recruitment strategies have focused on growing employees internally or recruiting experienced workers from within the sector. Organizations report that they rarely hire new graduates. Organizations are discovering that they need to take a more strategic approach to identifying and developing resources and to broaden the sourcing of this talent beyond the sector itself.

- This long-standing practice has grown from the fact that new entrants need a combination of education/training and experience to be successful. This would suggest that educational curriculum that can incorporate work experience would be viewed as a positive development.

- To date, efforts to increase career awareness in the schools have been limited to the local level and are not widespread.

- International talent sourcing not fully developed; only 21% report hiring from outside Canada. At the same time, the requirement for an understanding of international business practices, language skills and cultural awareness is growing.

- The workforce is fairly diverse.

- The supply of "specialty skill sets" is a concern.

- While there is a significant investment in training, employers report that employees are not able to fully use technology.

Employee Engagement a Pending Concern

- Engagement and employee commitment is low.

- Employees are satisfied, yet suggest they would consider opportunities outside of the supply chain sector, particularly at the tactical and operational levels.

Strength/Weaknesses/Opportunities/Threats (SWOT) Analysis

The following SWOT analysis provides examples of strengths that the sector has to draw upon, the weaknesses it must work to overcome, some opportunities to pursue and threats to ward off. This analysis is based on a synthesis of the findings of this study and is intended to establish the context within which recommendations can be developed to address current and future challenges facing the sector.

6.1   Strengths

Workforce

- A well educated workforce, seeking opportunities for growth and development.
- The workforce profile suggests that employees are satisfied with their job and would recommend employment in logistics.
- The finding that skill differences do not vary by company size or region, suggests that supply chain employees can move with some degree of ease.
- A workforce that wants to be engaged in the business.
- A diverse workforce.

Investments in Training/Development

- Organizations are willing to invest in training and development and appear to do so, above the Canadian average.
- The sector is self-sufficient with a wide array of training available through educational institutions, associations and in-house programs.
- Organizations show a willingness to develop and promote their workforce indicating that they realize the importance of investing in their workforce.
- Significant investment in learning technology, health and safety and quality.

Emerging and Existing Alliances and Relationships

- All of the associations consulted had some form of relationship, or association, with other organizations:
  - Educational Institutions – predominant relationships focused on assisting educational institutions with curriculum development and some with delivery of association certification program.
  - Industry - approximately half of the associations interviewed indicated that they worked with industry to understand industry needs.
  - Government - approximately half of the associations work with government, including DND, Industry Canada and Transport Canada.
  - Other Organizations - several were also affiliated with other organizations, such as a US association or Community College.

6.2   Weaknesses

Fragmented and Lack Strategic Focus

- The players in the sector have difficulty defining/articulating the profession or what a career in logistics would look like.
- Logistics functions tend to operate in functional silos within the organization, as well as professional associations and as industries.

Training and Education

- Educational institutions are meeting some of the sector needs, however, there is significant room for improvement. Associations are filling the void but also overlapping in terms of program development.
- Significant concerns were expressed about the appropriateness of existing training and education programs:
    - Educational/training programs can be outdated and overly theoretical. They do not target specific needs of the sector, such as technical skills in freight, documentation, regulatory and legal.
    - Educational programs are too general. In Europe and US, there is focus on specific areas.
    - Many courses are being offered, but they are fragmented and non-cohesive.
    - Logistics training in business schools is generally restricted to transportation.
    - It is difficult to attract international professionals due to an absence of a recognition format (i.e., panel, exam, case study, associations, education).
- There is a significant need for coordination across sector stakeholders.
- Education/certification programs are fragmented and localized.
- While it is recognized that certification programs are becoming more important, there is a concern that they are not contemporary with respect to evolving regulatory requirements across other national jurisdictions.

General Lack of Understanding and Awareness of Logistics

- Employers, and future and current employees, are not clear as to where to look for training and information about career opportunities.
- There is a lack of sector awareness amongst students, job seekers, career changers and guidance counsellors.
- Students' lack of awareness or interest in supply chain is apparent in low enrolment in these programs at colleges and universities.

Ability to Apply or Keep Pace with Technology

- Technology usage is relatively low.
- While organizations are continually updating their technology to improve efficiency, they indicate that their ability to keep pace with technological change is a challenge. In addition:
    - Introduction of technology is also changing the nature of work for employees, in terms of:
        - Increased pace of work with less lead time; and
        - More real time information and increased requirement to manage this influx of information.
    - Software application, and analytical and decision-making skills are rapidly replacing traditional manual processes. It appears that many employees have been able to adapt to this evolution.
    - Divergent views with respect to whether employees possess technically adaptable skills. Employers are dealing with this in the short term by focusing on in-house and on-the-job training. In the longer-term, this has implications for more pro-active technical skill development and opportunity for industry/academic institution alliances.

6.3   Opportunities

Emerging Best Practices

- Although in the minority, some organizations have undertaken initiatives to better address their talent needs. These practices include the articulation of career paths or definition of requirements for key benchmark jobs. Some have also adopted a more formal succession planning process for manager level positions in recognition of impending retirements.
- Emerging supply chain specialist jobs and support roles in training and human resources.
- International talent sourcing.

- Use of co-op programs.
- Career awareness campaigns at the high school level.

Growing Profile of Logistics

- Strategic relevance and alignment of logistics function is gaining recognition.
- 3PLs growing with increased need for technology and specialist skills, and complexity of global logistics.
    - Increasing pressures to reduce costs, yet challenges with Canadian infrastructure (e.g., capacity at ports), as organizations continually seek solutions to these challenges, specialized skill sets and knowledge such as freight forwarding options, tracking, management information become more critical resulting increased reliance on logistics specialists.
    - Increased regulations and security requirements leading to a need for more specialist knowledge.
- More and more organizations have a centralized approach to logistics headed by a senior manager. Vice-President Logistics positions are emerging at the executive table of larger organizations. This should result in increased integration of the sub-functions, more dialogue on the strategic value of the function to the organization, and increased focus on the need for specialist skills.
- Employers and employees are almost unanimous in the view that regulatory knowledge is less than optimal and related training is a priority. On a related note, the top five outsourced activities are those that are impacted by regulatory change (outbound/inbound transportation, freight forwarding, custom brokerage and clearance).

Curriculum in Colleges and Universities is Growing and the Schools have Some Capacity

- There is an emerging opportunity for universities, colleges and professional institutions to develop collaborative alliances with industry with respect to the development of programs. To date, these efforts have been ad hoc and generally not strong. Specialty and co-op programs are suggested as a starting point.
- Colleges have good industry relationships, but are more locally fragmented. Universities, however, tend to have a broader focus.
- There is concern that supply chain sector needs are too fragmented along industry sectors. Accordingly, it is difficult for academic institutions to build national programs.
- As post-secondary and certification programs gain sector eminence, the challenge will be to ensure effective marketing strategies (focused on awareness) to reach high school, new Canadians and other channels and networks.
- Curriculum in academic programs exists and are becoming more established, however, educational institutions are weak with respect to meeting sector needs. Curriculum design based on occupational standards and essential skills profiles needs industry, academic and association collaboration and the support of national occupation standards that delineate tasks and skill sets.
- Supply chain and supply chain-related programs are available at colleges and universities.

Continued Development of Partnerships and Sharing of Ideas/Best Practices

- Partnerships need to continue to grow.
- Relative to universities, colleges have strong industry alliances, gathering industry input for curriculum development and working with industry to develop the experience of their students through work-study programs.
- Overall, while there appears to be no shortage of sources of skill development, education, and professional development opportunities, they are fragmented and not optimally aligned.

Effective Training Investments are Made Across the Supply Chain Sector

- Even though the overall training strategy tends to emphasize on-the-job training, employees are concerned about the lack of sufficient time for external training.

- While not extensively employed by the sector, work-study programs (e.g., co-op, apprenticeships) represent future opportunities.

- From a scale perspective, training strategy investment in smaller organizations is less that optimal.

Untapped Labour Sources

- Females are a large segment of the workforce, yet they are typically less educated than males in the sector. With increasing need for more managerial employees and skills, there may be a need to encourage younger females to enter this field of study as a means to increase the pool of qualified candidates to meet demand.

- New graduates from supply chain programs and foreign trained workers are potential sources of employees.

- New entries into the workforce embrace technology.

6.4   Threats

Fragmentation

- Fragmentation – the sector is a collection of occupations, ranging from non-skilled to professional, and covers virtually all industries.

Adoption of Technology/Ability to Compete

- There is a slow pace of adoption of technology compared to the US and Europe. This is true for Canada in general and also apparent in this sector. This will impact organizations ability to compete as part of the supply chain.

- The cost of logistics as a percentage of cost of goods is higher in Canada than in the US, impacting Canada's competitiveness.

- Supply chain information management is not necessarily location specific (i.e., could be done from anywhere), as a result there is a risk of losing these jobs to offshore locations. This is also an opportunity for Canada to deliver these services.

- There is an emerging presence of global service providers with multi-jurisdictional regulatory expertise and quality standards. This poses an emerging competitive threat for regional and national third party providers.

Competing with Each Other for Scarce Resources

- Organizations within the sector are competing amongst themselves for experienced resources – not focused on generating new talent pool.

- Specialty purchasing/procurement, material handling and inventory/storage control positions are emerging as priorities for many organizations, and in all cases with cost reduction and customer service (on-time delivery with decreasing lead times) as an overriding context.

- Supply chain regulatory knowledge (processes, shipping protocols, material handling requirements, custom duties, taxation) is strategically key for companies operating and growing across international markets. Without this knowledge, strategic growth would be curtailed.

- The sector is increasingly relying on knowledge workers, for which there is growing competition with other sectors/professions. Additionally, other sectors are adopting more proactive and aggressive strategies to increase awareness and attract talent to opportunities within their sector, e.g., Canadian Association of Petroleum Producers, Residential Home Builders.

- Internal development of sector talent is not providing enough qualified resources, which creates an urgent need to attract young qualified resources.

Lack of Talent Management Strategies

- Workforce is disengaged.

- There is limited succession planning underway to replace talent loss as result of retirement or transfer.

- There is a shortage of qualified instructors available to teach in schools.

Recommendations

Recommendations for consideration are structured according to the following five categories:

- Sector governance;

- Training and development/education;

- Marketing the sector and the "profession";

- Policy implications for governments; and

- Human resources processes and practices, both for sector-wide application and for small and medium-sized organizations.

The first four categories comprise sector-wide recommendations that address issues of common concern. The last category, Human Resources Processes and Practices, contains recommendations that apply across the sector and others that may be of particular interest to small and medium-sized organizations. While many of the large organizations consulted during the course of this study have defined human resources strategies and programs (and, in some cases, demonstrate best practices), this is generally not the case for small and medium-sized organizations. Accordingly, recommendations that address the specific needs of these organizations have been developed.

Sector Governance

1. Given the fact that the supply chain sector is rapidly becoming strategically important to most organizations across all industry sectors, and that it is a highly fragmented and disparate sector, it is recommended that a nationally focused integrating mechanism or sectoral forum be created. This integrating mechanism could take the form of a human resources sector council.

   The council must be unbiased and provide for full stakeholder access, and be national in scope, industry-driven and market-focused. Governance composition would ideally include representatives from all key stakeholders and provide for regional participation.

   Its initial mandate would be to articulate and implement a broad-based human resources strategy, including a national awareness campaign, for the national sector taking into account the needs of small, medium-sized and large Canadian organizations.

   This initiative will likely require government funding to initially capitalize and commence operations. With strategic and tactical success realized in the first one to two years, a combination of government funding and employer membership (and supporting fees) would be used to finance ongoing operations over the mid to long term.

   There is also an opportunity to expand the council's mandate in the future beyond human resources, taking on a broad secretariat function, forum for sectoral learning and growth, representation and leadership on issues and initiatives of common interest.

   The risks associated with not acting upon this recommendation are simply continued strategic fragmentation, less-than-optimal integration of stakeholder interests (e.g., across private- and public-sector employers, educational institutions, professional associations, unions, shareholders and governments), and further diminished market awareness on the part of future workforce participants as competing industries aggressively promote their brand and employment

opportunities. Accordingly, many of the subsequent recommendations are contingent on the establishment of a sector council.

2. As highlighted in this report, the supply chain is being significantly impacted by a dynamic regulatory environment in Canada and internationally. Accordingly, there is a need for more meaningful government/industry collaboration to ensure that government practically understands industry needs and that industry can be in a position to proactively stay abreast of anticipated and current regulatory developments. Government and industry relationships may also lead to the development or strengthening of public/private partnerships to further advance the sector.

3. There is also a need for ongoing collection and monitoring of labour market information for the supply chain sector in order to identify and understand changes, impacts and sector trends. This information may be employed to establish priorities for such items as the recognition of foreign credentials, development of essential skills, the creation of occupational standards and career awareness activities. This information will be essential for the supply chain sector to develop strategies to compete with other sectors that are increasingly taking a more proactive and aggressive approach to promote career opportunities and to attract similar talent and skill sets that are of interest to the supply chain sector.

Training and Development/Education

4. Again, assuming the creation of a sector council to integrate and promote a multi-stakeholder human resources strategy, it is recommended that this council initiate an effort to clarify and communicate educational and certification options within the sector. To facilitate this, it is recommended that a national integrating entity, possibly the sector council, create an informational repository of post-secondary academic programs and industry association certifications, and implement an enabling marketing strategy to provide web-based access and promotion to all of interest. Accessibility should be maximized by offering information in multiple languages and ensuring both urban and rural access.

5. Given the nature of supply chain management, and the growing complexity of the sector, there will be continued demand for specialist training and development in supply chain specializations (e.g., purchasing, customs). In order to minimize the fragmentation that many diverse offerings within a sector create, it is recommended that associations collaborate or partner to some degree to consolidate and deliver a common foundation upon which to build a specialization. Further, and as is the case between most universities and with some professional associations (e.g., CICA), that reciprocal arrangements and cross-recognition of certification standards and common bodies of knowledge be developed. This will serve to simplify the current array of fragmented and varying degrees of duplicative offerings and standards in the eyes of prospective applicants and candidates, and begin to create a common supply chain training and development "platform" for professional certification and recognition.

6. Assuming implementation of Recommendation #1, it is recommended that more effective coordination between post-secondary academic institutions and industry be encouraged and facilitated to determine, update and validate course/program content. While some localized best practices were noted, industry is not convinced that post-secondary programs are addressing content needs as well as they could. There is a need for industry or research group(s) to identify anticipated sector changes (e.g., international/globalization) and to have a forum or mechanism for feeding this information back to the appropriate stakeholders for incorporation into educational curriculum design.

7. Building on Recommendation #2, and supporting the delivery of Recommendations 4 to 6, there is an opportunity to develop or leverage stronger partnerships within the sector across various types of stakeholders (e.g., industry, associations, academia, governments). In this regard, there should be additional interaction and collaboration with academic institutions, for instance:

    o   Technology service providers and academic institutions need to collaborate to ensure adequate and timely education/training of emerging technology skill requirements;
    o   As noted earlier, colleges and universities (in the context of creating an integrated and common "professional platform") need to collaborate to more effectively cross-reference and recognize credits and standard offerings for those employees and students who may need to be geographically mobile;

- o Academic institutions should work with industry to increase the availability of work/field placements for students and to increase initial employment opportunities in the supply chain sector;
- o Programs should be developed to address curriculum development and develop instructors; and
- o Creative public/private partnerships should be employed to leverage and share existing practices and knowledge (e.g., between large-scale government institutions and industry).

It should be noted that some current best-practice partnerships have already been formed and may serve as potential models or success stories to encourage others (e.g., the Laurier Institute and its respective industry relationships). In order for these relationships and partnerships to develop, some or all stakeholders (e.g., industry, associations and government) need to promote the concept and provide incentive for this to happen. In addition, since education is governed provincially, there may be a role for the sector council to liaise with provinces in this regard to promote a much-needed national approach.

8. Building on a select number of best-practice examples, it is also recommended that those post-secondary institutions (in collaboration with industry) that envision themselves as emerging centres of expertise/excellence in local, regional or national marketplaces appoint functional or departmental heads and expand their proactive liaison with industry.

9. In the interest of developing a broader supply chain managerial cadre and addressing the current demand for strategic and managerial skills, more advanced professional/managerial training should be made available that will develop skills such as information management, change management, strategy development and relationship management.

Marketing the Sector and the "Profession"

10. In order to address current attraction challenges and the low awareness levels of the supply chain sector and its career opportunities, there is a need to better educate and promote the sector in target marketplace segments, with particular emphasis on those making career and education decisions (e.g., students and those interested in changing careers). Delivering this type of promotion to attract new talent will require national infrastructure, perspective, coordination and funding. Again this is another potential area of responsibility or role for a sector council. Some specific areas of focus for inclusion under this initiative include:

- o Clarifying and communicating the definition of the supply chain sector, as well as its sub-functions and occupations.
- o Stimulating stronger awareness and, more importantly, demand for education within the business community.
- o Marketing potential career paths and longer-term career opportunities within the sector. Articulated career paths will support a number of human resources programs: for example, recruitment (prospective candidates and workforce entrants will see that the supply chain sector offers more than just a job and that a career is possible), learning and development (to identify gaps to be addressed through training), and succession planning.
- o Working with career advisors and influencers, such as Career Services within universities and colleges, high school guidance counselors, associations (e.g., Canada Career Consortium, Canadian Association of Career Advisors (College and University)) and HRSDC career centres.
- o Engaging alumni of post-secondary supply chain-related programs and association certification programs to promote employment opportunities and to encourage employers to develop field placements/work study programs and entry-level job opportunities.
- o Increasing the focus on awareness activities directed at high school students to influence decisions related to post-secondary career and education. These awareness initiatives should include the use of interactive on-line tools aimed to engage youth.
- o Building on the current practice at some locations, whereby intermediate-level students, in grade 8 or 9, are provided an opportunity to experience a week at a college or university during which they are exposed to potential areas of study and career options.

11. It is noted that the general lack of knowledge and understanding of the supply chain sector goes beyond students and career changers. It is suggested that a broader awareness and education campaign targeting, and in partnership with, specific stakeholders (e.g., Industry Canada, Regional Economic Development sections of local Chambers of Commerce) would be beneficial to increase appreciation for the diversity and complexity of the supply chain and its significance, not only as a business imperative but for its impact in effectively delivering on social and quality-of-life responsibilities (e.g., disaster-relief projects). While the initial focus of a sector council may be on human resources-related initiatives that are directed at attracting, retaining and developing talent, a broader mandate is also appropriate.

Policy Implications for Governments

12. With international hiring becoming more important, there are implications for government immigration policy and the recognition of foreign credentials. In this regard, there may be a role for government in facilitating the mobility of employees for Canadian companies operating internationally. Government assistance would serve to facilitate the competitive growth aspirations of Canadian companies.

13. With the exception of a few examples (e.g., Ivey School of Business, HEC, Van Horne Institute), industry/education alliances for the purposes of applied management research are not prevalent. Government promotion of research funding programs and mechanisms needs to be enhanced. One possibility would see increased involvement and collaboration from academia, Industry Canada, municipal and provincial governments and a sector council to create a Canadian Research Centre with regional centres of expertise (e.g., in Halifax, Montreal, Toronto, Calgary and Vancouver). Such focus would serve to enhance "thought leadership" and contribute to building a stronger employment brand in the marketplace. This Canadian Centre could also create alliances with other supply chain research centres, such as the Georgia Institute of Technology (U.S.), to provide research that capitalizes on the unique attributes of supply chain management in Canada and in conjunction with our most significant trading partners/parties.

14. Given the scope, complexity and cost of strategic investments in such things as recruitment/staffing, IT systems development and international marketing, many small and medium-sized businesses are challenged to identify and implement contemporary practices and related management protocols. As such, government advisory entities need to be more effectively identified and promoted in the marketplace as a source of information for such things as talent sourcing (recruitment) in foreign markets, small-business technology tool-kits, and export and financing advice.

Human Resources Processes and Practices

Sector-wide Recommendations

15. It is recommended to develop supply chain-specific occupational standards (e.g., tasks and skill sets) that will then set the standard for the development of educational curriculums applicable to the needs of supply chain occupations. National Occupation Classification (NOC) codes should be reviewed to eliminate those that are no longer valid and add new ones based on new and emerging supply chain jobs (e.g., logistics managers, supply chain analysts, marketing and sales specialists, and trainers). A sector council would be a good source of subject-matter expertise to assist with this review.

16. Given that sector organizations are at different stages of human resources strategy sophistication as a result of their maturity, business strategy and model, their ability to execute human resources solutions varies, despite the fact that the human resources challenges they encounter may be similar. To facilitate the development of better human resources practices across the sector, it is recommended that "best-practice information sharing" mechanisms be created. For example, a sector council could gather and promote, through its website, best-practice human resources processes, practices and tools. Having access to human resources best practices or services for the supply chain sector would be of particular benefit to small and medium-sized organizations.

17. With a sector council as a catalyst (Recommendation #1), it would be ideal if an industry-sponsored mentoring program could be established in target geographic locales with a primary focus on advising and guiding the career interests of younger top-talent employees typically working in small or medium-sized organizations. An effective source of mentors could be retired supply chain professionals wanting to remain connected to the sector on a part-time basis. Program success would also be contingent upon company- or organization-specific commitment to provide employees with the time to participate in such meetings.

18. Based on the findings and observations presented in Module 5, it is recommended that all organizations examine their compensation policies, practices and processes to ensure that the principles of internal equity and pay equity are supported, and that compliance risks are mitigated. Further, and in the context of the growing strategic importance of supply chain management, and the fact that there is a relatively limited supply of both tactical and managerial competence, organizations in target geographical labour markets should conduct an annual market pricing review of internal/external total compensation practices and possibly consider supplemental base salary premiums for "near and dear" skill sets. This will serve to enhance retention and minimize the risk of losing supply chain professionals to competing interests for simply compensatory reasons.

Recommendations of Particular Interest to Small and Medium-sized Organizations

19. The findings of the study suggest that a more strategic approach to managing human resources in the sector is required. With the growth of the sector and the emerging focus on the supply chain function as a source of competitive advantage, it is increasingly important that individual organizations take a longer-term and more thoughtful approach to developing and deploying their current workforce and attracting new talent. The strategic nature and scope of an organization's human resources strategy sets the context for the design, implementation and management of its enabling human resources policies, practices and systems, especially those that are deemed to be strategic and proactive. It is recommended that organizations articulate a clear vision for people and organizational effectiveness and implement an enabling human resources strategy in the context of the organization's business strategy and economic foundation.

20. As noted in the findings section of Module 5, an emerging trend and opportunity for the sector is the growing number of new sector-specific occupations. Of primary importance in this regard is the emerging number of marketing, sales, account management, human resources specialists and trainers that are exclusively focused on the supply chain. This emerging trend provides employees with opportunities to expand their career beyond operational and tactical roles. Accordingly, it is recommended that organizations consider implementing more formalized human resources programs, such as job rotation, secondments and defined developmental projects, to create broader career opportunities for employees on the one hand, and to create greater breadth of knowledge and resource deployment flexibility on the other hand.

21. Consistent with identified best practices, it is recommended that, where practical, organizations implement a defined talent management program to identify critical supply chain positions and related high-potential employees, and then implement specific developmental programs to further expand the cadre of operational, tactical or managerial resource pools. In addition to being part of an effective succession and human resources planning strategy, this type of initiative will also serve to enhance organizational retention capability.

22. Organizational economics permitting, defined career paths, including skill and competency profiles, should be developed for operational and tactical employees. In this regard, existing best practices from academic, professional and employer organizations could be leveraged and shared.

23. In response to interest expressed by operational employees and given the increased emphasis on quality and customer satisfaction, organizations should consider developing education or information sessions for operational employees that will augment their understanding of the economics of the business and their role in this context. This would enhance employee engagement and, ultimately, performance by providing them with a line-of-sight and understanding of the broader supply chain.

24. Manager and supervisor positions are commonly cited as difficult roles to fill, supported by the fact that general managerial skills were identified as a current and future demand. Given this, and the need for 'career planning', 'opportunities' and 'succession planning', the development of managerial and supervisory skills should be a focus in order to provide employees with these opportunities and to fill future leadership roles.

25. In an effort to address a potential gap in leadership skills, organizations should consider a leadership development program in concert with succession planning efforts. A leadership development program regularly identifies and develops leaders and leadership competencies. Development programs should provide support, resources, information and learning opportunities that will systematically target and improve desired performance and behaviours. Typical program components include internal and external training programs, informal internal training (e.g., lunch and learns), mentorship, job rotations, stretch assignments, communications, and information management and diversity management programs.

26. In addition to providing training to ensure that technology is used effectively and appropriately, organizations should ensure that a comprehensive change management program designed to support employees through technological change is in place. A comprehensive program typically includes a readiness assessment of the target population to ensure that training, ongoing communications and technical support address the key areas of concern to support transition. Further it is recommended that organizations conduct a follow-up assessment to gauge the extent to which the technology is being employed effectively and as envisioned.

Implementation Considerations

There are two main areas for action to take these findings and recommendations forward:

A. The governance and infrastructure for addressing these findings and moving forward with the recommendations. There is a need to establish a sector council and clarify its role and governance model, and assuming business case funding, strategic and tactical priorities.

