SUPPLY CHAIN SKILL REQUIREMENTS: INSIGHTS FOR POST-SECONDARY TRAINING

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1. Introduction

It is indisputable that supply chain management (SCM) performance in companies requires developing *people* with the appropriate vision, determination, and SCM competence. Assuring a sufficient stock of such people in Canada is a top priority goal of the Canadian Supply Chain Sector Council (CSCSC). This represents a real opportunity for individuals with career aspirations in SCM but to realize will involve addressing a crucial question: *what specific competences and attributes must those individuals have in order to help companies effectively confront current and future SCM challenges?* This has important implications for the major developers of SCM talent: post-secondary institutions with programs in SCM and SCM's allied fields of management (e.g., logistics, procurement, traffic/transportation, and materials/distribution).

We address that question through a systematic and comprehensive study of job descriptions for managers in SCM and its kin fields. From the research, we present 10 insights to guide emerging SCM professionals and their post-secondary institutions. A unifying theme in these insights is that highly competent SCM professionals must possess a breadth of skills that reflect a balanced blend of technical and non-technical skills and attributes. That is, technical domain-specific skills are insufficient for SCM practitioner excellence: they must be complemented by (and may be less crucial than) skills that span a broad range of domains instead of being specific to SCM.

Research Method
The core research methodology was a content analysis of SCM job descriptions taken from postings at nineteen major websites that target North American SCM professionals. The sites included monster.com, workopolis.com, supplychainrecruit.com, and tsigroup.com. Data collection, which started in September 2006, covered 392 job descriptions after removing duplicate postings. Three quarters of the jobs were advertised through recruiting, placement, staffing sector, consulting firms or some other third party sourcing agency (25% were directly by employers). Most of the jobs were based in Canada (246 or 62.8% of the jobs). The rest were in the US (104 or 26.5%), the UK (38 or 9.7%), and one each in Brazil, continental Europe, Mexico, and an unspecified location.

In obtaining job descriptions from the websites, "SCM" and its variations (e.g., "supply chain") were used as key terms for job classification. However, it is noteworthy that not all of the 392 jobs from that classification had those terms in the job title. Instead, as Table 1 shows, the search uncovered jobs with titles for SCM's kin disciplines as well as jobs with hybrid titles.

Table 1: Breakdown of job advertisements by category of job title

Job Title Category	Number with pure title (hybrid/multi-category titles)
1. Supply Chain	83 (plus 19 hybrids = 102 total)
2. Logistics	61 (plus 35 hybrids = 96 total)
3. Distribution	16 (plus 13 hybrids = 29 total)
4. Transportation	16 (plus 15 hybrids = 31 total)
5. Materials/Inventory	37 (plus 23 hybrids = 60 total)
6. Procurement/Purchasing	69 (plus 26 hybrids = 95 total)
7. Distribution Centre	16 (plus 10 hybrids = 26 total)
Total pure titles	298
Total hybrid titles	82 (hybrids of above categories)
Other/miscellaneous titles	12
Total advertisements	392

To gauge from the job descriptions what skills/knowledge/attributes (competencies) recruiters require of candidates, we used the well established BLM framework introduced in 1991 by Paul Murphy and Richard Poist. The acronym comes from the fact that competencies cover three categories: Business (33 areas), Logistics (18 areas), and Management (32 areas). Table 2 shows the BLM framework. In addition to ascertaining which of the 83 competencies were of most interest to recruiters, we also determined the importance recruiters placed on qualifications/certification (academic degrees/diplomas and professional certificates) and work experience.

