Supply Chain Management Skills in Business and Humanitarian Contexts

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This study explores the differential skill requirements within supply chain management (SCM) across commercial and humanitarian contexts and career levels. Analysing 116 responses regarding context and 96 concerning career levels, the research confirms the applicability of the T-shaped model, highlighting the distinct skills critical for each sector. Significant discrepancies were found: humanitarian SCM prioritizes functional logistics, while business SCM places a larger emphasis on information technology, customs, transportation, and port/airport management. These findings suggest a dynamic skillset evolution, where functional skills, essential at entry-level positions, give way to general management capabilities as one progresses. This shift is more pronounced by experience rather than job title in the humanitarian sector. The implications for educational institutions and SCM practice are profound, necessitating curriculum updates to meet changing industry demands and support logistics practitioners transitioning between sectors.

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Introduction

Several reasons stand out why it is important to understand the skill requirements firstly in supply chain management in general, and then specifically in the business and humanitarian contexts. There is a talent

gap in supply chain management (SCM), with the astonishing ratio of six jobs being available for every applicant (Zinn, Goldsby, and Cooper 2018). The logistics skill shortage has been cited as the number one megatrend likely to drive the future of logistics (Arvis et al. 2018). At the same time, it has been shown that the level of logistics and SCM skills of employees contribute positively to firm performance (Kovács and Tatham 2009a; Muogboh 2010). Thus, it is not a trivial matter for any organization in either the commercial or humanitarian sector that they find the right people for supply chain positions.

Talent gaps can occur because of a negative image of a discipline – e.g. SCM jobs being portrayed as dark, dangerous, and male-dominated (Zinn, Goldsby, and Cooper 2018), due to a difference in expected vs offered remuneration, as well as to an education gap. The latter is a question of a large enough population being trained and educated for the skills that are required by industry. This is not only a matter of enough SCM programmes being offered at universities, but also whether those programmes meet the actual skills requirements of industry, not to mention future needs, which is not always the case (Mangan, Gregory, and Lalwani 2010). For example, while current supply management programmes are still largely focused on function-oriented competences, companies continue to lack professionals in sustainable supply management (Schulze, Bals, and Johnsen 2019). As indicated by Fawcett and Rutner (2014), a prevailing obstacle to overcome the talent gap in SCM education is to develop programmes that could assist professionals to get both basic functional logistics skills and soft skills at the same time.

Skills requirements are not static. They can change in times of economic turbulence during which companies need to re-orientate themselves from current operations to seize new opportunities (Tatham et al. 2017), and in times of technological change, i.e. when companies have been seizing such new opportunities. There are many trends in SCM that would indicate such changes, from the impact of 3D printing on production and distribution, to the digitalization, robotization and automation of supply chains, and the possibilities in understanding markets and demand better when applying big data analysis, to name but a few. The new trends will generate needs for different supply chain skills, including those not yet in existence.

Skills requirements are not universal, either. Logistics and supply chain management job advertisements vary across contexts (Kovács, Tatham, and Larson 2012) and surveys have indicated differences between busi-

ness, humanitarian, and military logistics skills (Kovács and Tatham 2009b, 2010). Finally, they vary across the career stages of supply chain managers (Mangan and Christopher 2005). The aim of this research is, therefore, to analyse contextual differences in logistics and supply chain management skills requirements. The study itself has been carried out as a survey of alumni (practitioners) and students from both business and humanitarian logistics and SCM programmes.

The research focuses on the following research questions:

RQ1 *How does the importance of specific SCM skills vary between business and humanitarian contexts?*

RQ2 *Which SCM skills are required from supply chain managers at different career levels?*

Subsequently, the study aims at making several contributions. By addressing the importance of individual skills and comparing their needs in business and humanitarian contexts, the study contributes to educational institutions being able to better gauge their offerings to different groups. At the same time, assessing the importance of specific skill sets throughout the career progression of supply chain managers contributes to a better understanding of the changes in skills needs over time, and across different management positions.

The paper is also structured in accordance with these points. It unfolds with a literature review on SCM skills, dissecting the intricate relationship between SCM proficiency and firm performance. This segment delves into the essential resource configurations for competitive advantage, the pivotal relational dynamics for firm endurance, and stakeholder expectations, setting the academic foundation for the study.

Following this foundation, the Research Design section explicates the methodological framework, detailing the meticulous process of garnering and analysing a broad spectrum of responses from individuals at divergent career junctures within both commercial and humanitarian sectors. It illuminates the statistical techniques utilized to decipher the data, ensuring empirical rigour.

Next, the Analysis and Results section is a deep dive into the empirical findings from the collected data. It examines the practicality of the T-shaped model within SCM and delineates the critical skills that are essential at different career thresholds, emphasizing the unique demands of each sector. Progressing further, the paper elaborates on Contextu-

al Differences in SCM Skills, accentuating the statistical revelations that highlight stark contrasts in skill emphasis between business and humanitarian contexts, thus painting a detailed picture of sector-specific skill exigencies. The narrative then advances to Career Progression and SCM Skills, concentrating on the metamorphosis of SCM skill sets as professionals ascend the career ladder. This part scrutinizes the transition from functional expertise to broader managerial skills, reflecting on how these competencies evolve and become more nuanced over time.

A deliberative discussion ensues, interpreting the broader implications of the findings for SCM practice and pedagogy. This part advocates for educational institutions to dynamically tailor their offerings to the ever-evolving landscape of SCM skills needs. The paper culminates with the conclusion, synthesizing the insights gleaned from the study. It reaffirms the imperative for synchronizing SCM skills with the fluctuating demands of the respective sectors and propels a dialogue on future research trajectories within this field.

SCM SKILLS

Much of SCM research focuses on the holy grail of any discipline: how it adds value to the firm and its stakeholders. Whether looking through the different resource configurations needed for competitive advantage, the relational links and their dynamics for the survival of the firm, or the mere expectations of stakeholders, for the most part, this is a question of establishing the link between SCM and firm performance.

Investigating SCM skills does not come first to mind when it comes to firm performance. Yet skills are unique in that they are non-eroding resources; in fact, quite the opposite, they tend to accumulate, and grow over time (Molloy et al. 2011). At the same time, they fulfil the other requirements of a VRIN resource – they are Valuable, Rare, Inimitable, and Non-substitutable – as well as heterogeneous (Ramsay 2001). Importantly, the individuals possessing certain skills are also the catalysts for developing new capabilities in the firm (Azadegan et al. 2008). From a theoretical perspective, therefore, skills models have been discussed either through the lens of the Resource-Based View (RBV) (Wong and Karia 2010; Kovács, Tatham, and Larson 2012), or, if embracing the role of catalysts and looking at the link between skills and the dynamic environment a firm operates in, through the dynamic capabilities model (Tatham et al. 2017).