   In recognition that strategic leadership is a key success factor in addressing the human resources challenges facing the sector, industry roundtables demonstrated overwhelming support for creation of a sector council.

B. Roll-out:
   - Create a strategy to roll out and promote these findings and recommendations across the sector, starting with organizations participating in this study.
   - Develop appropriate communication and change management strategies to move this broad agenda forward.
   - Host a sector-wide symposium once the governance and infrastructural business model have been determined and established.
   - As part of a defined financial/funding strategy, develop appropriate business cases to secure funding and move the agenda forward.

Conclusion

The recommendations provided in this report essentially focus on the collective needs of an emerging and strategically important, but fragmented, sector in the Canadian economy and the micro-economic needs and opportunities that individual organizations can capitalize on to improve their related human resources practices and ultimately, their competitive position.

Fundamentally, however, strategic sector-wide progress (and enabling governance and infrastructure) will be the catalyst for both macro- and micro-economic development. The opportunity to make this progress happen will ultimately depend on the ability and commitment of key stakeholders to collaborate with each other and elevate and address the broader interests of the sector.

Appendices

Appendix A

Steering Committee Members

Name	Organization	Affiliation
INDUSTRY		
Donald Borsk (co-chair)	Supply Chain Management Inc.	Supply Chain & Logistics Canada
Michel Ravacley (co-chair)	The Hockey Company	Former Chairman, Institut de formation en gestion du transport et de la logistique
Serge Alexandre	Domtar Inc.	Former committee member, Institut de formation en gestion du transport et de la logistique
James Bergeron	Lafarge Canada Inc.	The Logistics Institute
John F. Chipperfield	Bellville Rodair International	Canadian Institute of Traffic and Transportation
Tracy Clayson	In Transit Personnel Inc.	
Bryan Cox	Source Medical Corporation	Supply Chain & Logistics Canada
Dwayne Hihn	BAX Global Canada	The Logistics Institute
Louis Joncas	Thales Avionique Canada Inc.	Former committee member, Institut de formation en gestion du transport et de la logistique
Stéphan Lauzon	4L^2 Consulting Group	Supply Chain & Logistics Canada – Quebec
Philippe Leblanc	Metro Canada Logistics	Supply Chain & Logistics Canada – Quebec
Paul Lobas	ITN Logistics Group	Canadian International Freight Forwarders Association
Drake MacDonald	SMART Technologies	Purchasing Management Association of Canada
Pierre Massicotte	L'Oréal Canada	
Craig McLean	UPS Supply Chain Solutions	Supply Chain & Logistics Canada
John McMurray	Colgate-Palmolive Canada Inc.	Supply Chain & Logistics Canada
Al Norrie	SAP Canada Co.	Former member, Lean Logistics Technology Roadmap Working Group
Derrick Ronayne	The Brick Warehouse LP	Canadian Institute of Traffic and Transportation
Dale Ross	Effem Inc. (retired)	
Con Taillon	United Farmers of Alberta	Chair, Mount Royal College Advisory Committee – Supply Chain Management
Branko Tosic	Danex Systems Limited	APICS - The Association for Operations Management

ACADEMIC INSTITUTIONS		
Frances Humphreys	Laurier School of Business & Economics	University liaison group
Susan Krausz	Humber Institute of Technology and Advanced Learning	Association of Canadian Community Colleges
GOVERNMENT		
Colonel F. Michael Boomer	National Defence Headquarters	
Hanaa El-Alfy	Ontario Ministry of Economic Development and Trade	Former member, Lean Logistics Technology Roadmap Intergovernmental Committee
Darren Gorman	Transport Canada	
Colonel Mark Matheson	National Defence Headquarters	
Philippe Richer	Industry Canada	
Pierre Rodrigue	Ministère du Développement économique et régional et de la Recherche, Gouvernement du Québec	Former member, Lean Logistics Technology Roadmap Intergovernmental Committee
Deborah Shaman	Human Resources and Skills Development Canada	

Appendix B

Methodology

This Section provides additional methodological details on each of the activities outlined in the Approach section, as well as sampling methodology and response rates.

Secondary Data Analysis

Prior to developing the primary research plan, a literature review and gap analysis were conducted in order to identify existing secondary data for each module and highlight where secondary information was insufficient, and therefore define the focus of the primary data collection.

The purpose of this literature review was to:

- Create an inventory of reference material for each module;
- Determine the reliability and completeness of secondary research data; and
- Identify gaps and understand the implications for further research.

In order to accomplish this, based on the Terms of Reference, the key information components listed for each of the five modules were identified. Secondary research was then conducted in order to identify what information is readily available through secondary sources for each of these information components.

The results of the analysis were presented by Module and included a summary of the type of secondary information that is available, as well as information sources and key high-level findings in each area of the module. An inventory of data sources was also created.

Steering Committee Interviews

In order to gather an initial understanding of the key supply chain sector trends and issues, interviews were conducted with Canadian Logistics Skills Committee members. The information gathered in these meetings helped to guide the development of subsequent primary research tools (i.e., survey tools and interview guides), as well as identify areas for further analysis. Committee members are listed in Appendix A.

Primary Data Collection

Based on input from the steering committee interviews and secondary literature review, primary data collection approaches and tools were developed. The approach to primary data collection focused on both administering several audience tailored surveys, as well as conducting interviews and focus groups.

Surveys were administered to:

- Sector employers;
- Sector employees;
- Academic institutions; and
- Students.

Interviews and focus groups were held as follows:

- Employee focus groups;
- Interviews with sector employers; and
- Interviews with a selection of associations.

Stakeholders	Data Collection Tool	Participants	Distribution Mechanism
Employers	• Paper/electronic Survey • Web Survey	172	• A database of potential survey participants was created based on key variables to ensure a stratified sample. • Invitations and questionnaires were mailed to 1,292 potential participants. • A follow-up reminder was mailed to invitees and to organizations that expressed an interest in the survey.
Employees	• Paper/electronic Survey • Focus Groups	753	• Calls were placed to a stratified sample of 280 organizations, to further enlist participation. • Association websites and memberships were used to facilitate additional distribution • In total, it is estimated an audience of 11,300 was contacted. • Employer questionnaire was revised and web enabled.
Educational Institutions	• Paper/electronic Survey • Interviews	27	• Steering Committee members were actively involved in increasing survey participation. • Calls were made to enlist participation in interviews and focus groups.
Students	• Paper Survey	196	• Administered by instructors at college, university and secondary school level.
Sector Associations	• Interviews	9	• A list of 10 suggested associations were provided by the Steering Committee. • Participation was requested through individual phone calls.

A comprehensive and methodologically sound approach to sampling has been followed to ensure that the objectives of the study, as defined by the Steering Committee, were met. The data from all research sources are suitably representative and robust from which to draw meaningful conclusions.

Survey Sampling Methodology

The strata to study were selected in order to represent critical segments of the supply chain sector population. Following a comprehensive assessment of the supply chain sector and the precise needs of the study, the Steering Committee settled on two stratification variables – region and company size. The number of strata is a critical factor in determining sample size.

Therefore, with the decision of the Steering Committee that region and company size are the key variables to be studied, i.e., 7 regions and 3 company sizes, the sampling then focused on 21 strata. Accordingly, the sampling targets were set at 630 potential respondents; 21 strata x 30 data points. The initial mail out was sent to a stratified sample 1,207 employers and 85 educational representatives. This sampling was further supplemented with broadcast messages from PMAC, CITT, SCL and the Logistics Institute, thus reaching an estimated audience totalling 11,300*.

Number of Subjects in Sample

Source	Size of Sample
Database created by Deloitte	1,292
PMAC	10,000
CITT	2,000
SCL	900
Logistics Institute	1,900
Total	16,092*

* If we assume a 30% overlap in membership the sample size is approximately 11,300.

Sector and Academia Surveys

Separate surveys were developed to gather data from employers, employees, educational institutions and students. Invitations to participate were sent out by mail to a stratified sample of over 1200 employers and 85 educational institution representatives, with a follow-up reminder sent one week later. The surveys were returnable by fax or participants could request an electronic copy. In order to increase participation, calls were subsequently made to a stratified sample of organizations to

personally invite them to participate and offer to email soft copies if preferred. Employees were reached either through the stratified sample of employers or through sector associations. See list above.

In order to further increase participation, the employer survey was web-enabled for online completion. A number of sector associations, agreed to send an invitation to participate and the link for the web-based survey to their membership, as well as post the link to the survey on their website.

In addition to these three main surveys, a survey was developed for delivery to High School, College and University students who are not enrolled in a supply chain-specific program to gain an understanding of the awareness level among them of the opportunities that the sector offers.

Survey participation was dispersed across all the targeted geographic and size segments as outlined in the table below. Refer to the Appendices for a detailed profile of the survey participants and list of participating organizations.

Interviews and Focus Groups

In addition to the administration of survey questionnaires, interviews and focus groups were conducted with supply chain sector participants across the country. Interviews were conducted with supply chain and HR management representatives from twenty organizations. Additionally, nine sector associations were interviewed. Employee focus groups were held with fifty employees, covering a cross- section of the functional areas and occupational categories and regions.

Sector Roundtables

Sector roundtables were held in Montreal, Toronto and Calgary to validate research findings and gather feedback on recommendations. The 50 roundtable participants included senior supply chain executives from the sector and representatives of academic institutions.

Steering Committee

Throughout the study, a twenty-eight member Steering Committee comprising industry, academic and government representatives, provided ongoing direction regarding study objectives, research methodologies and instruments, the identification of relevant National Occupation Classification (NOC) codes, review of findings and development of recommendations.

Appendix C

Participant Profile: Employer Respondents

The main industries in which surveyed organizations operated were 'Transportation and Warehousing' and 'Manufacturing'. The table below depicts the distribution of employer survey respondents by industry.

Number of Employer Respondents by Industry (n=160)

Industry	Count
Agriculture	5
Fishing & Trapping	1
Forestry & Logging	4
Oil & Gas Extraction	2
Mining	4
Utilities	4
Construction	4
Manufacturing	31
Wholesale Trade	7
Retail Trade	14
Transportation and Warehousing	38
Finance, Insurance, Real Estate, and Leasing	1
Professional, Scientific & Technical Services	4
Technology and Information	4
Business and Support Services	9
Educational Services	4
Health Care and Social Assistance	6
Culture and Recreation	2
Accommodation and Food Services	1
Government and Public Administration	7
Other	3
Did Not Respond	5

Participating employer organizations represented a combination of small, medium and large-sized organizations across the country. Of these, the majority described themselves as either 'Established and Growing' organizations or 'Mature and Stable' organizations.

Employer Respondents by Organization Size (n=160)   **Organization Stage of Development** (n=160)
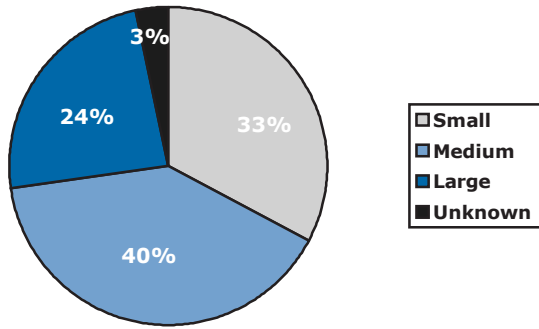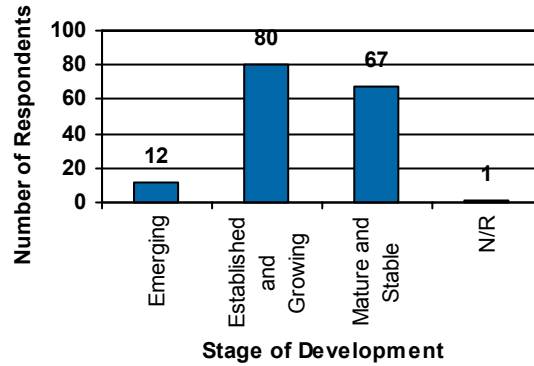
Organizations were categorized into three sizes: small, revenue < $100 M; medium, revenue $100 M to $999 M; and large, revenue greater than or equal to $1 B. Employer participants operate in multiple regions across the country and internationally. The scope of the survey research covered 354 international employer operations.

Canadian Geographic Distribution of Operations (n=160)
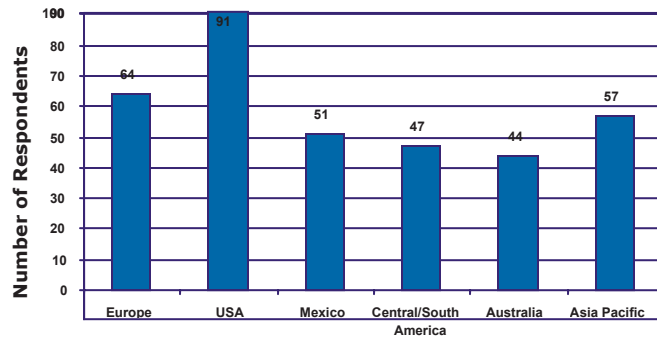
International Geographic Distribution of Operations (n=160)

Employers reported supply chain employees in 339 locations across Canada. Organizations surveyed represent over 110,000 Canadian supply chain employees.

Location of Logistics Employees by Region as Reported by Employers (n=160)
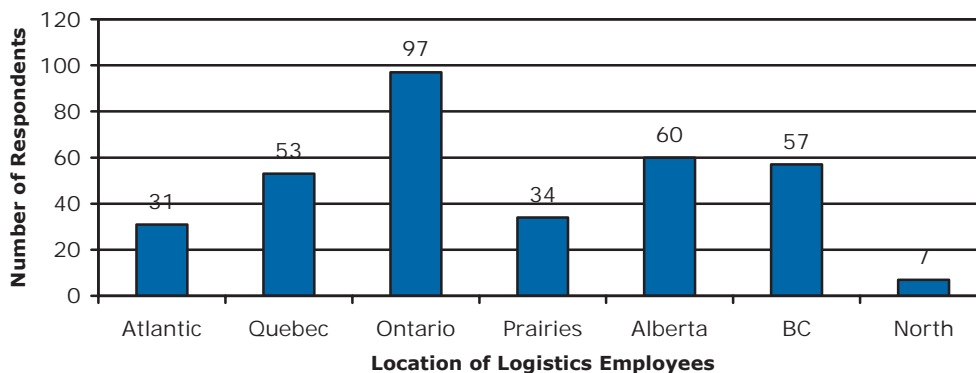
Survey participants included both providers and users of supply chain and logistics services, with 55% of respondents indicated that they were users and 45% being providers.

Participant Profile: Employee Respondents

A total of 753 employees responded to the employee survey. The majority of employee respondents represented medium and large-sized organizations and were primarily concentrated in Ontario, followed by Quebec and Alberta.

Employee Respondents by Work Location and Company Size (n=748)

Region	Company Size				Total
	Small	Medium	Large	Unknown	
Maritimes	12	8	12	11	43
Quebec	5	31	58	21	115
Ontario	46	130	115	86	377
Central	3	16	14	22	55
Alberta	1	66	32	16	115
BC	0	12	24	7	43
Total	**67**	**263**	**255**	**163**	**748**

The most common sub-function within which participating employees indicated they worked was transportation, followed by customer service and warehousing. Note that employees were asked to identify all areas that applied to their role. Clearly a number of respondents are operating in more than one sub-function.

Number of Employee Respondents by Sub-Function (n=753)
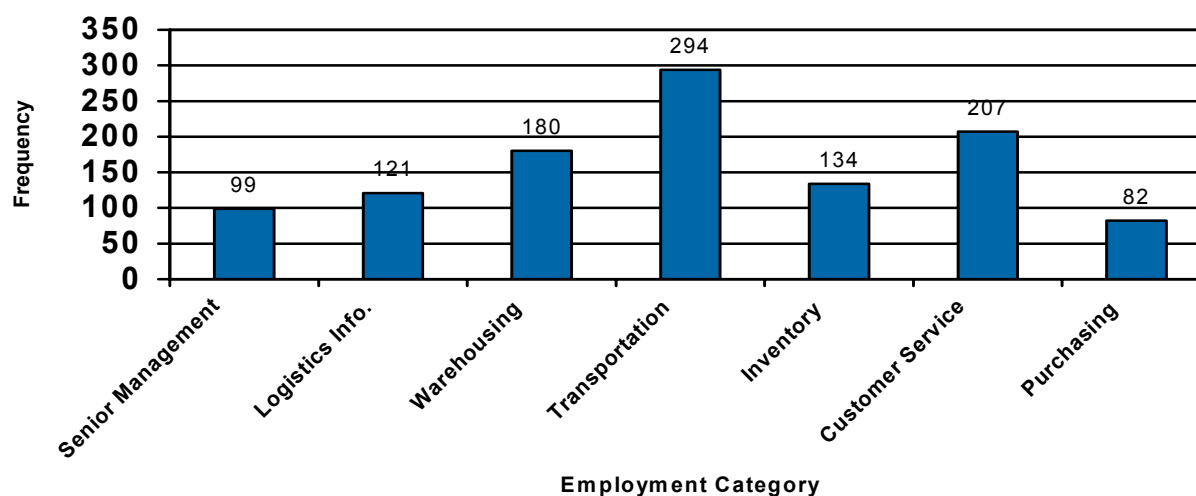
The following figure provides the distribution of employee participants across sub-functions, occupation categories and NOC codes:

Sub-Function	Occupation Category	Sample Job Titles	NOC Code	# of Responses
Senior Management	Managerial	Senior Managers: Goods, Production, Utilities, Transportation and Construction	0016	65
Logistics Information Systems	Managerial	Computer and Information Systems Managers	0213	24
Warehousing	Managerial	Facility Operations and Maintenance Manager: Warehouse Manager	0721	29
	Tactical	Data Entry Operator	1422	2
	Operational	Material Handlers	7452	48
Transportation	Managerial	Supervisors, Motor Transport and other Ground Transit Operators	7222	3
		Transportation Managers	0713	54
	Tactical	Customs, Ship and Other Brokers	1236	42
		Dispatchers and Radio Operators	1475	18
		Transportation Route and Crew Schedulers	1476	16
	Operational	Accounting and Related Clerks: Freight Rate Clerk	1431	9
		Shippers and Receivers	1471	70
Inventory/ Material Control	Managerial	Supervisors, Mail and Message Distribution Occupations	1214	1
		Other Administrative Service Managers: Inventory Control Manager, Support Services	0114	56
		Supervisors, Recording, Distributing and Scheduling Occupations	1215	71
	Tactical	Production Clerks: Expediter, Material Estimator. Traffic Control Clerk	1473	8
		Purchasing and Inventory Clerks: Inventory Analyst, Planner	1474	21
		Industrial Engineering and Manufacturing Technologists and Technicians	2233	46
Customer Service	Tactical	Customer Service Information	1453	6
	Operational	Tickets Agents, Cargo Service Representative and Related Clerks	6434	4

Purchasing	Managerial	Purchasing Managers	0113	22
	Tactical	Purchasing Agents and Officers	1225	21
		Sales, Marketing and Account Managers	0611	33
		Sales representatives and coordinators	6411	9
		Accountant	1111	1
		General Clerks	1441	10
		Executive Assistants	1222	2
		Receptionist	1414	1
		Investigator	2262	1
		Heavy Equipment Operator	7421	1
		HR Managers	0112	3
		Training Clerks	1442	1
		HR Specialist and coordinators	1121	4
		Recruiting	1223	2
		Payroll Clerks	1432	5
		Instructors/Trainers	4131	13
		Policy and Program Officers, Researchers and Consultants	4166	1
		Trades Helpers and Labourers	7612	1
		Student Employee		7
		Unknown		22
TOTAL				**753**

Diversity

Excluding gender, 17% of participants self-identified as members of a diversity group. Of this group, the majority were visible minorities:

- Aboriginal: 1.4%
- Visible Minority   15%
- Disabled   0.6%

The majority (59%) of employee respondents were male employees, which is reflective of the makeup of the sector.

Gender Breakdown (n=753)

No Response 4%
Female 37%
Male 59%
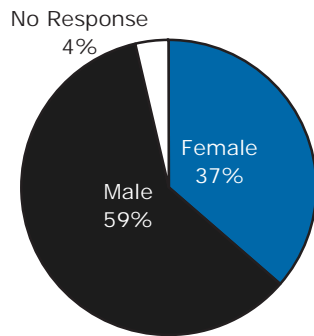
The average age of employee participants is approximately 39 years of age, with the largest segment of employees being between 36 and 45 years of age.

Number of Respondents by Age Category (n=743)

5%   1%   8%
23%
29%
34%

☐ <25
■ 26-35
☐ 36-45
■ 46-55
■ >55
☐ Unknown
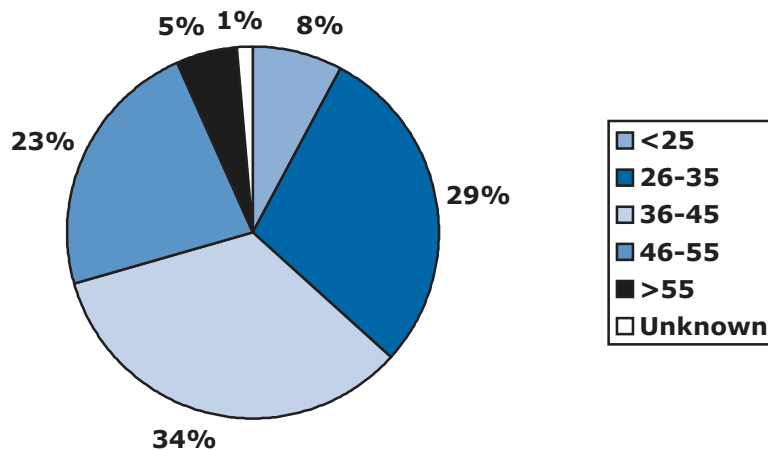
Experience and Education

The employee participant group is fairly experienced and educated, as:

- Approximately 31% of employee participants have more than 15 years of experience;
- Majority have post secondary education; and
- 26% hold professional designation, license or certification.

% of Employee Respondents by Years of Logistics Experience (n=680)
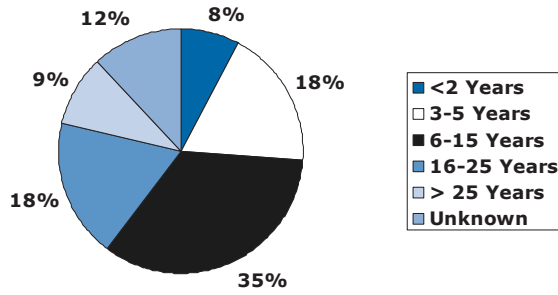
- 8%
- 12%
- 9%
- 18%
- 35%
- 18%

Legend:
- ■ <2 Years
- □ 3-5 Years
- ■ 6-15 Years
- ■ 16-25 Years
- □ > 25 Years
- ■ Unknown

% of Employee Respondents by Highest Level of Education (n=672)

- 11%
- 7%
- 11%
- 1%
- 10%
- 23%
- 18%
- 19%

Legend:
- □ No High School
- ■ High School
- ■ CEGEP
- □ Some College/University
- ■ Diploma/Certificate
- ■ Undergrad Degree
- ■ Graduate Degree
- ■ Unknown
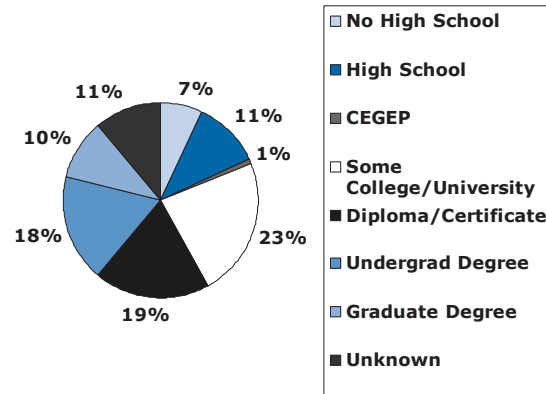
The employment status profile suggests a very strong reliance on a full-time and fixed cost employment model. Employee respondents also represent a mix of managerial, tactical and operational positions. Tactical are specialized strategic supply chain occupations that require a high level of sophistication without management responsibilities, such as inventory analyst, routing planning, and optimization occupations. Operational can be described as more labour intensive and less strategic occupations, such as material handlers and packaging.

Employee Respondents by Occupation Category (n=753)

- Unknown 18%
- Operational 22%
- Managerial 36%
- Tactical 24%

Employee Respondents by Employment Category (n=753)

- Co-op Student 1%
- Other 1%
- Unknown 1%
- Temporary 4%
- Continuing Part-time 3%
- Continuing, full-time 90%
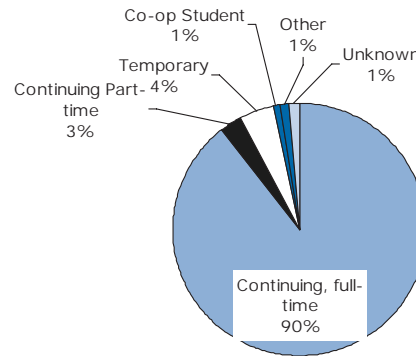
Participant Profile: Academic Institution Respondents

While various sizes and types of academic institutions were surveyed, the main respondent profile, and source of educational information, was large (>10,000 student population) Canadian universities and colleges.

