

# **COMPETENCY REQUIREMENTS FOR LOGISTICS PROFESSIONALS IN SUPPLY CHAIN MANAGEMENT**

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## ***Abstract***

*Logistics and supply chain management has been playing a critical role in the national economy. With business environments continue to change rapidly, it is critical that logistics professionals are well trained and equipped with important skills and knowledge. This study aims to explore the current profile of skills and knowledge of logistics professionals and identify important requirements for the future. It is found that all proposed business-, logistics- and management-related skills and knowledge are important for logistics professionals. In addition, logistics-related skill and knowledge set was found to be the area that educational and training institutions should particularly aim at to further equip local logistics workforce with substantial skills and knowledge to perform their job successfully.*

**Keywords:** *skill requirements, logistics competencies, logistics professionals, BLM framework*

# **COMPETENCY REQUIREMENTS FOR LOGISTICS PROFESSIONALS IN SUPPLY CHAIN MANAGEMENT**

## **1. Introduction**

Logistics and supply chain management plays a critical role in the national economy. Like any other economic sector, skilled workforce in logistics and supply chain contributes greatly to the success of the sector. As business environments continue to change rapidly, logistics and supply chain sectors face many challenges, of which the need for well trained and skilled logistics professionals is absolutely essential. To reflect this, Closs (2000) suggested that ‘one of the major challenges to management in the next decade is the scarcity of trained supply chain managers’, and that ‘substantial change in logistics and supply chain education is necessary’ to meet these challenges. Until recently, this perception has been reinforced by Carter and Carter (2007) who argued that supply management organisations would take on a higher value role in the coming decade, and thus success would hinge on whether they can attract, develop, and retain individuals with the right skills and capabilities to excel in the future. This view is further elaborated by Green (2010) of the Accenture Supply Chain Academy in that leading companies in recent years have recognised the vital role that people play in driving innovation in their supply chain and improving their ability to produce results, rather than investing only on technology and processes.

Managing the supply chain has become increasingly more complex as logisticians attempt to adapt to turbulent and competitive market environments. Adding to the complexity is managing the paradox of achieving cost efficiencies whilst improving customer service and improving customer and supplier relationships within the supply chain (Christopher 1998). Whereas logistics professionals may have focused on managing traditional logistics functions

such as logistics information systems, transportation and warehousing, their contemporaries no longer operate in isolation from the organisation's value chain and instead must constantly interact with other functional areas within an organisation such as marketing and production, as well as integrate with those of their suppliers and customers. The issue that arises is what knowledge and skills are necessary for logistics professionals to be able to meet the broader challenges of their role in a globalised market. Logistics professionals must be multi-talented across a range of management skills as well as having the depth of logistics knowledge and abilities, which means they must have both generalist and specialist knowledge and skills (Gammelgaard and Larson 2001; Razzaque and Sirat 2001; Murphy and Poist 2006).

This paper aims to address the above mentioned issue and is organised in four sections. First, a literature review is conducted to examine how the research issue has been addressed in the contemporary literature and identify rooms for further investigation in this study. Secondly, research methodology in this study with the adopted conceptual framework, data collection and sampling methods will be explained. Findings and conclusions will be presented next, followed by a discussion on both academic and managerial implications. Finally, a conclusion is presented together with some notes on directions for future research.

## **2. Literature review**

During the 1990s, a number of studies emerged that drew attention to the range of skills that logistics managers may require (for example see La Londe 1990; Williams and Currey 1990; Murphy and Poist 1991a, 1991b, 1993, 1998; Minihan 1998; Trunick 1998; Gibson, Gibson and Rutner 1998). What is apparent from the studies is that logistics managers require many skills to be effective. Researchers have tested the importance of a wide variety of skills ranging from the four broad sets of people, analytic, communication and computer skills (see

Gibson, Gibson and Rutner 1998) through to 83 items classified by Murphy and Poist (1991a) as business skills, logistics skills and management skills. In a variety of other studies (for example, see Young 1998; Le May 1999) necessary skills for logistics managers spread over from technological, to organisational and interpersonal ones. What becomes apparent is that to become a successful logistics manager, one may need to take on super-human characteristics to take on the plethora of activities.

The BLM framework of 33 business, 18 logistics and 32 management skills developed by Murphy and Poist (1991a) has since become a backbone model of research on skills and competencies of logistics professionals. It was found from this study that management skills are seen as the most important component for logistics executives, with emphasis on traditional managerial skills such as motivation, planning, and organising. Next in importance is the logistics skills followed by the business skills. These results are said to have implications for practitioners, head-hunters, employers and educators. Murphy and Poist have since conducted some other studies to explore the above mentioned implications. The above finding was replicated in the subsequent study by Murphy and Poist (1991b) to compare the views of head-hunters and practitioners which also found that some disagreements between these two groups of respondents were in the logistics and management skills. Respondents who were educators in the study by Murphy and Poist (1993) rated management skills as the most important, followed by logistics and business skills, and this finding was also confirmed by respondents who are practitioners in the later study (Murphy and Poist 1998). Among 83 presented skills, educators also perceived nine management skills as the most important for senior logistics executives in this study, which confirms the earlier ascertain that logistics executives should first be proficient in management skill set. Using the same BLM framework, Murphy and Poist (2006) also found that management skills are most important

for both senior- and entry-level managers, followed in order by logistics and business skills, although there was a high degree of difference across the two groups. The BLM framework was also validated in the Asian context as evidenced in the study by Razzaque and Sirat (2001). It is also found from this study that business and government skill received high score which perhaps reflect the great influence of the local government policies and legislature and concern for society in the respective study countries.

Although the research has brought attention to the changing role of logistics managers, researchers such as Razzaque and Sirat (2001) suggest that the focus on ‘the skills and attributes that make a good logistician, has been rather scant’. Similarly, Gammelgaard and Larson (2001) add that overall ‘little has been written on these new logistics skills and competencies’. Although the BLM framework has so far been used as a common tool to evaluate skills and knowledge of logisticians, it has been validated mostly in the American context. Furthermore, it is also important to take into account factors that affect and change business environments, i.e. globalisation, outsourcing, technology developments, climate change and the increasing emphasis on risk management which may impact the preference for skills and competencies of logisticians. For example, a recent study conducted in the context of the new European Union environment found that skill preference will be given to international business expertise or skill levels in a relevant foreign language (Poist, Scheraga and Semeijn, 2001). With the exception of the recent United States based study by Murphy and Poist (2006), the amount of interest in the knowledge and skill sets for logistics managers appears to have somewhat subsided.

### **3. Methodology**

#### **3.1 Research question**

This study aims to examine the questions of what skills and knowledge are necessary for logistics professionals to be successful in their job and how these skills and knowledge profiles may change in the future. It also looks at the perceived importance of these skills and knowledge and the implication to educational providers in preparing students embarking on a logistics career.

### **3.2 Methods of data collection**

Triangulation is utilised in this study. Triangulation is strongly suggested in transportation and logistics research literature as an effective and useful technique to achieve the width and depth of research issues (Cunningham et al. 2000). The type of triangulation technique employed in this paper is the methodological triangulation, in which the author used and combined qualitative and quantitative methods to obtain a comprehensive understanding and a wide and deep picture of the research question. The methods of data collection and interpretation used in this study are exploratory in-depth interviews to provide more inputs for the follow-up survey method (by using mail questionnaires).

### **3.3 Sampling design**

The exploratory phase of this research involves seven in-depth interviews with senior logistics executives who are members of the Chartered Institute of Logistics and Transport in Australia (CILTA). Due to the elite nature of the interview population which is required to be those in senior designations of logistics profession, interviewee sample for this research was selected on convenient basis, i.e. from the authors' contact database. Given the target population being logistics professionals with their skills and knowledge as the unit of analysis in this research, the sampling frame for the questionnaire survey is constructed from the member directory of CILTA with the total sampling approach taken. A list of 1,300 members of CILTA is thus

used as the mailing list. By the cut-off date, 147 questionnaires were returned, representing a 11.3% overall response rate.

### **3.4 Design of research instruments**

During the interviews, a response card consisting of a brief description of the three groups of business, logistics and management skills was given to interviewees asking them about the suitability of these skill groups for logistics professionals as well as their rankings. Interviewees were also asked to indicate any new skill and knowledge that they would think important to be included, as well as any possible difference of requirements for logistics professionals at the entry and management levels. For the questionnaire survey, both fixed-alternative and open-ended response questions were utilised. Skills and knowledge required by logistics professionals were explored by asking respondents to rank the perceived current and future importance (in 10 years time) of 68 skills and knowledge on the scale with 1 indicating ‘not important’ and 5 denoting ‘most important’. Table 1 presents the 68 skills and knowledge used in this study and their associated codes. Respondents were also asked to indicate whether they currently have the relevant skill and knowledge. The 68 skills and knowledge used for this research are mainly derived from the BLM framework of 33 business, 18 logistics and 32 management skills. However, they were thoroughly reviewed and scrutinised to ensure their relevant meaning and avoid repetition. This led to the rewording as well as deletion of some skills and knowledge in the original BLM framework. In addition, some other new skills and knowledge were added on the basis of findings from the in-depth interviews specifically on the aspect of how changes in the business environment would affect logistics professionals in terms of requirements of skills and knowledge necessary to perform their jobs successfully. As a result, in the business-related group, 13 skills were deleted, two of them were combined, and seven new skills were added making up

25 skills and knowledge in this group. In the logistics-related group, 20 skills and knowledge in the original framework were retained with some modification in wording to make them more user-friendly. Three new skills and knowledge were also added following the findings from the in-depth interviews. In the management-related group, 12 deletions were made from the original 32 skills and knowledge on the basis of review of repetition in semantic meaning as well as in other skill groups. The above revision is reflected in Table 2.