Combining (a) the current talent gap in SCM (Arvis et al. 2018; Sinha, Millhiser, and He 2016; Zinn, Goldsby, and Cooper 2018), and (b) the link that has been established not just between skills and firm performance, but between SCM skills and firm performance (Kovács and Tatham 2009a; Muogboh 2010), the question really becomes one of how to ensure the person one hires has the right SCM skills for the specific job – and related to this, which skills should be emphasized in SCM education for the particular SC context. After all, a lack of job market relevance, and a lack of practical and professional skills development are two out of the three main criticisms made towards SCM education (van Hoek 2001; Lutz and Birou 2013).

The issue is not only about current, but also future needs. Different methods in SCM education with respect to emerging topics have also been emphasized in academic literature. Field trips, while being a generally effective teaching method, appear to be specifically fruitful in sustainable transportation education by impacting behavioural intentions (Putz, Treiblmaier, and Pfoser 2018). At the same time, in-class teaching methods are also highlighted, with a focus on ICT. Use of commercial software is extremely helpful in building fundamental SCM knowledge and presenting real challenges of SCM work tasks (Sweeney, Campbell, and Mundy 2010), especially evident when the pandemic hit, as online education frequently became standard. Applying global virtual teams in higher SCM education allows students to obtain experience in conducting work projects internationally via ICT and to become better prepared for the globalized reality of working life by being exposed to high levels of diversity (Trautrims, Defee, and Farris 2016).

Yet what are the "right" SCM skills? Numerous skills and skill sets have been emphasized in SCM, with lists covering both the breadth of general management skills as well as the depth and detail of logistics and SCM. However, there is agreement that logistics professionals need the whole set of the Business-Logistics-Management skills (BLM) (Thai 2012). There is also an entire stream of literature on the intricacies of the 'T-shaped model' (Leonard-Barton 1995) as applied and further developed1 in the SCM context, from Mangan and Christopher (2005) to Heaslip et al. (2019), though exactly which skills are included in which group of skills varies between studies (Lutz and Birou 2013). However, studies on SCM education have embraced and widely applied the T-shaped model (i.e. Naim et al. 2000; Mangan, Lalwani, and Gardner 2001; Allen et al. 2013; Wu et al. 2013; Tatham et al. 2017).

One size does not fit all, however. Different roles in the supply chain, such as whether a company is a manufacturer, wholesaler or retailer, or logistics service provider, may lead to a different emphasis among SCM skills (Wong and Karia 2010; Lorentz et al. 2013). Similarly, different industry sectors such as health care emphasize different SCM skills (Lee, Rammohan, and Sept 2013; Adekola and Adelanwa 2014). Equally, applying SCM skills in different countries or regions may lead to different emphases (Naim et al. 2000; Mangan, Lalwani, and Gardner 2001; Muogboh 2010; Luke and Heyns 2012; Rahman and Yang 2012; Wu et al. 2013; Tatham et al. 2017). Additionally, different contexts, such as the business or the humanitarian, lead to different SCM skills being emphasized for each (see, for example, Kovács and Tatham 2010; Heaslip et al. 2019). Thus, the question arises which SCM skills are the most relevant for each context.

SCM Skills in business and Humanitarian Contexts

Different supply chain settings require different skills. Skills requirements vary geographically, mostly due to different needs between developed and emerging markets (Piotrowicz and Cuthbertson 2015). At the same time, there are differences between skills required for stable environments and skills during turbulent times (Tatham et al. 2017). Many of the emerging areas represent challenges that could, however, be common for different contexts. For example, some of the main challenges to cold supply chain implementation are similar in developing and developed countries and include lack of relevant expertise, inappropriate information systems and scarce operational level training (Gligor, Tan, and Nguyen 2018). Even more to the extreme would be humanitarian supply chains that need to respond to natural disasters and complex emergencies, though even there, there are differences in SCM skill requirements for steadier programmes vs sudden-onset disasters (Kovács, Tatham, and Larson 2012).

A growing stream of literature has focused on SCM skills in the humanitarian context. The context indeed exhibits specific features, from a not-for-profit aim to the urgency of disaster relief operations, struggles with the impact of disasters on transport infrastructure, and restricted access in conflict zones, to name but a few. Yet is it different in terms of the skills required for the job? Recent research indicates that contextually, academic education still focuses on business logistics and commercial supply management, thus neglecting skills for graduates aiming to enter

the humanitarian field (Khan et al. 2020). Kovács and Tatham (2010) singled out the humanitarian cohort from their survey on the T-shaped model and found few significant differences between business and humanitarian contexts. Negotiation skills were more highly emphasized by humanitarians, but none of the other expected differences in other skills, such as marketing, customs clearance, transportation, or even stress management, turned out to be significant. When they then looked at job advertisements, however, there was a reduced overall emphasis on general management skills, as well as on marketing and customer relationship management (Kovács, Tatham, and Larson 2012). In addition, there were differences in SCM skills requirements across levels of emergencies, as well as depending on the size and urgency of a humanitarian programme (Kovács, Tatham, and Larson 2012; Allen et al. 2013). At the same time, Kovács, Tatham, and Larson (2012) discovered hierarchies of skills in their model and found that lower-level skills in the hierarchies (such as fleet management, which is otherwise seen as part of the higher-level skill of transportation) were highly emphasized in humanitarian logistics. In conclusion, this research posits that:

> H1 *The prioritization and emphasis of SCM skills are distinct between business and humanitarian contexts, reflecting the varied strategic and operational demands of each sector.*

In particular, context-specificities are expected as follows:

- A larger emphasis on the groups of general management skills in the business context, vs
- A larger emphasis on the groups of (a) functional skills, as well as (b) problem-solving skills in the humanitarian context;
- A larger emphasis on skills related to (a) marketing, (b) customer relationship management, but also (c) reverse logistics in the business context, vs
- A larger emphasis on negotiation skills in the humanitarian context.

SCM Skills in Career Progression

A closer look at skills hierarchies has also led to their mapping in terms of competence levels across different career stages (Heaslip et al. 2019), along with career progression. This is an important aspect of the professionalization of logistics and SCM overall. Career progression alongside specific elements such as career needs, values and satisfaction become

an important topic academically and practically, with many large companies focusing on nurturing SCM career paths (Goffnett et al. 2012). In the humanitarian space, many different endeavours exist in supporting such a professionalization of the 'humanitarian logistician': new training programmes are constantly being developed and provided not just within but also across humanitarian organizations; certification programmes have been established for humanitarian logistics and humanitarian SCM, as well as medical humanitarian logistics; and numerous courses as well as entire education programmes have been established at institutions around the world. The Humanitarian Logistics Association (HLA) has been an important driving force in such professionalization endeavours, working closely with researchers on their surveys of skills requirements (Allen et al. 2013) or in the effort to map these in such a way as to support the career stages of humanitarian logisticians (Heaslip et al. 2019).