Type of Academic Institution (n=25)
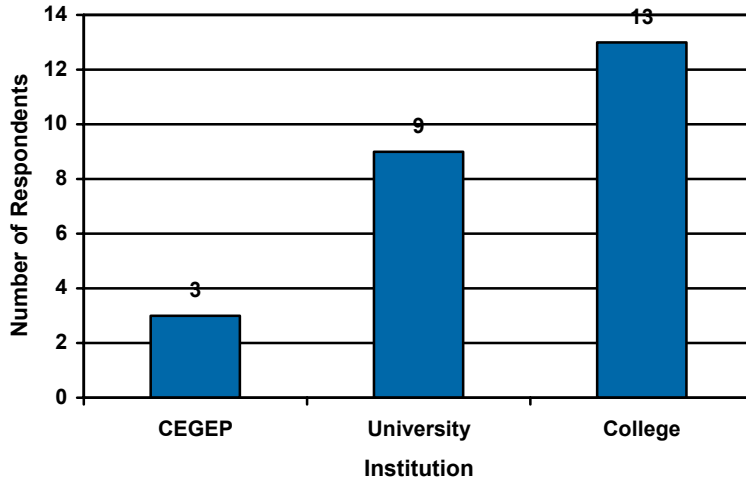
Participant Profile: Student Respondents

One hundred and ninety-six (196) students responded to the Student Survey from various universities, colleges or secondary institutions in Canada. The majority of respondents were enrolled in a university or college, and were in their first or third year of studies. Male and female survey responses were received in almost equal proportion.

Number of Respondents by Educational Institution
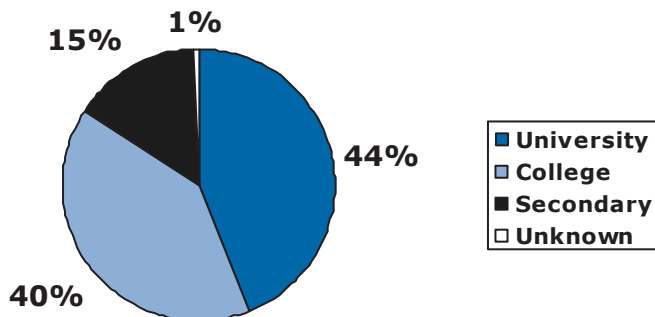
Gender Distribution (n=195)
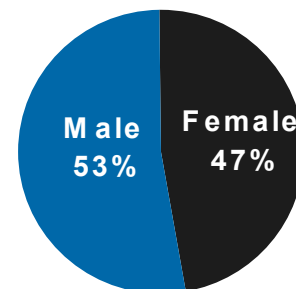
Number of Students by Level (n=196)

Bar chart — X axis: Level; Y axis: Number of Respondents

Level	Number of Respondents
Grade 9	2
Grade 10	1
Grade 11	22
Grade 12	2
1st Year	64
2nd Year	23
3rd Year	48
4th Year	26
Fifth Year	2
Unknown	6
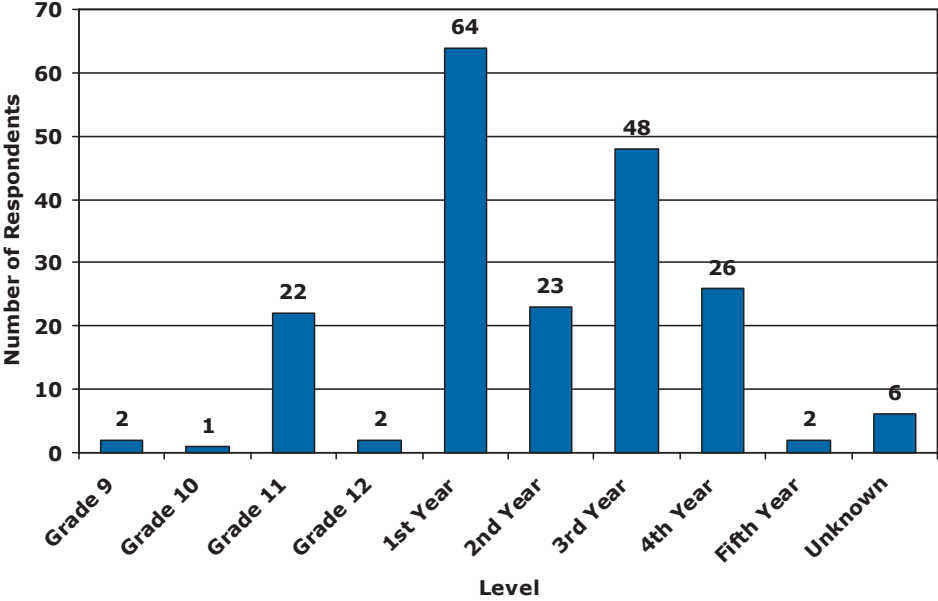
Appendix D

List of Employer Participants

3XS Enterprises Inc
AA Options Transport Consultants
Acklands-Grainger Inc
AIM Integrated
Akzo Nobel Chemicals Ltd.
Aldo Groupe
Alexandria Molding
Aliments Ultima
ALSTOM Canada
Apex Motor Express
Assured Logistics
AstraZeneca Canada Inc
Atlantic Lottery Corporation
Atlas Cold Storage
Atripco Delivery Service
Avaya
Ballard Power Systems
BC Hydro
Bellville Rodair International
Bison Transport Inc
BLJC
Bridge Brand (GSF Subsidiary)
BTC Logistics
Campbell Co. of Canada
Canada Post Corporation
Canadian Coast Guard
Canadian Tire Corp., Ltd.
Canadian Wheat Board
Canpotex Limited
Cargill Limited
CDMV Inc.
Celestica Inc.
Chep
Clearwater Seafoods
CN
Coca-Cola Bottling
COGEMA Resources Inc
Colgate-Palmolive Canada Inc.
Cornwall Warehousing Ltd
Country Home Products
CPLS
Culture Regeneration Research Society
David Thompson Health Region
Dawn Food Products
Deloitte Inc.
Department of National Defence
DHL Danzas Air & Ocean
Diversity Technologies Corp.
Domtar Inc.
DOT/Manitoba
Effem Inc.
Emerald Software Inc.
ENMAX
EPCOR

Expeditors Canada
FedEx Canada
Finning Canada
Fleet Check
Fleetguard International
Fluor Corporation
Forest Engineering Research Institute of Canada
Freight Xperts
GD Canada
Geologistics
GILLESPIE-MUNRO INC.
GLAXOSMITHKLINE
Government of Canada
Grand & Toy
Great Canadian Casinos Inc
Groupe GCI
Guelph General Hospital
Harder International Media
Harris Aerospace Canada
Haworth, Ltd.
Hillary's Ltd
Hospital Logistics Inc.
Husky Energy
IBM
Igloo Building Supplies Group
In Transit Personnel
Infobase Marketing Inc.
Irving Tissue
ITIF Inc.
ITN Logistics Group
James B Grover Consulting Corp
JD Smith And Sons Limited
KDR Logistics Management Inc.
Kraft Foods
Kwantlen University College
L.E Walker Transport
Lafarge Canada Inc.
Lana Lee Fashions Inc.
Logistics Solution Builders Inc.
Logisti-Solve
Logisync Inc.
Maritime Paper
Metro Canada Logistics
Metro Richelieu
Molson Canada
Monsanto Canada
Mountain Equipment Co-op
National Gallery of Canada
Neptune Foods
Nestle Canada
New Brunswick Community College
Noranda / Falconbridge
NOVA Chemicals
Novelis Foil Products
Noye Enterprises Inc.
Panalpina Inc.
Parmalat
PepsiCo Foods Canada Inc.
Pfizer Canada
Phantom Mfg. (Intl) Ltd.
POS Pilot Plant Corp
Precision Drilling
Progistix Solutions Inc.

Province of BC
Provincial Health Services Authority
Purolator Courier LTD
Quality Safety Systems
Queensway Carleton Hospital
Race Face Corporation
Red Leaf Soft Inc.
Reebok Canada Inc.
Rona inc.
Ryder Canada
Saint John Port Authority
Saputo Div. Boulangerite
Schneider Foods
Scotia Investments ltd
Sears Canada
Siemens Canada Ltd.
Sobeys INC.
Source Medical Corp
Spices of Life
Steels Industrial Products Ltd
Supply Chain Management, Inc.
Supreme International Limited
T&P Trucking Ltd.
TAIGA FOREST PRODUCTS
Tannis
TDL Group Corp
TELUS Mobility
The City of Calgary
The Forzani Group Ltd.
The Hockey Company
Thomas, Large and Singer
Tolko/Riverside
Transkor Systems Inc.
Transport Sonar
Trillium Health Care
Truestar Health Inc.
Unilever Canada
United Farmers of Alberta
UPS-SCS
Vancouver Community College
Victoria General Hospital
Victoria Nissan Ltd.
VICWEST
Vincor International Inc
Wood Wyant

Appendix E

List of Employee Participant Organizations

Abitibi Consolidated
Access Distribution
Ace Group
Acklands-Grainger Inc.
Affiliated Int. Transport
Agricore United
AIM Integrated Management Corp.
Air Liquide Canada
Alberta Transportation
Alcan
Aliments Ultima
AMARAS Inc.
Amres Cowncer
Andrew Paxton
Assured Logistics Inc.
Atlantic Institute of Logistics and Transportation
Atlantic Provinces Trucking Association
Atomic Energy Of Canada
B.C. Tree Fruits Limited
B.T.C Logistics
Ballard Power Systems
Bank Of Canada
Bano Canada
Bax Global
Best Buy Canada Ltd.
Big Freight Systems Inc.
Big Sky Farms Inc.
Bison Transport Ltd.
BLJC
Bombardier Produits Recreatifs Inc.
Bowring
BP Canada Energy Company
Brake Parts Canada Inc.
Brick Warehouse
Bristol Myers Squibb Canada Co.
Brookville Carriers Flatbed LP Inc.
BTC Logistic
Buntin Reid
C Scot R
C.H. Robinson Worldwide
CAE
Calbeek + Clarke Inc.
Calgary Customs Brokers Ltd.
Campbell Company of Canada
Canada Business Services
Canada Post Corporation
Canada Revenue Agency
Canadian National Railways
Canadian Pacific Railway
Canadian Tire Corporation
Canadian Wheat Board
Canpotex Shipping Services Limited
Carbra Trans Inc.
Cargill Limited
Cargo Alliance

Carson freight services
Cavalier International
CCNB - Dieppe
Celanese Canada
Celestica International Inc.
City of Saskatoon
City of Vaughan
Clearwater Seafoods
Codiac Transit Commission
COLE Freight Inc.
Colgate-Palmolive Canada Inc.
Container Port of Saskatchewan
Copperweld Automotive Business
Cornwall Warehousing Ltd.
Daily Transport
Dantar
DCTS
Delmar International
Deloitte Inc.
Department of National Defence
DHL Danzas
Dieppe Community College
Domtar
Dumur Industries
Ecolab Co.
Effem Inc
Elaine Deschenes
Entreposage Eastern
Esco Limited
Evermon Consulting Services Inc.
Exel Global Logistics
Expeditors Canada Inc.
Falconbridge Limited
FCI Fisker Cargo Inc.
Federated Freight Services
Fedex Trade Networks
Fluor Canada
Freight Systems (Canada) Inc.
Frito Laya Canada
G.L.R. Freight Xperts
Gaston Losier
General Dynamics Canada
Geo H. Young & Co. Ltd.
GHY International
Gillespie Munro Inc.
Global Distribution and Warehousing
Gourmet Baker
Group 4L2 Inc.
GS Battalion Transportation Company
Harbour Grain Inc.
Hillary's Limited
Hockey Company
Home Depot Of Canada Inc.
Horizon Agro Inc.
Hummingbird Ltd.
Imperial Manufacturing Group
Inco Limited
International Cargo Transportation Systems
International Forest Products
Irving Oil
Irving Paper Ltd.
ITN Logistics
iWheels International

John Buffone
Johnson & Johnson
Karrys Bros., Limited
Kuehne and Nagel
Lafarge Western Division
Lande and Associates
LHL Logistic Solutions
Logisti-Solve Inc.
London Drugs Limited
L'Oreal Canada
Louis Riel School Division
Magnate Shipping
Manitoba Government
Manitoba Liquor Control Commission
Maple Leaf Pork
MCL Metro Canada Logistics
MDS Nordion
Metro Canada Logistics Inc.
Molson Breweries
Monsanto Canada
Mosaic Canada ULC
Mountain Equipment Coop
Mutual Transportation Services Inc.
Near North Customs Broker Inc.
NEMF
New England Motor Freight
New Flyer Industries
Nexen Chemicals
NOVA Chemicals
Novelis Foil Products
Noye ENTERPRISES INC.
Omnitrans Inc.
Ontario Limited
Ontario Management Board
ORBEX Computer Systems
P.F. Collins Customs Broker Ltd.
Panalpina Inc.
Panasonic Canada
Paul's Transport Inc.
Payne Transportation Inc
PBB Global Logistics
People Soft
Personal Touch Travel & Cruises
Pfizer Canada Inc.
Plains Marketing Canada, L.P.
Polimex Forwarding Inc.
Poolies Maska Inc.
POS Pilot Plant Corporation
Prairie Malt Limited
Progistix Solution Inc.
Provigo Inc.
Provincial Health Services Authority
Purolator Courier Ltd.
Quality Safety System
R. Monoz Ltd.
Rainbow Transport Ltd.
Red River College
Reebok Canada Inc.
Regional Cadets Pacific
Reimer Express Lines
Rena Rigrard
Riverside Forest Products Limited
Robert Transport

RodAir International
Rona Inc.
Ronzoni Foods Canada
Saputo Div. Bouhangerie
SAQ
Saskferco Products Inc.
Savino Del Bene Corp.
Schenker of Canada
Schneiden Foods
Scholastic Canada Ltd.
Sears Canada
Shoreload Transport
Sico
SKF Canada Limited
Sobeys
Source Medical Corp
St. Boniface General Hospital
Standard Areo
STIHL Ltd
Supply Chain Alliance
Supply Chain Management
Supply Chain Systems Ltd.
Swire Pacific Offshore Ltd.
Tannis
Team Cargo Logistics
Teck Cominco Limited
Teckn-O-Laser Ltee
Tembec Ind.
Thompson Ahern + Company Ltd.
Time
Toshiba of Canada Limited
Total Logistics Partner
Transwest
Tri-Line Freight Systems L.P. Van Division
Trimac Transportation
Trumph Express
UFA
Unifreight International Ltd.
Unilever Canada
UPS
UTI Canada
Valles Steamship (Canada) Ltd.
VCC and BCITT
Venmar Ventilation Inc.
Versacold Group
Victoria General Hospital
VWR International
Wal Mart Canada Corp.
Wescast Industries Inc.
West Direct Express
Wheels Logistics
Wing Greenwood Transportation
Winnipeg Airports Authority Inc.
Yanke Group of Companies
Zircon Logistics Inc.

Appendix F

List of Educational Institution Participants

Algonquin College
Assiniboine Community College
Carleton University
Cegep Andre-Laurendeau
College Lionel-Groulx
Community College of New Brunswick - Dieppe
Concordia University College of Alberta
Consestoga College Institute of Technology and Advanced Learning
Douglas College
George Brown College
Georgian College
Grant MacEwan College
Haskayne School of Business
HEC Montreal
Humber College I T.A.L
Institut maritime du Quebec
Kwantlen University College
Mount Royal College
Red River College
Ryerson University
Seneca College
Université du Quebec a Trois-Rivières
Université Laval
University College of the Cariboo
University of Manitoba
Van Horne Institute
Wilfrid Laurier University

Appendix G

List of Association Participants

Association for Operations Management (APICS)
Atlantic Institute of Logistics and Transportation
Canadian Institute of Traffic and Transportation (CITT)
Canadian International Freight Forwarders Association (CIFFA)
Canadian Society of Customs Brokers (CSCB)
Materials Handling and Management Society (MHMS)
Purchasing Management Association of Canada (PMAC)
Supply Chain & Logistics Canada (SCL)
The Logistics Institute

Appendix H

List of Roundtable Participants

Montreal
Alcan
Bombardier
Conseiller en transport Inc.
Dismed
Frito-Lay Canada
GasBoc
Groupe GCL
HEC Montréal
Hydro-Québec
IBM
Metro Canada Logistics
Produits de sécurité North
Reebock Canada
RONA Inc.
Société des alcools du Québec
Technirack
Transport Sonar Inc.
UPS

Toronto
Bellville Rodair International
CN
Concord Transport
Effem Inc.
Global Distribution & Warehousing
Hbc Supply Chain
Laurier Institute
Metro Canada Logistics
MSM & Associates Consulting Inc.
Romark Logistics Inc.
Supply Chain Solutions
Supply Chain Systems
Trans-Logic Executive Search Group
Unilever
Vanguard Global Services
Wal-Mart Canada Corp.

Calgary
AB Online Consortium
Bissett School of Business, Mount Royal College
Calgary Board of Education
Calgary Logistics Council
Cole International
ENMAX Corporation
Shell Canada
Supply Chain Management
TransAlta
University of Calgary
Van Horne Institute

Appendix I

Employer Interview Guide

Interviewed person(s): _____

Organization: _____

Role: _____

Interviewer: _____

INTRODUCTION

The objective of the interview is to gain your perspective on challenges facing your logistics function with a focus on HR issues, such as attraction, retention and skill and training requirements.

Information that is shared during the interview will be treated as confidential.

INTERVIEW GUIDE

General Logistics
- What is the range of logistics jobs in your organization? Describe buckets of activity (e.g., purchasing, material planners, warehousing people, refer to Appendix for list)
- How is logistics organized? (i.e., centralized, decentralized; which department(s)/areas do they report in to)
- Can you describe the perception of the function's value added to the organization? (e.g., cost centre, strategic, valuable or not, a key success factor, critical business activity or not)?
- What are the challenges from a logistics and supply chain perspective affecting your organization's ability to compete internationally (if applicable)?

Technology
- What is the impact of technology on the logistics/ supply chain management function jobs and skills?
    - Is it changing jobs and skill sets (jobs/skills that are declining, new jobs/skills emerging)? How are you addressing these changes?
    - What are the main logistics or supply chain processes or practices are affected by technology?
- Do you feel your logistics function and its employees are ready for new technologies? Why or why not?

Human Resources
- Do you encounter any challenges in terms of filling demand for employees and skills? Which roles do you have trouble filling? Which skills do you feel are lacking in the marketplace?
- What new jobs are emerging, what jobs are diminishing?
- Is there a clearly articulated career path for logistics/ supply chain management jobs in your organization? Please describe.
- What are the main trends that are impacting HR requirements for logistics staff (in terms of new skill requirements and new positions/roles)?
- What do you see as the key HR challenges facing the logistics function in the industry and in your organization? (e.g., turnover, retention, job satisfaction, compensation, competition for human resources)

- How has the industry and your organization addressed these challenges to date, with what success?

Skills and Education
- What are the required skills and competencies to meet the current and future needs?
- When will you source these skill sets?
- What do you see as the pros and cons for a certification program?
- Are changing regulations and policies impacting employee and skill requirements? If yes, please describe change in skill requirements.
- What do you see as the main barriers preventing the current and potential employees from acquiring the required skills and experiences?
- Can you comment on the appropriateness of existing training/education programs?
  - Colleges/universities
  - Associations (certification programs)

Appendix J

Employee Focus Group Guide

Focus Group Participants: _____

Organization: _____

Interviewer: _____

INTRODUCTION

The objective of the interview is to gain your perspective on various aspects of employment within the logistics and supply chain field.

Information that is shared during the interview will be treated as confidential.

We will start by having each of you complete a questionnaire that should take about 30 minutes to complete, and then we will have an open discussion on some more qualitative aspects.

DISCUSSION GUIDE

- Can you explain your initial attraction to the logistics industry and reason for staying in the industry?
    - o How did you become aware of this industry?
    - o Why were you attracted to and entered this industry?
    - o What do you see as the main reasons for staying in this industry/ why do you like working in logistics?
    - o What do you see as the typical career progression/path for you?

- How would you describe the perceptions of the logistics industry by people outside of the industry or by young people selecting a career?
    - o How do you think people in your organization outside of logistics functions perceive the logistics function (e.g., cost centre, strategic, valuable or not, a key success factor, critical business activity or not)?
    - o How do you think young people selecting a career perceive the industry? Or people in general. What do you think is the general image and perception of the industry?
    - o Can you describe the typical demands of your job in terms of worklife balance, flexibility, stress load, etc.
    - o Are there issues that trouble you in your work job and work environment (e.g., safety, employment equity, equitable compensation, length of hours etc..)

- Which skills are in greatest need of development, e.g., which skills are lacking in people and which skills are hard to learn because of inadequate courses/training available.
  - Do you find that it is challenging to attain the skills you require to succeed in this function? Why (e.g., lack of courses of offered, lack of support by organization?)
  - Where do you see the greatest skill gap?
  - Where do you seek to upgrade skills?
  - What is your opinion of the education that is available in this field? (e.g., available, up-to-date, applicable to the real world, not covering a key topic, etc)

- Do you feel there is a need for standard certification?

- How has technology impacted your position and the skills you require?
  - Do you feel that your organization and yourself are ready for new technology? What would need to change to make you more ready?

Appendix K

Association Interview Guide

Organization: _____

Interviewee(s): _____

Role: _____

Interviewer: _____

Date: _____

INTRODUCTION

The objective of the interview is to gain your perspective on:
- How the industry is changing and the impact on the association
- Current and emerging expectations of your membership
- Industry needs with respect to training and development and the association's role in addressing them.

Information that is shared during the interview will be treated as confidential. We will not attributing comments to a specific organization, but will be reporting aggregate results.

INTERVIEW GUIDE

About Your Association
- Please describe the focus of your association
  - Mandate
  - Types of members
  - Services offered
- Has there been a shift in the focus of the organization and/or its service offering? What has caused the shift? What do you see as the future direction or primary role of the association?
- Does the association rely upon partnerships or relationships with industry, government or other educational institutions? (e.g., industry advisory boards to help set curriculum or research initiatives, affiliation with a university or college, etc.)? Briefly describe the partnership – with whom, for what purpose, successes, etc.

Membership and Industry Needs
- Have you noticed an increased or decreased interest in your association (e.g., membership levels, number of certifications, or participation in events and education activities)? Has there be a change in the makeup of the membership? Any thoughts on why?
- How do you identify and/or assess the needs of your membership? Are there emerging trends?
- How does your organization stay abreast of industry trends and educational requirements for this field? (e.g., how do you determine educational needs)

Education and Skill Requirements
- What do you view as the main education and skill requirements to prepare people to enter the logistics and supply chain industry? How are these best acquired? (on the job training, external development courses, pre-employment education)
- How have these changed over the last decade?
- What factors are influencing/driving the training needs – technology, regulation, globalization….?.
- Are there unmet educational demands in the industry that educational institutions and associations are not currently satisfying?

Certification
- What education and certification does your organization offer?
- What is the association's view regarding the value of a standard certification program? Pros, Cons? Is industry pushing for this?
- Do you have any insight or comments on international certification and educational best practices? (e.g., are there particularly good programs that come to mind, what makes them stand out in your mind, what can Canada learn from them).

Role of Government
- What role, if any, should government play in developing the logistics industry?

Appendix L

Steering Committee Members Interview Guide

Interviewed person: _____

Organization: _____

Role: _____

Interviewer: _____

INTRODUCTION

The objective of the interview is to gain your perspective of the strategic direction of the industry, how your organization is adapting within this context and an understanding of the human resource implications.

Information that is shared during the interview will be treated as confidential.

THE INDUSTRY

1. What are the biggest challenges facing the logistics industry in Canada in the following areas?
    a. Competition – internationally and US
    b. Technology – [What trends are being driven by technology? What are the industry's capabilities and capacities to apply existing and emerging technologies?]
    c. Customer
    d. Regulatory
    e. Others

2. What are the key business drivers affecting the industry and what impact are they having on human resources? Areas to explore:
    a. Fiscal environment
    b. Environmental regulations
    c. Technology

3. How is the logistics industry structure changing? Can you comment on:
    a. The prevalence and impact of mergers and alliances
    b. Fiscal environment and environmental regulations
    c. The prevalence of outsourcing and what functions
    d. Management and labour relationship

4. How does the Canadian industry compare internationally:
   a. Definition of international competitors
   b. Canadian firms' ability to compete
   c. Strengths and weaknesses of Canadian industry

HR MANAGEMENT

5. What do you see as the key HR challenges facing the industry, your organization? How has the industry and your organization addressed these challenges to date, with what success?

6. How do you describe the industry's culture in terms of:
   a. Turnover and retention issues
   b. Quality of life and job satisfaction
   c. Compensation and benefits
   d. Competition amongst industries for human resources

WORKFORCE PROFILE

7. What are the top/key 3 to 5 supply chain management jobs in your organization?

8. Describe the typical current and the emerging employment profile for each of these jobs:
   a. Educational background
   b. Professional certification
   c. Age
   d. Diversity
   e. Career path

9. What are the required skills and competencies to meet the current and future needs (by occupational level, e.g., operations, management)? What jobs are increasing in demand, what jobs are diminishing?

EDUCATION AND TRAINING

10. Can you comment on the appropriateness of existing training/education programs?

CLOSING

11. Are there specific organizations that should be included in the research? Do you have contact information we can use?