*Insert Table 2 about here.*

### **3.4 Administering research instruments**

Prior to the interviews, a list of prospective interviewees in various organisations was drawn up, and each of these interviewees was contacted by telephone inviting their participation in the interviews. The interviews were conducted on a one-to-one basis and averaged approximately sixty minutes. A tape recorder was used to record the whole interview with the prior consent of the interviewees. The survey questionnaire was pre-tested with a group of 10 organisations. Once this was completed and all feedback was incorporated in a revised questionnaire, the finalised version was mailed, together with a cover letter and a self-addressed envelope, to the Secretariat of CILT for further forwarding to their members.

## **4. Findings and discussion**

### **4.1 Measurement scale reliability analysis**

In this study, the statistical norm concerning the internal consistency adopted is above  $\pm 2.0$ , and the accepted value level of reliability (Chronbach's alpha value) is above 0.60 for the scale. Table 3 shows the item-total correlation analysis and Chronbach's alpha value of the scale measuring perceptions of 68 skills/knowledge. Since all the values in the 'Corrected item-total correlation' column , which shows the internal consistency of the whole scale, are

above  $\pm 2.0$  (the lowest item has an item-total correlation of 0.38), it is decided that no variable is dropped from the scale, as each is considered a reliable skill/knowledge necessary for logistics professionals. Even when the variable with the lowest item-total correlation is dropped from the scale, the scale's alpha is still very high (0.972). The overall alpha value for the questionnaire is 0.972, which indicates that the survey instrument is very reliable.

*Insert Table 3 about here*

#### **4.2 General perception of proposed skills and knowledge for logistics professionals**

Table 4 presents the descriptive statistical results of the proposed 68 skills and knowledge which deem necessary for logistics professionals in the current and future states. Mean and standard deviation were computed to derive the descriptive profile of variables. Based on the mean scores, conclusion could be drawn on respondents' perception of the perceived importance of each skill and knowledge. Ranking of skills and knowledge in terms of importance could also be established based on their mean scores and standard deviation. Specifically, as the midpoint of the scale is 3 (neutral), those variables having a mean score greater than 3 would indicate that their importance is supported by the survey respondents, while those with mean score less than 2 (little important) should be eliminated from the original model. The change in ranks of each variable from the current to future state is also computed using mean score differences. In addition, the test of significant at 95% confidence level using z test (Zikmund 2003) was also conducted to examine the generalisability of all variables involved.

*Insert Table 4 about here*

As can be seen from Table 4, no skill and knowledge in the proposed set has the mean response lower than 2 both in current and future states, which indicate that they are all

accepted by respondents as necessary skills and knowledge for logistics professionals. However, in terms of perceived importance, four skills/knowledge (*managing returned products, packaging, salvage and scrap disposal*, and *knowing two or more languages*) were seen as least important to logistics professional in the current state, although *managing returned products* would be of moderate importance in the future. This, to some extent, demonstrate the increasing importance of reverse logistics in the future as logistics professionals would be entrusted to take care of all related operations and processes of the product's lifecycle, i.e. "from cradle to grave". However, the finding that *salvage and scrap disposal* was rated least importantly must be interpreted with caution, since this may be industry specific rather than a universal outcome. For instance, this skill is important in the electronics but might be less likely so in the trucking industry. The finding that *knowing two or more languages* was not seen as of great importance reflects the context where respondents are operating in, i.e. English speaking as the mother tongue, nevertheless this is also seen as of increasing importance in the future given the international exposure of logistics and supply chain operations.

In terms of ranking, the five most important skills and knowledge (in order) as currently perceived by respondents are *personal integrity, managing client relationships, problem-solving ability, cost control* and *ability to plan*. All these skills/knowledge have mean scores greater than 4 denoting that they are seen as greatly important skill sets that logistics professionals must possess. In the future state, these skills and knowledge are also seen of most important magnitude since they are still in the top five most important. However, rankings of individual skill/knowledge have changed slightly. While *personal integrity* and *problem-solving ability* remain their ranks as the most and third most important skill and knowledge necessary for logistics professionals, *ability to plan* has become the second most

important in the future (from the 5<sup>th</sup> rank), the importance of *managing client relationship* has been downgraded from second to fourth rank, while the same is observed for *cost control* (from the 4<sup>th</sup> to 5<sup>th</sup> rank). What can be induced from the above is that planning capability is seen as critical for logistics professionals operating in an increasingly complex business environment with many uncertainties. At the same time, logistics professionals will need to remain their personal integrity as an important virtue for business success, while also being vigilant in solving any problem that may arise in their operations.

Compared between the current and future states, several skills and knowledge in the proposed set of skills and knowledge for logistics professionals have their ranks changed substantially. This is reflected in the last column in Table 4 which shows the gap score of ranks for each skill and knowledge between current and future states. A positive score indicates an increase in ranking from the current to the future state which means the perceived importance of a specific skill/knowledge has been decreased, and vice versa. It can be seen from Table 4 that those skills and knowledge which have biggest positive scores (decreased perceived magnitude of importance of eight, seven and five ranks respectively) are *understanding logistics terminologies, ability to delegate, traffic/transport management, effective supervision of staff, occupational health and safety*, among others. On the other hand, those skills and knowledge which have biggest negative scores (increased perceived magnitude of importance) are *use of logistics specialised softwares* (13 ranks difference), *strategic management* (11 ranks difference), *risk management* (8 ranks difference), *impact of climate change* (7 ranks difference), among others. The above findings signify that those skills and knowledge at the basic operational level are decreasing their importance, while logistics professionals in Australia emphasised the increasing importance in the future of those skills and knowledge relating to the capability at the strategic level such as strategically managing

the overall logistics processes as well as risks. It is also interesting to note the increasing concern of logistics professionals on the capability to understand and mitigate climate change's impact on logistics operations, which in turns can be interpreted into logistics-related skill and knowledge such as the capability to design, operate and manage environmentally friendly logistics operations processes ("green logistics").

Majority of the five least important skills and knowledge for logistics professionals are those related to logistics skill and knowledge group (*packaging, managing returned products, and salvage and scrap disposal*). The other least important skills and knowledge are business-related (*international business regulations*) and management-related (*knowing two or more languages*). As discussed earlier, this may be induced as context-constrained where English is the mother tongue of respondents and Australia as a continent is geographically separated from the rest. However, the latter must be interpreted with much caution given the connectivity in terms of logistics operations between Australia and the rest of the world. The finding that respondents give a lesser extent of importance to logistics-related skills and knowledge is in line with other findings in the literature where logistics professionals need to be managers first, not logistician. This can be seen clearer when skills and knowledge are classified into business, logistics and management groups with statistical results summarised in Table 5. It is also worth noticing that the perceived importance of each skill and knowledge group in the future state is increased compared to the current state.

*Insert Table 5 about here*

Table 6 depicts the current skill and knowledge profile of the Australian logistics professionals. As can be seen from this table, 86% of respondents in this study currently have management-related skill and knowledge set while the percentage for business- and logistics-

related ones are 71% and 52% respectively. What can be deduced from this result is that, from the training and education perspective, respondents are quite proficient in terms of management and business areas, but it is quite alarming that just about half of them currently possess logistics-related skill and knowledge set. This might be partly because many respondents have been concentrated their daily work on some specific areas but not the overall picture of the logistics and supply chain. Given the finding that logistics-related skills and knowledge are seen as important and necessary for the success of logistics professionals in Australia, educational and training institutions will need to act on this accordingly.

*Insert Table 6 about here*

#### **4.3 Respondents' perception by demographic variables**

Statistical tests were conducted to explore whether there is a significant difference in respondents' perception of the proposed skills and knowledge at present and future, and whether their perception is dependent on other demographic variables such as their designation and work experience. First, a paired sample t-test was conducted to investigate whether there is any particular skill and knowledge in which their respective perceived present and future importance is significantly different from each other. As can be seen from Table 7, there are 11 skills and knowledge which perceived present and future importance are significantly different from each other ( $p$  value  $<0.05$ ), in that respondents perceived that these skills and knowledge would be significantly more important to possess in the future so that logistics professionals can fulfil their job successfully. On the business side, respondents emphasised the future importance of knowledge on local and international business regulations (skills 1, 8), impact of globalisation and climate change (skills 7, 19), and information system management (skill 22). On the logistics side, respondents also emphasised the future importance of application of ICT in logistics such as the use of specialised logistics

softwares (skill 28), minimising the effect of demand uncertainty (skill 29), logistics personnel recruitment (skill 37), global logistics operations (skill 39), as well as developing environmentally sustainable logistics systems (skill 48), which are in line with ongoing trends on technological application in business and increasing awareness for the environmental sustainability. On the management side, there was not much difference in respondents' perception of current and future importance of the proposed skills and knowledge, except that the knowledge of two or more languages in the future was specifically emphasised (skill 68). This finding is quite expected in the context of Australian logistics professionals given the social context of an English speaking nation.

*Insert Table 7 about here*

Based on description of job title, respondents were classified into two main groups: 99 respondents at senior level (with designations such as CEO, director, deputy director, general manager, manager, etc.) and 48 at entry level (for all other designations). Table 8 presents the statistical summary of the findings. As can be seen from this table, in terms of current importance there are 11 skills and knowledge in which the difference in perception of respondents at the entry and senior levels is significant. Specifically, senior level respondents rated significantly more important than do respondents at the entry level in the skills and knowledge of *analysing statistical data, the impact of globalisation, marketing, human resource management, strategic management, understanding economic principles, engineering logistics, ability to organise, expertise in interpersonal relations, and ability to train subordinates*. The higher emphasis by senior level respondents on some skills such as strategic management, knowledge of impact of globalisation, ability to train subordinates, etc. is quite expected given the respondents' designation profile. Entry level respondents, however, rated significantly more important than do respondents at the senior level on the

knowledge of two or more languages. This is also understandable as entry-level respondents are those directly involved in logistics business at the operational level. As far as future importance of skills and knowledge is concerned, there are five skills and knowledge in which respondents at the entry level rated significantly more important than do those at the senior level, namely, *business regulations, modelling of operations systems, infrastructure planning and management, understanding transport regulations, and salvage and scrap disposal*. At the aggregate level, there is no significant difference in the perception of respondents at the senior level towards current and future importance of business, logistics and management skills and knowledge. However, those at the entry level rated these three skills and knowledge groups significantly more important in the future compared to the current state. This is reflected in Table 9.