Notwithstanding recent mappings of SCM competence levels across career progressions, at least in the humanitarian context, not much attention has been paid to a segregation of skills data over career progression (Heaslip et al. 2019). At the same time, McKinnon et al. (2017) indicate that not only is there a general and growing shortage of logistics skills but there is a shortage of skilled labour on the more junior level in developed countries, in contrast with a shortage of people being able to fill higher SCM positions in developing countries (Arvis et al. 2018).

As already posited in the business context, there is an expectation of the importance of functional skills diminishing vs general management skills increasing along the career progression in SCM (Mangan and Christopher 2005; Schulze, Bals, and Johnsen 2019). In other words, while functional SCM skills are important for (job) market entry, they are taken for granted at higher management positions that then emphasize other areas such as finance and accounting, human resource management, communication and problem-solving. In the humanitarian context, as Allen et al. (2013) discovered, it was not down to job titles but still to years of experience when this shift could be observed. In conclusion, this research posits that:

H2A *The importance of functional SCM skills decreases with career progression, while*

H2B *The importance of general management skills increases with career progression.*

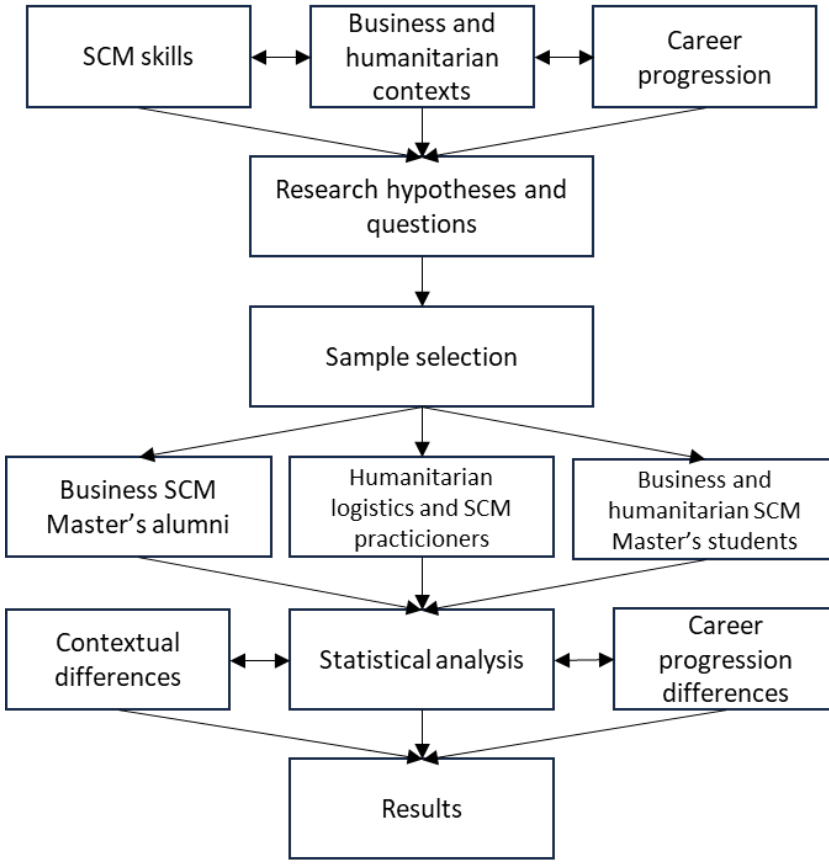

FIGURE 1 Conceptual framework of the research

Research Design

In developing the methodological framework for this study, particular emphasis was placed on the use of sophisticated statistical techniques, pivotal to extracting nuanced insights from the data. This choice was driven by the complex nature of supply chain management skill requirements, which necessitate a rigorous and multifaceted analytical approach to fully comprehend their dynamics across different sectors and career stages.

The statistical analysis, therefore, forms the cornerstone of our research, enabling us to distil a broad spectrum of responses into meaningful patterns and trends. The statistical analysis method is beneficial in minimizing risks such as bias and subjective interpretation (Yalcin et al. 2011) and has become a valuable method in education research (Hedges

and Rhoads 2010). By employing advanced statistical methods, we could accurately identify and compare the nuances in SCM skills prioritization between the commercial and humanitarian contexts. These methods included, but were not limited to, factor analysis, T-tests, and variance analysis, ensuring that our findings were not only comprehensive but also statistically robust. This analytical rigour was essential to validate the hypotheses of our study, providing a reliable foundation upon which further discussion and implications could be built.

The meticulous application of these statistical techniques was crucial in navigating the complex interplay of skills across different career levels and sectors. It allowed us to draw insightful conclusions that were both empirically sound and highly relevant to the field of SCM. This approach not only strengthens the validity of our findings but also enhances their applicability in both academic and practical realms, offering valuable insights for curriculum development and professional training in SCM. An overall summary of how this research is conducted can be seen in figure 1.

Any research to test hypotheses (H1, H2a and H2b) needs to include samples from both a business and humanitarian context, and respondents from various career levels. To collect data three mailing lists were used to comprise a relevant sample: the alumni mailing list of a business-oriented SCM master programme, the practitioner mailing list of a research centre in humanitarian logistics and SCM, and the current students of both a business, and a newer, humanitarian SCM master level academic course at a Nordic business school. Table 1 summarizes the resultant sample of the research, which was carried out between January-April 2018. The overall final response rate was 35.2%, comparable to mean survey response rates in SCM (Melnyk et al. 2012) and with response rates in each cohort well exceeding the levels Larson (2005) reported for logistics and SCM surveys.

Mailing lists do not reflect respondent demographics in the research, as some respondents on the alumni list also worked in the past in the humanitarian context, while some students were former, or current, practitioners from both business and humanitarian sectors. To address this, the survey included a question to self-report the relevant context of the respondent.

At the same time, career levels were assessed in terms of Flöthmann and Hoberg's (2017) management level categories of Analysts, Managers, and Executives, thereby aligning work experience and job titles. Table 2 shows the resultant respondent demographics as it was also relevant for group splits to test the hypotheses of this research.

TABLE 1 Resultant Sample

Mailing list	Initial sample	Bouncing	Resultant sample	Initial responses	Responses after reminder	Response rate of resultant sample
Students	148	91	57	30	39	68.4%
Humanitarian practitioners	165	56	109	17	22	20.1%
Alumni	178	6	172	43	58	33.7%
Total	491	153	338	90	119	35.2 %

TABLE 2 Respondent Demographics

Mailing list	Relevant context (n = 116)		Career level (n = 96)		
	Business	Humanitarian	Analysts	Managers	Executives
Students	25 (21.6%)	14 (12.1%)	17 (17.5%)	3 (3.1%)	0 (0%)
Humanitarian practitioners	5 (4.3%)	16 (13.8%)	6 (6.2%)	5 (5.2%)	9 (9.4%)
Alumni	52 (44.8%)	4 (3.4%)	34 (35.4%)	12 (12.5%)	11 (11.5%)
Total	82 (70.7%)	34 (29.3%)	57 (59.4%)	20 (20.8%)	20 (20.8%)

The table indicates total numbers per group, and the percentage of these after having removed missing responses. After removal there were 116 valid responses for relevant context, vs 96 for career levels. The fall-off is greater for career levels, but this is explained by 19 missing responses from the student mailing list, which is, after all, less surprising.