Table 2: BLM Framework of Competencies for SCM

Business Competence Areas	Logistics Competence Areas	Management Competence Areas
1 Transportation and Logistics	Traffic/Transportation Mgmt.	Personal Integrity
2 General Business Administration	Customer Service	Ability to Motivate
3 Business Ethics	Warehousing	Ability to Plan
4 Information Systems	Inventory Control	Ability to Organize
5 Strategic Management	Materials Handling	Self-Motivation
6 Accounting and Cost Control	Transportation Regulations	Managerial Control
7 Business Writing	Production Planning	Effective Oral Communication
8 Finance	Distribution Communications	Ability to Supervise
9 Human Resources Management	Order Processing	Problem-Solving Ability
10 Labour Relations	Facilities Location	Self-Confidence
11 Microeconomics	Demand Forecasting	Ability to Delegate Responsibility
12 Operations Research	Purchasing/Procurement	Ability to Manage Time
13 Purchasing	Parts Support	Ability to Negotiate
14 Organizational Psychology	Personnel Movement	Ability to Adapt to Change
15 Production (Manufacturing)	Packaging	Interpersonal Relationships
16 Computer Science	International Logistics	Effective Written Communication
17 Business Statistics	Return Goods Handling	Ability to Persuade
18 Marketing	Salvage/Scrap Disposal	Ability to View Firm as a System
19 Industrial Engineering		Ability to Listen
20 Macroeconomics		Ability to Train Subordinates
21 Business and Government		Enthusiasm
22 Business Law		Analytical Reasoning Ability
23 Public Relations		Operational Knowledge
24 Business and Society		Assertiveness Towards Others
25 Civil Engineering		Personal Grooming Habits
26 Industrial Sociology		Personal Dress Habits
27 International Business		Ability to Display Statesmanship
28 Business History		Can Identify Environmental
29 Economic Geography		Quantitative Expertise
30 Insurance		Outgoing Personality
31 Speech		Computer Expertise
32 Urban & Regional Planning		Expertise in Foreign Languages
33 Foreign Languages		

Note: For this study, we used a slightly modified BLM model to account for items that the original model treats as separate but were so highly correlated they could be treated as synonyms and stated once under a single category; e.g., "business writing" and "effective written communication".

Findings, Insights, and Recommendations

1. *Recruiters place strong emphasis on communication skills.* In Table 3, which rank orders the twenty most frequently cited competency requirements in the job descriptions, written and oral communication skills (emphasized in 62-63% of the job descriptions) occupy the two highest spots. This finding validates the typically high priority that degree programs in business and management place on report preparation (e.g., case analysis write-ups) and in-class presentation. Thus, for example, assignments requiring students to give persuasive presentations with compelling content (e.g., to garner support for an approach to solve an SCM case study) hones skills that are prized by recruiters.

2. *Managerial training must provide breadth of expertise reflecting a balance between (domain-specific) skills and skills that are not necessarily specific to SCM/SCM-related domains.* Indicative of balance is that the highly ranked competencies listed in Table 5 are not only technically oriented ones that fall within the core (domain-specific) training of traditional logisticians and modern-day supply chain practitioners (e.g., transportation and logistics, computer expertise, and inventory control). The fact is that the highly ranked items include competencies that can neither be regarded as technical or as specific to the SCM domain (e.g., written and oral communication skills and analytical reasoning ability). The issue of breadth in the desired skill set goes beyond the technical/non-technical dichotomy. Case in point is the high ranking of "accounting and cost control". That is, this study's findings affirm that today's SCM practitioners are expected to have sufficiently deep knowledge in an area that some myopically view as the sole province of accounting practitioners. This finding exemplifies the interdisciplinary nature of SCM and its related fields and also demands a training approach that is very cognizant of how other areas contribute to the advancement of SCM.

Table 3: Overall top 20 competencies required of job candidates

	Competency Requirement (Percentage of job descriptions that cite it)
1	Effective Written Communication (63%)
2	Effective Oral Communication (62%)
3	Transportation and Logistics (61%)
4	Computer Expertise (55%)
5	Accounting and Cost Control (51%)
6	Purchasing and Procurement (49%)
7	Inventory Control (46%)
8	Ability to View Firm as a System (46%)
9	Analytical Reasoning Ability (43%)
10	General Business Administration (42%)
11	Managerial Control (41%)
12	Production Planning (41%)
13	Information Systems (38%)
14	Problem-Solving Ability (37%)
15	Customer Service (36%)
16	Ability to Negotiate (36%)
17	Ability to Display Statesmanship (36%)
18	Ability to Organize (31%)
19	Expertise in Interpersonal Relationships (30%)
20	Ability to Supervise (27%)