*Insert Tables 8 and 9 about here*

Respondents were also classified into three groups according to their levels of experience. As two-third of respondents hold senior positions, they have also correspondingly spent many years working in the industry. The average number of years of work experience is 26, and for this reason respondents were grouped into those of having  $\leq 15$  years (35 respondents),  $> 15$  and  $< 25$  years (23 respondents), and those of  $> 25$  years (89 respondents). One-way ANOVA tests and multiple comparisons among groups (posthoc test) using the Tukey test procedure were conducted to examine whether there is any significant difference in respondents' perception of the current and future importance of skills and knowledge by their levels of work experience. The statistical results are summarised in Table 10 and Table 11. It can be seen from Table 10 that there are 14 skills and knowledge in which the difference in perception of the three respondent groups is significant (based on the p value). Specifically, respondents with more than 25 years of experience rated *general business administration*

significantly more important than do those with more than 15 and less than 25 years. Those with more than 25 years of experience also rated *human resource management* and *ability to plan* significantly more important than those with less than 15 years. This is expected given that these skills are at the management level. In terms of *effective written communication*, there are significant differences between respondents with 25 years of experience and those with less than 15 years, as well as between those with more than 15 and less than 25 years and those with 15 years, in which the former rated this skill significantly more important than the latter. Another common observation is that respondents with 25 years of work experience placed more importance on the skills of *self-motivation*, *individual time management*, *enthusiasm*, and *effective verbal communication* than do those with the least experience (less than 15 years). The difference between these two respondent groups is particularly reflected in the current perceived importance of the management-related skills and knowledge group, in that respondents with more than 25 years of experience rated this group significantly more important than do those with less than 15 years. This is summarised in Table 12.

*Insert Tables 10, 11 and 12 about here*

With regards to the perceived future importance of skills and knowledge by work experience, there is no but one significant difference between three respondent groups toward the knowledge on the *impact of climate change*. In this respect, it is interesting to note that respondents with less than 15 years of work experience rated this knowledge significantly more important than do those with more than 25 years, as well as those having more than 15 but less than 25 years of experience. This finding is unexpected given the earlier observation that respondents with more work experience were often in favour of skills and knowledge in terms of perceived importance than do those with less experience, and that experienced respondents normally rated knowledge on trends impacting on logistics operations, such as

climate change, more importantly than do those with less experience. Nevertheless, this finding does not necessarily mean that experienced respondents did not appreciate the importance on the knowledge of how climate change might impact logistics operations and professionals (since mean scores are 3.22 and 3.28 respectively), but implies the increasing awareness of other less experienced respondents on this knowledge in the future. The above finding is summarised in Tables 13 and 14.

*Insert Tables 13 and 14 about here*

#### **4.4 Educational programs for the future**

This section explores how educational providers are implicated from the results of this study. In the survey questionnaire, respondents were asked to indicate the educational programs that they would need to undertake in the next 10 years to prepare and perform their job as a logistics professional. The result is summarised in Table 15. It can be seen from this table that a majority number of respondents favoured to have some professional development courses in the future to prepare themselves as a logistics professional. This is also in inline with responses in the ‘other’ selection category, in that respondents indicated *skill sets, management training, certificate of competency, IT courses, specific target short courses, and cultural awareness of foreign country business* as the most popular training programs in the future. This is also aligned with the earlier finding that logistics-related skills and knowledge need further attention from educators and trainers for the current workforce. Interestingly, the second most desired training program is postgraduate qualifications, only followed by undergraduate degree and diploma qualifications. This can be partly explained by looking at the respondents’ profile, in that 76% currently hold logistics or business-related qualifications. It is understood from this finding that some professional short courses or in-depth knowledge

courses (postgraduate courses) would be the preferred choice, given the respondents' existing professional qualification background.

*Insert Table 15 about here*

In response to the question of how education programs to prepare logistics professionals for the next 10 years should be developed and conducted, the majority of responses indicated that the industry should be involved in this process. In other words, universities should develop and conduct these programs in consultation with logistics associations. In addition, it was also suggested by respondents that such a development and conduct of logistics education programs be supported by other business associations, while international universities should also be involved to provide reference of necessary educational programs. This result supports the earlier finding that respondents would prefer professional development courses in that educators and trainers provide skills and knowledge that are in line with the needs of industry professionals. All in all, universities designing and conducting educational program on their own is not a preferred choice. The above findings are presented in Table 16.

*Insert Table 16 about here*

## **5. Academic and managerial implications**

This research has several academic implications. First of all, it helps to enrich the contemporary literature on logistics knowledge and skill set for logistics professionals, which is currently rather scant. Secondly, although this study was designed on the BLM framework, it has gone further to elaborate the framework and incorporated a number of additional skills and knowledge which are considered to be critical in the contemporary business environment, while refining several other existing variables in the current framework. Findings from this research also indicate the consistency in findings from several earlier studies in the field,

whilst also discover that new skills and knowledge which are critical for logistics professionals should be continuously explored and empirically validated along with changes in the logistics business environment.

This study is also of benefits to managers in logistics firms as they can identify important skills and knowledge to improve on, while policy makers and educational and training bodies can also use the findings from this research to design and implement courses which are necessary to facilitate skill and knowledge development for logistics workforce. On the one hand, as management-related skills and knowledge were rated the most important group, it is paramount that educator and trainers continue to focus their curriculum development and teaching designs on areas which are perceived as critical to logistics professionals such as customer relationship management and problem solving and decision making. Meanwhile, more emphasis should also be placed on areas of increasing concern such as logistics cost control and management, and ability to plan business processes effectively. These skills and knowledge can be imparted as part of the overall tailor-made curriculum development in strategic management in logistics and supply chain, which also includes topical aspects such as risk management and environmental management. Some necessary teaching tools can be developed accordingly such as business strategy games in which learners need to employ their knowledge on various aspects of planning, cost management, customer service management, etc. to achieve business performance objectives within the given constraints. On the other hand, the finding that nearly half of the current logistics workforce has not possessed necessary logistics-related skills and knowledge requires further attention of educators and trainers. While many logistics professionals have learnt their logistics skills and knowledge on the job, these might be too constrained within their daily job scope and thus logistics and supply chain management education programs to provide holistic logistics knowledge are

desired to fill up this knowledge gap. This should not be the job of only training institutions but collaboration with professionals in the logistics and supply chain industry is also required.

## **6. Conclusion**

This research aims to build and empirically validate a model of skills and knowledge which are necessary for logistics professionals to perform their job successfully based on the existing BLM framework with substantial refinement based on critical screening and analysis of changes that may impact logistics business environment. It has been found from this study that all proposed skills and knowledge in the model are empirically validated, while findings on the relative importance of business, logistics and management skill and knowledge sets are consistent with earlier research. In addition, logistics-related skill and knowledge set was found to be the area that educational and training institution should particularly aim at to further equip logistics workforce with substantial skills and knowledge to perform their job successfully in the future.

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<b>Skill/knowledge</b>	<b>Code</b>
Business regulations	Skill 1
Modelling of operations systems	Skill 2
Knowledge of client's systems	Skill 3
Financial management	Skill 4
Public relations	Skill 5
Analysing statistical data	Skill 6
The impact of globalisation	Skill 7
International business regulations	Skill 8
Cost control	Skill 9
Marketing	Skill 10
Managing client relationships	Skill 11
General business administration	Skill 12
Managing corporate knowledge	Skill 13
Human resource management	Skill 14
Managing organisational culture	Skill 15
Risk management	Skill 16
Ethical behaviour	Skill 17
Being a good corporate citizen	Skill 18
Impact of climate change	Skill 19
Strategic management	Skill 20
Understanding economic principles	Skill 21
Information system management	Skill 22
Industrial relations	Skill 23
Occupational health and safety	Skill 24
Infrastructure planning and management	Skill 25
Planning the location of facilities	Skill 26
Contract management	Skill 27
Use of logistics specialised softwares	Skill 28
Product demand forecasting	Skill 29
Spare parts support	Skill 30
Understanding transport regulation	Skill 31
Order processing	Skill 32
Traffic/transport management	Skill 33
Distribution communications	Skill 34
Purchasing	Skill 35
Materials handling	Skill 36
Recruiting logistics personnel	Skill 37
Packaging	Skill 38
International logistics	Skill 39
Inventory control	Skill 40
Managing returned products	Skill 41
Salvage and scrap disposal	Skill 42
Production planning	Skill 43
Understanding logistics terminology	Skill 44
Customer service	Skill 45
Engineering logistics	Skill 46
Warehousing	Skill 47

Developing environmentally sustainable logistics systems	Skill 48
Ability to plan	Skill 49
Effective written communication	Skill 50
Self-confidence	Skill 51
Effective supervision of staff	Skill 52
Negotiation skills	Skill 53
Ability to delegate	Skill 54
Problem-solving ability	Skill 55
Self-motivation	Skill 56
Individual time management	Skill 57
Ability to motivate staff	Skill 58
Enthusiasm	Skill 59
Personal integrity	Skill 60
Adapting to organisational change	Skill 61
Effective verbal communication	Skill 62
Ability to organise	Skill 63
Expertise in interpersonal relations	Skill 64
Knowledge of operations	Skill 65
Ability to train subordinates	Skill 66
Identifying opportunities and threats	Skill 67
Knowing two or more languages	Skill 68