Respondents were asked to rate the skills in the T-shaped model as proposed by Mangan and Christopher (2005) and refined further by Tatham et al. (2017), on a 7-point Likert scale. While the model was later refined for specific contexts (Kovács, Tatham, and Larson 2012; Heaslip et al. 2019), this study used the same scales as Tatham et al. (2017) used for the business context, to ensure the comparability of findings. The same skill groupings and labels were used as well, with GMS for general management skills, PSS for problem-solving skills, IPS for interpersonal skills, and FLS for functional logistics skills.

T-tests on the T-shaped model between early and late responders were used to check for consistency and non-response bias. There were no significant differences for skill sets but there were some for specific skills: early responders valued the skills of supplier relationship management ($t = 2.245$), information gathering ($t = 2.037$), and listening ($t = 2.848$)

significantly higher than late responders in the sample (all with $p < 0.05$). While the results do not provide an answer to the reasons behind this, this does posit the question to what extent the timing of such a survey may influence results. In fact, Tatham et al.'s (2017) survey was timed during economic turbulence and evaluated SCM skills that are of importance for companies to survive, and thrive, in such times. In other words, timing does matter, and results would need to be assessed considering their context.

Analysis and Results

First, factor analysis was used to assess the skill groupings in the T-shaped model (table 3). The results showed a strong overlap with the model itself, especially when it comes to the assignment into four groups from the T-shaped model: functional skills vs interpersonal skills, general management skills and problem-solving skills. Results confirm the T-shaped model, which is also why there is no need to rename the factors.

There are, though, some notable exceptions to the skill sets in the T-shaped model vs factor loadings. For example, supplier relationship management, that the original model groups with general management skills, came up in the area of functional skills. This is less surprising considering that it concerns *supplier* relationships management; rather, this finding may lead to reconsidering what is a functional SCM skill vs a (different) general management one – which is probably why Heaslip et al. (2019) have grouped it under what they had relabelled the 'technical logistics domain'. On the other hand, the functional skill of 'forecasting' was grouped with one of the sub-factors of problem-solving that also included information sharing and information gathering.

There were several general management skills that were not significant overall, such as finance and accounting, information technology, change management, marketing, and customer relationship management. In contrast, stress management was the only skill missing from the group of interpersonal skills, and legal specifications from the group of functional skills. The question is, however, whether these skills should be eliminated from the list of variables from the T-shaped model. Indeed, 'marketing' and 'customer relationship management', as well as 'reverse logistics' had earlier been ranked so low for the humanitarian context (Kovács, Tatham, and Larson 2012) that subsequent research has changed the label of customer relationship management to 'beneficiary focus' and eliminated the others from the model (Heaslip et al. 2019).

TABLE 3 Factors in the T-shaped Model

Skill	Category	Mean score	Component total	% of variance
Warehousing	FLS	0.86	7.55	22.89
Transportation management	FLS	0.86		
Customs, import and export	FLS	0.83		
Port/airport management	FLS	0.81		
Logistics information systems	FLS	0.75		
Inventory management	FLS	0.74		
Purchasing / procurement	FLS	0.65		
Reverse logistics	FLS	0.63		
Supplier relationship management	GMS	0.54		
Oral communication	IPS	0.86	6.09	18.47
People management	IPS	0.74		
Negotiation	IPS	0.71		
Written communication	IPS	0.58		
Listening	IPS	0.57		
Leadership	IPS	0.53		
Meeting facilitation	IPS	0.49		
Project management	GMS	0.77	2.45	7.43
Risk management	GMS	0.70		
Strategic management	GMS	0.68		
Problem identification	PSS	0.91	2.12	6.43
Problem solving	PSS	0.87		
Problem analysis	PSS	0.87		
Information sharing	PSS	0.81	1.67	5.05
Information gathering	PSS	0.81		
Forecasting	FLS	0.64		

Interestingly, 'marketing' was also lowest ranked in the business context in another research (Tatham et al. 2017), but other than that, these results have not been replicated in that context. Therefore, factor analysis was run for business vs humanitarian context (see Appendix 1) and also for different levels in career progression (see Appendix 2). Results differ here across contexts and career levels, but more importantly, all the variables re-appear when doing such an analysis. In conclusion, as there seems to be such a group dependence of the factors, the findings do not suggest eliminating any of the variables from the T-shaped model. However, other tests are needed to better understand the differences across contexts and levels in one's career progression.

Contextual Differences

Next, further tests were conducted to establish which of the differences between the business vs humanitarian context are significant. Table 4 shows the results of the skills ratings for each context, as well as the results of the T-test. As for ratings, this study cannot confirm Kovács and Tatham's (2010) results of the humanitarian responses being more polarized; rather, they are generally higher. Interestingly, in neither context do functional logistics skills appear among the top ten ratings: for the business context, 'forecasting' as the first functional logistics skill appears as number fourteen, whereas for the humanitarian context, 'transportation management' gets the eleventh-highest rating.

Looking at skill sets, in fact both the business and the humanitarian context value problem-solving skills higher than other skill groups (6.08 business vs 6.17 humanitarian), also in both cases followed by interpersonal skills (5.63 and 5.78, respectively). Only then do differences arise, with general management skills rated higher for the business context (5.38 and 5.32, respectively) vs functional logistics ones rated higher in the humanitarian context (4.79 and 5.41, respectively). But apart from these descriptive statistics, the only difference in skill sets that is significant is for functional logistics skills, that the business context values less than the humanitarian one ($t = -2.064$, at $p < 0.05$). Therefore, only a larger emphasis on functional logistics skills in the humanitarian context can be confirmed.

Yet, on the individual skill level, very few differences turned out to be significant, with the following exceptions: the higher importance of 'information technology' in the business context, and the higher importance of 'customs, import and export', 'transportation management', and 'port/airport management' in the humanitarian context.