Thank you

Appendix M

Employer Questionnaire

**Strategic Human Resources Study of Logistics
and Supply Chain Management in Canada**

Employer Questionnaire
Confidential (when completed)

Welcome to the Logistics Study Employer Questionnaire. Please note that this questionnaire is **confidential**. Individual responses will not be shared; we will only report on aggregate results.

This questionnaire is designed to gain perspective from employers with either a logistics business mandate (e.g., third party providers) or with logistics functionality/processes, on their HR challenges and current and future skill and competency requirements for their logistics workforce. This questionnaire is complemented by two other surveys: one for logistics employees and the other for educational institutions. The aggregate results from these surveys, along with stakeholder interviews and industry roundtables, are part of the research under the direction of the Canadian Logistics Skills Committee, funded by the Government of Canada's Sector Council Program, that will be used to develop a human resources strategy to ensure the Canadian logistics and supply chain management workforce has the requisite skills, knowledge and experience to meet current and future industry demands. Results of the study will be made available in June 2005.

For the purpose of this survey, **logistics** is defined as "the process of moving and positioning inventory to meet customer requirements at the lowest possible total landed cost. **Supply chain management** is the process of strategically positioning and aligning distributive capabilities to gain and maintain competitive advantage." (*source – SCL Canada website*) Sub-functions within logistics and supply chain management are further defined in the attached Appendix, which provides a representative sample of the kinds of jobs/occupations that fall within the scope of the study. *Please note that although transportation and distribution functions are considered part of the logistics function and within the scope of this study, driver jobs are specifically excluded.*

This questionnaire is also available in electronic format.

There are five sections in this questionnaire. Most of the questions are close-ended and require that you check off the box that best corresponds to your situation. Please check only one box in each question unless more than one response is required. Where you are asked to provide additional information, please be as specific as possible. This questionnaire will take you approximately 45 to 60 minutes to complete.

Your feedback is appreciated. Thank you for your time and effort to complete this questionnaire.

Please return the completed questionnaire by:

Email   logisticstudy@deloitte.ca

or

FAX   604-922-3508   Vancouver
        416-364-4189   Toronto

Section 1: Organization Information

Company Name:	
Canadian Headquarter Location:	
Core Product or Service:	
Name and Title of Person Completing Questionnaire:	
Telephone #:	

1.1   Please indicate the approximate size of your organization in terms of total revenue or, if you are a para-public or public organization, total operating budget:

☐   <$100M (Cdn)

☐ $100M - $499M (Cdn)

☐ $500M – $999M (Cdn)

☐ $1B – $1.9B (Cdn)

☐ $2B - $5B (Cdn)

☐   > $5B (Cdn)

1.2   Please indicate the main industry within which your firm operates. Please check **one** only:

☐ Agriculture   ☐ Transportation and warehousing

☐ Fishing & trapping   ☐ Finance, insurance, real estate and leasing

☐ Forestry & logging   ☐ Professional, scientific and technical services

☐ Oil and gas extraction   ☐ Technology and information

☐ Mining (except oil and gas)   ☐ Business and support services

☐ Utilities   ☐ Educational services

☐ Construction   ☐ Health care and social assistance

☐ Manufacturing   ☐ Culture and recreation

☐ Wholesale trade   ☐ Accommodation and food services

☐ Retail trade   ☐ Government and public administration

                                   ☐ Other: ____

1.3   Which best describes the stage of development of your organization?

☐ Emerging

☐ Established and growing

☐ Mature and stable

1.4   What category best describes your organization?

☐ Global

☐ Canadian-based

☐ Canadian branch of a multinational organization. Please indicate in what country your head office is based: ____

1.5   In what geographic areas does your firm operate? Please indicate all that apply.

Within Canada:

☐ Maritimes

☐ Quebec

☐ Ontario

☐ Central (Saskatchewan and Manitoba)

☐ Alberta

☐ BC

☐ North (Territories and the Yukon)

Internationally:

☐ Europe

☐ United States

☐ Mexico

☐ Central and South America

☐ Australia

☐ Asia Pacific

1.6   Please provide the total number of full and part-time employees in your organization in all its Canadian locations and worldwide operations:

Canadian # ____   Worldwide # ____

a) Approximately what percentage of these **Canadian** employees are solely or mainly logistics or supply chain management employees? ____

b) Approximately what percentage of your organization's **logistics** personnel are based in:

____   Maritimes

____   Quebec

____   Ontario

____   Central (Saskatchewan and Manitoba)

____   Alberta

____   BC

____   North (Territories and the Yukon)

1.7 Which best describes your organization's role with respect to Logistics?

☐ Provider of logistics services to clients (please proceed to question 1.8)

☐ User of logistics services, either internal services or external service provider (Please proceed to question 1.9)

1.8 If you are a third party logistics provider, please select all of the logistics services that you provide? (Please proceed to section 2.0)

☐ Warehousing	☐ Product Marking/Labelling
☐ Outbound transportation	☐ Rate Negotiation
☐ Customs brokerage	☐ Inventory Management
☐ Inbound transportation	☐ Product Returns and Repair
☐ Customs clearance	☐ Information Technology
☐ Freight forwarding	☐ Fleet Management
☐ Freight bill	☐ Order Entry/Processing
☐ Cross-Docking	☐ Product Assembly/Installation
☐ Shipment Consolidation/Distribution	☐ Distribution Control
☐ Consulting Services	☐ Customer Service
☐ Return/Reverse Logistics	☐ 4PL Services
☐ Carrier Selection	☐ Inventory Ownership
☐ Order Fulfillment	☐ Factoring (Trade Financing)
☐ Procurement of Logistics	☐ Supply Chain Manager/Integrator
☐ Selected Manufacturing Activities	☐ Other ____

1.9 Please indicate what logistics activities are required by your organization and whether they are currently completed in-house or outsourced. Also indicate which activities were previously outsourced and which ones are being considered for outsourcing in the future. Select all that apply.

	Currently		Previously was outsourced	Considering outsourcing in the future	Currently outsourced and considering bringing back in
	In-house	Out-sourced			
Warehousing	☐	☐	☐	☐	☐
Outbound transportation	☐	☐	☐	☐	☐
Customs brokerage	☐	☐	☐	☐	☐
Inbound transportation	☐	☐	☐	☐	☐
Customs clearance	☐	☐	☐	☐	☐
Freight forwarding	☐	☐	☐	☐	☐
Freight bill	☐	☐	☐	☐	☐
Cross-Docking	☐	☐	☐	☐	☐
Shipment Consolidation/ Distribution	☐	☐	☐	☐	☐
Consulting Services	☐	☐	☐	☐	☐
Return/ Reverse Logistics	☐	☐	☐	☐	☐
Carrier Selection	☐	☐	☐	☐	☐
Order Fulfillment	☐	☐	☐	☐	☐
Procurement of Logistics	☐	☐	☐	☐	☐
Selected Manufacturing Activities	☐	☐	☐	☐	☐
Product Marking/ Labelling	☐	☐	☐	☐	☐
Rate Negotiation	☐	☐	☐	☐	☐
Inventory Management	☐	☐	☐	☐	☐
Product Returns and Repair	☐	☐	☐	☐	☐
Information Technology	☐	☐	☐	☐	☐
Fleet Management	☐	☐	☐	☐	☐
Order Entry/ Processing	☐	☐	☐	☐	☐

	Currently		Previously was outsourced	Considering outsourcing in the future	Currently outsourced and considering bringing back in
	In-house	*Out-sourced*			
Product Assembly/ Installation	☐	☐	☐	☐	☐
Distribution Control	☐	☐	☐	☐	☐
Customer Service	☐	☐	☐	☐	☐
4PL Services	☐	☐	☐	☐	☐
Inventory Ownership	☐	☐	☐	☐	☐
Factoring (Trade Financing)	☐	☐	☐	☐	☐
Supply Chain Manager/ Integrator	☐	☐	☐	☐	☐
Other. Please specify. _____	☐	☐	☐	☐	☐
Other. Please specify. _____	☐	☐	☐	☐	☐
Other. Please specify. _____	☐	☐	☐	☐	☐

1.10   Please check the statement below that best describes your organization:
☐ Logistics functions are centralized under a chief logistics or supply chain management officer
☐ Logistics functions are spread out under different departments
☐ There is no formal organization for logistics functions

1.11   What is the level of the highest logistics or supply chain management position in your organization:
☐ Vice-president
☐ Director
☐ Manager
☐ Other, please specify _____
☐ No position

Section 2: Industry Information

2.1   Please indicate the extent to which the following business drivers are currently affecting your logistics operations, and the extent they will have an impact in the next five years.

	Currently facing	Impact over past five years	Expected impact over next five years
Increasing Complexity	☐	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same
Financial/Cost Pressures	☐	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same
Technology	☐	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same

	Currently facing	Impact over past five years	Expected impact over next five years
New technology introduction	☐	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same
Increasing use of technology	☐	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same
Affordability of technology	☐	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same
Information management	☐	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same
Real-time and synchronized supply-chain	☐	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same
Customer Demand		☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same
Increasing quality expectations	☐	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same
Increasing speed expectations	☐	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same
Globalization		☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same
Global security	☐	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same
International trade	☐	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same
Competition		☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same
Large competitors	☐	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same
Local competition	☐	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same
International competition	☐	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same
Lack of critical mass	☐	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same
Industry Structure		☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same
Alliances	☐	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same
Industry growth	☐	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same
Mergers and consolidations	☐	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same
Outsourcing	☐	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same
Regulations		☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same
Environmental regulations	☐	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same
Border-crossing requirements (documentation, customs, tariffs, processes)	☐	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same
Infrastructure capacity (e.g., rail or marine terminal capacity)	☐	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same
Other. Please specify. _____	☐	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same
Other. Please specify. _____	☐	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same
Other. Please specify. _____	☐	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same

2.2 Please indicate up to three (3) key regulations that have had a significant impact on your logistics operations in the last three years: (for example: CTPAT, NAFTA, provincial regulations, municipal regulations).

_____

_____

_____

2.3 Please indicate in what areas you employ technology:

	Currently use technology	Considering using technology in the next five years	Currently have the requisite skills to employ this technology
Demand Resource Planning (DRP)	☐	☐	☐
Materials Resource Planning (MRP)	☐	☐	☐
Warehouse Management Systems (WMS)	☐	☐	☐
Transportation Management Systems (TMS)	☐	☐	☐
Advanced Planning and Scheduling (APS)	☐	☐	☐
Customer Management System (CMS)	☐	☐	☐
Inventory Management	☐	☐	☐
Supplier Relationship Management	☐	☐	☐
Other: _____	☐	☐	☐
Other: _____	☐	☐	☐
Other: _____	☐	☐	☐

Section 3: Human Resources Forecast

3.1 For each of the logistics sub-functions listed in the table below, please identify whether the occupation category is unionized, the number of employees, the number of vacancies as well as past, and future expected, changes to staffing levels.
In general the following outlines the types of positions that are represented by each category:
- Managerial: e.g., manager, supervisor
- Tactical: e.g., engineers, technician, professional, dispatchers, schedulers, data entry
- Operational: e.g., material handlers, ticket agents, shippers, store keepers
Please refer to the Appendix for more detailed examples of jobs within each of the sub-functions and occupation categories.

Sub-Function	Occupation Category	Check below if Union-ized (X)	Current Number of Employ-ees	Current Number of Vacancies if applicable	Change in number of logistics positions over the past five years	Expected change in number of logistics positions over the next five years	If applicable, percent increase
Senior management	Managerial	☐	____	____	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same	____
Logistics information systems	Managerial	☐	____	____	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same	____
	Tactical	☐	____	____	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same	____
	Operational	☐	____	____	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same	____
Warehousing	Managerial	☐	____	____	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same	____
	Tactical	☐	____	____	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same	____
	Operational	☐	____	____	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same	____
Transportation	Managerial	☐	____	____	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same	____
	Tactical	☐	____	____	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same	____
	Operational	☐	____	____	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same	____
Inventory/ material control	Managerial	☐	____	____	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same	____
	Tactical	☐	____	____	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same	____
	Operational	☐	____	____	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same	____
Customer service	Managerial	☐	____	____	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same	____
	Tactical	☐	____	____	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same	____
	Operational	☐	____	____	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same	____
Purchasing	Managerial	☐	____	____	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same	____
	Tactical	☐	____	____	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same	____
	Operational	☐	____	____	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same	____
Other. Please specify. ____		☐	____	____	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same	____
Other. Please specify. ____		☐	____	____	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same	____

3.2 Please provide information with respect to your use of contractors (excluding third party providers of outsourced services).

    a) Do you currently employ contractors to perform logistics activities?

    ☐ Yes. Approximately what percentage of your logistics personnel does this group represent: _____

    ☐ No

    b) If yes, please indicate for which positions/roles:

    _____

    c) If yes, why do you employ contractors:

    ☐ To meet a temporary or seasonal demand requirement

    ☐ To fill a skill gap

    ☐ To manage payroll and benefits costs

    ☐ Other. Please specify.

3.3 What formal **education and/or certifications** are required by your organization for each of the applicable occupational category listed below. If applicable, indicate anticipated future education and certification requirements if different than current requirements.
Please refer to the Appendix for more detailed examples of jobs within each of the sub-functions and occupation categories.

Sub-Function	Occupational category	_**Current** education and certification requirements_	_**Expected** future education and certification requirements_
Senior management	Managerial	_____	_____
Logistics information systems	Managerial	_____	_____
	Tactical	_____	_____
	Operational	_____	_____
Warehousing	Managerial	_____	_____
	Tactical	_____	_____
	Operational	_____	_____
Transportation	Managerial	_____	_____
	Tactical	_____	_____
	Operational	_____	_____
Inventory/ material control	Managerial	_____	_____
	Tactical	_____	_____
	Operational	_____	_____
Customer service	Managerial	_____	_____
	Tactical	_____	_____
	Operational	_____	_____
Purchasing	Managerial	_____	_____
	Tactical	_____	_____
	Operational	_____	_____

Sub-Function	Occupational category	***Current* education and certification requirements**	***Expected future* education and certification requirements**
Other. Please specify. _____		⎯⎯	⎯⎯
Other. Please specify. _____		⎯⎯	⎯⎯

3.4   Using the legend below, list the top five current and future **skill requirements** for logistics employees in each of the areas listed below using the corresponding numbers provided in the Skill and Knowledge Legend.

		Top 5 current requirements	*Top 5 future requirements*
Senior Management	Managerial	⎯⎯	⎯⎯
Logistics information systems	Managerial	⎯⎯	⎯⎯
	Tactical	⎯⎯	⎯⎯
	Operational	⎯⎯	⎯⎯
Warehousing	Managerial	⎯⎯	⎯⎯
	Tactical	⎯⎯	⎯⎯
	Operational	⎯⎯	⎯⎯
Transportation	Managerial	⎯⎯	⎯⎯
	Tactical	⎯⎯	⎯⎯
	Operational	⎯⎯	⎯⎯
Inventory/ material control	Managerial	⎯⎯	⎯⎯
	Tactical	⎯⎯	⎯⎯
	Operational	⎯⎯	⎯⎯
Customer service	Managerial	⎯⎯	⎯⎯
	Tactical	⎯⎯	⎯⎯
	Operational	⎯⎯	⎯⎯
Purchasing	Managerial	⎯⎯	⎯⎯
	Tactical	⎯⎯	⎯⎯
	Operational	⎯⎯	⎯⎯
Other. Please specify. _____		⎯⎯	⎯⎯
Other. Please specify. _____		⎯⎯	⎯⎯

Skill and Knowledge Legend	
1	Communication skills (verbal & written)
2	Reading skills
3	Mathematic skills
4	Technology/Computer skills
5	Mechanical skills
6	Customer relations skills
7	Analytical and problem solving skills
8	Decision-making skills
9	Negotiation skills
10	Interpersonal (e.g., team building, etc.) skills
11	Time management skills
12	Project management skills
13	People management/ leadership skills
14	Operational planning
15	Financial planning
16	Forecasting
17	Cost analysis and budgets
18	Knowledge of international business practices
19	Optimization of workflow and operations
20	Knowledge of transportation systems
21	Knowledge of laws and regulations
22	Process documentation and analysis
23	Knowledge of logistics functions and supply chain management
24	Other. Please specify: _____
25	Other. Please specify: _____

3.5 How do employees develop required skills/knowledge if they do not possess them upon hire?

☐ On-the-job training

☐ Internal courses – offered by your organization

☐ External courses – offered by outside educational service providers

3.6 If you provide internal training courses specifically for logistics employees, please list:

_____

3.7 For external courses please indicate the kind of support provided to employees. Check all that apply:

☐ Time-off to attend courses

☐ Full tuition

☐ Partial Tuition

☐ Tuition and textbooks

☐ No support

☐ Other. Please describe. _____

3.8 Please answer the following training related questions, approximations are appropriate if specific data is not available:

a) What is your organization overall training and education budget? _____ (% of payroll _____)

b) What is your per capita spending on training and education for logistics employees? _____

c) What is the average number of training days per employee per annum for all employees?
_____

d) What is the average number of training days per employee per annum for logistics employees? _____

3.9 Does your organization participate in any of the following work-study programs for logistics employees (select all that apply)?

☐ Internship

☐ Co-op program

☐ Apprenticeship

☐ Other. Please specify. _____

Section 4: Human Resources Challenges and Practices

4.1   Please identify the extent to which the following human resources issues are challenges currently facing your organization with respect to logistics employees, as well as whether this challenge has, and is expected to, increase, decrease or remain stable:

	Currently a Challenge	*Currently NOT a Challenge*	*Change over past five years*	*Expected change over next five years*
Attraction	☐	☐	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same
Retention	☐	☐	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same
Education and training	☐	☐	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same
Lack of defined/standard career path(s)	☐	☐	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same
Keeping pace with technological change	☐	☐	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same
Loss of experience/aging employees	☐	☐	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same
Succession planning	☐	☐	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same
Labour relations	☐	☐	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same
Competitive compensation/benefits	☐	☐	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same
Employee satisfaction	☐	☐	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same
Creating/maintaining a diverse workforce	☐	☐	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same
Leadership skills	☐	☐	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same
Requirement to provide 24/7 coverage	☐	☐	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same
Other. Please specify. _____	☐	☐	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same
Other. Please specify. _____	☐	☐	☐ ↑ ☐ ↓ ☐ same	☐ ↑ ☐ ↓ ☐ same

4.2 Please indicate from where you typically recruit the majority of your logistics employees for each of the following job categories:

		Educational institutions	*Logistics functions of other organizations*	*Outside of the logistics function (from inside your organization)*	*Outside of the logistics function (from outside your organization)*	*Other. Please Specify.*
Senior management	Managerial	☐	☐	☐	☐	____
Logistics information systems	Managerial	☐	☐	☐	☐	____
	Tactical	☐	☐	☐	☐	____
	Operational	☐	☐	☐	☐	____
Warehousing	Managerial	☐	☐	☐	☐	____
	Tactical	☐	☐	☐	☐	____
	Operational	☐	☐	☐	☐	____
Transportation	Managerial	☐	☐	☐	☐	____
	Tactical	☐	☐	☐	☐	____
	Operational	☐	☐	☐	☐	____
Inventory/ material control	Managerial	☐	☐	☐	☐	____
	Tactical	☐	☐	☐	☐	____
	Operational	☐	☐	☐	☐	____
Customer service	Managerial	☐	☐	☐	☐	____
	Tactical	☐	☐	☐	☐	____
	Operational	☐	☐	☐	☐	____
Purchasing	Managerial	☐	☐	☐	☐	____
	Tactical	☐	☐	☐	☐	____
	Operational	☐	☐	☐	☐	____
Other. Please specify. ____		☐	☐	☐	☐	____
Other. Please specify. ____		☐	☐	☐	☐	____

4.3   List the top three (3) logistics jobs that you are having difficulty filling, if any.

        ——

        ——

        ——

☐ No difficulties filling logistics positions.

4.4   What recruitment issue(s) are you currently facing with respect to your logistics employees?

☐ Competition for resources

☐ Difficulty finding required skills/experience

☐ Uncompetitive compensation packages

☐ Lack of awareness of the logistics function

☐ Lack of interest in entering the logistics function

☐ Other. Please specify: ——

☐ No issues

4.5   Please indicate if your organization is engaged in any of the following retention strategies:

☐ Providing a career path

☐ Long-term incentive pay

☐ Retention allowance

☐ Job rotation

☐ Flexible work schedule

☐ Mentorship program

☐ Other. Please specify: ——

☐ No strategy in place

4.6   Please indicate if your organization is facing any of the following retention and turnover issues.

☐ Employees going to the logistics function in other organizations

☐ Employees leaving the logistics function

☐ Employees leaving the Canadian market

☐ Competitors actively recruiting your employees

☐ Other. Please specify: ——

☐ No issues

4.7 Does your organization engage in any career awareness activities outside of your organization?

☐ Yes

☐ No

If yes, please check all that apply:

☐ In high schools

☐ In universities

☐ In colleges

☐ In conjunction with other organizations

☐ In conjunction with associations and industry groups

☐ General marketing (e.g., public marketing of logistics as a career)

☐ Other ____

4.8 Please read each of the statements below. Please select the box that best indicates your opinion about the statement.

Statement	Rating				
	Strongly Agree (1)	Agree (2)	Disagree (3)	Strongly Disagree (4)	Unable to Rate
Labour relations with logistics employees are good	☐	☐	☐	☐	☐
Employee morale among logistics employees is strong.	☐	☐	☐	☐	☐
Our organization is constantly updating its technology.	☐	☐	☐	☐	☐
Logistics employees are open to adopting new technologies.	☐	☐	☐	☐	☐
Logistics employees have the basic skills required to adopt new technologies.	☐	☐	☐	☐	☐
Our organization has a productive workforce.	☐	☐	☐	☐	☐
There are specific HR initiatives in place to meet the needs of logistics employees.	☐	☐	☐	☐	☐
There are specific HR initiatives in place to create a diverse logistics workforce.	☐	☐	☐	☐	☐
Our organization has been successful in increasing the diversity of our logistics workforce.	☐	☐	☐	☐	☐
Our organization promotes multi-skilling and cross-training for logistics positions.	☐	☐	☐	☐	☐
Our organization employs job rotation for logistics employees.	☐	☐	☐	☐	☐
Our organization permits flexible work arrangements for logistics employees, such as job sharing and flexible hours.	☐	☐	☐	☐	☐
Top management understands the potential of logistics to add competitive advantage other than cost savings.	☐	☐	☐	☐	☐
The importance of integrated supply chain management is growing for my organization.	☐	☐	☐	☐	☐

Statement	Rating				
	Strongly Agree (1)	Agree (2)	Disagree (3)	Strongly Disagree (4)	Unable to Rate
Higher education with a logistics/supply chain management or related major is essential when we look at new recruits.	☐	☐	☐	☐	☐
Professional development courses in logistics plus work experience could substitute for a university degree for entry into management level positions in my organization.	☐	☐	☐	☐	☐
Technical training courses are essential for logistics personnel to stay up to date.	☐	☐	☐	☐	☐
Professional development courses are essential for logistics personnel stay up to date.	☐	☐	☐	☐	☐
Logistics professional designations (e.g., P.Log) are seen as an asset in recruitment and/or promotion decisions.	☐	☐	☐	☐	☐
We will probably find it difficult to find qualified logistics personnel to meet our needs over the next five years.	☐	☐	☐	☐	☐
Technical training courses that meet the needs of logistics personnel are difficult to find.	☐	☐	☐	☐	☐
Professional development courses that meet the needs of logistics personnel are difficult to find.	☐	☐	☐	☐	☐
Logistics employees are typically developed and promoted from within rather than hired from outside the organization.	☐	☐	☐	☐	☐
External academic programs meet the needs of our organization.	☐	☐	☐	☐	☐
Recent graduates of logistics programs have the required skills to meet job requirements.	☐	☐	☐	☐	☐
Some of our logistics employees are hired from outside of Canada.	☐	☐	☐	☐	☐

4.9 Has your organization recently, in the past two years, implemented an initiative that was specifically targeted at attracting and/or retaining logistics employees?

☐ Yes

☐ No

Explain: _____

Section 5: General Comments

5.1   Please provide us with any others comments / issues.

_____

Thank you for taking the time to fill out this questionnaire.