Table 1: List of skills & knowledge and associated codes

Original BLM framework	Framework in this study
<b>BUSINESS (33 SKILLS)</b>	<b>BUSINESS (33 – 13 deletions – 2 combinations + 7 additions = 25 SKILLS)</b>
General business administration	General business administration
Marketing management	Marketing
Human resource management	Human resource management
Public relations	Public relations
Business strategy	Strategic management
Transport & logistics	Deleted, to be in traffic/transport management in Logistics-related group
Business ethics	Ethical behavior
Accounting	Cost control
Business writing	Deleted, to be part of effective written communication in Management-related group
Financial management	Financial management
Labor relations	Industrial relations
Microeconomics	Understanding economic principles
Macroeconomics	Understanding economic principles
Quantitative methods	Modeling of operations systems
Procurement	Deleted, to be in Purchasing in Logistics-related group
Organizational psychology	Managing corporate knowledge
Production management	Deleted, to be included in Strategic management
Computer science	Information system management
Information system	Information system management

management	
Statistics	Analysis statistical data
Industrial engineer	Deleted, combined with civil engineering to become engineering logistics in Logistics-related group
Business & government	Australian business regulations
Business law	International business regulations
Business & society	Being a good corporate citizen
Transport engineer	Deleted, combined with industrial engineering to become engineering logistics in Logistics-related group
Industrial sociology	Deleted
International business	International business regulations
Business history	Deleted
Economic geography	Deleted
Insurance & real estates	Deleted
Speech communication	Deleted, to be part of effective verbal communication in Management-related group
Regional planning	Infrastructure planning & management
Foreign languages	Deleted, to be covered in Knowing two or more languages in Management-related group  NEW: knowledge of client's systems <b>NEW: the impact of globalization</b> <b>NEW: managing client relationships</b> <b>NEW: managing organizational culture</b> <b>NEW: risk management</b> <b>NEW: impact of climate change</b> <b>NEW: occupational health &amp; safety</b>
<b>LOGISTICS (18 SKILLS)</b>	<b>LOGISTICS (20 SKILLS WITH MODIFICATION + 3 additions = 23 SKILLS)</b>
Customer service	Customer service
International logistics	International logistics
Inventory management	Inventory control
Materials handling	Materials handling
Order management	Order processing
Production scheduling	Production planning
Packaging	Packaging
Purchasing	Purchasing
Salvage & scrap disposal	Salvage & scrap disposal
Transport and traffic management	Transport/traffic management
Warehousing management	Warehousing
Logistics-related regulations	Understanding transport regulations
Facilities location	Planning the location of facilities
Forecasting	Product demand forecasting
Parts & service support	Spare parts support
Personnel movement	Recruiting logistics personnel
Return goods handling	Managing returned products
Logistics information management	Use of logistics specialized softwares
	<b>NEW: understanding logistics terminology</b>

	<b>NEW: engineering logistics (combined industrial engineering &amp; civil engineering)</b>
	<b>NEW: developing an environmentally sustainable logistics systems</b>
<b>MANAGEMENT (32 SKILLS)</b>	<b>MANAGEMENT (32 – 12 deletions = 20 SKILLS)</b>
Written communication	Effective written communication
Interpersonal relations	Expertise in interpersonal relations
Plan	Ability to plan
Organize	Ability to organize
Decision making ability	Problem-solving ability
Train/mentor	Ability to train subordinates
Personal integrity	Personal integrity
Self-motivation	Self-motivation
Self-confidence	Self-confidence
Enthusiasm	Enthusiasm
Motivate others	Ability to motivate staff
Managerial control	Deleted, to be part of effective supervision of staff
Oral communication	Effective verbal communication
Supervise others	Effective supervision of staff
Delegate	Ability to delegate
Time management	Individual time management
Negotiate	Negotiation skills
Adapt to change	Adapting to organizational change
Persuasion	Deleted, to be part of negotiation skills
System concept	Deleted, to be part of managing corporate knowledge in Business-related group
Listen and empathize	Deleted, to be part of expertise in interpersonal relations
Analytic reasoning	Deleted, to be part of problem-solving ability
Operational logistics tasks	Knowledge of operations
Assertiveness	Deleted, to be part of expertise in interpersonal relations
Personal grooming	Deleted, to be part of personal integrity
Personal dress	Deleted, to be part of personal integrity
Statesmanship	Deleted, to be part of expertise in interpersonal relations
Visualize future threats/opportunities	Identifying opportunities and threats
Quantitative expertise	Deleted, to be part of modeling operations systems in Business-related
Outgoing personality	Deleted, not considered as part of management skills
Computer expertise	Deleted, to be part of information system management in Business-related group
Foreign languages	Knowing two or more languages

Table 2: Changes from the BLM framework to this study

<b>Alpha = 0.972</b>				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted

skill1	248.82	1758.48	0.39	0.972
skill2	248.71	1739.51	0.51	0.972
skill3	248.73	1744.09	0.46	0.972
skill4	248.14	1756.99	0.42	0.972
skill5	248.97	1746.11	0.40	0.972
skill6	248.56	1745.48	0.55	0.972
skill7	248.98	1741.86	0.45	0.972
skill8	249.37	1726.24	0.61	0.972
skill9	248.08	1749.50	0.57	0.972
skill10	248.91	1736.79	0.56	0.972
skill11	248.05	1749.67	0.54	0.972
skill12	248.50	1753.10	0.45	0.972
skill13	248.57	1746.25	0.56	0.972
skill14	248.44	1736.73	0.59	0.972
skill15	248.46	1741.73	0.58	0.972
skill16	248.36	1748.83	0.54	0.972
skill17	248.15	1757.36	0.43	0.972
skill18	248.54	1736.83	0.61	0.972
skill19	249.30	1744.44	0.48	0.972
skill20	248.35	1743.46	0.60	0.972
skill21	248.79	1740.52	0.56	0.972
skill22	248.57	1746.58	0.53	0.972
skill23	248.70	1731.53	0.65	0.971
skill24	248.27	1741.77	0.57	0.972
skill25	248.67	1733.65	0.64	0.971
skill26	248.89	1721.10	0.72	0.971
skill27	248.58	1736.14	0.58	0.972
skill28	249.09	1729.00	0.59	0.972
skill29	248.97	1724.02	0.67	0.971
skill30	249.24	1722.84	0.56	0.972
skill31	248.65	1729.53	0.64	0.971
skill32	249.25	1725.82	0.65	0.971
skill33	248.85	1723.68	0.68	0.971
skill34	249.08	1715.17	0.75	0.971
skill35	248.99	1732.37	0.63	0.972
skill36	249.04	1713.07	0.78	0.971
skill37	248.93	1721.64	0.68	0.971
skill38	249.50	1719.09	0.64	0.971
skill39	249.18	1718.43	0.66	0.971
skill40	248.86	1717.24	0.71	0.971
skill41	249.41	1716.53	0.66	0.971
skill42	249.63	1719.77	0.62	0.972
skill43	249.20	1715.19	0.66	0.971
skill44	248.85	1738.83	0.53	0.972
skill45	248.22	1731.02	0.60	0.972

skill46	249.35	1730.02	0.55	0.972
skill47	249.03	1720.99	0.67	0.971
skill48	249.19	1719.39	0.70	0.971
skill49	248.08	1752.06	0.51	0.972
skill50	248.13	1762.32	0.38	0.972
skill51	248.26	1761.59	0.35	0.972
skill52	248.22	1745.79	0.52	0.972
skill53	248.24	1738.95	0.67	0.971
skill54	248.33	1749.22	0.51	0.972
skill55	248.07	1760.02	0.43	0.972
skill56	248.14	1742.36	0.56	0.972
skill57	248.28	1743.74	0.61	0.972
skill58	248.38	1733.74	0.60	0.972
skill59	248.29	1752.41	0.44	0.972
skill60	247.88	1751.71	0.47	0.972
skill61	248.41	1744.83	0.54	0.972
skill62	248.16	1743.53	0.60	0.972
skill63	248.34	1739.18	0.66	0.971
skill64	248.47	1743.89	0.59	0.972
skill65	248.33	1735.07	0.67	0.971
skill66	248.68	1727.75	0.73	0.971
skill67	248.35	1738.60	0.63	0.972
skill68	249.93	1738.55	0.50	0.972

Table 3: Reliability analysis of scale measuring necessary skill/knowledge of logistics professionals