These results are not in line with prior literature that had informed H1. While back in 2010, Kovács and Tatham (2010) found more skills to be valued significantly differently than not between the business and humanitarian contexts, one of the few that was not significantly different was that of 'transportation'. On the other hand, 'port/airport management' was ranked second lowest in the business context in an Australian business sample (Tatham et al. 2017), although Australia as an island country might differ from other locations. In conclusion, however, there is some support for H1 overall, though with different than expected specifications. Results show that there are some significant differences be-

TABLE 4 Contextual Differences

	Context	N	Mean	SD	SEM	F	t
General management skills (GMS)							
Finance and accounting	Business	55	4.56	1.385	.187	.434	−1.335
	Humanitarian	19	5.05	1.353	.310		
Information technology	Business	56	5.79	1.202	.161	.162	2.309*
	Humanitarian	19	5.05	1.177	.270		
Change management	Business	55	5.93	.959	.129	17.462	1.792
	Humanitarian	15	5.07	1.792	.463		
Marketing	Business	54	4.15	1.510	.205	.020	.785
	Humanitarian	16	3.81	1.471	.368		
Project management	Business	57	5.79	1.423	.189	1.182	.111
	Humanitarian	20	5.75	1.164	.260		
Strategic management	Business	56	5.46	1.401	.187	.848	−1.235
	Humanitarian	20	5.90	1.210	.270		
Customer relationship management	Business	56	5.77	1.112	.149	3.887	1.130
	Humanitarian	18	5.39	1.577	.372		
Supplier relationship management	Business	56	5.36	1.623	.217	3.363	−1.653
	Humanitarian	20	6.00	1.026	.229		
Risk management	Business	55	5.60	1.382	.186	.042	−.851
	Humanitarian	20	5.90	1.252	.280		
Problem-solving skills (PSS)							
Problem identification	Business	56	6.20	1.135	.152	2.181	−.747
	Humanitarian	17	6.41	.618	.150		
Information gathering	Business	57	5.74	.992	.131	.859	−.144
	Humanitarian	18	5.78	1.215	.286		
Problem analysis	Business	56	6.16	1.218	.163	2.430	−.571
	Humanitarian	18	6.33	.686	.162		
Information sharing	Business	57	5.86	.953	.126	.081	−.540
	Humanitarian	20	6.00	1.124	.251		
Problem solving	Business	55	6.42	1.013	.137	.185	.384
	Humanitarian	16	6.31	.793	.198		
Interpersonal skills (IPS)							
Listening	Business	56	5.55	1.320	.176	2.200	−1.181
	Humanitarian	20	5.95	1.191	.266		
Oral communication	Business	57	6.21	.921	.122	2.243	−1.007
	Humanitarian	18	6.44	.616	.145		
Written communication	Business	57	5.84	1.279	.169	.159	−.302
	Humanitarian	18	5.94	1.162	.274		

Continued on the next page

TABLE 4 *Continued from the previous page*

	Context	N	Mean	SD	SEM	F	t
People management	Business	57	5.84	1.222	.162	.090	−.472
	Humanitarian	18	6.00	1.283	.302		
Meeting facilitation	Business	57	4.65	1.408	.186	.030	−.473
	Humanitarian	18	4.83	1.543	.364		
Negotiation	Business	56	5.95	1.135	.152	.948	.340
	Humanitarian	19	5.84	1.214	.279		
Stress management	Business	56	5.41	1.449	.194	.065	−.166
	Humanitarian	19	5.47	1.349	.309		
Leadership	Business	57	5.56	1.376	.182	.060	−.485
	Humanitarian	19	5.74	1.327	.304		
Functional logistics skills (FLS)							
Legal specifications	Business	55	4.47	1.476	.199	1.973	−1.374
	Humanitarian	19	5.00	1.333	.306		
Customs, import and export	Business	53	4.77	1.502	.206	.867	−2.194*
	Humanitarian	19	5.63	1.342	.308		
Transportation management	Business	56	4.84	1.827	.244	5.877	−3.006**
	Humanitarian	19	5.89	1.100	.252		
Inventory management	Business	54	4.89	1.798	.245	2.124	−1.183
	Humanitarian	19	5.42	1.305	.299		
Warehousing	Business	55	4.73	1.870	.252	2.079	−1.467
	Humanitarian	19	5.42	1.465	.336		
Purchasing / procurement	Business	55	5.13	1.678	.226	2.664	−.737
	Humanitarian	18	5.44	1.247	.294		
Forecasting	Business	57	5.72	1.278	.169	.137	.856
	Humanitarian	17	5.41	1.372	.333		
Reverse logistics	Business	54	4.30	1.574	.214	.048	−.605
	Humanitarian	18	4.56	1.580	.372		
Port/airport management	Business	53	3.51	1.957	.269	10.008	−5.296**
	Humanitarian	20	5.55	1.234	.276		
Logistics information systems	Business	55	5.49	1.585	.214	1.844	−.702
	Humanitarian	18	5.78	1.215	.286		

Notes **p < .01, *p < .05.

tween the skills emphasized for the business vs the humanitarian context of SCM. Specifically, there is:

- A larger emphasis on the skill set of functional logistics skills in the humanitarian context,

- A larger emphasis on the skill of 'information technology' in the business context, and
- A larger emphasis on the skills of 'customs, import and export', 'transportation management', and 'port/airport management' in the humanitarian context.

With the maturation of humanitarian logistics as a field, concurrent with the increasing professionalization of humanitarian logisticians, there is less of a need to emphasize the differences of the field overall, which may explain why the results of this study differ so much from surveys carried out a decade earlier. At the same time, however, differences that are still evident boil down to the specificities of the humanitarian context. For example, large scale disasters are characterized by the delivery of international aid, hence the emphasis on cross-border transportation where customs, import and export are frequently required, as well as port/airport management that deals with typical points of entry of such deliveries – air transport allows fastest delivery of goods in need at the early disaster response phase, especially when other (land) infrastructure is damaged, while ports (sea ports) are used for large shipments, such as food commodities. Also, while the digitalization of supply chains is an important topic overall, in this regard at least, the humanitarian context may still lag behind the business context, if the need is to deliver aid in areas without any functioning electricity, information and/or telecommunication infrastructure.

Differences in career progression

Differentiating the emphasis on skill sets between analysts, managers, and executives in supply chain management (as in Flöthmann and Hoberg 2017), this study could confirm the upwards trend in emphasis on general management skills and problem-solving skills as well as interpersonal skills throughout their career progression. The downward trend for any focus on functional logistics skills is less clear, however: it increases from analysts to managers, and decreases only on the executive level (table 5). As Mangan and Christopher (2005) stated, supply chain managers are indeed 'managers first and logisticians second', or, as Tatham et al. (2017) put it, functional SCM skills are required for the earlier, entry levels of the job.

Details for individual skills were tested in a one-way ANOVA test across management levels. Again, the importance of very few individual skills

TABLE 5 Skill sets in career progression

	GMS	PPS	IPS	FLS
Analysts	5.35	6.00	5.48	5.02
Managers	5.39	6.13	5.66	5.19
Executives	5.52	6.34	6.03	4.67

changes significantly over time (table 6). To better understand the actual progression, however, post hoc analyses (table 7) revealed that results are only significant for:

- An increase in the importance of 'information sharing' from analysts to executives,
- First a decrease in the importance of 'leadership' from analysts to managers, and then an increase when it comes to executives,
- A steady increase in the importance of 'listening' from analysts to managers to executives, and
- A steady decrease in the importance of 'logistics information systems' from analysts to managers to executives.

It is important to note that the variables 'leadership' and 'listening' did not meet the requirements of variances homogeneity tests. As the null hypothesis was rejected, Games-Howell post-hoc analysis was thus applied, which is recommended in the cases of differences among variances in the population (Field 2013).