3. *It is advantageous to be trained in how to exploit the data analytic and manipulation tools of popular software.* Under the category of computer expertise (cited in 55% of the job descriptions), 58% of those job descriptions targeted candidates with proficiency in Microsoft (MS) Office applications. Given MS Office's ubiquity in homes, schools, and workplaces, one expects most people to have a basic working knowledge of MS Office so it might seem hardly worth citing as a job competency requirement. However, careful study of the wording in the job descriptions made it clear that the competency of interest to recruiters was not merely basic MS Office knowledge (e.g., not just an ability to do a

simple spreadsheet). What recruiters sought were job candidates with superior MS Office skills; e.g., those who can fully exploit Excel and Access capabilities to perform highly sophisticated analysis of SCM issues would have an advantage). Evidentiary quotes from the advertisements include "advanced computer skills with MS Office", "expert skills with MS Office products", "in-depth knowledge on Microsoft Office products", and "technical proficiency in Microsoft Office". This finding is particularly relevant to the training of personnel who are likely to take on a staff analyst role (as opposed to more of a line manager role). The finding underscores the need for training regimens in which assignments are rigorous enough to push the bounds of spreadsheet capabilities to efficiently analyze complex SCM issues. As well as meeting the apparent immediate job market needs, practitioners with that kind of training are likely to develop a keener awareness of which problems are beyond spreadsheet capabilities and should therefore be tackled with more specialized computer-based tools.

4. *For the most part, the competency requirements of pure SCM jobs and non-SCM jobs are quite similar* (*but there are some important differences*). Table 4 highlights the strong similarities with a correlation matrix derived as follows. First, for each job title category, relative appearance frequency of each competency requirement in the BLM model was calculated (relative frequency of a requirement is the percentage of a given category's job descriptions in which each it appears). To avoid confounding the inter-category comparisons, each category covers only "pure" job titles; i.e., hybrid or multi-category job titles are excluded. Second, we calculated the correlations between the percentages; e.g., 0.93 is the coefficient of correlation between the percentages for pure SCM jobs and for pure materials/inventory jobs. The fact that these coefficients are close to +1 (and statistically significant at the 1% level) affirms the strong similarity in required skill sets across different job titles. This finding suggests that the training required to expand one's expertise in order to make career moves among the disciplines listed in Table 4 might not be very onerous.

Table 4: Matrix of correlation among job title categories (variable is
the frequency of appearance of competency requirements in
each category's job descriptions)

	Logistics (L)	*Distribution (D)*	*Transportation/ Traffic (T)*	*Materials/ Inventory (M)*	*Procurement/ Sourcing (P)*	*Warehouse/DC/Facility (W)*
Supply Chain (S)	0.89	0.70	0.78	0.93	0.88	0.76
Logistics (L)		0.80	0.87	0.83	0.76	0.80
Distribution (D)			0.84	0.76	0.56	0.88
Transportation and Traffic (T)				0.75	0.68	0.76
Materials/Inventory (M)					0.88	0.78
Procurement/Sourcing (P)						0.58

5. ***Some competencies are more important targets for extending
one's expertise when considering career moves among SCM
fields.*** As Table 5 shows, the study uncovered a few key (and
statistically significant) differences in competency requirements
across the seven job title categories. These differences signal the
kind of training and background practitioners need to develop to
effect successful career moves. For example, those looking to
move from a pure procurement track into SCM might need to focus
heavily on deepening their knowledge of production planning.
That is because the findings indicate that while production
planning was a required competence in 22% of pure procurement
jobs, it was an explicit requirement in a much larger percentage of
pure SCM jobs: 53% (see Table 5). Similarly, since procurement
competence was asked for in 61% of pure SCM jobs but in only
21% of pure logistics jobs, it would be the targeted skill for a

logistician wanting to move into SCM. Interestingly, while some skills seem markedly less crucial for SCM than for other fields, having those skills could provide a clear competitive edge in the job market. Case in point is skill in distribution communication (ability to effectively manage essential communication among parties in a firm's internal and external distribution network). That competence was cited as essential in proportionately more jobs in the distribution, transportation/traffic, and warehousing, etc. categories (50%-56% of jobs in these three categories versus 17% in the pure SCM category). However, for those 17% of SCM jobs, an individual moving from one of the aforementioned three categories may well have a distinctive edge over other candidates.