Skills	Current importance					Future importance					Gap
	M	STD	Rank	z stat	zobs	M	STD	Rank	z stat	z obs	
skill60	4.51	0.93	1	1.96	19.65	4.44	1.18	1	1.96	14.72	0
skill11	4.33	0.85	2	1.96	18.91	4.28	1.16	4	1.96	13.33	2
skill55	4.32	0.78	3	1.96	20.61	4.29	1.05	3	1.96	14.86	0
skill9	4.31	0.81	4	1.96	19.61	4.27	1.09	5	1.96	14.11	1
skill49	4.31	0.85	5	1.96	18.65	4.33	1.12	2	1.96	14.37	-3
skill50	4.26	0.82	6	1.96	18.61	4.22	1.07	7	1.96	13.86	1
skill56	4.24	0.98	7	1.96	15.46	4.19	1.21	11	1.96	11.90	4
skill4	4.24	0.89	8	1.96	16.99	4.18	1.14	12	1.96	12.46	4
skill17	4.24	0.85	9	1.96	17.56	4.26	1.06	6	1.96	14.39	-3
skill62	4.23	0.89	10	1.96	16.74	4.20	1.11	9	1.96	13.03	-1
skill52	4.16	0.97	11	1.96	14.61	4.16	1.14	16	1.96	12.25	5
skill45	4.16	1.14	12	1.96	12.36	4.16	1.32	13	1.96	10.69	1
skill53	4.14	0.88	13	1.96	15.68	4.20	1.11	8	1.96	13.10	-5
skill51	4.13	0.89	14	1.96	15.32	4.10	1.14	18	1.96	11.73	4
skill24	4.12	0.96	15	1.96	14.11	4.07	1.15	20	1.96	11.30	5
skill57	4.11	0.87	16	1.96	15.47	4.15	1.12	17	1.96	12.39	1

skill59	4.10	0.96	17	1.96	13.83	4.08	1.18	19	1.96	11.14	2
skill54	4.06	0.92	18	1.96	14.05	4.01	1.11	26	1.96	11.07	8
skill65	4.05	0.95	19	1.96	13.47	4.04	1.15	23	1.96	11.01	4
skill63	4.05	0.89	20	1.96	14.21	4.05	1.13	22	1.96	11.34	2
skill20	4.04	0.90	21	1.96	14.05	4.19	1.13	10	1.96	12.77	-11
skill67	4.03	0.94	22	1.96	13.35	4.16	1.14	14	1.96	12.43	-8
skill16	4.03	0.88	23	1.96	14.23	4.16	1.08	15	1.96	12.94	-8
skill58	4.01	1.08	24	1.96	11.28	4.03	1.29	25	1.96	9.72	1
skill61	3.98	0.96	25	1.96	12.35	4.05	1.18	21	1.96	10.83	-4
skill14	3.95	1.04	26	1.96	11.15	4.03	1.16	24	1.96	10.80	-2
skill15	3.93	0.95	27	1.96	11.91	4.01	1.14	27	1.96	10.73	0
skill64	3.92	0.90	28	1.96	12.44	3.94	1.10	29	1.96	10.35	1
skill12	3.89	0.93	29	1.96	11.62	3.85	1.11	34	1.96	9.27	5
skill18	3.84	1.00	30	1.96	10.18	3.90	1.18	32	1.96	9.22	2
skill6	3.82	0.93	31	1.96	10.68	3.82	1.11	35	1.96	8.91	4
skill13	3.82	0.89	32	1.96	11.10	3.92	1.13	30	1.96	9.89	-2
skill22	3.82	0.93	33	1.96	10.65	4.00	1.14	28	1.96	10.63	-5
skill27	3.81	1.07	34	1.96	9.13	3.90	1.22	31	1.96	8.96	-3
skill31	3.73	1.10	35	1.96	8.10	3.77	1.23	37	1.96	7.56	2
skill25	3.71	1.02	36	1.96	8.49	3.86	1.19	33	1.96	8.75	-3
skill66	3.71	0.99	37	1.96	8.62	3.78	1.18	36	1.96	8.00	-1
skill23	3.69	1.05	38	1.96	7.97	3.72	1.22	41	1.96	7.16	3
skill2	3.68	1.14	39	1.96	7.23	3.75	1.30	39	1.96	6.99	0
skill3	3.65	1.14	40	1.96	6.92	3.75	1.37	38	1.96	6.63	-2
skill21	3.60	1.02	41	1.96	7.13	3.67	1.16	42	1.96	7.04	1
skill1	3.57	0.91	42	1.96	7.58	3.73	1.11	40	1.96	8.05	-2
skill33	3.54	1.14	43	1.96	5.73	3.59	1.29	50	1.96	5.56	7
skill44	3.54	1.11	44	1.96	5.86	3.55	1.26	52	1.96	5.32	8
skill40	3.52	1.20	45	1.96	5.29	3.60	1.37	49	1.96	5.30	4
skill26	3.50	1.12	46	1.96	5.38	3.61	1.34	47	1.96	5.53	1
skill10	3.48	1.09	47	1.96	5.31	3.62	1.29	45	1.96	5.80	-2
skill37	3.46	1.17	48	1.96	4.72	3.63	1.29	44	1.96	5.86	-4
skill29	3.42	1.15	49	1.96	4.46	3.61	1.31	48	1.96	5.60	-1
skill5	3.41	1.25	50	1.96	4.03	3.52	1.30	53	1.96	4.89	3
skill7	3.41	1.23	51	1.96	4.04	3.61	1.44	46	1.96	5.17	-5
skill35	3.40	1.06	52	1.96	4.57	3.48	1.26	54	1.96	4.59	2
skill47	3.35	1.20	53	1.96	3.58	3.42	1.39	58	1.96	3.68	5
skill36	3.35	1.16	54	1.96	3.64	3.43	1.30	56	1.96	4.00	2
skill34	3.31	1.17	55	1.96	3.18	3.40	1.34	59	1.96	3.62	4
skill28	3.30	1.20	56	1.96	3.03	3.63	1.40	43	1.96	5.46	-13
skill39	3.21	1.27	57	1.96	2.02	3.42	1.49	57	1.96	3.42	0
skill48	3.20	1.18	58	1.96	2.03	3.57	1.43	51	1.96	4.83	-7
skill43	3.18	1.31	59	1.96	1.69	3.29	1.48	60	1.96	2.39	1
skill30	3.14	1.38	60	1.96	1.26	3.22	1.51	62	1.96	1.80	2
skill32	3.14	1.15	61	1.96	1.43	3.12	1.32	64	1.96	1.13	3

skill19	3.09	1.08	62	1.96	0.99	3.46	1.37	55	1.96	4.09	-7
skill46	3.03	1.25	63	1.96	0.33	3.15	1.40	63	1.96	1.29	0
skill8	3.01	1.21	64	1.96	0.14	3.27	1.38	61	1.96	2.39	-3
skill41	2.97	1.29	65	1.96	-0.26	3.03	1.41	65	1.96	0.29	0
skill38	2.89	1.28	66	1.96	-1.03	2.95	1.47	66	1.96	-0.45	0
skill42	2.76	1.31	67	1.96	-2.26	2.88	1.45	68	1.96	-1.03	1
skill68	2.46	1.18	68	1.96	-5.50	2.90	1.47	67	1.96	-0.78	-1

Table 4: Descriptive statistics of proposed skills/knowledge of logistics professionals

SKILL GROUPS	Current importance		Future importance	
	M	STD	M	STD
BUSINESS GROUP	3.79	0.60	3.88	0.90
LOGISTICS GROUP	3.34	0.87	3.45	1.07
MANAGEMENT GROUP	4.04	0.67	4.07	0.97

Table 5: Descriptive statistics of proposed skills/knowledge of logistics professionals by groups

SKILL GROUPS	Possession of this skill		Absence of this skill	
BUSINESS GROUP			71%	
LOGISTICS GROUP			52%	
MANAGEMENT GROUP			86%	
			29%	
			48%	
			14%	

Table 6: Descriptive statistics of skill possession

Skills	Current importance		Future importance		p value	Skills	Current importance		Future importance		p value
	M	STD	M	STD			M	STD	M	STD	
skill1	3.57	0.91	3.73	1.11	<b>0.023</b>	skill35	3.40	1.06	3.48	1.26	0.356
skill2	3.68	1.14	3.75	1.30	0.346	skill36	3.35	1.16	3.43	1.30	0.250
skill3	3.65	1.14	3.75	1.37	0.228	skill37	3.46	1.17	3.63	1.29	<b>0.027</b>
skill4	4.24	0.89	4.18	1.14	0.371	skill38	2.89	1.28	2.95	1.47	0.396
skill5	3.41	1.25	3.52	1.30	0.095	skill39	3.21	1.27	3.42	1.49	<b>0.007</b>
skill6	3.82	0.93	3.82	1.11	0.929	skill40	3.52	1.20	3.60	1.37	0.369
skill7	3.41	1.23	3.61	1.44	<b>0.008</b>	skill41	2.97	1.29	3.03	1.41	0.319
skill8	3.01	1.21	3.27	1.38	<b>0.000</b>	skill42	2.76	1.31	2.88	1.45	0.095
skill9	4.31	0.81	4.27	1.09	0.606	skill43	3.18	1.31	3.29	1.48	0.117
skill10	3.48	1.09	3.62	1.29	0.115	skill44	3.54	1.11	3.55	1.26	0.848
skill11	4.33	0.85	4.28	1.16	0.467	skill45	4.16	1.14	4.16	1.32	1.000
skill12	3.89	0.93	3.85	1.11	0.542	skill46	3.03	1.25	3.15	1.40	0.119
skill13	3.82	0.89	3.92	1.13	0.151	skill47	3.35	1.20	3.42	1.39	0.346
skill14	3.95	1.04	4.03	1.16	0.319	skill48	3.20	1.18	3.57	1.43	<b>0.000</b>
skill15	3.93	0.95	4.01	1.14	0.285	skill49	4.31	0.85	4.33	1.12	0.756
skill16	4.03	0.88	4.16	1.08	0.097	skill50	4.26	0.82	4.22	1.07	0.645
skill17	4.24	0.85	4.26	1.06	0.799	skill51	4.13	0.89	4.10	1.14	0.699

skill18	3.84	1.00	3.90	1.18	0.478	skill52	4.16	0.97	4.16	1.14	0.928
skill19	3.09	1.08	3.46	1.37	<b>0.000</b>	skill53	4.14	0.88	4.20	1.11	0.459
skill20	4.04	0.90	4.19	1.13	0.052	skill54	4.06	0.92	4.01	1.11	0.508
skill21	3.60	1.02	3.67	1.16	0.311	skill55	4.32	0.78	4.29	1.05	0.733
skill22	3.82	0.93	4.00	1.14	<b>0.025</b>	skill56	4.24	0.98	4.19	1.21	0.439
skill23	3.69	1.05	3.72	1.22	0.664	skill57	4.11	0.87	4.15	1.12	0.595
skill24	4.12	0.96	4.07	1.15	0.563	skill58	4.01	1.08	4.03	1.29	0.723
skill25	3.71	1.02	3.86	1.19	0.073	skill59	4.10	0.96	4.08	1.18	0.858
skill26	3.50	1.12	3.61	1.34	0.116	skill60	4.51	0.93	4.44	1.18	0.319
skill27	3.81	1.07	3.90	1.22	0.202	skill61	3.98	0.96	4.05	1.18	0.327
skill28	3.30	1.20	3.63	1.40	<b>0.000</b>	skill62	4.23	0.89	4.20	1.11	0.637
skill29	3.42	1.15	3.61	1.31	<b>0.024</b>	skill63	4.05	0.89	4.05	1.13	0.922
skill30	3.14	1.38	3.22	1.51	0.283	skill64	3.92	0.90	3.94	1.10	0.781
skill31	3.73	1.10	3.77	1.23	0.651	skill65	4.05	0.95	4.04	1.15	0.856
skill32	3.14	1.15	3.12	1.32	0.851	skill66	3.71	0.99	3.78	1.18	0.403
skill33	3.54	1.14	3.59	1.29	0.485	skill67	4.03	0.94	4.16	1.14	0.089
skill34	3.31	1.17	3.40	1.34	0.187	skill68	2.46	1.18	2.90	1.47	<b>0.000</b>