In conclusion, H2a can only partially be confirmed. Even though there is a large drop in the emphasis on the functional logistics skill set among executives, this is not a steady downwards trend. On the other hand, the increase in other skill sets is steady, and not only general management skills, but also problem-solving and interpersonal skill sets are emphasized more strongly the more a person progresses in their supply chain career.

Conclusions

This research aimed to analyse the differences in logistics and supply chain management (SCM) skills requirements between business and humanitarian contexts and across various career levels of supply chain managers. The study's findings provide nuanced insights into these varying SCM skill requirements, which are essential for both educational institutions and practitioners in the field.

This investigation addressed two key research questions:

TABLE 6 Differences in skills in career progression

		N	Mean	SD	SE	95% Confidence Interval for Mean		F
						Lower Bound	Upper Bound	
General management skills								
Finance and accounting	Analyst	55	4.42	1.474	.199	4.02	4.82	2.334
	Manager	20	4.70	1.174	.263	4.15	5.25	
	Executive	19	5.21	1.316	.302	4.58	5.84	
	Total	94	4.64	1.405	.145	4.35	4.93	
Information technology	Analyst	55	5.49	1.318	.178	5.13	5.85	.308
	Manager	20	5.75	1.209	.270	5.18	6.32	
	Executive	19	5.58	1.170	.268	5.02	6.14	
	Total	94	5.56	1.258	.130	5.31	5.82	
Change management	Analyst	51	5.65	1.309	.183	5.28	6.02	1.482
	Manager	18	6.22	.732	.173	5.86	6.59	
	Executive	18	5.83	1.339	.316	5.17	6.50	
	Total	87	5.80	1.228	.132	5.54	6.07	
Marketing	Analyst	53	4.19	1.532	.210	3.77	4.61	2.908
	Manager	18	3.17	1.618	.381	2.36	3.97	
	Executive	18	4.00	1.572	.370	3.22	4.78	
	Total	89	3.94	1.591	.169	3.61	4.28	
Project management	Analyst	56	5.79	1.345	.180	5.43	6.15	.518
	Manager	20	6.00	1.170	.262	5.45	6.55	
	Executive	20	6.10	1.252	.280	5.51	6.69	
	Total	96	5.90	1.285	.131	5.64	6.16	
Strategic management	Analyst	56	5.57	1.248	.167	5.24	5.91	.401
	Manager	20	5.85	.933	.209	5.41	6.29	
	Executive	19	5.74	1.558	.357	4.99	6.49	
	Total	95	5.66	1.251	.128	5.41	5.92	
Customer relationship management	Analyst	56	5.84	1.233	.165	5.51	6.17	.757
	Manager	20	5.45	1.234	.276	4.87	6.03	
	Executive	18	5.67	1.237	.291	5.05	6.28	
	Total	94	5.72	1.230	.127	5.47	5.98	
Supplier relationship management	Analyst	56	5.48	1.427	.191	5.10	5.86	.211
	Manager	20	5.65	1.461	.327	4.97	6.33	
	Executive	20	5.70	1.525	.341	4.99	6.41	
	Total	96	5.56	1.442	.147	5.27	5.85	
Risk management	Analyst	55	5.69	1.345	.181	5.33	6.05	.187
	Manager	20	5.75	1.070	.239	5.25	6.25	
	Executive	19	5.89	1.150	.264	5.34	6.45	
	Total	94	5.74	1.244	.128	5.49	6.00	

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TABLE 6 *Continued from the previous page*

		N	Mean	SD	SE	95% Confidence Interval for Mean		F
						Lower Bound	Upper Bound	
Problem-solving skills								
Problem identification	Analyst	56	6.18	1.046	.140	5.90	6.46	.482
	Manager	20	6.40	.883	.197	5.99	6.81	
	Executive	17	6.35	.786	.191	5.95	6.76	
	Total	93	6.26	.966	.100	6.06	6.46	
Information gathering	Analyst	56	5.63	1.137	.152	5.32	5.93	2.141
	Manager	19	5.79	.855	.196	5.38	6.20	
	Executive	19	6.21	1.032	.237	5.71	6.71	
	Total	94	5.78	1.079	.111	5.56	6.00	
Problem analysis	Analyst	56	6.13	1.145	.153	5.82	6.43	.073
	Manager	20	6.20	1.105	.247	5.68	6.72	
	Executive	18	6.22	.808	.191	5.82	6.62	
	Total	94	6.16	1.071	.110	5.94	6.38	
Information sharing	Analyst	56	5.73	1.070	.143	5.45	6.02	4.390*
	Manager	20	5.75	1.118	.250	5.23	6.27	
	Executive	20	6.50	.761	.170	6.14	6.86	
	Total	96	5.90	1.061	.108	5.68	6.11	
Problem solving	Analyst	54	6.35	.955	.130	6.09	6.61	.271
	Manager	19	6.53	.772	.177	6.15	6.90	
	Executive	17	6.41	.795	.193	6.00	6.82	
	Total	90	6.40	.884	.093	6.21	6.59	
Interpersonal skills								
Listening	Analyst	55	5.18	1.492	.201	4.78	5.59	7.007**
	Manager	20	5.90	1.021	.228	5.42	6.38	
	Executive	20	6.35	.671	.150	6.04	6.66	
	Total	95	5.58	1.349	.138	5.30	5.85	
Oral communication	Analyst	57	6.12	1.019	.135	5.85	6.39	.825
	Manager	20	6.15	.875	.196	5.74	6.56	
	Executive	18	6.44	.705	.166	6.09	6.79	
	Total	95	6.19	.937	.096	6.00	6.38	
Written communication	Analyst	56	5.54	1.439	.192	5.15	5.92	2.979
	Manager	20	5.60	1.231	.275	5.02	6.18	
	Executive	19	6.37	.895	.205	5.94	6.80	
	Total	95	5.72	1.334	.137	5.44	5.99	
People management	Analyst	57	5.79	1.319	.175	5.44	6.14	1.118
	Manager	19	5.79	1.357	.311	5.14	6.44	
	Executive	19	6.26	.733	.168	5.91	6.62	
	Total	95	5.88	1.237	.127	5.63	6.14	

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TABLE 6 *Continued from the previous page*