Sub-Function	Occupation Category	NOC Code	Sample Job Titles
Senior Management	Managerial	0016	Senior Managers: Goods, Production, Utilities, Transportation and Construction
		0132	Postal and Courier Services Managers
		0013	Senior Manager, Financial, Communications and other businesses: COO
Logistics Information Systems	Managerial	0213	Computer and Information Systems Managers
	Tactical	2172	Database Analysts and Data Administrators
		2173	Software Engineers
Warehousing	Managerial	0721	Facility Operations and Maintenance Manager: Warehouse Manager
		1215	Supervisors of Purchasing and Inventory Clerks
	Tactical	1422	Data Entry Operator
	Operational	7452	Material Handlers
		9617	Labourers in Food, Beverage and Tobacco Processing: Material Handling, Packaging.
		1472	Store Keepers and Parts Clerks: Parts Supplier, Supply Clerk...
		7451	Longshore Workers: Dock Worker, Ship Loader Operator...
Transportation	Managerial	7222	Supervisors. Motor transport and other ground transit operators
		0713	Transportation managers
	Tactical	1236	Customs, ship and other brokers
		1475	Dispatchers and radio operators
		1476	Transportation route and crew schedulers
	Operational	1431	Accounting and related clerks: freight rate clerk
		1471	Shippers and receivers

Sub-Function	Occupation Category	NOC Code	Sample Job Titles
		7437	Air Transport Attendants: Cargo attendant, air transport
Inventory/material control	Managerial	1214	Supervisors, Mail and message distribution occupations
		0114	Other administrative service managers : inventory control manager, support services
Inventory/material control	Managerial	0911	Manufacturing managers : operations manager
		1215	Supervisors, recording, distributing and scheduling occupations
	Tactical	1122	Professional occupations in business services to management : consulting
		1473	Production clerks: expediter, material estimator. Traffic control clerk
		1474	Purchasing and inventory Clerks: inventory analyst, planner
		2233	Industrial engineering and manufacturing technologists and technicians
Customer service	Managerial	6216	Supervisors of ticket and cargo agents and related clerks in this unit group
	Tactical	1453	Customer Service information
		6433	Airline sales and service agents: airline cargo agent, load planner airline
	Operational	6434	Tickets agents, cargo service representative and related clerks
Purchasing	Managerial	0113	Purchasing managers
	Tactical	1225	Purchasing Agents and Officers
		6233	Retail and wholesale buyers
		1215	Supervisors of purchasing and inventory clerks

Appendix N

**Strategic Human Resources Study of Logistics and Supply Chain
Management in Canada
Employee Questionnaire
*Confidential (when completed)***

Welcome to the Logistics Study Employee Questionnaire. Please note that this questionnaire is **confidential**. Individual responses will not be shared; we will only report on aggregate results.

This questionnaire is designed to gain an understanding of the profile of employees working in the logistics function; to gain their perspective on what skills, education and experience they need to perform their jobs both now and into the future, and their perspective on the nature of their workplace.

This questionnaire is complemented by two other surveys: one for employers and the other for educational institutions. The aggregate results from these surveys, along with stakeholder interviews and industry roundtables, are part of the research under the direction of the Canadian Logistics Skills Committee, funded by the Government of Canada's Sector Council Program, that will be used to develop a human resources strategy to ensure the Canadian logistics and supply chain management workforce has the requisite skills, knowledge and experience to meet current and future industry demands. Results of the study will be made available in June 2005.

There are five sections to this questionnaire. Most of the questions will require that you check off the box that best corresponds to the answer. Please check only one box in each question unless more than one response is required. Where you are asked to provide additional information, please be as specific as possible. This questionnaire will take you approximately 30 to 45 minutes to complete. Your feedback is appreciated.

Thank you for your time and effort to complete this questionnaire.

Please return the completed questionnaire by:

Email: logisticstudy@deloitte.ca

or

Fax: 604-922-3508 – Vancouver
416-364-4189 – Toronto

Section 1: Employee Information

Your
Company's
Name: _____

Your Position
Title: _____

1.1 Please identify which age category you currently belong in:

☐ 25 years or less

☐ 26-35 years

☐ 36-45 years

☐ 46-55 years

☐ Over 55 years

1.2 Please identify your employment category:

☐ Continuing, full-time

☐ Continuing, part-time

☐ Temporary/contract, full-time

☐ Temporary/contract, part-time

☐ Coop student

☐ Other. Please specify. _____

1.3 Please identify which logistics sub-functions you currently work in (e.g., in terms of your role, not your company's industry). If you work as a generalist, please check all the areas that apply. **(Refer to the Appendix for examples of jobs that fall in the sub-functions listed below.)**

☐ Senior Management

☐ Logistics information systems

☐ Warehousing

☐ Transportation

☐ Inventory/material control

☐ Customer service

☐ Purchasing

☐ Other. Please specify. _____

1.4   Is your position unionized?

☐   Yes

☐   No

If unionized, by which bargaining agent are you represented? _____

1.5   Please identify the nature of your role:
       **(Refer to the Appendix for examples of jobs that fall in the categories
       listed below.)**

☐   Managerial (e.g., manager, supervisor)

☐   Tactical (e.g., engineers, technician, professional, dispatchers,
     schedulers, data entry)

☐   Operational (e.g., material handlers, ticket agents, shippers, store
     keepers)

1.6   How many years have you been in your current role?

☐   0-1

☐   2-5

☐   6-10

☐   > 10

1.7   In what region do you work primarily? Check only one.

☐   Maritimes

☐   Quebec

☐   Ontario

☐   Central (Saskatchewan and Manitoba)

☐   Alberta

☐   BC

☐   North (Territories and the Yukon)

1.8   What is your current annual salary?

☐   < $30,000

☐ $30,000 - $49,999

☐ $50,000 – $74,999

☐ $75,000 – $99,999

☐ $100,000 – $125,000

☐   > $125,000

1.9 Are you eligible for commission or annual bonus pay?

☐ Yes

☐ No

If yes, at what percent of base-salary: _____

1.10 Are you:

☐ Female

☐ Male

1.11 Do you consider yourself to be a member any of the following groups? Check which applies.

☐ Aboriginal

☐ Visible minority

☐ Disabled

Section 2: Education & Experience

In this section, we would like to learn about your overall level of education, as well as the experience you have acquired both within and outside of your current organization.

2.1 Please indicate the highest level of education that you have completed and specify details where appropriate (e.g., type of diploma, BA, B.Comm, MBA **and** area of specialization).

☐ Highest grade completed at school _____

☐ A high school diploma or general equivalency certificate _____

☐ Cegep _____

☐ Some Community College courses completed _____

☐ A diploma/certificate from a Community College _____

☐ Some University courses completed _____

☐ An undergraduate degree _____

☐ A post-graduate degree _____

2.2 Do you hold any professional designations or licenses (e.g., PEng, PLog, heavy weight license)?

☐ Yes; please list all designations and level completed, if applicable.

☐ No

2.3   Have you completed any other continuing education or certificate (e.g., CITT, CIRM, CPIM)?

☐   Yes; please list all designations and level completed, if applicable.

_____

☐   No. If no, do you plan to enrol in a certification program?
      ☐ Yes   ☐ No

2.4   Over the last 3 years, did you complete any formal education?

☐   Yes. If yes, please provide details in the table below.
☐   No

Subject(s)	Length of Course(s)	Who Paid? (e.g., you, employer)	Where? (e.g., name of high school, college, vocational or learning institute, etc.)	Delivery method (e.g., in class, computer-based, interactive on-line, correspondence)

2.5   What was your main reason for undertaking these courses?

☐   Required by my employer
☐   I plan to move out of the logistics area to another career
☐   To improve my career opportunities in logistics
☐   To improve my income
☐   To do better at my present job
☐   Other, please specify _____

2.6   How many years have you worked in a logistics position/function or related
       area with *your current employer*?

☐   2 years or less

☐   3-5 years

☐   6-15 years

☐   16-25 years

☐   Over 25 years

2.7   How many years have you worked in a logistics position/function or related
       area *over the course of your career*?

☐   2 years or less

☐   3-5 years

☐   6-15 years

☐   16-25 years

☐   Over 25 years

2.8   Please list previous jobs that you have held.

a)   With your current employer:

Job	Location (city, province)	Number of Years in this Job

b)   With previous employers:

Job	Location (city, province)	Number of Years in this Job

Section 3: Skills and Knowledge Profile

In this section we would like to learn about the skills and knowledge that you feel you currently possess and/or will need in the future.

PART A – CURRENT SKILLS/KNOWLEDGE

3.1   For the skills/knowledge areas listed below, please rate your current skills according to *Need to Acquire Much More of the Skill, Need to Acquire Somewhat More of the Skill, or Have the Skill* compared to your co-workers working in the same or similar jobs as you. If these skills do not relate to your job, please indicate *Not Applicable*. Please check all boxes that apply.

Skills/Knowledge You Currently Have:				
	Need to Acquire Much More of the Skill	***Need to Acquire Somewhat More of the Skill***	***Have the Skill***	***Not Applicable***
General Skills and Knowledge				
Communication (verbal, written), Reading and Mathematics	☐	☐	☐	☐
Technology/Computer skills	☐	☐	☐	☐
Mechanical skills	☐	☐	☐	☐
Customer relations skills	☐	☐	☐	☐
Analytical, problem solving and decision making skills	☐	☐	☐	☐
Negotiation skills	☐	☐	☐	☐
Interpersonal (e.g., team building) People management/leadership skills	☐	☐	☐	☐
Time management; Project management skills	☐	☐	☐	☐
Operational planning	☐	☐	☐	☐
Financial (e.g., planning, forecasting, cost analysis and budgeting)	☐	☐	☐	☐
Knowledge of international business practices	☐	☐	☐	☐
Optimization of workflow and operations; Process documentation and analysis	☐	☐	☐	☐
Knowledge of transportation systems	☐	☐	☐	☐
Knowledge of laws and regulations	☐	☐	☐	☐
Knowledge of logistics functions and supply chain management	☐	☐	☐	☐

Skills/Knowledge You Currently Have:				
	Need to Acquire Much More of the Skill	**Need to Acquire Somewhat More of the Skill**	**Have the Skill**	**Not Applicable**
General Skills and Knowledge				
Please list any other applicable skills or knowledge:				
Other:	☐	☐	☐	☐

Jobs often require employees to have <u>specific</u> skills and knowledge in order to complete the tasks of a particular job. For example, Dispatchers require radio operation skills, while Material Planners may require skills with particular MRP software.

Please list any specific skills and knowledge that you currently have that are required for you to complete the tasks of your current job.

Specific skills and knowledge you have:
1.
2.
3.
4.
5.

PART B - SKILLS/KNOWLEDGE YOU WILL NEED TO PERFORM YOUR J0B IN THE NEXT 5 YEARS

The following questions will ask you to assess how your skills and knowledge will need to change to reflect changing business needs.

3.2   Do you think that the tasks you perform in your current job will be different in 5 years?

☐   Yes

☐   No

If yes, how will they be different?

_____

3.3   Please indicate the degree to which the skills listed below will be needed in the next 5 years for your role, as compared to now, by checking off the appropriate boxes. Please check "not applicable" if the skill does not apply to your role.

	Not applicable	*Much More*	*More*	*Same*	*Less*	*Much Less*
General Skills and Knowledge						
Communication (verbal, written), Reading and Mathematics	☐	☐	☐	☐	☐	☐
Technology/Computer skills	☐	☐	☐	☐	☐	☐
Mechanical skills	☐	☐	☐	☐	☐	☐
Customer relations skills	☐	☐	☐	☐	☐	☐
Analytical, problem solving and decision making skills	☐	☐	☐	☐	☐	☐
Negotiation skills	☐	☐	☐	☐	☐	☐
Interpersonal (e.g., team building) People management/leadership skills	☐	☐	☐	☐	☐	☐
Time management; Project management skills	☐	☐	☐	☐	☐	☐
Operational planning	☐	☐	☐	☐	☐	☐
Financial (e.g., planning, forecasting, cost analysis and budgeting)	☐	☐	☐	☐	☐	☐
Knowledge of international business practices	☐	☐	☐	☐	☐	☐
Optimization of workflow and operations; Process documentation and analysis	☐	☐	☐	☐	☐	☐
Knowledge of transportation systems	☐	☐	☐	☐	☐	☐
Knowledge of laws and regulations	☐	☐	☐	☐	☐	☐
Knowledge of logistics functions and supply chain management	☐	☐	☐	☐	☐	☐

3.4   Please list any other relevant skills/knowledge that you feel you will need in the future to complete your job.

Section 4: Training & Development

In this section, we are interested in learning about the training in *specific skill areas* that you have received over the past 3 years. The following definitions are provided for your reference as you answer the questions in this section.

> ***Definitions:***
> **_"On-the-Job"_**: specific job instructions, coaching and counselling as provided by supervisors; apprenticeship training; job rotation; and, management projects/special assignments.
> **_"Off-the-Job"_**: self study programs such as correspondence courses, formal classroom instruction from an educational institution, and/or employer-sponsored courses taken either during or not during standard work hours.
> **_"No Training"_**: no on-the-job or off-the-job training received.

4.1   Have you received job related training and development in any of the following skill areas within the last 3 years? Please indicate whether this training was received On-the-Job or Off-the-Job.

No Training	Yes, training received	Skill Area	If yes, please indicate the source:		For *Off-the-job* training, please indicate where you took the training:	Did the training meet your needs	
			On-the-Job	Off-the-Job		Yes	No
☐	☐	Communication (verbal, written), Reading and Mathematics	☐	☐		☐	☐
☐	☐	Technology/Computer skills	☐	☐		☐	☐
☐	☐	Mechanical skills	☐	☐		☐	☐
☐	☐	Customer relations skills	☐	☐		☐	☐
☐	☐	Analytical, problem solving and decision making skills	☐	☐		☐	☐
☐	☐	Negotiation skills	☐	☐		☐	☐
☐	☐	Interpersonal (e.g., team building) People management/leadership skills	☐	☐		☐	☐
☐	☐	Time management; Project management skills	☐	☐		☐	☐
☐	☐	Operational planning	☐	☐		☐	☐
☐	☐	Financial (e.g., planning, forecasting, cost analysis and budgeting)	☐	☐		☐	☐
☐	☐	Knowledge of international business practices	☐	☐		☐	☐
☐	☐	Optimization of workflow and operations; Process documentation and analysis	☐	☐		☐	☐

No Training	Yes, training received	Skill Area	If yes, please indicate the source:		For *Off-the-job* training, please indicate where you took the training:	Did the training meet your needs	
			On-the-Job	Off-the-Job		Yes	No
☐	☐	Knowledge of transportation systems	☐	☐		☐	☐
☐	☐	Knowledge of laws and regulations	☐	☐		☐	☐
☐	☐	Knowledge of logistics functions and supply chain management	☐	☐		☐	☐
☐	☐	Other:	☐	☐		☐	☐

4.2 How many days of formal training or professional development did you receive in the past 12 months? Days: _____

Section 5: Employee Opinions

In this section, we would like to learn about your views on a number of employment-related matters.

5.1 Are you interested in furthering your skills, knowledge and education in the logistics field?
☐ Yes, Why? _____

☐ No, why not? _____

5.2 What support (financial or other) do you currently receive from your employer to meet your learning and development goals?
☐ Time-off for study
☐ Full tuition
☐ Partial Tuition
☐ Tuition and textbooks
☐ In-house training programs
☐ No support
☐ Other. Please describe. _____

5.3 In your opinion, what are the obstacles preventing you from building on the skills, knowledge and education you currently have?
☐ Time
☐ Cost
☐ Lack of opportunity
☐ Lack of interest

☐ Organization's budget constraints

☐ Lack of support

☐ Other. Please specify. _____

☐ No obstacles

5.4 In your opinion, what is the most important challenge confronting employees working in a logistics/supply chain management role?

_____

5.5 How has technology changed the nature of your work?

☐ Changes to means of communication

☐ Changes to processes

☐ Changes to equipment

☐ Changes to analytical tools

☐ Other. Please describe. _____

5.6 How has technology changed the skills required for your position? For each type of change selected, please list the skills.

☐ New skills required _____

☐ Skills that have increased in importance _____

☐ Skills that have decreased in importance _____

☐ Skills no longer required _____

☐ Other: _____ _____

☐ Other: _____ _____

5.7 How do you think technology will change your work in the future?

_____

5.8   Please read each of the statements below. Please select the box that best indicates your opinion about the statement.

Statement	Strongly Agree (1)	Agree (2)	Disagree (3)	Strongly Disagree (4)	Unable to Rate
Overall, I am satisfied with my job	☐	☐	☐	☐	☐
I would recommend employment in logistics careers	☐	☐	☐	☐	☐
I expect to have a long career in logistics	☐	☐	☐	☐	☐
I regularly work 50 hours or more a week.	☐	☐	☐	☐	☐
Employee morale among logistics employees is strong.	☐	☐	☐	☐	☐
I work in a high-pressure environment	☐	☐	☐	☐	☐
I work in a safe environment	☐	☐	☐	☐	☐
I work in an environment in which management treats employees with respect	☐	☐	☐	☐	☐
I work in an environment where any employee, regardless of race or ethnic background can be successful	☐	☐	☐	☐	☐
I usually have the time I need to do my work effectively	☐	☐	☐	☐	☐
I work in an environment in which I am able to balance the demands of my work and personal life	☐	☐	☐	☐	☐
In my work place we continually strive to improve our knowledge and capabilities	☐	☐	☐	☐	☐
In my workplace, we are given the opportunity to rotate jobs to gain experience	☐	☐	☐	☐	☐

In my work place, we continually update our technology to improve our efficiency	☐	☐	☐	☐	☐
I am compensated fairly for the work that I do	☐	☐	☐	☐	☐
I am provided adequate training in order to make full use of technology in my job.	☐	☐	☐	☐	☐
Top management understands the potential of logistics to add competitive advantage other than cost savings.	☐	☐	☐	☐	☐
My manager creates an environment in which employees can be successful	☐	☐	☐	☐	☐

5.9   I plan to explore other opportunities within the logistics function and supply chain management.

      ☐   Yes   ☐   No

5.10   I plan to explore other opportunities outside the logistics function and supply chain management.

      ☐   Yes   ☐   No

5.11   If you were to consider leaving the logistics function, what would be the main reason for this?

5.12   Please provide us with any others comments / issues.

Thank you for taking the time to fill out this questionnaire.

Sub-Function	Occupation Category	NOC Code	Sample Job Titles
Senior Management	Managerial	0016	Senior Managers: Goods, Production, Utilities, Transportation and Construction
		0132	Postal and Courier Services Managers
		0013	Senior Manager, Financial, Communications and other businesses: COO
Logistics Information Systems	Managerial	0213	Computer and Information Systems Managers
	Tactical	2172	Database Analysts and Data Administrators
		2173	Software Engineers
Warehousing	Managerial	0721	Facility Operations and Maintenance Manager: Warehouse Manager
		1215	Supervisors of Purchasing and Inventory Clerks
	Tactical	1422	Data Entry Operator
	Operational	7452	Material Handlers
		9617	Labourers in Food, Beverage and Tobacco Processing: Material Handling, Packaging.
		1472	Store Keepers and Parts Clerks: Parts Supplier, Supply Clerk...
		7451	Longshore Workers: Dock Worker, Ship Loader Operator...
Transportation	Managerial	7222	Supervisors. Motor transport and other ground transit operators
		0713	Transportation managers
	Tactical	1236	Customs, ship and other brokers
		1475	Dispatchers and radio operators
		1476	Transportation route and crew schedulers
	Operational	1431	Accounting and related clerks: freight rate clerk
		1471	Shippers and receivers

Sub-Function	Occupation Category	NOC Code	Sample Job Titles
		7437	Air Transport Attendants: Cargo attendant, air transport
Inventory/material control	Managerial	1214	Supervisors, Mail and message distribution occupations
		0114	Other administrative service managers : inventory control manager, support services
Inventory/material control	Managerial	0911	Manufacturing managers : operations manager
		1215	Supervisors, recording, distributing and scheduling occupations
	Tactical	1122	Professional occupations in business services to management : consulting
		1473	Production clerks: expediter, material estimator. Traffic control clerk
		1474	Purchasing and inventory Clerks: inventory analyst, planner
		2233	Industrial engineering and manufacturing technologists and technicians
Customer service	Managerial	6216	Supervisors of ticket and cargo agents and related clerks in this unit group
	Tactical	1453	Customer Service information
		6433	Airline sales and service agents: airline cargo agent, load planner airline
	Operational	6434	Tickets agents, cargo service representative and related clerks
Purchasing	Managerial	0113	Purchasing managers
	Tactical	1225	Purchasing Agents and Officers
		6233	Retail and wholesale buyers
		1215	Supervisors of purchasing and inventory clerks

Appendix O

Educational Institution Questionnaire

**Strategic Human Resources Study of Logistics
and Supply Chain Management in Canada**

Educational Institution Questionnaire
Confidential (when completed)

Welcome to the Logistics Study Educational Institution Questionnaire. Please note that this questionnaire is **confidential**. Individual responses will not be shared; we will only report on aggregate results.

This questionnaire is designed to gain perspective from members of the education profession on what courses, programs, and support they offer to students wishing to enter the logistics and supply chain management function, or upgrade their existing skills. This survey is complemented by two other surveys: one for logistics employees and the other for employers. The aggregate results from these surveys, along with stakeholder interviews and industry roundtables, are part of the research under the direction of the Canadian Logistics Skills Committee, funded by the Government of Canada's Sector Council Program, that will be used to develop a human resources strategy to ensure the Canadian logistics and supply chain management workforce has the requisite skills, knowledge and experience to meet current and future industry demands. Results of the study will be made available in June 2005.

For the purpose of this survey, ***logistics*** is defined as "the process of moving and positioning inventory to meet customer requirements at the lowest possible total landed cost. ***Supply chain management*** is the process of strategically positioning and aligning distributive capabilities to gain and maintain competitive advantage." (*source – SCL Canada website*) Sub-functions within logistics and supply chain management are further defined in the attached Appendix, which provides a representative sample of the kinds of jobs/occupations that fall within the scope of the study. *Please note that although transportation and distribution functions are considered part of the logistics function and within the scope of this study, driver jobs are specifically excluded.*

This questionnaire is also available in electronic format.

There are four different sections in this questionnaire. Most of the questions will require that you check off the box that best corresponds to the answer. Please check only one box in each question unless more than one response is required. Where you are asked to provide additional information, please be as specific as possible. This questionnaire will take you approximately 30 minutes to complete.

Your feedback is appreciated. Thank you for your time and effort to complete this questionnaire.

Please return the completed questionnaire by: Email: logisticstudy@deloitte.ca *or* Fax: 604-922-3508 – Vancouver 416-364-4189 – Toronto

Section 1: Educational Institution Information

Institution Name: _____

Faculty Name: _____
Department/Program
Name: _____

Contact Name & Title _____

Telephone # _____

1.1   Please identify the type of institution you represent:

    ☐   Cegep

    ☐   University

    ☐   College

    ☐   Technical institution

    ☐   Trade school

    ☐   Other. Please specify. _____

1.2   Please identify the approximate number of students currently registered at your institution:

    ☐   < 500

    ☐   501 - 1000

    ☐   1001 – 10,000

    ☐   > 10,000

1.3   Is your institution primarily publicly or privately funded? If both, check both boxes and indicate the percentage breakdown.

    ☐   Private   _____ %

    ☐   Public   _____ %

Section 2: Course and Program Information

2.1   Does your institution offer an entire program(s) specifically tailored to educate students in logistics or supply chain management?

☐   Yes. Please specify. _____

☐   No, Courses only

2.2   Does your institution offer a logistics, or supply chain management, specialization within another program (e.g., supply chain specialization within a business program)?

☐   Yes. Please specify. _____

☐   No

2.3   Please identify the degrees/diplomas that you offer in the logistics or supply chain management area (you may indicate more than one):

☐   Graduate degree

☐   Undergraduate degree

☐   Diploma

☐   Certificate

☐   Executive/Management Development Program

☐   Other. Please specify. _____

☐   None

2.4   Do your logistics programs or logistics-related disciplines include any of the following work-study programs (select all that apply).

☐   Internship

☐   Co-op program

☐   Apprenticeship

☐   Other. Please specify. _____

2.5　Please indicate how your curriculum has evolved to meet changes in skill and knowledge demands over the past 5 years? For each type of change selected, please specify what programs, courses or subjects were added or removed.

☐　New programs added.　_____

☐　New courses added.　_____

☐　New subject matter focus.　_____

☐　New technologies taught.　_____

☐　Courses or subjects removed from curriculum.　_____

☐　Other: ____　_____

☐　Other: ____　_____

2.6　Please provide details pertaining to the logistics courses, or logistics related courses, that you offer. [You may wish to have an administrator or instructor complete this section of the form.]

	Core Topics(s)/ Learning Outcomes	Program under which course falls	Num-ber of sess-ions offer-ed/ year	Num-ber of class hours per course	Approx. spaces avail-able/ offering	Approx. number of stud-ents/ offering	Does student dem-and exceed avail-ability (yes/ no)
Example: Supply Chain Management	*Purch-asing, Inventory Manage-ment, Contin-uous Replenish-ment, Material Require-ment Planning, Bar Codes, Forecast-ing*	*Business Program*	*Twice a year*	*40*	*120*	*80*	

2.7   Please select and/or list any logistics related technical tools or systems that are taught at your institution:

☐   Advanced Planning and Scheduling (APS)
☐   Demand Resource Planning (DRP)
☐   Materials Resource Planning (MRP)
☐   Warehouse Management Systems (WMS)
☐   Transportation Management Systems (TMS)
☐   Inventory Management
☐   Customer Management System (CMS)
☐   Supplier Relationship Management
☐   Other: ____
☐   Other: ____
☐   Other: ____

2.8   Please select the skills and knowledge areas that are taught as part of the logistics or supply chain management programs.