Table 7: Respondents' perception of current and future skills and knowledge

Skills	Current importance				p value	Future importance						
	Entry level		Senior level			M	STD	M	STD			
	M	STD	M	STD								
skill1	3.67	0.91	3.53	0.92	0.789	3.98	0.89	3.62	1.18	<b>0.013</b>		
skill2	3.77	1.21	3.64	1.11	0.856	3.98	1.14	3.64	1.36	<b>0.029</b>		
skill3	3.50	1.30	3.73	1.06	0.095	3.85	1.41	3.70	1.35	0.732		
skill4	4.29	0.94	4.22	0.86	0.975	4.40	0.94	4.07	1.22	0.387		
skill5	3.33	1.45	3.45	1.15	0.133	3.56	1.35	3.51	1.28	0.761		
skill6	3.71	1.09	3.88	0.85	<b>0.028</b>	3.90	1.10	3.78	1.12	0.702		
skill7	3.19	1.50	3.52	1.06	<b>0.013</b>	3.56	1.60	3.64	1.36	0.110		
skill8	3.08	1.25	2.98	1.20	0.559	3.50	1.27	3.16	1.42	0.472		
skill9	4.27	0.94	4.32	0.74	0.330	4.33	0.97	4.23	1.14	0.786		
skill10	3.21	1.32	3.61	0.93	<b>0.023</b>	3.58	1.46	3.64	1.22	0.093		
skill11	4.10	1.04	4.44	0.73	0.156	4.15	1.15	4.34	1.17	0.877		
skill12	3.79	1.11	3.94	0.83	0.088	3.96	0.99	3.80	1.17	0.228		
skill13	3.85	1.01	3.80	0.83	0.940	4.13	0.94	3.82	1.20	0.075		
skill14	3.67	1.26	4.09	0.88	<b>0.003</b>	4.10	1.10	4.00	1.20	0.916		
skill15	3.85	1.07	3.97	0.89	0.365	4.00	1.05	4.01	1.18	0.545		
skill16	3.98	0.98	4.05	0.83	0.692	4.31	0.90	4.08	1.16	0.464		
skill17	4.08	1.01	4.31	0.76	0.413	4.29	0.87	4.24	1.14	0.236		
skill18	3.81	1.07	3.86	0.98	0.570	4.02	1.02	3.84	1.25	0.146		
skill19	3.02	1.28	3.12	0.98	0.136	3.56	1.40	3.41	1.36	0.788		
skill20	4.02	1.16	4.05	0.75	<b>0.027</b>	4.25	1.10	4.16	1.15	0.645		
skill21	3.56	1.27	3.62	0.88	<b>0.024</b>	3.75	1.18	3.64	1.16	0.708		
skill22	3.83	1.08	3.81	0.85	0.604	4.10	1.08	3.95	1.17	0.542		

skill23	3.63	1.20	3.72	0.97	0.097	3.90	1.08	3.64	1.28	0.234
skill24	4.02	1.10	4.17	0.89	0.937	4.17	1.00	4.03	1.22	0.246
skill25	3.81	1.10	3.67	0.98	0.900	4.13	0.98	3.73	1.26	<b>0.029</b>
skill26	3.46	1.13	3.52	1.12	0.594	3.79	1.22	3.53	1.39	0.121
skill27	3.98	1.08	3.73	1.07	0.753	4.21	1.03	3.76	1.29	0.262
skill28	3.42	1.38	3.24	1.10	0.284	3.85	1.53	3.52	1.33	0.869
skill29	3.48	1.34	3.39	1.05	0.119	3.77	1.28	3.53	1.33	0.418
skill30	3.02	1.49	3.20	1.32	0.452	3.27	1.50	3.20	1.53	0.636
skill31	3.79	1.18	3.71	1.06	0.701	4.02	1.04	3.65	1.30	<b>0.019</b>
skill32	2.98	1.21	3.21	1.12	0.766	3.15	1.22	3.11	1.37	0.211
skill33	3.58	1.18	3.52	1.12	0.777	3.81	1.23	3.48	1.31	0.147
skill34	3.29	1.30	3.31	1.10	0.602	3.54	1.34	3.33	1.35	0.430
skill35	3.50	1.11	3.35	1.04	0.865	3.73	1.12	3.35	1.30	0.119
skill36	3.35	1.23	3.34	1.13	0.978	3.60	1.18	3.34	1.35	0.086
skill37	3.38	1.35	3.49	1.08	0.215	3.69	1.19	3.60	1.35	0.192
skill38	2.88	1.41	2.90	1.22	0.249	3.08	1.53	2.88	1.44	0.513
skill39	3.33	1.43	3.15	1.18	0.166	3.69	1.53	3.29	1.47	0.883
skill40	3.63	1.21	3.47	1.20	0.714	3.79	1.27	3.51	1.41	0.156
skill41	3.02	1.38	2.95	1.25	0.534	3.21	1.35	2.95	1.43	0.664
skill42	2.71	1.27	2.78	1.34	0.557	2.98	1.26	2.83	1.53	<b>0.013</b>
skill43	3.27	1.25	3.14	1.35	0.356	3.52	1.30	3.18	1.55	0.052
skill44	3.56	1.18	3.53	1.08	0.947	3.75	1.19	3.45	1.28	0.301
skill45	4.10	1.34	4.19	1.04	0.485	4.23	1.26	4.13	1.35	0.432
skill46	2.83	1.55	3.13	1.08	<b>0.001</b>	3.17	1.60	3.14	1.30	0.050
skill47	3.35	1.26	3.35	1.17	0.919	3.46	1.35	3.40	1.41	0.534
skill48	3.21	1.34	3.19	1.10	0.256	3.69	1.45	3.52	1.43	0.952
skill49	4.21	1.03	4.35	0.75	0.075	4.52	0.90	4.24	1.21	0.339
skill50	4.15	0.99	4.31	0.72	0.266	4.29	0.90	4.19	1.15	0.467
skill51	4.08	1.11	4.15	0.77	0.250	4.19	1.12	4.06	1.15	0.798
skill52	4.04	1.20	4.22	0.83	0.123	4.31	0.97	4.08	1.22	0.428
skill53	4.06	1.08	4.18	0.77	0.791	4.27	1.05	4.16	1.14	0.690
skill54	3.83	1.10	4.17	0.80	0.141	3.98	0.96	4.03	1.18	0.225
skill55	4.25	0.93	4.35	0.69	0.341	4.33	0.86	4.27	1.14	0.317
skill56	4.15	1.13	4.29	0.90	0.401	4.23	1.13	4.17	1.25	0.597
skill57	4.04	1.09	4.14	0.74	0.265	4.29	1.07	4.08	1.15	0.917
skill58	3.83	1.23	4.09	1.00	0.182	4.15	1.18	3.98	1.34	0.650
skill59	3.96	1.09	4.16	0.89	0.338	4.11	1.13	4.07	1.21	0.861
skill60	4.46	1.11	4.54	0.84	0.248	4.52	1.07	4.39	1.24	0.414
skill61	3.92	1.05	4.01	0.92	0.695	4.06	1.02	4.05	1.26	0.149
skill62	4.08	1.15	4.30	0.73	0.128	4.23	1.06	4.18	1.15	0.643
skill63	3.88	1.21	4.13	0.68	<b>0.024</b>	4.02	1.19	4.07	1.10	0.840
skill64	3.73	1.12	4.01	0.75	<b>0.017</b>	3.92	1.05	3.95	1.13	0.622
skill65	3.98	1.19	4.09	0.81	0.262	4.08	1.13	4.02	1.16	0.966
skill66	3.54	1.18	3.79	0.88	<b>0.037</b>	3.83	1.15	3.75	1.19	0.877
skill67	3.88	1.10	4.11	0.84	0.466	4.10	1.08	4.19	1.17	0.457

skill68	2.58	1.38	2.40	1.08	<b>0.022</b>	3.08	1.51	2.82	1.45	0.741
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Table 8: Respondents' perception of current and future skills and knowledge by designation

Entry level						
Skill group	current importance		future importance		p value	
	M	STD	M	STD		
BUS	3.72	0.76	3.98	0.72	<b>0.000</b>	
LOG	3.35	0.96	3.61	0.93	<b>0.000</b>	
MAN	3.93	0.85	4.13	0.82	<b>0.001</b>	

Table 9: Entry-level respondents' perception of current and future skills and knowledge