		N	Mean	SD	SE	95% Confidence Interval for Mean		F
						Lower Bound	Upper Bound	
Meeting facilitation	Analyst	56	4.43	1.488	.199	4.03	4.83	1.795
	Manager	20	4.65	1.531	.342	3.93	5.37	
	Executive	18	5.17	1.150	.271	4.59	5.74	
	Total	94	4.62	1.453	.150	4.32	4.91	
Negotiation	Analyst	56	5.89	1.289	.172	5.55	6.24	.165
	Manager	20	5.85	1.040	.233	5.36	6.34	
	Executive	18	6.06	.998	.235	5.56	6.55	
	Total	94	5.91	1.179	.122	5.67	6.16	
Stress management	Analyst	57	5.46	1.240	.164	5.13	5.79	1.706
	Manager	19	6.00	1.000	.229	5.52	6.48	
	Executive	19	5.21	1.960	.450	4.27	6.16	
	Total	95	5.52	1.383	.142	5.23	5.80	
Leadership	Analyst	57	5.44	1.389	.184	5.07	5.81	4.296*
	Manager	20	5.35	1.348	.302	4.72	5.98	
	Executive	19	6.37	.684	.157	6.04	6.70	
	Total	96	5.60	1.318	.134	5.34	5.87	
Functional logistics skills								
Legal specifications	Analyst	56	4.61	1.397	.187	4.23	4.98	.107
	Manager	20	4.75	1.552	.347	4.02	5.48	
	Executive	19	4.74	1.327	.304	4.10	5.38	
	Total	95	4.66	1.404	.144	4.38	4.95	
Customs, import and export	Analyst	54	5.00	1.479	.201	4.60	5.40	.892
	Manager	19	5.26	1.368	.314	4.60	5.92	
	Executive	19	4.63	1.535	.352	3.89	5.37	
	Total	92	4.98	1.467	.153	4.67	5.28	
Transportation management	Analyst	56	5.20	1.742	.233	4.73	5.66	.635
	Manager	19	5.32	1.635	.375	4.53	6.10	
	Executive	20	4.75	1.773	.397	3.92	5.58	
	Total	95	5.13	1.721	.177	4.78	5.48	
Inventory management	Analyst	55	5.13	1.689	.228	4.67	5.58	1.249
	Manager	20	5.30	1.490	.333	4.60	6.00	
	Executive	19	4.53	1.679	.385	3.72	5.34	
	Total	94	5.04	1.652	.170	4.70	5.38	
Warehousing	Analyst	56	5.04	1.809	.242	4.55	5.52	1.142
	Manager	19	5.16	1.740	.399	4.32	6.00	
	Executive	20	4.40	1.729	.387	3.59	5.21	
	Total	95	4.93	1.782	.183	4.56	5.29	

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TABLE 6 *Continued from the previous page*

		N	Mean	SD	SE	95% Confidence Interval for Mean		F
						Lower Bound	Upper Bound	
Purchasing / procurement	Analyst	56	5.21	1.604	.214	4.78	5.64	.958
	Manager	18	5.61	1.335	.315	4.95	6.27	
	Executive	19	5.68	1.250	.287	5.08	6.29	
	Total	93	5.39	1.489	.154	5.08	5.69	
Forecasting	Analyst	57	5.61	1.386	.184	5.25	5.98	.093
	Manager	19	5.74	1.195	.274	5.16	6.31	
	Executive	18	5.56	1.294	.305	4.91	6.20	
	Total	94	5.63	1.320	.136	5.36	5.90	
Reverse logistics	Analyst	54	4.52	1.657	.225	4.07	4.97	1.731
	Manager	20	4.70	1.750	.391	3.88	5.52	
	Executive	17	3.76	1.480	.359	3.00	4.53	
	Total	91	4.42	1.660	.174	4.07	4.76	
Port/airport management	Analyst	55	4.11	2.088	.281	3.54	4.67	.331
	Manager	18	4.50	2.093	.493	3.46	5.54	
	Executive	20	4.00	1.806	.404	3.15	4.85	
	Total	93	4.16	2.018	.209	3.75	4.58	
Logistics information systems	Analyst	55	5.73	1.459	.197	5.33	6.12	3.241*
	Manager	20	5.60	1.667	.373	4.82	6.38	
	Executive	17	4.65	1.656	.402	3.80	5.50	
	Total	92	5.50	1.579	.165	5.17	5.83	

RQ1 *How does the importance of specific SCM skills vary between business and humanitarian contexts?*

Analysis confirmed significant differences in SCM skill prioritization between these contexts. In business settings, there was a greater emphasis on skills such as information technology, customs, transportation, and port/airport management. Conversely, the humanitarian context placed higher importance on functional logistics skills. This divergence underlines the contextual uniqueness of SCM skills and calls for tailored educational and training programmes.

RQ2 *Which SCM skills are required from supply chain managers at different career levels?*

The study revealed a distinct evolution of SCM skills across career stages. Entry-level positions required strong functional logistics skills, which gradually gave way to general management skills at higher career levels. This trend was particularly pronounced in the humanitarian sector,

TABLE 7 Results from the post-hoc analysis

	Test	Level	Groups compared	Mean difference	SE	Sig	95% Confidence Interval	
							Lower Bound	Upper Bound
Information sharing	Tukey HSD	Analyst	Manager	-.018	.267	.998	-.65	.62
			Executive	-.768**	.267	.014	−1.40	-.13
		Manager	Analyst	.018	.267	.998	-.62	.65
			Executive	-.750	.324	.059	−1.52	.02
		Executive	Analyst	.768**	.267	.014	.13	1.40
			Manager	.750	.324	.059	-.02	1.52
Leadership	Games-Howell	Analysts	Manager	.089	.353	.966	-.78	.95
			Executive	-.930**	.242	.001	−1.51	-.35
		Managers	Analyst	-.089	.353	.966	-.95	.78
			Executive	−1.018**	.340	.015	−1.86	-.18
		Seniors	Analyst	.930**	.242	.001	.35	1.51
			Manager	1.018**	.340	.015	.18	1.86
Listening	Games-Howell	Analysts	Manager	-.718	.304	.057	−1.45	.02
			Executive	−1.168**	.251	.000	−1.77	-.57
		Managers	Analyst	.718	.304	.057	-.02	1.45
			Executive	-.450	.273	.241	−1.12	.22
		Seniors	Analyst	1.168**	.251	.000	.57	1.77
			Manager	.450	.273	.241	-.22	1.12
Logistics information systems	Tukey HSD	Analysts	Manager	.127	.403	.946	-.83	1.09
			Executive	1.080*	.428	.035	.06	2.10
		Managers	Analyst	-.127	.403	.946	−1.09	.83
			Executive	.953	.509	.152	-.26	2.17
		Seniors	Analyst	−1.080**	.428	.035	−2.10	-.06
			Manager	-.953	.509	.152	−2.17	.26

NOTES **p < .01, *p < .05.

suggesting a more dynamic skillset evolution influenced by experience rather than job title.

The testing of our hypotheses yielded the following insights:

H1 *Confirmed that SCM skills are distinctly prioritized in different contexts, reflecting their unique strategic and operational demands.*

H2A *and H2B Demonstrated that while functional logistics skills are crucial at entry levels, there is an increasing emphasis on general management skills as one progresses in their career.*

This was consistent across both business and humanitarian contexts.