Table 5: Sources of statistically significant differences among job title categories

Competency requirement and relative appearance frequency in pure SCM job descriptions	Relative appearance frequency in non-SCM pure title job descriptions					
	L	D	T	M	P	W
Human Resources Management 8%		38%				
Warehousing 18%		69%				63%
Transportation Regulations 8%	26%		57%			
Production Planning 53%					22%	
Distribution Communications 17%		56%	50%			56%
Purchasing and Procurement 61%	21%					
Managerial Control 42%		94%				
Ability to Supervise 12%		44%		35%		56%
Expertise in Interpersonal Relations 25%		69%				
Ability to Train Subordinates 13%		56%				50%
Expertise in Foreign Languages 10%			38%			

Note: significant at the 1% level; *L*= logistics, *D* = distribution, etc.

6. *For transportation/traffic professionals, knowledge of regulation must focus on trans-border contexts, particularly in the NAFTA region.* As shown in Table 5, for pure Traffic and Transportation jobs, knowledge of transport regulations is more widely regarded as beneficial (cited in 57% of those jobs) than for jobs in the pure

SCM category (only 8% of SCM job descriptions cited this competence). More importantly, detailed study of job descriptions for Traffic/Transportation practitioners revealed that recruiters are especially keen on candidates whose knowledge covered customs regulations affecting trans-border transportation, invariably within the NAFTA region. True, in training future Traffic/Transportation practitioners, covering regulatory milestones such as transportation deregulation will continue to be important in providing historical context. Still, the rapidly evolving security and trade regulations affecting trans-border transportation should get considerable treatment in degree and certification programs that deal with transportation regulation. Given the strong emphasis on these issues in the job descriptions, we believe that, despite the small sample of jobs targeted exclusively at Traffic and Transportation practitioners, our recommendation is very valid.

7. *Interpersonal skills for supervisor-supervisee relationships is less emphasized in pure SCM jobs than in jobs viewed as key SCM elements.* Table 5 shows that ability to supervise, expertise in interpersonal relationships, and ability to train subordinates were infrequently cited for pure SCM jobs (respectively, 12%, 25%, and 13%). On the other hand, these abilities were much more frequently as required in several non-SCM jobs (e.g., up to 69% for pure distribution jobs). Wording in the descriptions suggested that the reason was the relatively high-level focus of SCM jobs vis-à-vis jobs in the other categories. In particular, the SCM jobs gave much higher priority to the ability to be effective in peer-to-peer relationships (inside and outside the firm) than in relationships between supervisor and subordinates. The opposite seemed true for the non-SCM jobs in that the incumbents were tasked with greater direct responsibility to optimize the performance of their subordinates; i.e., by being competent in motivating, supervising, and training subordinates. To be sure, the data make it clear that expertise in working effectively with others is required of SCM practitioners. Yet, it would appear that job description drafters view it as more crucial to stress this skill to those targeted for

supervisory (line management) roles than to those who are more likely to be working in peer-to-peer relationship (staff roles).

8. *Foreign Language expertise seems to be regarded as a distinctive competence for pure Transportation/Traffic Management jobs vis-à-vis pure SCM jobs.* Given the apparent growing global reach of SCM operations, the expected finding was that emphasis on expertise in foreign languages would be no less for practitioners in SCM than for transportation and traffic practitioners. That is, one would not expect that expertise to be among the statistically significant differences between the two job categories (see Table 5). However, the wording of the job descriptions indicates why this finding might not be as surprising as it first appeared. The job descriptions conveyed a need for transportation and traffic practitioners to interact with a truck driver workforce having diverse language backgrounds. This seems to be a corollary of overseas driver recruitment to help alleviate driver shortages. This might well be an enduring North American reality in light of, for example, Canada's perceived multicultural philosophy and practice, and global conventional wisdom that the USA welcomes all those with the work ethic to pursue the American dream.