☐   Communication skills (verbal & written)
☐   Reading skills
☐   Mathematic skills
☐   Technology/Computer skills
☐   Mechanical skills
☐   Customer relations skills
☐   Analytical and problem solving skills
☐   Decision-making skills
☐   Negotiation skills
☐   Interpersonal (e.g., team building, etc.) skills
☐   Time management skills
☐   Project management skills
☐   People management/leadership skills
☐   Operational planning
☐   Financial planning
☐   Forecasting
☐   Cost analysis and budgets
☐   Knowledge of international business practices
☐   Optimization of workflow and operations
☐   Knowledge of transportation systems
☐   Knowledge of laws and regulations
☐   Process documentation and analysis
☐   Knowledge of logistics functions and supply chain management
☐   Other. Please specify: ____
☐   Other. Please specify: ____

Section 3: Current Challenges

In this section, we would like to learn about any challenges that your institution faces in delivering logistics training.

3.1   Demand for logistics courses is generally:

☐   Increasing   Please go to question 3.2

☐   Decreasing   Please go to question 3.4

☐   Not changing   Please go to section 4.

3.2   If demand is increasing, please indicate the level of difficulty or ease you face in meeting this demand for each of the issues listed below.

Issue	Very difficult	Somewhat difficult	Neither easy or difficult	Somewhat easy	Very easy
☐ Securing sufficient funding	☐	☐	☐	☐	☐
☐ Hiring sufficiently qualified instructors	☐	☐	☐	☐	☐
☐ Competition from other educational institutions	☐	☐	☐	☐	☐
☐ Designing courses that meet student needs	☐	☐	☐	☐	☐
☐ Lack of financial aid for students	☐	☐	☐	☐	☐
☐ Meeting scheduling needs of mature and/or working students	☐	☐	☐	☐	☐
Other					

3.3   If demand is increasing, do you have any insights into the reason for the increased demand (e.g., is the level of awareness about career opportunities in this field increasing, is your institution promoting this area of study in high schools?)?

_____

_____

_____

3.4   If demand is decreasing, please indicate the extent to which each of the following factors may be contributing to this decrease.

Issue	Very important	Somewhat important	Neither important or unimportant	Somewhat unimportant	Very unimportant
☐ Cost of enrolment	☐	☐	☐	☐	☐
☐ Inability of student to obtain financial assistance	☐	☐	☐	☐	☐
☐ Competition from other educational institutions	☐	☐	☐	☐	☐
☐ Courses not meeting student needs	☐	☐	☐	☐	☐
☐ Lack of student interest in logistics professions	☐	☐	☐	☐	☐
☐ Lack of student awareness about logistics professions	☐	☐	☐	☐	☐
Other					

Section 4: Student and Alliance Profile

4.1   Please provide the percentage distribution of students enrolled in your logistics/supply chain management courses or program:

Gender	_____% Male _____% Female
Average Age	_____
Type of Student	_____% Undergrad _____% Continuing education _____% Executive development
Time Commitment	_____% Part-time student _____% Full-time student _____% Evening and weekend student

4.2   If you have a dedicated logistics or supply chain management program, please indicate if you have industry alliances for any of the following activities:

☐   Coop and/or apprenticeship

☐   Job placement

☐   Input into curriculum development

☐   Research/best practices

☐   Professional associations

☐   Other. Please specify. _____

Section 5: Career Opportunities

5.1 Please indicate the three (3) most common sub-functions (not the industry) that your graduates enter into after completing your logistics related program? **(Please refer to the Appendix for jobs associated with these areas.)**

☐ Senior Management

☐ Logistics information systems

☐ Warehousing

☐ Transportation

☐ Inventory/material control

☐ Customer service

☐ Purchasing

☐ Forecasting

☐ Other. Please specify. _____

5.2 At what level do your logistics related program graduates find their first position? Please provide an estimated percentage distribution across the three categories below. **(Please refer to the Appendix for jobs associated with these categories.)**

_____ % Managerial (e.g., manager, supervisor)

_____ % Tactical (e.g., engineers, technician, professional, dispatchers, schedulers, data entry)

_____ % Operational (e.g., material handlers, ticket agents, shippers, store keepers)

5.3 What is the average starting salary of your logistics related program graduates: _____

5.4 How has this starting annual salary changed over the last three years relative to the starting salary of other non-logistics positions?

☐ Increased

☐ Decreased

☐ Remained the same

5.5 Approximately what percent of your logistics related program graduates find employment in a logistics function after graduation: _____

5.6   How would you describe the response rate to logistic related job postings as compared to other types of job postings:

☐   Above average

☐   Average

☐   Below average

Section 6: Comments

6.1.   The purpose of this study is to identify ways to address the education and skill needs of logistics function within Canadian organizations. Educational institutions play a key role in addressing this need. Please provide any insight you may have about the issues that your institution faces in improving logistics education and supporting the industry needs related to the logistics function.

___

Thank you for taking the time to fill out this questionnaire.

Appendix A *(to Appendix O)*
Logistics Function
Sample List of Occupations from the
National Occupational Classification
(http://www.hrdc-drhc.gc.ca/noc)

Sub-Function	Occupation Category	NOC Code	Sample Job Titles
Senior Management	Managerial	0016	Senior Managers: Goods, Production, Utilities, Transportation and Construction
		0132	Postal and Courier Services Managers
		0013	Senior Manager, Financial, Communications and other businesses: COO
Logistics Information Systems	Managerial	0213	Computer and Information Systems Managers
	Tactical	2172	Database Analysts and Data Administrators
		2173	Software Engineers
Warehousing	Managerial	0721	Facility Operations and Maintenance Manager: Warehouse Manager
		1215	Supervisors of Purchasing and Inventory Clerks
	Tactical	1422	Data Entry Operator
	Operational	7452	Material Handlers
		9617	Labourers in Food, Beverage and Tobacco Processing: Material Handling, Packaging.
		1472	Store Keepers and Parts Clerks: Parts Supplier, Supply Clerk...
		7451	Longshore Workers: Dock Worker, Ship Loader Operator...
Transportation	Managerial	7222	Supervisors. Motor transport and other ground transit operators
		0713	Transportation managers
	Tactical	1236	Customs, ship and other brokers
		1475	Dispatchers and radio operators
		1476	Transportation route and crew schedulers
	Operational	1431	Accounting and related clerks: freight rate clerk
		1471	Shippers and receivers

Sub-Function	Occupation Category	NOC Code	Sample Job Titles
		7437	Air Transport Attendants: Cargo attendant, air transport
Inventory/material control	Managerial	1214	Supervisors, Mail and message distribution occupations
		0114	Other administrative service managers : inventory control manager, support services
Inventory/material control	Managerial	0911	Manufacturing managers : operations manager
		1215	Supervisors, recording, distributing and scheduling occupations
	Tactical	1122	Professional occupations in business services to management : consulting
		1473	Production clerks: expediter, material estimator. Traffic control clerk
		1474	Purchasing and inventory Clerks: inventory analyst, planner
		2233	Industrial engineering and manufacturing technologists and technicians
Customer service	Managerial	6216	Supervisors of ticket and cargo agents and related clerks in this unit group
	Tactical	1453	Customer Service information
		6433	Airline sales and service agents: airline cargo agent, load planner airline
	Operational	6434	Tickets agents, cargo service representative and related clerks
Purchasing	Managerial	0113	Purchasing managers
	Tactical	1225	Purchasing Agents and Officers
		6233	Retail and wholesale buyers
		1215	Supervisors of purchasing and inventory clerks

Appendix P

**Strategic Human Resources Study of Logistics
and Supply Chain Management in Canada**

**Student Questionnaire
Confidential (when completed)**

Welcome to the Logistics Study Student Questionnaire. Please note that your responses will be treated as **confidential**. Individual responses will not be shared; we will only report on aggregate results.

This questionnaire is designed to gain an understanding of your knowledge of the supply chain and logistics industry and your awareness and perceptions of careers in this industry.

Section 1: Student Profile

1.1 Name of school   _____

1.2 In what educational program
     are you enrolled?:   _____

1.3 What is your area of
     specialization? (if applicable):   _____

1.4 I am in year _____ of a _____ year program.

1.5 Are you:

☐   Female

☐   Male

Section 2: Careers in Supply Chain Management and Logistics

2.1   To what extent do you have an understanding of jobs or career opportunities in the following areas:

	Fully	**Limited**	**Not at All**
Warehousing	☐	☐	☐
Purchasing	☐	☐	☐
Transportation	☐	☐	☐
Customer Services	☐	☐	☐
Inventory / Material Management	☐	☐	☐
Logistics Information Systems	☐	☐	☐

2.2   How have potential career opportunities in supply chain management/logistics come to your attention? (check all that apply)

☐   Friends or family working in the industry

☐   Guidance counsellors in high school

☐   Career services at university

☐   Job advertisements by companies

☐   Prior work experience

☐   General marketing by the industry

☐   Portrayal of the industry in media

☐   Other. Please specify:_____

☐   Not aware of careers in this area

2.3   Are you interested in a career in supply chain management/logistics?

☐   Yes, please proceed to question 2.3.1

☐   No, please proceed to question 2.3.2

2.3.1 If yes, what attracts you to this area of employment? (check all that apply)

	Attraction	Not a Consideration
The role of logistics/supply chain management in an organization	☐	☐
Pay	☐	☐
Hours of work	☐	☐
Interesting work	☐	☐
Reputation of industry	☐	☐
Prestige of role	☐	☐
Opportunity for advancement	☐	☐
Other, specify_____	☐	☐

2.3.2 If no, what detracts from this area of employment? (check all that apply)

	Detraction	Not a Consideration
The role of logistics/supply chain management in an organization	☐	☐
Pay	☐	☐
Hours of work	☐	☐
Interesting work	☐	☐
Reputation of industry	☐	☐
Prestige of role	☐	☐
Opportunity for advancement	☐	☐
Other, specify_____	☐	☐

Section 3: Perceptions of Logistics and Supply Chain Management

3.1   Please indicate the extent to which you agree or disagree with the following statements.

Statement	Rating				
	Strongly Agree (1)	Agree (2)	Disagree (3)	Strongly Disagree (4)	Do Not Know (5)
Logistics/supply chain management jobs require technology skills	☐	☐	☐	☐	☐
Employment in logistics/supply chain management has been recommended to me	☐	☐	☐	☐	☐
I plan to pursue a career in logistics	☐	☐	☐	☐	☐
I am aware of educational programs that specialize in logistics or supply chain management	☐	☐	☐	☐	☐
There is job security in logistics/supply chain management	☐	☐	☐	☐	☐
Logistics is a high-pressure environment	☐	☐	☐	☐	☐

	Strongly Agree (1)	Agree (2)	Disagree (3)	Strongly Disagree (4)	Do Not Know (5)
Logistics comprises primarily blue-collar jobs	☐	☐	☐	☐	☐
Jobs in logistics pay well	☐	☐	☐	☐	☐
Professional designations and certification programs exist for logistics	☐	☐	☐	☐	☐
I am aware of career paths within logistics	☐	☐	☐	☐	☐
Supply chain management is a growing field	☐	☐	☐	☐	☐
I am aware of career opportunities in logistics	☐	☐	☐	☐	☐
Logistics is a rapidly changing field	☐	☐	☐	☐	☐
The role of logistics/supply chain management is taking on increasing profile in organizations	☐	☐	☐	☐	☐
There are supply chain/logistics related courses or programs available at my school	☐	☐	☐	☐	☐
I am interested in furthering my knowledge and/or education in logistics and supply chain management.	☐	☐	☐	☐	☐

Appendix Q

List of Affiliated Associations

Academy of Management, Operations Management Division
Advanced Integrated Manufacturing Center (AIM)
AERCE Spanish Association of Purchasing and Supply
Alberta Motor Transport Association (AMTA)
American National Standards
American Production & Inventory Control Society (APICS)
American Society for Quality (ASQ)
American Society of Mechanical Engineers (ASME)
American Society of Professional Estimators (ASPE)
American Society of Transportation and Logistics
American Trucking Associations
Association of Manufacturing Excellence (AME)
Atlantic Provinces Trucking Association
Avraham Y. Goldratt Institute
BC Trucking Association
Calgary Logistics Council
Canadian Association of Importers and Exporters
Canadian Industrial Transportation Association / Association Canadienne de Transport Industriel (CITA-ACTI)
Canadian Institute of Traffic and Transportation (CITT)
Canadian International Freight Forwarders Association (CIFFA)
Canadian Pallet Council
Canadian Ship Owners Association
Canadian Society of Customs Brokers (CSCB)
Canadian Transportation Research Forum
Canadian Trucking Human Resources Committee
Center for Advanced Purchasing Studies (CAPS)
Chartered Institute of Purchasing & Supply (CIPS)
Chartered Institute of Transport in North America (CILTNA)
Chartered Institute of Transport International (CILT)
CIRAS Constraints Management
Council of Logistics Management (CLM)
CPFR Voluntary Inter-industry Commerce Standards (VICS) Association
CTHRC Program for Ontario Transport Association
Data Interchange Standards Association
Design Management Institute
Directory of Trade and Professional Organizations of Interest to Logistics Management Personnel
European Logistics Association (ELA)
Grainger Center for Supply Chain Management
Industrial Truck Association
InfoChain: Canadian Association of Supply Chain & Logistics Management
Institute for Supply Chain Management
Institute of Industrial Shipbrokers (ICS)
Institute of Logistics and Transport
International Air Cargo Association (TIACA)
International Air Transport Association
International Federation of Purchasing and Materials Management (IFPMM)
International Society of Logistics (SOLE)
International Warehouse Logistics Association (IWLA)
Logistics Association of Australia (LAA)
Logistics Management Institute
Manitoba Trucking Association
Manufacturing Enterprise Solutions Association (MESA)
Manufacturing Skill Standards Council

Maritime Associations
Material Handling Industry of America (MHIA)
Materials and Manufacturing Ontario (MMO)
Materials Handling & Management Society (MHMS)
National Center for Remanufacturing & Resource Recovery
National Coalition for Advanced Manufacturing
National Industrial Transportation League
National Institute of Standards and Technology Manufacturing (NIST MEP)
Ontario Trucking Association
Outsourcing Supply Chain Management
Packaging Association of Canada
Procurement and Supply-Chain Benchmarking Association (PASBA)
Production and Operations Management Society (POMS)
Production Engine Remanufacturers Association (PERA)
Project Management Institute (PMI)
Purchasing Management Association of Canada (PMAC)
Remanufacturing Industries Council
Reverse Logistics Professional
Saskatchewan Trucking Association
Society for Inventory Management Benchmarking Analysis (SIMBA)
Society of Manufacturing Engineers (SME)
Stanford Global Supply Chain Forum
Supply Chain and Logistics Canada (SCL)
Supply-Chain Council
The American Society of Transportation & Logistics
The Canadian Association of Importers & Exporters
The Canadian Society of Customs Brokers
The Logistics Institute
The MGI Management Institute
The National Industrial Transportation League
The Remanufacturing Institute
The Virtual Center for Supernetworks at the Isenberg School of Management
Thomas Register of European Manufacturers
Tooling and Manufacturing Association (TMA)
Toronto Trucking Association
Transportation Association of Canada
Uniform Code Council
Van Horne Institute
Vertmarkets
Warehousing Education and Research Council (WERC)
Western Transportation Advisory Council (WESTAC)
Wisconsin Manufacturing Extension Partnership

Appendix R

Association Program and Certification Inventory

Association Name	Certificate Name	Subject Areas Covered	Duration	Mechanism	Requirements
APICS - The Association for Operations Management	Certified in Integrated Resource Management (CIRM)	5 Modules: - Enterprise concept and fundamentals; - Identifying and creating demands; - Designing products and processes; - Delivering products and services; - Integrated enterprise management.	Students go at their own pace. They may take as many different exams in one day as time and space permit; however, they must register for exams at least four days before exam date.	On-line (self-study)	Must pass an exam for each module with a minimum score of 300 (The scale minimum is 265 and the maximum is 330).
	Certified in Production and Inventory Management (CPIM)	5 modules: - Basics of supply chain management; - Master planning of resources; - Detailed scheduling and planning; - Execution and control of operations; - Strategic management of resources.	- Students go at their own pace. They may take as many different exams in one day as time and space permit; however, they must register for exams at least four days before exam date.	On-line (self-study)	Must pass an exam for each module with a minimum score of 300 (The scale minimum is 265 and the maximum is 330).
	Certified Fellow in Production and Inventory Management (CFPIM)	Professionals who share their knowledge with others through presenting, publishing, teaching, and participating in other professional development activities.	Not available	Delivering presentations, publish works, classroom instruction and workshops	A minimum score of 300 must be achieved for every of the following exams (The scale minimum is 265 and the maximum is 330): - Inventory Management; - Just-in-Time; - Master Planning; - Material and Capacity Requirements Planning; - Production Activity Control; - Systems and Technologies. Also, must earn points according to exams, conferences delivered, classroom taught, volunteered activities.

Association Name	Certificate Name	Subject Areas Covered	Duration	Mechanism	Requirements
Atlantic Institute of Logistics	P.Log Certification (see The Logistics Institute for more info)				
Canadian Institute of Traffic and Transportation (CITT)	CITT Designation	Mandatory courses: - Distribution I; - Distribution II; - Integrated Logistics. Any five of the following: - Business Law; - Business Management; - Business Strategy; - Essentials of Risk Management; - Introductory Economics; - Financial Management; - Marketing: An Introduction. Any two of the following: - Logistics Decision Modeling; - Transportation Economics; - Transportation Law.	2-5 years depending on candidates' prior learning assessment.	Internet, correspondence and classroom education from different Canadian universities and colleges	Candidates entering the program must have a minimum of grade 12 or equivalent work experience. Each course has an exam and requires a passing grade.
Canadian International Freight Forwarders Association (CIFFA)	Certificate in International Freight Forwarding	- Introductory to basic study skills; - Understanding freight forwarding; - Transportation geography; - Terms of trade; - Land transportation; - Airfreight; - Ocean freight; - Commercial documentation; - Transport insurance; - International payments; - Export packaging; - Land transportation; - Costing/Quoting; - Alternative methods; - Dangerous goods; - Cargo security.	26 weeks	78 hours of in-class time. Offered in part-time courses through the Continuing Education Depart-ments of various colleges/ universities across Canada (British Columbia Institute of Technology, University of Calgary, Concordia University) or through Distance Learning; and through a full-time program at Ashton College in Vancouver.	High school completion (or equivalent). Four exams with a passing grade of 60%.

Association Name	Certificate Name	Subject Areas Covered	Duration	Mechanism	Requirements
Canadian International Freight Forwarders Association (CIFFA)	Advanced Certificate in International Freight Forwarding	- Chartering a vessel; - Chartering an airplane; - Project transportation; - Customs compliance process; - IT and e-logistics - Supply Chain Management; - Transportation law; - International marketing; - Sales and marketing.	26 weeks	78 hours of in-class time. Offered in part-time courses through the Continuing Education Departments of various colleges/ universities across Canada (British Columbia Institute of Technology, University of Calgary, Concordia University) or through Distance Learning; and through a full-time program at Ashton College in Vancouver.	The successful completion of Module I. Four exams with a passing grade of 60%.
Canadian Society of Customs Brokers (CSCB)	Certificate in Import and Export Permit Management	- Canada's export and import controls program; - The permit issuance system administered by the Department of Foreign Affairs and International Trade (DFAIT).	Final examination must be requested within 90 days of the student gaining access to the course material. The completed examination must then be returned within 2 weeks.	Internet based	Pass exam under supervision of an approved exam administrator.

Association Name	Certificate Name	Subject Areas Covered	Duration	Mechanism	Requirements
Canadian Society of Customs Brokers (CSCB)	Certified Customs Specialist Designation (CCS)	4 assignments on: - Principal acts involved in Import and Export of Goods; - Customs Brokers Licensing Requirements and Agency Agreements; - The Canadian Customs Tariff Classification System; - Tariff Treatments and Trade Agreements; - Valuation Application of Federal Taxes; - AMPS and CSA Marking of Imported Goods Refunds, Drawbacks, Self-corrections; - Export and Import Permits; - Export Documentation; - U.S. Customs Procedures; - The Special Import Measures Act	12 months	Distance learning, available in hard copy or CD	To be eligible to enroll in the program, an individual must have either one year's experience in a Canadian Customs environment, or have graduated from one of the following programs: the Seneca College International Transportation and Customs Administration Diploma program, or the Law and Justice Program (Customs Administration) at Sir Sandford Fleming College. One final examination with a passing grade of 65%.

Association Name	Certificate Name	Subject Areas Covered	Duration	Mechanism	Requirements
Materials Handling and Management Society	Certified Associate in Materials Handling (CAMH)	CAMH Certification covers: - Definition of Materials Handling; - Resources and References; - Overview of Material Handling Equipment and Systems; - Material Handling Trends; - Introduction to Integrated Systems; - Information Flow Control; - Control and Communication Systems; - Economic Justification; - An Introduction to Basic Material Handing Equipment; - Ten Principles of Material Handling.	Self-paced	Distance education	The applicant must have a minimum of eight combined experience credits in the materials handling field. 1. 1 credit for each 1 year of College or University Education (4 credits max) 2. 1 credit for each 1 year of full-time Employment in the Materials Handling Industry 3. 1 credit for every 3 certified material handling Continuing Education Units Earned 4. 1 credit for each certificate earned through attendance at educational sessions offered by the Material Handling Institute 5. 1 credit for each Certification in Related Disciplines such as warehousing, logistics, production and inventory management 6. 1 credit for teachers each time formal Material Handling/Facilities Planning is taught at an accredited college or university 7. 1 credit if a Registered Professional Engineer Requirements: - Pass of Exam - Must apply for recertification every three years

Association Name	Certificate Name	Subject Areas Covered	Duration	Mechanism	Requirements
Purchasing Management Association of Canada (PMAC)	Certified Professional Purchaser (CPP)	4 principles courses: - Principles of buying; - Principles of inventory and operations control; - Principles of transportation and logistics; - Principles of quality. 12 PMAC Seminar credits. 10 Management courses: - 5 Mandatory courses in each of the following areas: - Marketing; - Accounting; - Economics; - Management theory discipline - 5 Electives courses from the same business related disciplines listed above.	Candidates proceed through the program at their own pace, with a maximum of ten years for completion. The majority of participants complete the program within two to seven years.	In-class through selected universities and colleges across Canada or correspondence. Some provincial institutes of PMAC offer Principles courses in a condensed in-class format over a few weekends.	There are no formal academic or experiential requirements for enrolling in the C.P.P. Accreditation Program. Exams: You must submit the required five assignments (except Principles of Buying which contains 10 assignments) and write the final exam within one year of enrolling in the course. A minimum average of 70% is required to write the final exam. A minimum mark of 60% is required on the final exam to pass the course. You may complete the course at any time before the one-year deadline.
	APMC (Advanced Purchasing Management Course)	6 courses: - Supply vision; - Supply strategy; - E-procurement; - Benchmarking; - Supply chain management; - Meaningful involvement in organizational activities and strategies.	6 days	Seminars offered by the University of Western Ontario, Richard Ivey School of Business	CPP candidates who have completed all of the program requirements, or who will have completed all the requirements by May 31, 2005 are invited to register.

	Certificate in Purchasing	3 courses:
		 Mandatory:
		  - Principles of buying
		
		 2 of the following courses:
		  - Principles of inventory and operations control;
		  - Principles of transportation and logistics;
		  - Principles of quality.
		
		4 PMAC credits
			Candidates proceed at their own pace, with a maximum of ten years.	Seminars offered by a variety of colleges and universities across Canada	Not available

Association Name	Certificate Name	Subject Areas Covered	Duration	Mechanism	Requirements
Supply Chain & Logistics Canada (SCL)	Only offers a membership				
The Logistics Institute	P.Log Certification	6 modules: - Integrated logistics network; - Logistics process diagnostics; - Supply chain strategies; - Team dynamics; - Leading & managing change; - Ethics & leadership.	While it is possible to complete the program in less than 12 months, the Institute usually recommends developing a training plan for over a 12-18 month time-frame.	Three modules are PC-based and three are delivered face-to-face. On site: - Supply chain strategies module; - Leading & managing change; - Ethics & leadership. Online: - Integrated logistics network; - Logistics process diagnostics; - Team dynamics.	Standard Program entails successful completion of 6 certification modules and a minimum of 5 years industry / business experience OR Executive Program entails a minimum 10 years senior industry / business experience for entry and successful completion of a 6-day residence program. Each module has an exam and requires a passing grade.
The Packaging Association of Canada (PAC)	Packaging Certificate Program	One day is spent on each of the following topics: - Packaging; - Graphic design; - Colour perception; - Printing; - Food preservation; - Polymers; - Molding; - Closures; - Glass packaging; - Folding carton; - Fiberboard; - Distribution environnent; - Universel Product codes; - Packaging machinery; - Production line; - Environmental issues and law.	14 days	A/V presentations, classroom discussions, industrial field trips, workshops and case studies	To obtain certificate, one must pass the Certified Packaging Professional Exam.

Appendix S

College/University Logistics Program Inventory

The following appendix lists logistics/supply chain specific or related programs by province. Programs are listed by universities and colleges. The website of the institution is also provided.