These findings have implications for both practice and education. To reflect the changes in needs in skills over time, educational institutions should adjust their offer to different groups, according to the career stage. There is a need to provide, or refresh, skills for those who are progressing in their career, focusing on 'leadership' and 'information sharing'. While there are similarities between business and humanitarian contexts, those individuals that are aiming to move from business into the humanitarian field should look again at 'customs, import and export' skills. This skill is easily forgotten in large common markets, whether the EU, NAFTA, Mercosur, or the common market of the East African Community, but it is seeing a renaissance in importance not just for global trade beyond these markets, but also due to current trade wars and related disruptions. Apart from 'customs, import and export', training for humanitarian organizations would need to emphasize 'transportation', and 'port/airport management'. While 'information technology' was less important in the humanitarian context, it cannot be expected to remain, as the growing role of information technology in humanitarian settings could be observed (i.e. blockchain, mobile solutions, e-vouchers).

Results show some differences in the importance of specific skill sets throughout the career progression of supply chain managers, though rather on the aggregate level than when it comes to specific skills. Generally, the results of this study concur with the previous research that solid functional logistics skills are essential for the entry levels of the job, but then perhaps are taken for granted on higher management levels while giving space to the requirement of other skills such as leadership and general management overall. This may also answer the question of which skills to invest in at which level: a solid foundation of SCM skills is important at first, but building on that, managers, and especially executives, need leadership and management programmes to thrive in their career.

Perhaps even more importantly, it may be crucial to revisit the groupings of skills in the T-shaped model. Moving away from truly 'functional' logistics towards supply chain management, 'supplier relationship management' should be grouped with other SCM skills. At the same time, further studies are needed to establish whether any of the skills in the T-shaped model can de facto be eliminated from the model – and whether a different set of questions would be necessary to be able to add to

them if needed. While this research confirms the applicability of the T-shaped model, more research is needed to tune it up.

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Appendix 1: Factors in Context

Business context					Humanitarian context				
Skill	Category	Mean score	Component total	% of variance	Skill	Category	Mean score	Component total	% of variance
Warehousing	FLS	.85	7.58	22.97	Warehousing	FLS	.91	8.51	25.78
Transportation management	FLS	.82			Purchasing / procurement	FLS	.88		
Reverse logistics	FLS	.80			Transportation management	FLS	.86		
Port/airport management	FLS	.79			Customs, import and export	FLS	.84		
Purchasing / procurement	FLS	.74			Inventory management	FLS	.75		
Customs, import and export	FLS	.70			Logistics information systems	FLS	.71		
Inventory management	FLS	.67			Port/airport management	FLS	.69		
Supplier relationship management	GMS	.62			Supplier relationship management	GMS	.54		
Logistics information systems	FLS	.61			Information sharing	PSS	.94	6.05	18.34
Legal specifications	FLS	.52			Information gathering	PSS	.93		
Oral communication	IPS	.85	6.38	19.32	Risk management	GMS	.72		
Negotiation	IPS	.80			Forecasting	FLS	.62		
Meeting facilitation	IPS	.75			Information technology	GMS	.62		
People management	IPS	.72			Stress management	PSS	.61		
Listening	IPS	.57			Reverse logistics	FLS	.56		
Change management	GMS	.54			Written communication	IPS	.46		
Information gathering	PSS	.52			Project management	GMS	.44		
Written communication	IPS	.52			Problem analysis	PSS	.94	3.43	10.41
Information sharing	PSS	.49			Problem identification	PSS	.94		
Project management	GMS	.79	2.90	8.77	Problem solving	PSS	.91		
Strategic management	GMS	.74			Oral communication	IPS	.56		
Risk management	GMS	.71			Negotiation	IPS	.44		
Leadership	IPS	.49			Strategic management	GMS	.76	2.78	8.42
Problem identification	PSS	.88	2.38	7.21	Change management	GMS	.75		
Problem solving	PSS	.87			Listening	IPS	.54		
Problem analysis	PSS	.85			Meeting facilitation	IPS	.51		
					People management	IPS	.88	2.34	7.01
					Leadership	IPS	.84		

Appendix 2: Factors across career levels

Analyst					Manager					Executive				
Skill	Category	Mean score	Component total	% of variance	Skill	Category	Mean score	Component total	% of variance	Skill	Category	Mean score	Component total	% of variance
Warehousing	FLS	.90	7.06	21.40	Purchasing / procurement	FLS	.93	7.19	21.80	Problem analysis	PSS	.97	9.00	27.27
Port/airport management	FLS	.85			Warehousing	FLS	.91			Problem identification	PSS	.96		
Transportation management	FLS	.81			Transportation management	FLS	.85			Problem solving	PSS	.85		
Purchasing / procurement	FLS	.79			Supplier relationship management	GMS	.77			Listening	IPS	.80		
Inventory management	FLS	.76			Customs, import and export	FLS	.75			Written communication	IPS	.80		
Reverse logistics	FLS	.69			Logistics information systems	FLS	.72			Information gathering	PSS	.54		
Logistics information systems	FLS	.69			Inventory management	FLS	.60			Purchasing / procurement	FLS	.94	7.10	21.53
Customs, import and export	FLS	.68			Reverse logistics	FLS	.60			Project management	GMS	.81		
Supplier relationship management	GMS	.63			Port/airport management	FLS	.58			Legal specifications	FLS	.65		
Legal specifications	FLS	.57			Legal specifications	FLS	.58			Risk management	GMS	.56		
Project management	GMS	.83	5.73	17.37	Problem identification	PSS	.92	6.76	20.48	Information sharing	PSS	.54		
Strategic management	GMS	.77			Problem solving	PSS	.90			Inventory management	FLS	.54		
Risk management	GMS	.72			Problem analysis	PSS	.86			Customs, import and export	FLS	.94	4.32	13.08

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Analyst					Manager					Executive				
Skill	Category	Mean score	Component total	% of variance	Skill	Category	Mean score	Component total	% of variance	Skill	Category	Mean score	Component total	% of variance
Leadership	IPS	.59			Forecasting	FLS	.67			Transportation management	FLS	.92		
Finance and accounting	GMS	.41			Listening	IPS	.63			Port/airport management	FLS	.83		
Problem identification	PSS	.91	3.99	12.10	Written communication	IPS	.56			Logistics information systems	FLS	.81		
Problem solving	PSS	.83			Stress management	PSS	.49			Warehousing	FLS	.55		
Problem analysis	PSS	.81			People management	IPS	.92	4.48	13.56	Leadership	IPS	.84	2.74	8.29
Customer relationship management	GMS	.79	2.77	8.40	Information gathering	PSS	.88			Negotiation	IPS	.71		
Change management	GMS	.71			Oral communication	IPS	.62			People management	IPS	.64		
Forecasting	FLS	.63			Negotiation	IPS	.53							
Stress management	PSS	.49			Project management	GMS	.93	3.37	10.20					
Listening	IPS	.53	2.21	6.71	Risk management	GMS	.73							
Information sharing	PSS	.92			Customer relationship management	GMS	.71							
Information gathering	PSS	.84			Strategic management	GMS	.69							
Oral communication	IPS	.73	1.40	4.24	Marketing	GMS	.67							
Written communication	IPS	.68												
People management	IPS	.61												