Skills	$\leq 15$		$> 15 \text{ & } < 25$		$\geq 25$		F	Sig.
	M	STD	M	STD	M	STD		
skill1	3.57	0.74	3.26	1.05	3.65	0.93	1.686	0.189
skill2	3.77	1.06	3.43	1.08	3.71	1.19	0.667	0.515
skill3	3.57	1.09	3.30	1.11	3.78	1.17	1.679	0.190
skill4	4.14	0.94	4.22	0.95	4.29	0.86	0.365	0.695
skill5	3.23	1.21	3.43	1.31	3.48	1.25	0.522	0.594
skill6	3.69	0.96	3.74	0.96	3.90	0.92	0.762	0.469
skill7	3.49	1.27	3.26	1.01	3.42	1.27	0.235	0.791
skill8	2.89	1.05	2.87	1.32	3.10	1.24	0.587	0.557
skill9	4.23	0.65	4.17	0.94	4.37	0.83	0.752	0.473
skill10	3.20	1.02	3.43	0.84	3.60	1.16	1.697	0.187
skill11	4.14	0.88	4.13	1.06	4.46	0.77	2.558	0.081
skill12	3.66	0.97	3.52	1.12	4.08	0.81	4.991	<b>0.008</b>
skill13	3.63	0.88	3.78	0.90	3.90	0.89	1.177	0.311
skill14	3.60	1.01	3.91	1.16	4.10	0.99	3.042	<b>0.051</b>
skill15	3.94	0.87	3.87	1.10	3.94	0.95	0.058	0.943
skill16	3.91	0.74	4.04	1.02	4.07	0.89	0.386	0.681
skill17	4.06	0.76	4.35	0.88	4.28	0.88	1.087	0.340
skill18	3.71	0.79	3.65	1.19	3.94	1.03	1.152	0.319
skill19	3.26	1.04	2.91	1.00	3.07	1.13	0.738	0.480
skill20	4.00	0.91	3.96	0.98	4.08	0.88	0.214	0.808
skill21	3.57	0.88	3.61	1.12	3.61	1.05	0.016	0.984
skill22	3.86	0.69	3.65	0.93	3.84	1.01	0.425	0.654
skill23	3.66	0.87	3.52	1.16	3.74	1.08	0.419	0.658
skill24	4.00	0.87	4.04	1.02	4.19	0.99	0.581	0.561
skill25	3.74	0.85	3.70	1.11	3.71	1.07	0.019	0.981
skill26	3.34	1.14	3.26	0.96	3.62	1.14	1.372	0.257
skill27	3.77	0.91	3.57	1.12	3.89	1.12	0.849	0.430
skill28	3.46	0.92	2.87	1.46	3.35	1.21	1.887	0.155
skill29	3.49	1.29	3.39	1.03	3.40	1.13	0.072	0.931
skill30	2.94	1.35	3.17	1.40	3.21	1.39	0.487	0.616

skill31	3.49	1.04	3.65	1.19	3.85	1.09	1.494	0.228
skill32	3.09	0.98	2.91	1.16	3.21	1.21	0.664	0.516
skill33	3.54	0.95	3.30	1.18	3.60	1.19	0.597	0.552
skill34	3.14	1.19	3.09	1.20	3.43	1.15	1.227	0.296
skill35	3.40	0.98	3.22	1.13	3.45	1.09	0.431	0.651
skill36	3.29	1.05	3.00	1.28	3.46	1.16	1.525	0.221
skill37	3.29	1.18	3.35	0.98	3.55	1.22	0.755	0.472
skill38	2.69	1.23	2.96	1.07	2.96	1.36	0.586	0.558
skill39	3.31	1.16	3.00	1.13	3.22	1.35	0.437	0.647
skill40	3.69	0.93	3.35	1.30	3.51	1.27	0.572	0.566
skill41	2.94	1.24	2.87	1.22	3.01	1.34	0.122	0.886
skill42	2.69	1.13	2.57	1.34	2.83	1.38	0.437	0.647
skill43	3.26	1.12	2.96	1.40	3.21	1.37	0.418	0.659
skill44	3.54	1.04	3.57	1.12	3.53	1.15	0.011	0.989
skill45	3.94	1.30	4.00	1.24	4.29	1.04	1.465	0.234
skill46	2.91	1.34	3.17	1.03	3.04	1.28	0.304	0.738
skill47	3.29	1.18	3.30	1.06	3.39	1.25	0.123	0.884
skill48	3.20	1.16	3.04	1.11	3.24	1.22	0.241	0.786
skill49	3.94	1.03	4.35	0.93	4.44	0.71	4.517	<b>0.013</b>
skill50	3.89	1.02	4.43	0.90	4.36	0.66	5.094	<b>0.007</b>
skill51	3.91	0.98	4.09	1.20	4.22	0.75	1.559	0.214
skill52	3.74	1.15	4.35	0.98	4.28	0.84	4.617	<b>0.011</b>
skill53	3.91	0.98	4.13	0.87	4.24	0.84	1.683	0.189
skill54	3.54	1.04	4.17	0.94	4.24	0.78	8.123	<b>0.000</b>
skill55	3.97	0.95	4.35	0.93	4.45	0.60	5.046	<b>0.008</b>
skill56	3.86	1.19	4.35	0.98	4.37	0.84	3.765	<b>0.025</b>
skill57	3.74	0.92	4.13	0.92	4.25	0.80	4.438	<b>0.013</b>
skill58	3.74	1.09	4.00	0.90	4.11	1.11	1.474	0.232
skill59	3.63	1.09	4.26	0.92	4.24	0.87	5.785	<b>0.004</b>
skill60	4.29	0.99	4.61	0.89	4.57	0.92	1.353	0.262
skill61	3.77	0.94	3.96	0.98	4.07	0.96	1.202	0.304
skill62	3.86	1.03	4.30	0.88	4.36	0.80	4.259	<b>0.016</b>
skill63	3.71	0.96	4.17	0.83	4.15	0.86	3.304	<b>0.040</b>
skill64	3.49	1.07	3.87	0.76	4.10	0.80	6.419	<b>0.002</b>
skill65	3.86	1.12	4.04	0.93	4.13	0.88	1.078	0.343
skill66	3.23	1.03	3.83	0.98	3.87	0.93	5.682	<b>0.004</b>
skill67	3.77	0.97	4.04	1.07	4.13	0.88	1.905	0.153
skill68	2.54	1.22	2.39	1.23	2.45	1.17	0.126	0.882

Table 10: ANOVA test – Current importance of skills/knowledge by work experience

Factor	Experience groups		Sig.	Factor	Experience groups		Sig.
skill12	≤ 15	> 15 & < 25	0.84	skill56	≤ 15	> 15 & < 25	0.14
		≥ 25	0.05			≥ 25	<b>0.02</b>
	> 15 & < 25	≤ 15	0.84		> 15 & < 25	≤ 15	0.14

	$\geq 25$	$\geq 25$	<b>0.03</b>		$\geq 25$	$\geq 25$	0.99
	$\geq 25$	$\leq 15$	0.05		$\geq 25$	$\leq 15$	<b>0.02</b>
		$> 15 \& < 25$	<b>0.03</b>			$> 15 \& < 25$	0.99
skill14	$\leq 15$	$> 15 \& < 25$	0.49	skill57	$\leq 15$	$> 15 \& < 25$	0.21
		$\geq 25$	<b>0.04</b>			$\geq 25$	<b>0.01</b>
	$> 15 \& < 25$	$\leq 15$	0.49		$> 15 \& < 25$	$\leq 15$	0.21
		$\geq 25$	0.71			$\geq 25$	0.83
	$\geq 25$	$\leq 15$	<b>0.04</b>		$\geq 25$	$\leq 15$	<b>0.01</b>
		$> 15 \& < 25$	0.71			$> 15 \& < 25$	0.83
skill49	$\leq 15$	$> 15 \& < 25$	0.17	skill59	$\leq 15$	$> 15 \& < 25$	<b>0.03</b>
		$\geq 25$	<b>0.01</b>			$\geq 25$	<b>0.00</b>
	$> 15 \& < 25$	$\leq 15$	0.17		$> 15 \& < 25$	$\leq 15$	<b>0.03</b>
		$\geq 25$	0.89			$\geq 25$	0.99
	$\geq 25$	$\leq 15$	<b>0.01</b>		$\geq 25$	$\leq 15$	<b>0.00</b>
		$> 15 \& < 25$	0.89			$> 15 \& < 25$	0.99
skill50	$\leq 15$	$> 15 \& < 25$	<b>0.03</b>	skill62	$\leq 15$	$> 15 \& < 25$	0.14
		$\geq 25$	<b>0.01</b>			$\geq 25$	<b>0.01</b>
	$> 15 \& < 25$	$\leq 15$	<b>0.03</b>		$> 15 \& < 25$	$\leq 15$	0.14
		$\geq 25$	0.91			$\geq 25$	0.96
	$\geq 25$	$\leq 15$	<b>0.01</b>		$\geq 25$	$\leq 15$	<b>0.01</b>
		$> 15 \& < 25$	0.91			$> 15 \& < 25$	0.96
skill52	$\leq 15$	$> 15 \& < 25$	<b>0.05</b>	skill63	$\leq 15$	$> 15 \& < 25$	0.13
		$\geq 25$	<b>0.01</b>			$\geq 25$	<b>0.04</b>
	$> 15 \& < 25$	$\leq 15$	<b>0.05</b>		$> 15 \& < 25$	$\leq 15$	0.13
		$\geq 25$	0.95			$\geq 25$	0.99
	$\geq 25$	$\leq 15$	<b>0.01</b>		$\geq 25$	$\leq 15$	<b>0.04</b>
		$> 15 \& < 25$	0.95			$> 15 \& < 25$	0.99
skill54	$\leq 15$	$> 15 \& < 25$	<b>0.02</b>	skill64	$\leq 15$	$> 15 \& < 25$	0.23
		$\geq 25$	<b>0.00</b>			$\geq 25$	<b>0.00</b>
	$> 15 \& < 25$	$\leq 15$	<b>0.02</b>		$> 15 \& < 25$	$\leq 15$	0.23
		$\geq 25$	0.95			$\geq 25$	0.49
	$\geq 25$	$\leq 15$	<b>0.00</b>		$\geq 25$	$\leq 15$	<b>0.00</b>
		$> 15 \& < 25$	0.95			$> 15 \& < 25$	0.49
skill55	$\leq 15$	$> 15 \& < 25$	0.16	skill66	$\leq 15$	$> 15 \& < 25$	0.06
		$\geq 25$	<b>0.01</b>			$\geq 25$	<b>0.00</b>
	$> 15 \& < 25$	$\leq 15$	0.16		$> 15 \& < 25$	$\leq 15$	0.06
		$\geq 25$	0.83			$\geq 25$	0.98
	$\geq 25$	$\leq 15$	<b>0.01</b>		$\geq 25$	$\leq 15$	<b>0.00</b>
		$> 15 \& < 25$	0.83			$> 15 \& < 25$	0.98