BRITISH COLUMBIA

COLLEGES

British Columbia Institute of Technology   www.bcit.ca
- International Trade and Transportation Logistics Certificate
- Management certificate - Operations Management (Materials Management Option)
- CPIM Certification

Camosun College   www.bus.camosun.bc.ca
- PMAC Certificate

Douglas College   www.douglas.bc.ca
- PMAC Certificate

Kwantlen University College   www.kwantlen.bc.ca
- Automotive Parts and Light Warehousing Certificate

University College of the Fraser Valley   www.ucfv.bc.ca
- Parts and Warehousing Certificate

Vancouver Community College   http://business.vcc.ca
- Business Administration - Transportation Logistics Program

UNIVERSITIES

Royal Roads University   www.royalroads.ca
- Master of Business Administration in Executive Management Curriculum

Simon Fraser University   www.sfu.ca
- PMAC Certification
- Executive Master of Business Administration

University College of the Cariboo   www.cariboo.bc.ca
- PMAC Certification

University of British Columbia   www.sauder.ubc.ca
- Bachelor of Commerce in Transportation and Logistics
- Master of Business Administration specialization in Supply Chain Management

ALBERTA

COLLEGES

Bow Valley College   www.bowvalleycollege.ca

Accounting and Financial Management Certificate (with Purchasing/Warehousing Specialty)

Grant MacEwan College   http://itsm.macewan.ca
- Bachelor of Applied International Business and Supply Chain Management

Mount Royal College   www.mtroyal.ab.ca
- Supply Chain Management extension Certificate
- Bisset School of Business - Supply Chain Management

Northern Alberta Institute of Technology   http://portal.nait.ca
- Certified Professional Purchaser (PMAC) - continuing education
- Asset Inventory Specialist Certificate

Southern Alberta Institute of Technology   www.sait.ab.ca
- Transportation Logistics Certification

UNIVERSITIES

University of Alberta   www.bus.ualberta.ca
- Bachelor of Commerce - major in Operations Management

University of Calgary   www.haskayne.ucalgary.ca
- Bachelor of Commerce - Transportation and Logistics concentration

University of Lethbridge   www.uleth.ca
- Transportation Logistics Diploma

SASKATCHEWAN

UNIVERSITIES

University of Saskatchewan   www.usask.ca
- Bachelor of Commerce in Production and Operations Management

MANITOBA

COLLEGES

Red River College   www.rrc.mb.ca
- Supply Chain and Logistics Management Diploma

UNIVERSITIES

University of Manitoba   www.umanitoba.ca
- Bachelor of Business Administration with Operations Management/Operations Research Major
- PMAC Certification

ONTARIO

COLLEGES

Algonquin College of Applied Arts and Technology   www.algonquincollege.com
- Bachelor of Applied Business - E-Business Supply Chain Management
- Supply Chain Management Certification (CPIM)
- Business Administration Diploma - Materials/Operations Management
- Supply Chain Management Program

Canadore College   www.canadorec.on.ca
- Supply Chain and Logistics Management (Post-Diploma)

Centennial College of Applied Arts and Technology   www.centennialcollege.ca
- Diploma in Operations Management
- Logistics Management Certificate (continuing education)
- Transportation Policies & Economics Certificate (continuing education)
- Transportation Management Advanced (continuing education)

Conestoga College Institute of Technology and Advanced Learning   www.conestogac.on.ca
- Materials & Operations Management Program
- CPIM Certification
- PMAC Certification

Confederation College   www.confederationc.on.ca
- PMAC Certification

Durham College of Applied arts and Technology   www.durhamcollege.ca
- Business Administration Diploma in Operations Management
- Supply Chain Management Graduate Certificate

Fanshawe College   www.fanshawec.on.ca
- Continuing Education - Logistics Management course
- CITT Certification
- Continuing Education - Production & Operations Management course

Fleming College   www.flemingc.on.ca
- Business Administration - Materials Management and Distribution
- International Trade

George Brown College of Applied Arts and Technology   www.torontocitycollege.ca
- Certificate in Logistics
- Certificate in Logistics and Supply Chain Management
- Diploma in Logistics Management

Georgian College   www.georgianc.on.ca
- CPIM Certification

Humber College Institute of Technology and Advanced Learning   www.humber.ca
- Logistics Administration Diploma
- Graduate Certificate in Supply Chain Management

Loyalist College of Applied Arts and Technology   www.loyalistc.on.ca
- Business Administration Diploma with option in Materials Management

Mohawk College of Applied Arts and Technology   www.mohawkc.on.ca
- E-Commerce B2B specialist program
- Transportation Engineering Technology

Niagara College   www.niagarac.on.ca
- PMAC Certification
- CPIM Certification
- Business Administration - Operations Management

St. Clair College   www.stclaircollege.ca
- Production and Inventory Management Certificate (CPIM Certification)

St. Lawrence College   www.sl.on.ca
- PMAC Certification
- CPIM & CIRM Certification

Sault College   www.saultc.on.ca
- PMAC Certification

Seneca College   www.senecac.on.ca
- International Transportation and Custom
- Global Logistics and Supply Chain Management

Sheridan College Institute of Technology and Advanced Learning   www1.sheridaninstitute.ca
- Fundamentals of Materials & Operations Management (APICS Certification)
- CITT Designation
- Canadian Institute of Management Certification in Management & Administration

UNIVERSITIES
Carleton University   www.carleton.ca
- Bachelor of Commerce with concentration in Technology and Operations Management

Lakehead University   www.lakeheadu.ca
- Bachelor of Administration with concentration in Management Science/Management Operations

McMaster University   www.mcmaster.ca
- Master of Business Administration with specialization in Operations Management

Ryerson University www.ryerson.ca
- PMAC Certification
- Bachelor of Commerce in Retail Management

University of Windsor www.uwindsor.ca
- Supply Chain Engineering

Wilfrid Laurier University www.wlu.ca
- Executive program: Supply Chain Management
- Bachelor of Business Administration with concentration in Supply Chain Management

York University www.yorku.ca
- Certificate in Supply Chain and Logistics Management (Professional Program)

QUEBEC

COLLEGES

Cégep André-Laurendeau www.claurendeau.qc.ca
- Transportation Logistics (1998)

Cégep de Drummondville www.cdrummond.qc.ca
- Transportation Logistics (1998)

Cégep François-Xavier Garneau www.cegep-fxg.qc.ca
- Transportation Logistics (1998)

Cégep Lévis-Lauzon www.clevislauzon.qc.ca
- Transportation Logistics (1998)

Cégep Lionel-Groulx www.clg.qc.ca
- Transportation Logistics (1998)

Cégep de Rimouski www.cegep-rimouski.qc.ca
- Transportation Logistics (1998)

Cégep Saint-Jean-sur-Richelieu www.cstjean.qc.ca
- Transportation Logistics (1998)

Cégep de Trois-Rivières www.cegeptr.qc.ca
- Transportation Logistics (1998)

College d'affaires Ellis www.ecc.qc.ca
- Transportation Logistics (1998)

College Lasalle www.clasalle.qc.ca
- Transportation Logistics (1998)

UNIVERSITIES
École Polytechnique de Montréal www.polymtl.ca
- Master in Industrial Engineering option in Logistics

HEC Montreal www.hec.ca
- Certificate in Operation and Production Management
- Bachelor of Business Administration in Operation and Production Management
- Master of Science in Administration in Production and Operation Management
- Master of Science in Administration in Logistics

McGill University www.mcgill.ca
- Certificate in Transport and Logistics
- Bachelor of Commerce with concentration in Operations Management
- Graduate Certificate in Operations Management
- Diploma in Management - Operations Management concentration
- Master in Manufacturing Management

Université Laval www.ulaval.ca
- Bachelor of Business Administration with concentration in Operations and Logistics
- Master of Business Administration with a concentration in Manufacturing Management and Logistics

Université du Québec à Montréal (UQAM) www.uqam.ca
- Bachelor of Business Administration with concentration in Operations Management
- Master of Business Administration with a concentration in Logistics and Transport

Université du Québec à Trois-Rivières (UQTR) www.uqtr.ca
- Bachelor of Business Administration with concentration in Logistics

NEW BRUNSWICK

COLLEGES
Collège communautaire du Nouveau-Brunswick, Dieppe www.nbcc.nb.ca
- Logistics and Transport Management Technique

UNIVERSITIES
Université de Moncton www.umoncton.ca
- Bachelor of Business Administration with concentration in Operations Management

University of New Brunswick, Fredericton www.unb.ca
- Bachelor of Business Administration with concentration in Operations Management

University of New Brunswick, Saint John www.unbsj.ca
- Master of Business Administration specialized in General Management

NOVA SCOTIA

UNIVERSITIES
Dalhousie University   www.mgmt.dal.ca
- Bachelor of Commerce (Marketing Logistics)

PRINCE EDWARD ISLAND

COLLEGES
Holland College   www.hollandc.pe.ca
- Business Administration - Business and Sales manager profile

Appendix T

Employee NOC Profiles

Sub Function	Occupation Category	NOC #	Highest Level of Education	% Certified or Licensed	Top 5 Skills in 5 yrs	Most Frequent Salary Range ($ 000's)	Gender	Diversity	Years of Logistics Experience	Most Frequent Age Category
Senior Management	Managerial	0016	Undergraduate or Graduate Degree	49%	Knowledge of Business, Technological Knowledge, Mechanical Knowledge, Knowledge of Transportation, Customer Relations	(29%) 75-100, (33%) >125	92% Male, 8% Female	2% Aboriginal, 6% Visible Minority, 0% Disabled	(33%) **16-25**, (32%) >25	(35%) 36-45, (40%) **46-55**
Logistics Information Systems/Processes	Managerial	0213	Undergraduate Degree or Diploma/Certificate	17%	Operational Management, Knowledge of Business, Negotiations Skills, Time Management, Financial Management	(54%) 50-75	75% Male, 25% Female	0% Aboriginal, 8% Visible Minority, 0% Disabled	(33%) 6-15, (33%) 16-25	(46%) 46-55
	Tactical	2233	Some college/university or Undergraduate Degree	33%	Knowledge of Business, Forecasting, Financial Management, Cost Analysis, Knowledge of Laws	(61%) 30-50	51% Male, 49% Female	2% Aboriginal, 11% Visible Minority, 0% Disabled	(40%) 6-15	(41%) **26-35**, (30%) 35-45
Warehousing	Managerial	0721	Some college/university	22%	Knowledge of Business, Technological Knowledge, Knowledge of Laws, Optimization of Workflow, Cost Analysis	(64%) 50-75	86% Male, 14% Female	0% Aboriginal, 7% Visible Minority, 3% Disabled	(57%) 6-15	(36%) **26-35**, (25%) 36-45, (25%) 46-55

Most Frequent Sub Function	Occupation Category	NOC #	Highest Level of Education	% Certified or Licensed	Top 5 Skills in 5 yrs	Most Frequent Salary Range ($ 000's)	Gender	Diversity	Years of Logistics Experience	Most Frequent Age Category
Warehousing	Operational	7452	High School	18%	Financial Management Cost Analysis Forecasting Knowledge of Business Operational Management	(76%) 30-50	77% Male 23% Female	0% Aboriginal 21% Visible Minority 0% Disabled	(34%) **3-5** (32%) 6-15	(26%) 26-35 (38%) **36-45**
Transportation	Managerial	0713	Some college/university	43%	Technological Knowledge Knowledge of Business Cost Analysis Forecasting Knowledge of Laws	(53%) 50-75	70% Male 30% Female	0% Aboriginal 11% Visible Minority 2% Disabled	(32%) 6-15 (35%) **16-25**	(30%) 36-45 (43%) **46-55**
	Tactical	1236	Diploma/Certificate	19%	Cost Analysis Forecasting Financial Management Mechanical Knowledge Knowledge of Business	(76%) 30-50	33% Male 67% Female	5% Aboriginal 33% Visible Minority 0% Disabled	(39%) 3-5 (44%) **6-15**	(38%) 26-35 (41%) **36-45**
	Tactical	1476	Diploma/Certificate	17%	Cost Analysis Financial Management Forecasting Operational Knowledge Knowledge of Business	(80%) 30-50	53% Male 47% Female	0% Aboriginal 38% Visible Minority 0% Disabled	(64%) 6-15	(50%) 36-45
	Operational	1471	Diploma/Certificate	5%	Financial Management Cost Analysis Forecasting Knowledge of Laws Knowledge of Business	(65%) 30-50	50% Male 50% Female	0% Aboriginal 29% Visible Minority 0% Disabled	(33%) 3-5 (38%) **6-15**	(39%) **26-35** (34%) 36-45
Inventory/Material Control	Managerial	0114	Some college/university or Diploma/Certificate	24%	Knowledge of Business Operational Management Knowledge of Laws Knowledge of Logistics Forecasting	(52%) 50-75	73% Male 27% Female	0% Aboriginal 11% Visible Minority 2% Disabled	(30%) 6-15 (30%) 16-25	(33%) 36-45 (37%) **46-55**

Sub Function	Occupation Category	NOC #	Highest Level of Education	% Certified or Licensed	Top 5 Skills in 5 yrs	Most Frequent Salary Range ($ 000's)	Gender	Diversity	Years of Logistics Experience	Most Frequent Age Category
Inventory/ Material Control	Managerial	1215	Some college/university or Diploma/Certificate	21%	Knowledge of Business, Technological Skills, Cost Analysis, Financial Management, Forecasting	(57%) 30-50	61% Male 39% Female	1% Aboriginal, 16% Visible Minority, 1% Disabled	(46%) 6-15	(37%) **36-45** (30%) 46-55
	Tactical	1474	Undergraduate degree or Some college/university	28%	Forecasting, Cost Analysis, Knowledge of Business, Financial Management, Optimization of Workflow	(62%) 30-50	67% Male 33% Female	10% Aboriginal, 10% Visible Minority, 0% Disabled	(26%) 3-5 (37%) **6-15**	(33%) 26-35 (38%) **36-45**
Purchasing	Managerial	0113	Some college/university	36%	Knowledge of Business, Financial Management, Optimization of Workflow, Cost Analysis, Forecasting	(46%) 50-75 (46%) 75-100	62% Male 38% Female	5% Aboriginal, 9% Visible Minority, 0% Disabled	(55%) 6-15	(46%) **36-45** (36%) 46-55
	Tactical	1225	Some college/university	19%	Unknown	(43%) 30-50 (33%) 50-75	33% Male 67% Female	0% Aboriginal, 10% Visible Minority, 0% Disabled	(33%) **3-5** (24%) 6-15	(48%) 26-35
Other Sales and Marketing	Managerial	0611	Undergraduate degree or Some college/university	27%	Knowledge of Laws, Technological Knowledge, Knowledge of Business, Operational Knowledge, Knowledge of Logistics	(34%) 30-50 (31%) 50-75	60% Male 40% Female	0% Aboriginal, 6% Visible Minority, 0% Disabled	(59%) 6-15	(49%) 26-35

Appendix U

Education/Certification Required by Employers Segmented by Sub-Function and Occupation Category

Sub Function	Occupation Category	Sample NOCs	Most Frequent Education Level	Yes to Certification/ Designation	Top 5 Skills in 5 yrs
Senior Management	Managerial	**0016**	Undergraduate Degree	7%	Communication Customer Relations Interpersonal Negotiation Technology
Logistics Information Systems/Processes	Managerial	**0213**	Undergraduate Degree	2%	Analytical Technology Communication Time Management Interpersonal
	Tactical	**2233** 2172 2173	College & Cégep	2%	Communication Technology Analytical Time Management Optimization
	Operational		College & Cégep	1%	Communication Analytical Technology Interpersonal Time Management
Warehousing	Managerial	**0721** 1215	Undergraduate Degree	4%	Communication Interpersonal Analytical Technology Operating Planning
	Tactical	**1422**	College & Cégep	1%	Communication Analytical Technology Interpersonal Optimization
	Operational	**7452** 9617 1472 7451	High School	1%	Communications Technology Logistics Function Analytical Mechanical

Sub Function	Occupation Category	Sample NOCs	Most Frequent Education Level	Yes to Certification/ Designation	Top 5 Skills in 5 yrs
Transportation	Managerial	**0713** 7222	Undergraduate Degree	4%	Communication Analytical Interpersonal Customer Relation Transportation
	Tactical	**1236** **1476** 1475	College & Cégep	2%	Communication Analytical Technology Customer Relation Transportation
	Operational	**1471** 1431 7437	High School	1%	Communication Technology Customer Relation Mechanical Analytical
Inventory/Material Control	Managerial	**0114** **1215** 0911 1214	Undergraduate Degree	4%	Analytical Communication Technology Interpersonal Financial
	Tactical	**1474** 1122 1474	College & Cégep	2%	Analytical Technology Communication Customer Relations Logistics Function
	Operational		High School	1%	Communication Analytical Technology Customer Relations Time Management
Purchasing	Managerial	0113	Undergraduate Degree	0%	Communication Analytical Negotiation Customer Relation Financial
	Tactical	**1225** 6233 1215	College & Cégep	0%	Communication Analytical Technology Customer Relations Interpersonal
	Operational		College & Cégep	0%	Communication Technology Analytical Customer Relations Negotiation

Sub Function	Occupation Category	Sample NOCs	Most Frequent Education Level	Yes to Certification/ Designation	Top 5 Skills in 5 yrs
Customer Service	Managerial	6216	Undergraduate Degree	0%	Customer Relations Communication Analytical Interpersonal Negotiation
	Tactical	1453 6433	High School	0%	Communication Customer Relations Analytical Technology Interpersonal
	Operational	6434	High School	0%	Communication Customer Relations Technology Analytical Time Management
Other (Sales and Marketing)	Managerial	**0611**	Post Graduate	0%	Communication Negotiation Financial Technology Interpersonal

Appendix V

Program Details by Academic Institution

Institution Name: Algonquin College
Department/Program Name: Marketing and Management Studies / Bachelor of Applied Business (e-Business Supply Chain Management)
Entire Program Tailored to Supply Chain Management: Bachelor of Applied Business (e-Business Supply Chain Management - Four years)
Logistics/Supply Chain Specialization Program: Three years Business Administration major in Material and Operations Management
Degrees: Undergraduate, Diploma and Co-op

	Core Topics(s)/ Learning Outcomes	Program under which course falls	Number of sessions offered/ year	Number of class hours per course	Approx. spaces available/ offering	Approx. number of students/ offering	Does student demand exceed availability (yes/no)
ESC 4100	Introduction to Operations and Supply Chain Management	e-Business Supply Chain Management (ESCM)		48	60	40	No
ESC 4101	Financial Accounting	ESCM		48	60	40	No
ESC 4102	Microeconomics	ESCM		48	60	40	No
ESC 4103	Computer Applications	ESCM		48	60	40	No
ESC 4104	Communications I	ESCM		48	60	40	No
ESC 4105	Business Fundamentals	ESCM		48	60	40	No
ESC 4200	e-Business Concepts	ESCM		48	60	40	No
ESC 4201	Management Information Systems	ESCM		48	60	40	No
ESC 4202	Marketing I	ESCM		48	60	40	No
ESC 4203	Macroeconomics	ESCM		48	60	40	No
ESC 4204	Communications II	ESCM		48	60	40	No
ESC 4205	Law	ESCM		48	60	40	No
ESC 4300	Basics of Supply Chain Management and ERP	ESCM		48	60	40	No
ESC 4301	Spreadsheet Applications in Supply Chain Management	ESCM		48	60	40	No
ESC 4302	Marketing II	ESCM		48	60	40	No
ESC 4303	Managerial Accounting	ESCM		48	60	40	No
ESC 4304	Quantitative Methods	ESCM		48	60	40	No
ESC 4305	Speaking and Presentations	ESCM		48	60	40	No
ESC 4400	Purchasing Management	ESCM		48	60	40	No
ESC 4401	Logistics Management	ESCM		48	60	40	No
ESC 4402	Applications in Purchasing and Logistics (SAP)	ESCM		48	60	40	No
ESC 4403	Computer Networks and Data Communications	ESCM		48	60	40	No
ESC 4404	Manufacturing Processes and Systems	ESCM		48	60	40	No

	Core Topics(s)/ Learning Outcomes	Program under which course falls	Number of sessions offered/ year	Number of class hours per course	Approx. spaces available/ offering	Approx. number of students/ offering	Does student demand exceed availability (yes/no)
ESC 4405	Business Finance	ESCM		48	60	40	No
ESC 4406	Co-op Preparation	ESCM		48	60	40	No
ESC 4500	Master Planning of Resources	ESCM		48	60	40	No
ESC 4501	Project Management	ESCM		48	60	40	No
ESC 4502	e-business Systems Development	ESCM		48	60	40	No
ESC 4503	Computer Programming, Analysis and Design	ESCM		48	60	40	No
ESC 4504	Issues in Public Sector Purchasing, Contracting and Logistics	ESCM		48	60	40	No
ESC 4505	Cyber Law	ESCM		48	60	40	No
ESC 4600	Detailed Scheduling and Planning	ESCM		48	60	40	No
ESC 4601	Project Management Software	ESCM		48	60	40	No
ESC 4602	Database Management	ESCM		48	60	40	No
ESC 4603	Quality Management	ESCM		48	60	40	No
ESC 4604	Forecasting	ESCM		48	60	40	No
ESC 4605	Free Elective I	ESCM		48	60	40	No
ESC 4700	Execution and Control of Operations	ESCM		48	60	40	No
ESC 4701	Lean Principles	ESCM		48	60	40	No
ESC 4702	Production Planning and Execution (SAP)	ESCM		48	60	40	No
ESC 4703	e-Business SCM Applications and Programming	ESCM		48	60	40	No
ESC 4704	Project Human Resources and Communications Management	ESCM		48	60	40	No
ESC 4705	Interpersonal Communications	ESCM		48	60	40	No
ESC 4800	e-SCM Degree Project	ESCM		48	60	40	No
ESC 4801	Strategic Management of Resources	ESCM		48	60	40	No
ESC 4802	Applications in Advanced Planning & Scheduling and SCM	ESCM		48	60	40	No
ESC 4803	Customer Relations Management	ESCM		48	60	40	No
ESC 4804	Workplace Health and Safety	ESCM		48	60	40	No
ESC 4805	Free Elective II	ESCM		48	60	40	No
ESC 4900	Co-op Work Term 1	ESCM		48	60	40	No
ESC 4901	Co-op Work Term 2	ESCM		48	60	40	No
ESC 4902	Co-op Work Term 3	ESCM		48	60	40	No

Institution Name: Carleton University
Department/Program Name: School of Business
Logistics/Supply Chain Specialization Program: Bachelor of Commerce, concentration in Operations Management, which includes a required course on Logistics and Supply Chain Management
Degrees: Undergraduate and Co-op

	Core Topics(s)/ Learning Outcomes	Program under which course falls	Number of sessions offered/ year	Number of class hours per course	Approx. spaces available/ offering	Approx. number of students/ offering	Does student demand exceed availability (yes/no)
Supply Chain Manage-ment	Inventory, transportation, strategy, Information Technology	Bachelor of Commerce (B.Com)	1	36	40	35	No
Project Manage-ment	Project Management	B.Com	1	36	40	30	No
Operations Manage-ment	Supply Chain Management, quality, forecasting, production, services	B.Com	6	36	50	45	No
Quality Manage-ment	Six Sigma	B.Com	1	36	40	30	No
Supply Chain Manage-ment Theory	Theory of Supply Chain Management	PhD in Business	1	36	20	15	No

Institution Name: Community College New Brunswick - Dieppe
Department/Program Name: Business and Administration
Entire Program Tailored to Supply Chain Management: Two Programs: Logistics and Transportation, Logistics and Materials
Degrees: Diploma, Certificate, Internship and Co-op

	Core Topics(s)/ Learning Outcomes	Program under which course falls	Number of sessions offered/ year	Number of class hours per course	Approx. spaces available/ offering	Approx. number of students/ offering	Does student demand exceed availability (yes/no)
Logistique I	Définitions, historique et principes de base en logistique	Techniques de distribution et manutention (TDM)	1	60	16	16	No
Logistique II	Exploration approfondie de chacun des cinq modes de transport	TDM	1	60	16	16	No
Gestion des stocks et distribution	Réseaux de distribution, gestion des mouvements de stocks, contrôle des inventaires	TDM	1	60	16	16	No
Gestion des stocks informatisee I	Utilisation d'un logiciel spécialise de gestion des inventaires et des achats	TDM et TGLT	2	45	16+	16+	No
Gestion des stocks informatisee II	Utilisation d'un tableur électronique (Excel)	TDM	1	45	16	16	No
Conduite du chariot elevateur	Theorie et pratique de la conduite du chariot elevateur	TDM	1	45	16	16	No

Manutention	Principes et pratique en manutention des produits, emballages, etc.	TDM	1	90	16	16	No
Matieres dangereuses	Gestion des matieres dangereuses, I.e., SIMDUT et TMD	TDM	1	45	16	16	No
Principes d'achats	Approvisionnements, achats, negociation, couts, etc.	TDM et TGLT	2	45	16	16	No
Stage en gestion des ressources materielles	Stage pratique en industrie	TDM	1	120	16	16	No
Douanes	Connaissances de base, douanes	Techniques de gestion de la logistique et du transport (TGLT)	1	15	16	16	No
Economie des transports	Impact du transport sur l'économie et son importance	TGLT	1	45	16	11	No

Institution Name: Cégep Andre - Laurendeau
Department/Program Name: Techniques administratives
Entire Program Tailored to Supply Chain Management: Diplôme d'études collégiales en Logistique du Transport; AEC en Logistique et Transport de marchandises; AEC en perfectionnement en transport de marchandises; AEC en Logistique Intermodale internationale; AEC en Procedures Douanieres, Ateliers de perfectionnement (1-2 jours) en Gestion des approvisionnements, des stocks et d' entrepots, gestion du transport des matieres dangereuses, procedures douanieres.
Degrees: Diploma, Certificate, Executive and Internship