9. *Academic qualifications (degree/diploma) are more frequently cited as a job requirement than professional qualifications (e.g., PMAC certification).* Recruiters saw it as important to state the requirement for candidates to have a degree/diploma in 56% of the job descriptions. Interestingly, recruiters also saw it as important to state a requirement for field-specific academic training in 27% of the job descriptions. Required field-specific training was stated either as a full degree/diploma (e.g., a degree in Logistics) or as comprising certain courses (e.g., a degree with a concentration or specialization in SCM). Professional certification was cited in 20% of the job descriptions but it was stated as mandatory in just 6%. A reasonable interpretation of the limited emphasis on professional certification is that SCM and its related fields are not yet widely accepted as having become professions. A related result that was found to be statistically significant was the job

descriptions cited professional certification more frequently for jobs in the Procurement category (28%) than for jobs in the Logistics and SCM categories (10% and 13% respectively). This may be a reflection of whether a field has a renowned certification. That is, it might be fairly easy for job description drafters to cite certification requirements for fields in which the certifying organizations have become household names among professionals; e.g., the Institute for Supply Management and the Purchasing Management Association of Canada. All these results may be signaling that visibility of options for certification and qualification should be among key issues for discussion among those with interests in building Canada's stock of talent in SCM and in its related fields.

10. *Recruiters seem flexible on experiential requirements.* The number of years of required work experience was stated in 69% of the jobs. The average required number of years was 5.81 years within a range of 1 to 15 years (see Figure 1). This left 31% of the jobs for which there is an implied openness on the part of recruiters to entertain candidates whose only real shortcoming is limited on the job experience. This statistic, along with the finding that experience of up to two years would have been sufficient for an additional 6% of the jobs seems encouraging for recent graduates. That is because, except in rare cases and except for MBAs, their experiences are limited to short-term stints; e.g., semester-length jobs that are part of the practicum component of the degree program (generally termed co-op degree programs).

Figure 1: Required years of on the job experience specified in the job
advertisements
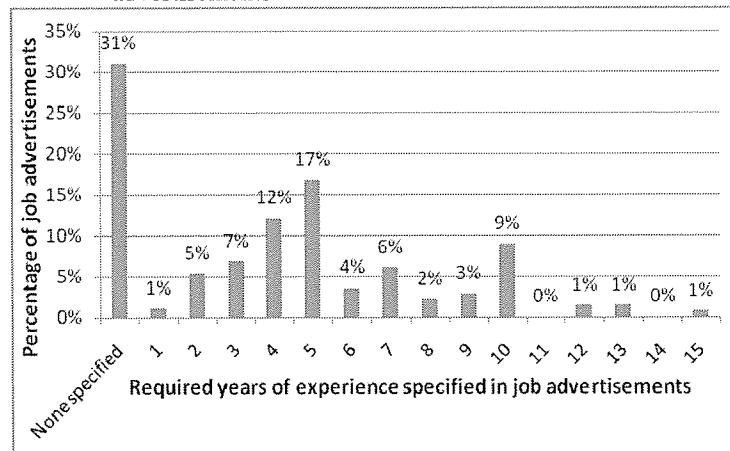
Note: if an advertisement specified a range (e.g., 10 to 15 years),
the range's mid-point, rounded up to the next integer, is used.

Conclusion
The SCM competency development recommendations presented
herein represent an important, but by no means a complete strategy for
building Canada's stock of SCM talent. One issue that should be
addressed in moving towards completeness concerns certification.
Though the results indicated low priority on professional certification,
discussions about certification to streamline and professionalize SCM
education continue to surface among parties such as academia and
sector/professional associations. One concern is this: should these
discussions lead to a higher priority on professional and academic
certification then academia and professional bodies must develop joint
initiatives to facilitate individuals seeking both types of certification.
Primary among current obstacles individuals face is when degree
holders are required to repeat professional certification courses that
contain bodies of knowledge that his/her degree covered. Models to
consider in pursuing these joint initiatives include the well established
modus operandi in the accounting field, and the efforts of more recent

joint academic/professional certification adopters such as the finance and human resources management fields.

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