Table 11: Posthoc test – Current importance of skills/knowledge by work experience

ANOVA	$\leq 15$		$> 15 \& < 25$		$\geq 25$		F	Sig.
	M	STD	M	STD	M	STD		
BUSINESS	3.70	0.43	3.67	0.63	3.85	0.65	1.315	0.272

GROUP								
LOGISTICS GROUP	3.29	0.79	3.20	0.85	3.40	0.91	0.589	0.556
MANAGEMENT GROUP	3.72	0.82	4.09	0.77	4.15	0.54	5.541	<b>0.005</b>
<b>Multiple Comparisons (Tukey HSD)</b>								
Factor	<b>Experience groups</b>		<b>Mean Difference</b>	<b>Sig.</b>				
MANAGEMENT GROUP	≤ 15	> 15 & < 25	-0.37	0.09				
		≥ 25	-0.43	<b>0.00</b>				
	> 15 & < 25	≤ 15	0.37	0.09				
		≥ 25	-0.06	0.92				
	≥ 25	≤ 15	0.43	<b>0.00</b>				
		> 15 & < 25	0.06	0.92				

Table 12: Current importance of management-related skill group by work experience

Skills	≤ 15		> 15 & < 25		≥ 25		F	Sig.
	M	STD	M	STD	M	STD		
skil1	3.97	0.66	3.43	1.24	3.72	1.20	1.67	0.19
skil2	3.91	1.20	3.74	1.10	3.69	1.39	0.39	0.68
skil3	3.86	1.19	3.35	1.23	3.81	1.46	1.18	0.31
skil4	4.09	0.95	4.04	1.19	4.25	1.21	0.43	0.65
skil5	3.51	0.98	3.43	1.50	3.55	1.37	0.07	0.93
skil6	4.00	0.84	3.70	1.11	3.78	1.20	0.67	0.51
skil7	3.94	1.28	3.43	1.24	3.53	1.53	1.26	0.29
skil8	3.49	1.09	3.09	1.41	3.24	1.47	0.66	0.52
skil9	4.31	0.72	4.13	1.10	4.28	1.21	0.22	0.80
skil10	3.46	1.24	3.70	1.06	3.66	1.37	0.36	0.70
skil11	4.26	1.07	4.04	1.22	4.35	1.19	0.63	0.53
skil12	3.86	0.81	3.35	1.27	3.98	1.15	3.01	0.05
skil13	3.86	0.77	4.00	1.13	3.92	1.25	0.11	0.89
skil14	4.11	0.68	3.91	1.24	4.03	1.29	0.21	0.81
skil15	4.09	0.78	3.96	1.15	3.99	1.26	0.12	0.89
skil16	4.31	0.63	4.09	1.04	4.11	1.23	0.49	0.61
skil17	4.34	0.59	4.35	1.03	4.20	1.21	0.31	0.73
skil18	3.91	0.78	3.87	1.22	3.90	1.31	0.01	0.99
skil19	4.09	0.95	3.22	1.28	3.28	1.47	5.02	<b>0.01</b>
skil20	4.40	0.69	4.13	1.25	4.12	1.23	0.79	0.46
skil21	3.89	0.63	3.61	1.20	3.61	1.30	0.77	0.47
skil22	4.29	0.62	3.74	1.14	3.96	1.28	1.79	0.17
skil23	3.91	0.78	3.65	1.23	3.66	1.36	0.57	0.57
skil24	4.20	0.80	4.04	1.11	4.03	1.28	0.27	0.76

skil25	4.23	0.60	3.78	1.04	3.73	1.36	2.30	0.10
skil26	3.54	1.22	3.57	1.20	3.65	1.43	0.10	0.91
skil27	4.06	0.87	3.61	1.31	3.92	1.32	0.95	0.39
skil28	4.00	1.06	3.23	1.38	3.58	1.50	2.22	0.11
skil29	3.80	1.21	3.65	1.27	3.52	1.37	0.60	0.55
skil30	3.17	1.46	3.30	1.33	3.22	1.59	0.05	0.95
skil31	3.89	0.76	3.48	1.27	3.80	1.37	0.82	0.44
skil32	3.37	1.14	2.87	1.25	3.09	1.40	1.08	0.34
skil33	3.77	1.03	3.39	1.23	3.57	1.40	0.62	0.54
skil34	3.51	1.27	3.17	1.37	3.42	1.37	0.46	0.64
skil35	3.71	1.07	3.13	1.29	3.47	1.31	1.51	0.22
skil36	3.66	1.08	3.09	1.31	3.43	1.36	1.35	0.26
skil37	3.80	1.08	3.57	1.12	3.57	1.41	0.41	0.66
skil38	2.94	1.47	3.04	1.33	2.92	1.51	0.06	0.94
skil39	3.89	1.30	3.17	1.30	3.30	1.58	2.33	0.10
skil40	3.91	1.15	3.48	1.34	3.51	1.45	1.23	0.30
skil41	3.20	1.30	2.91	1.28	3.00	1.48	0.35	0.70
skil42	2.97	1.25	2.74	1.39	2.88	1.54	0.18	0.84
skil43	3.57	1.27	3.09	1.53	3.24	1.54	0.91	0.41
skil44	3.74	1.04	3.57	1.08	3.47	1.37	0.58	0.56
skil45	4.26	1.20	3.96	1.36	4.18	1.36	0.37	0.69
skil46	3.29	1.36	3.39	1.12	3.03	1.48	0.81	0.45
skil47	3.51	1.36	3.43	1.12	3.38	1.47	0.11	0.89
skil48	4.03	1.18	3.22	1.24	3.48	1.54	2.71	0.07
skil49	4.43	1.01	4.30	1.15	4.30	1.17	0.16	0.85
skil50	4.14	0.97	4.26	1.14	4.25	1.10	0.13	0.88
skil51	4.06	1.03	4.00	1.38	4.15	1.12	0.18	0.83
skil52	4.11	0.93	4.26	1.18	4.15	1.22	0.12	0.89
skil53	4.23	0.94	4.04	1.07	4.22	1.18	0.26	0.77
skil54	3.83	0.92	4.17	1.15	4.04	1.17	0.76	0.47
skil55	4.20	0.93	4.22	1.13	4.35	1.09	0.31	0.73
skil56	3.94	1.21	4.26	1.21	4.27	1.21	0.96	0.39
skil57	4.06	0.97	4.09	1.16	4.20	1.18	0.25	0.78
skil58	4.20	0.99	3.87	1.10	4.01	1.43	0.49	0.62
skil59	3.85	1.18	4.09	1.12	4.17	1.19	0.88	0.42
skil60	4.40	0.98	4.43	1.16	4.45	1.27	0.02	0.98
skil61	4.06	0.94	4.04	1.15	4.06	1.28	0.00	1.00
skil62	4.06	0.97	4.13	1.10	4.27	1.18	0.50	0.61
skil63	4.03	0.92	4.04	1.07	4.07	1.22	0.02	0.98
skil64	3.80	1.05	3.87	1.01	4.01	1.14	0.51	0.60
skil65	4.00	1.03	3.91	1.16	4.09	1.19	0.24	0.78
skil66	3.60	1.06	3.83	1.15	3.83	1.23	0.51	0.60
skil67	4.11	0.96	4.13	1.18	4.19	1.20	0.07	0.93
skil68	3.20	1.41	2.96	1.55	2.78	1.48	1.06	0.35

Table 13: ANOVA test – Future importance of skills/knowledge by work experience

<b>Factor</b>	<b>Experience groups</b>		<b>Mean Difference</b>	<b>Sig.</b>
skil19	≤ 15	> 15 & < 25	0.87	<b>0.04</b>
		≥ 25	0.80	<b>0.01</b>
	> 15 & < 25	≤ 15	-0.87	<b>0.04</b>
		≥ 25	-0.06	0.98
	≥ 25	≤ 15	-0.80	<b>0.01</b>
		> 15 & < 25	0.06	0.98

Table 14: Posthoc test – Future importance of skills/knowledge by work experience

<b>Educational programs</b>	<b>Number of responses</b>
Professional development courses	90
Postgraduate qualifications	38
Undergraduate courses	13
Diploma	4
Others	2

Table 15: Educational programs needed for next 10 years

<b>How should education programs be developed</b>	<b>Number of responses</b>
In consultation with logistics associations	121
In consultation with other business associations	98
In consultation with international universities	77
Design and conduct training programs on their own	21
Others	11

Table 16: How universities should design and develop educational programs