	Core Topics(s)/ Learning Outcomes	Program under which course falls	Number of sessions offered/ year	Number of class hours per course	Approx. spaces available/ offering	Approx. number of students/ offering	Does student demand exceed availability (yes/no)
Initiation a la logistique et à la profession	Vue d'Ensemble de l'industrie da la logistique et du transport ; principes et étapes du processus logistique ; role et fonctions de la technicienne ou du technicien en logistique de transport.	Techniques de la logistique du transport		45	36	17	No
Prix de revient en transport	Approfondissement du concept de cout dans la determination du prix de revient pour les activites de transport ; methode d' estimation du prix de revient d'un mouvement de transport ; implantation d' un systeme de prix de revient en entreprise et application de cette methode à la prise de decision.	Techniques de la logistique du transport		45	36	21	No
Service a la clientele	Notions de service à la clientele ; elaboration et implantation d'un programme relationnel complet.	Techniques de la logistique du transport		45	36	16	No
Recherche et droit du transport	Notions juridiques propres au domaine de la logistique et du transport ; methodes de recherche par logiciels et par Internet.	Techniques de la logistique du transport		60	36	23	No

					60	36	15	No
Etude de marche et marketing en logistique du transport	Aspect technique de la recherche en marketing; elaboration d'une strategie de marketing.	Techniques de la logistique du transport						
Gestion des approvision nements	Notions de chaine d' approv-isionnement	Techniques de la logistique du transport						

Institution Name: College Lionel-Groulx
Department/Program Name: Genie industriel (Techniques de production manufacturiere)
Entire Program Tailored to Supply Chain Management: Deux programmes: Techniques de la logistique du transport (TLT) ainsi que Genie industriel (GI) (Techniques de production manufacturiere), offerts avec un tronc commun
Degrees: Diploma and internship

	Core Topics(s)/ Learning Outcomes	Program under which course falls	Number of sessions offered/ year	Number of class hours per course	Approx. spaces available/offering	Approx. number of students/ offering	Does student demand exceed availability (yes/no)
Etudes des fonctions de travail	Connaissance de la profession et de l'environnement de travail	TLT et GI	1	45	N/A	45	No
Initiation a la chaine logistique	Chaine logistique	TLT et GI	1	75	N/A		No
Techniques d'exploitation en transport multimodal		TLT	1	45	N/A		No
Conformite douaniere I		TLT	1	60	N/A		No
Exploitation en transport routier		TLT	1	45	N/A		No
Etablisment du cout de revient		TLT	1	75			No
Planification des approvisionnements internes et externes		TLT et GI	1	60			No
Repartition du transport routier		TLT	1	45			No
Conformite douaniere II		TLT	1	45			No
Amenagement et operation des centres de distribution		TLT et GI	1	60			No
Reseaux de transport		TLT	1	60			No

Institution Name: Concordia University College of Alberta
Department/Program Name: Management Sciences
Degrees: Undergraduate and Practicum

	Core Topics(s)/ Learning Outcomes	Program under which course falls	Number of sessions offered/ year	Number of class hours per course	Approx. spaces available/ offering	Approx. number of students/ offering	Does student demand exceed availability (yes/no)
E-Commerce and Supply Chain Management	An overview of acquisition, operations, and distribution in conjunction with information systems	Management Sciences	1	35	28	Will begin in Sept. 2005	

Institution Name: Douglas College
Department/Program Name: Business Management Diploma
Degrees: Co-op

	Core Topics(s)/ Learning Outcomes	Program under which course falls	Number of sessions offered/ year	Number of class hours per course	Approx. spaces available/ offering	Approx. number of students/ offering	Does student demand exceed availability (yes/no)
Operational Management	Business	Business Management Diploma	45	35	35		No
International Logistics Transportation (this course has not been offered since 1999)	Business	Business Management Diploma	45				No

Institution Name: George Brown College
Department/Program Name: Logistics and Supply Chain Management

	Core Topics(s)/ Learning Outcomes	Program under which course falls	Number of sessions offered/ year	Number of class hours per course	Approx. spaces available/ offering	Approx. number of students/ offering	Does student demand exceed availability (yes/no)
LSCM 1001	Logistics Basics	Logistics and Supply Chain Manage-ment (LSCM)	6	42	No Limit	20	No
LSCM 1002	Inventory	LSCM	2	42	No Limit	20	No
LSCM 1003	Transportation	LSCM	2	42	No Limit	20	No
LSCM 1004	Warehousing	LSCM	2	42	No Limit	20	No
LSCM 1005	Import/Export	LSCM	3	42	No Limit	20	No
LSCM 1006	Supply Chain Information	LSCM	2	42	No Limit	20	No
LSCM 2001	Integrated	LSCM	1	42	No Limit	15	No
LSCM 2002	Purchasing	LSCM	1	42	No Limit	15	No
LSCM 2003	Technology	LSCM	1	42	No Limit	15	No
LSCM 2004	Globalization	LSCM	1	42	No Limit	15	No

Institution Name: Georgian College
Department/Program Name: Business and Management Studies
Degrees: None

	Core Topics(s)/ Learning Outcomes	Program under which course falls	Number of sessions offered/ year	Number of class hours per course	Approx. spaces available/ offering	Approx. number of students/ offering	Does student demand exceed availability (yes/no)
Logistics	Logistics and Supply chain defined, importance of logistics, customer service goals, order processing and information systems, transportation decisions, inventory decisions, purchasing and supply scheduling decisions, facility locating decisions, organizing the logistics effort.	Business	1	42	45	30	No
Production Operations Management	Approaches to production control, inventory policy, facilities planning, methods improvement and technological assessment, forecasting, implications of the length of lead time required on the design of an operations system.	Business	2	42	90	90-100	Yes

Institution Name: Grant MacEwan Community College
Department/Program Name: International Business and Supply Chain Management
Entire Program Tailored to Supply Chain Management: Bachelor of Applied International Business and Supply Chain Management
Degrees: Undergraduate and Directed Field Studies

	Core Topics(s)/ Learning Outcomes	Program under which course falls	Number of sessions offered/ year	Number of class hours per course	Approx. spaces available/ offering	Approx. number of students/ offering	Does student demand exceed availability (yes/no)
Three-Credit Courses	- Introduction to Canadian Business - Introduction to Computing for Business - Introduction to Microeconomics - Communications Arts and Science Elective - Introduction to Logistics and Supply Chain Management - Introduction to Macroeconomics - Business Law I - Business Statistics - Introduction to Management - Introductory Accounting - Introduction to Physical Distribution - Fundamentals of Purchasing - International Business and Trade Management - Fundamentals of Marketing - Physical Distribution and Logistics - Introduction to e-Business - Inventory Management - Introductory Finance - International Marketing - International Finance - Managerial Information and Control Systems - Production and Operations Management - Materials Handling and Warehouse Management - Transportation Management - Principles of Quality Management - Supply Chain Planning and Coordination - e-Business Execution - Strategic Management - Global Sourcing and Logistics - Business Negotiations and Supplier Management	Supply Chain Management (SCM)	2	45	40	35	No
One-Credit Courses	- Business Ethics - Business Etiquette - Personal Effectiveness - Change Management - Customer Value Management - Effective Leadership - Competitive Intelligence - Competitive Bidding and Contract Management - Intercultural Communications	SCM	2	15	40	30	No

Institution Name: HEC Montreal
Department/Program Name: Service de l'enseignement de la gestion des Operations et de la Production
Entire Program Tailored to Supply Chain Management: Désignation en gestion de la chaine logistique et Master in Supply Chain Management and Logistics
Specialization Program: BAA, Certificat et MBA
Degrees: Graduate, Undergraduate, Diploma, Certificate, Executive, Internship and Activite de synthese - projet en entreprise

	Core Topics(s)/ Learning Outcomes	Program under which course falls	Number of sessions offered/ year	Number of class hours per course	Approx. spaces available/ offering	Approx. number of students/ offering	Does student demand exceed availability (yes/no)
Planification et contrôle de la production et des stocks	Planification de la production et des stocks	Bachelor of Business Admini-stration (BBA)	3	45	60	40	No
Gestion des approvisionnements	Approvisionnements, achats, stocks	BBA	3	45	60	50	No
Gestion de projets	Planification de projets logistiques	BBA	4	45	60	45	No
Logistics	Previsions, stocks, transport, distribution.	BBA	1	45	60	35	No
Gestion Integree	Planification avec ERP (SAP/R3)						
Gestion des operations de transport	Transport	Dess	1	45	45	40	No
Optimisation des reseaux logistique et de transport	Design de Reseaux, Localisation, Planification	Dess	1	45	45	40	No
Gestion des operations	Planification de la production projets, qualite, processus, etc.	Dess	8	45	45	45	No
Gestion des approvisonnements et logistique	Approvisionnements, Commerce electronique, relations avec fournisseurs.	Dess	3	45	45	45	No
Planification des activities de production et de distribution	Planification, simulation, previsions, stocks.	Dess	1	45	45	30	No
Gestion Commerciale de la distribution	Marketing, Canaux de distribution	Dess	1	45	45	40	No
Activite de synthese	Projet d' integration	Dess	1	45	40	30	No

Institution Name: Kwantlen University College
Department/Program Name: Entry Level pre-apprenticeship automotive parts and light warehousing
Degrees: Certificate, Co-op and Apprenticeship

	Core Topics(s)/ Learning Outcomes	Program under which course falls	Number of sessions offered/year	Number of class hours per course	Approx. spaces available/ offering	Approx. number of students/ offering	Does student demand exceed availability (yes/no)
Automotive parts and Light warehousing	Inventory control, parts lookup and ordering, office procedures and communications, standard stock and materials, mechanical support systems, catalogue types and applications.	Trades	Continuous	9 month program	24 per year	24	Wait List

Institution Name: Mount Royal College
Department/Program Name: Bachelor or Applied International Business and Supply Chain Management
Entire Program Tailored to Supply Chain Management: Bachelor of Applied International Business and Supply Chain Management
Degrees: Undergraduate and Directed Field Study

	Core Topics(s)/ Learning Outcomes	Program under which course falls	Number of sessions offered/year	Number of class hours per course	Approx. spaces available/ offering	Approx. number of students/ offering	Does student demand exceed availability (yes/no)
LSCM 1201	Introduction to Logistics and Supply Chain Management	Bachelor of Applied International Business and Supply Chain Management	1	48	40	40	Yes
LSCM 3301	Introduction to Physical Distribution	Bachelor of Applied International Business and Supply Chain Management	1	35	35	35	No
LSCM 3303	Fundamentals of Purchasing	Bachelor of Applied International Business and Supply Chain Management	1	35	35	35	No
LSCM 2203	Quality Management	Bachelor of Applied International Business and Supply Chain Management	1	35	35	35	No
LSCM 3305	Physical Distribution & Logistics	Bachelor of Applied International Business and Supply Chain Management	1	35	35	35	No

LSCM 3307	Introduction to E-Business	Bachelor of Applied International Business and Supply Chain Management	1	35	35	35	No
LSCM 4401	Inventory Management	Bachelor of Applied International Business and Supply Chain Management	1	35	35	35	No
LSCM 4403	Production & Operations Management	Bachelor of Applied International Business and Supply Chain Management	1	35	35	35	No
LSCM 4405	Materials & Warehouse Management	Bachelor of Applied International Business and Supply Chain Management	1	35	35	35	No
LSCM 4407	Business Negotiations/project Management	Bachelor of Applied International Business and Supply Chain Management	1	35	35	35	No
LSCM 4409	Supply Chain Decision Making	Bachelor of Applied International Business and Supply Chain Management	1	35	35	35	No
LSCM 4411	E-Business Execution	Bachelor of Applied International Business and Supply Chain Management	1	35	35	35	No

Institution Name: Red River College
Department/Program Name: Traffic and Transportation Program
Degrees: Certificate

	Core Topics(s)/ Learning Outcomes	Program under which course falls	Number of sessions offered/ year	Number of class hours per course	Approx. spaces available/ offering	Approx. number of students/ offering	Does student demand exceed availability (yes/no)
Distribution 1	Canadian Institute of Traffic and Transportation (CITT)	Traffic and Transport-ation (T&T)	2	40	20	16	No
Distribution 1	CITT	T&T	2	40	20	14	No
Economics	Red River College (RRC)	Business Admin-istration	3	50	40	25	No
Business Law	RRC	Bus Admin	3	50	40	25	No
Marketing	RRC	Bus Admin	3	50	40	26	No
Financial Math	RRC	Bus Admin	3	50	40	18	No
Microcomputer	RRC	Microcom-puter Applications	4	40	16	14	No

Institution Name: Ryerson University
Department/Program Name: Retail Management
Degrees: Professional Elective - Bachelor of Business

	Core Topics(s)/ Learning Outcomes	Program under which course falls	Number of sessions offered/year	Number of class hours per course	Approx. spaces available/ offering	Approx. number of students/ offering	Does student demand exceed availability (yes/no)
RMG903	Demand Side Logistics	Bachelor of Business (BBA)	1	40	50	50	Yes
RMG904	Supply Side Logistics	BBA	1	40	50	50	Yes

Institution Name: Seneca College
Department/Program Name: Faculty of Business; Global Logistics and Supply Chain Management
Entire Program Tailored to Supply Chain Management: Logistics & Supply Chain Management, Graduate Certificate program
Degrees: Certificate and Internship

	Core Topics(s)/ Learning Outcomes	Program under which course falls	Number of sessions offered/ year	Number of class hours per course	Approx. spaces available/ offering	Approx. number of students/ offering	Does student demand exceed availability (yes/no)
Logistics and Supply Chain Management 1	Supply Chain Management, SAP management	Global Logistics and Supply Chain Management (SCM)	2	52	70	70	Yes
International Business Law	Law	SCM	2	42	70	70	Yes
Accounting	Accounting SAP	SCM	2	52	70	70	Yes
Scheduling	Production, SAP Production	SCM	2	42	70	70	Yes
Transportation	Transportation	SCM	2	42	70	70	Yes
Logistics and Supply Chain Management 2	Supply	SCM	2	52	70	70	Yes
International Business marketing	Marketing	SCM	2	42	70	70	Yes
Project Management	Project Management	SCM	2	42	70	70	Yes
Customs Access	Customs	SCM	2	42	70	70	Yes
Logistics	Logistics	International Transportation and Customs (TCS)	2	52	70	65	No

Institution Name: Université du Québec a Trois-Rivières
Department/Program Name: Sciences de la gestion; bac. Administration des affaires
Logistics/Supply Chain Specialization Program: 27 credits sur 90 en logistique avec mention de la specialisation sur le diplome
Degrees: Undergraduate and Internship

	Core Topics(s)/ Learning Outcomes	Program under which course falls	Number of sessions offered/ year	Number of class hours per course	Approx. spaces available/ offering	Approx. number of students/ offering	Does student demand exceed availability (yes/no)
Gestion des stocks	Previsions, gestion des stocks	Administration des affaires	1 time, 3 sessions	45	50	25	No
Gestion de l'approvisionnement	Achats, sources d'approv selection	Administration des affaires	1 time, 3 sessions	45	50	40	No
Techniques avancees d'exploitation logistique	Reseau, gestion integree, ERP, JIT, transport, chaine d' approv.	Administration des affaires	1 time, 3 sessions	45	50	25	No
Planification et controle des operations	Planif. De production, distribution, horaire, maintenance	Administration des affaires	1 time, 3 sessions	45	50	25	No

Institution Name: Université Laval
Department/Program Name: Operations et Systemes de decision
Logistics/Supply Chain Specialization Program : BBA avec concentration en Operations et logistique, MBA avec concentration en Gestion manufacturiere et logistique, Ph.D. avec concentration en gestion manufacturiere et logistique
Degrees: Graduate, Undergraduate, Diploma, Internship and Co-op

	Core Topics(s)/ Learning Outcomes	Program under which course falls	Number of sessions offered/ year	Number of class hours per course	Approx. spaces available/ offering	Approx. number of students/ offering	Does student demand exceed availability (yes/no)
Introduction à la gestion de projets	Trop long a detailler pour tous le cours (voir http://www.fsa.ulaval.ca/html/baamajeureoperations.html ou http://www.fsa.ulaval.ca/html/mbamanufacturiere.htm)	Bachelor of Business Admin- istration (BBA)	1	45	200	87	No
Achat et approvisionne- ment electroniques		BBA	1	45	200	60	No
Gestion de la demande et des stocks		BBA	1	45	200	32	No
Planification et contrôle de la production		BBA	1	45	200	31	No
Design de res- eaux et centres de production		BBA	1	45	200	29	No
Operations et logistique		BBA	3	45	200	572	No

Modelisation et aide à la decision		BBA	3	45	200	192	No
Gestion de la qualite et de la maintenance		BBA	1	45	200	27	No
Transport routier des marchandises		BBA	1	45	200	27	No
Ingenierie de la chaine logistique		BBA	1	45	200	35	No
Distribution et entreposage		BBA	1	45	200	35	No
Environnement de developement de Siad		BBA	1	45	200	21	No
Operations et logistique		BBA	3	45	200	572	No

Institution Name: University of Manitoba
Department/Program Name: Supply Chain Management
Entire Program Tailored to Supply Chain Management: Certificate in Logistics evening program with CITT accreditation
Logistics/Supply Chain Specialization Program: Logistics and Transportation Major within the Bachelor of Commerce (Honours)
Degrees: Graduate, Undergraduate, Certificate and Internship

	Core Topics(s)/ Learning Outcomes	Program under which course falls	Number of sessions offered/ year	Number of class hours per course	Approx. spaces available/ offering	Approx. number of students/ offering	Does student demand exceed availability (yes/no)
Supply Chain Management	Not provided	Bachelor of Commerce (B.Com)	2	40	30 to 60	120	No
Purchasing		B.Com	2	40	30 to 60	60	No
Logistics		B.Com	2	40	30 to 60	120	No
Transport Economics		B.Com	2	40	30 to 60	60	Yes
Production		B.Com	6	40	30 to 60	400	No
Policy and Regulations		B.Com	1	40	30 to 60	400	No
Operations Research		B.Com	4	40	30 to 60	400	No
Transportation Law		Certificate in Logistics	1	35	35	20	
Safety and Risk Assessment		Certificate in Logistics	1	35	25	20	
Policy and Regulation		Certificate in Logistics	1	35	25	25	
Logistics		Certificate in Logistics	1	35	25	20	
Transport Economics		Certificate in Logistics	1	35	25	15	

Institution Name: Wilfrid Laurier University
Department/Program Name: Operations & Decision Sciences
Entire Program Tailored to Supply Chain Management: Yes and No. Specialization to Business students, consisting of particular elective courses. However, students receive a degree in Business.
Degrees: Graduate, Undergraduate, Executive and Co-op

	Core Topics(s)/ Learning Outcomes	Program under which course falls	Number of sessions offered/ year	Number of class hours per course	Approx. spaces available/ offering	Approx. number of students/ offering	Does student demand exceed availability (yes/no)
Supply Chain	Network design, shipping, inventory, contract design, pricing, product Design.	Bachelor of Business Admin (BBA)	1	32	50	30	No
Transportation and Facilities Manager	Distribution Networks, choice of mode, rate analysis, vehicle routing algorithms, warehouse location and layout analysis	BBA	1	32	50	20	No
Purchasing and Materials Management	Role of purchasing, purchasing strategy, supplier selection and development, and analysis of trade promotions and supply contracts	BBA	1	32	50	25	No
Information systems for supply chain management	Use of information and information technology to support "pull" versus "push" supply chain operations, control supply chain instability, and manage relationships with customers and suppliers.	BBA					

The following survey participants provided information on departments, programs and degrees, however, did not provide specific information about courses.

Institution Name: Institut maritime du Québec
Department/Program Name: Technique de la logistique du transport
Entire Program Tailored to Supply Chain Management: Diplome d'etudes collegiales en logistique du transport
Degrees: Diploma, Internship and DEC

Institution Name: University College of the Cariboo
Department/Program Name: School of Business + Economics

Institution Name: Humber College
Department/Program Name: School of Applied Technology
Entire Program Tailored to Supply Chain Management: Logistics Administration Diploma Supply Chain Management - Post- Graduate
Logistics/Supply Chain Specialization Program: Business Admin - Logistics Option
Degrees: Diploma, Certificate and Co-op

Institution Name: Assiniboine Community College
Department/Program Name: Business and Tourism Division
Logistics/Supply Chain Specialization Program: Logistics Management specialization within Business Administration Diploma program
Degrees: Diploma and Co-op

Institution Name: Conestoga College Institute of Technology and Advanced Learning
Department/Program Name: Materials and Operations Management
Entire Program Tailored to Supply Chain Management: Business Administration - Materials and Operations Management
Degrees: Diploma, Co-op

Appendix W

List of Supply Chain Sector NOC Codes (from Terms of Reference)

Sub-Function	Occupation Category	NOC Code	Sample Job Titles
Senior Management	Managerial	0016	Senior Managers: Goods, Production, Utilities, Transportation and Construction
		0132	Postal and Courier Services Managers
		0013	Senior Manager, Financial, Communications and other businesses: COO
Logistics Information Systems	Managerial	0213	Computer and Information Systems Managers
	Tactical	2172	Database Analysts and Data Administrators
		2173	Software Engineers
Warehousing	Managerial	0721	Facility Operations and Maintenance Manager: Warehouse Manager
		1215	Supervisors of Purchasing and Inventory Clerks
	Tactical	1422	Data Entry Operator
	Operational	7452	Material Handlers
		9617	Labourers in Food, Beverage and Tobacco Processing: Material Handling, Packaging.
		1472	Store Keepers and Parts Clerks: Parts Supplier, Supply Clerk…
		7451	Longshore Workers: Dock Worker, Ship Loader Operator…
Transportation	Managerial	7222	Supervisors. Motor transport and other ground transit operators
		0713	Transportation managers
	Tactical	1236	Customs, ship and other brokers
		1475	Dispatchers and radio operators
		1476	Transportation route and crew schedulers
	Operational	1431	Accounting and related clerks: freight rate clerk
		1471	Shippers and receivers
		7437	Air Transport Attendants: Cargo attendant, air transport

Sub-Function	Occupation Category	NOC Code	Sample Job Titles
Inventory/material control	Managerial	1214	Supervisors, Mail and message distribution occupations
		0114	Other administrative service managers : inventory control manager, support services
Inventory/material control	Managerial	0911	Manufacturing managers : operations manager
		1215	Supervisors, recording, distributing and scheduling occupations
	Tactical	1122	Professional occupations in business services to management : consulting
		1473	Production clerks: expediter, material estimator. Traffic control clerk
		1474	Purchasing and inventory Clerks: inventory analyst, planner
		2233	Industrial engineering and manufacturing technologists and technicians
Customer service	Managerial	6216	Supervisors of ticket and cargo agents and related clerks in this unit group
	Tactical	1453	Customer Service information
		6433	Airline sales and service agents: airline cargo agent, load planner airline
	Operational	6434	Tickets agents, cargo service representative and related clerks
Purchasing	Managerial	0113	Purchasing managers
	Tactical	1225	Purchasing Agents and Officers
		6233	Retail and wholesale buyers
		1215	Supervisors of purchasing and inventory clerks

Appendix X

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Appendix Y

Glossary

3PL (Third-party logistics provider)	A business that specializes in providing logistics services to other firms (i.e., performing or managing the logistics of others for them).
Academic Institution	A post-secondary scholastic institute offering educational courses. Includes CÉGEPS, colleges and universities.
Career Path	The typical sequence of jobs that an employee progresses through within a career. Often includes information as to what is required to progress between levels or positions (e.g., experience, education, skills).
Critical Workforce Segments	Groups and individuals that drive a disproportionate share of their company's business performance and generate greater-than-average value for customers and shareholders.
Large-sized Organizations	Organizations with revenue greater than or equal to $1B Canadian.
Logistics Service Provider	See 3PL.
Logistics User	An organization that requires logistics activities in order to conduct business and fulfill its mandate. Logistics activities may be conducted either internally or outsourced to a third-party logistics provider.
Managerial Category	Occupations with managerial or supervisory responsibility.
Medium-sized Organizations	Organizations with revenue from $100M to $999M Canadian.
National Occupational Classification Code	A system for describing the occupations of Canadians whereby each occupation is assigned a four-digit code according to skill level, education requirements, occupation domain, and occupation groups.
NOC Code	See National Occupational Classification Code.
Occupational Categories	The three levels in which jobs were categorized for this study: managerial, tactical and operational.
Operational Category	Labour intensive and less strategic occupations, such as material handlers and packaging.
Small-sized Organizations	Organizations with revenue under $100M Canadian.

Succession Planning	The process of pro-actively planning to fill anticipated labour requirements (both managerial and for key skill areas) through the development of internal employees.
Tactical Category	Specialized strategic logistics occupations without management responsibilities, such as inventory analyst and routing planning and optimization occupations.
Talent Management	An integrated set of processes, programs, and technologies designed to develop, deploy, and engage critical workforce segments and critical skill sets to drive business priorities.
Talent Strategy	Talent Management plan and outcomes.
Third-Party Logistics Service Provider	See 3PL.
Workforce Planning	A process to ensure that a sufficient number of appropriately skilled human resources are available to meet the business priorities of an organization.