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Global logistics management: a methodology for curriculum design

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Abstract: This study attempts to list and rank the essential or necessary skills that are required of a global logistician based on objective evaluations from industry practitioners. Centrally, the disconnection between existing academic curriculum designs and industry requirements is explored. The results provide a reference for instructors in terms of course arrangement. At the same time, the results also serve as a self-assessment tool for students.

Keywords: Multi-Carrier Communication, Impulsive Noise, Weibull Distribution, Correlation Coefficient, Distribution Probability

1. Introduction

As logistics operations become increasingly complex, industry practitioners have grown doubtful as to whether business schools can actually deliver the necessary logistics skill-set to students. Moreover, school educators are unable to fully grasp what types of global logistics skills are required by industry. Mangan and Christopher 2005 argued that business school logistics courses need to be more practical with less emphasis on theoretical academic content. It is thus imperative for logistics educators to pay attention to this growing gap between the content of global logistics courses and the practical logistics skills demanded by industry (Dubey & Singh, 2009).

The traditional logistics relationship between firms and their suppliers is being scaled up towards total global logistics networks. Under such fierce competition, global logistics managers must be competent across a diverse set of skills as well as have a clear sense of their own strengths and weaknesses in order to stay competitive. The question remains however: exactly what set of

skills does a logistician need to stay competitive in this market? Further, is there any mismatch between the current logistics curriculum of business schools and industry requirements? Do educators have a clear sense of what is needed in a global logistics curriculum?

The purpose of this study is first to explore the level of disconnect between existing curriculum designs and industry requirements. This study attempts to list and rank the essential or necessary skills that are required of a global logistician based on objective evaluations from industry practitioners. In addition, based on the relative ranking of skills, this study will propose a training curriculum for global logisticians. Furthermore, the literature on the essential capabilities required for a global logistician is analyzed. Through conceptual mapping and repeated brainstorming with industry practitioners, this study attempts to summarize the basic skill requirements of an effective global logistician. Based on multidimensional scaling and cluster analysis, this study also divides and weighs these capabilities into nine areas. Finally, through link analysis, the significance of the results is evaluated in order to adjust the gap between industry and the educational community in global logistics curriculum design.

2. Literature Review

In light of fast changing industry competition and multi-dimensional customer demands, logistics operations have had to evolve from traditional storage and delivery functions to total points of global operations. Abrahamson and Aaronson1999 observed the tendency for firms to internationalize their supply chain. Multinational corporations leverage their regional and global systems to facilitate marketing, delivery, and product services. In addition to the development of information and financial systems, firms have to be able to execute logistics and delivery effectively in order to sustain their competitive advantage (Carneiro, 2007).

In addition to internal logistics, firms are also required to provide consolidated global logistics services including transportation, storage, stock management, and order processing to their partners based on long term contracts. The objective is to increase customer satisfaction through consolidated logistics services (Coyle, Bardi, & Langley, 1996; (Knemeyer & Murphy, 2004; Lieb, Millen, & van Wassenhove, 1993; Lieb & Randall, 1996). Wilson 2007 pointed out that logistics services in the United States have been transformed from a simple means to reduce the transportation costs of customers to one stop solution services which include transportation, storage, consultation, and

information management. In the age of globalization, the ability to respond to customer requirements on a timely basis is critical if firms wish to sustain their competitive advantage (Talluri& Yoon, 2000). Further, the consolidation of every department within a firm under a single framework is imperative to maximize the strategic potential of logistics services. Cost and service levels have become the main deciding factors in the United States and Europe when selecting logistics services (Lieb, 1992; Lieb et al., 1993; Lieb& Randall, 1996).

Christopher 2005 discussed how logistics management has evolved along with industry complexity. The industry has changed from “push” to “pull”, from supplier centric to customer driven, with increasing emphasis on market size. The era of globalization has propelled the role of logistics to a preeminent position, particularly in the Asian market. Although economic development in Asia has been growing with vigor, certain factors have affected the growth of the region’s logistics markets. Many Asian countries lack logistics professionals capable of providing efficient logistics services (Wu & Cheng, 2008).

Van Hoek, Chatham, and Wilding 2002 also suggested that this industry is lacking in sufficient human resources and that cultivating future supply chain managers has become a critical challenge. The authors also uncovered a set of emotional capabilities which might affect the performance of supply chain managers. Giunipero, Handfield, and Eltantawy (2006) suggested that the industry is demanding supply manager to assume more strategic role especially in the areas of building strategic relationships, focusing on costs, and collaborating with suppliers. Mangan and Christopher 2005revealed that from the educator perspective, the essential skills are finance, information technology, general management, and operational and supply chain management together with analytical, interpersonal, leadership and change management skills.

Grammelgaard and Larson 2001 discussed how the ability to communicate with others is of the utmost importance for practitioners which was supported by Myers et al. 2004 and Belmiro, Gardiner, Simmons, and Rentes2000. Logisticians must have the ability to communicate across departments to both promote and coordinate supply chain management. This focus on communications is in stark contrast to the logistics education perspective which focuses on enhancing the analytic and intuitive ability of students. Moreover, Mangan, Gregory, and Lalwani2001 established the educational and training needs of logistics managers working in manufacturing firms in Ireland from the practitioner perspective. From the industry practitioner’s perspective, practical relevancy in the academic training is a crucial part of skill development (Basnet, 2000).

In comparing careers in logistics management between Australia and Britain, Burcher, Lee, and Sohal2005 found that Australians were keen on computer studies, whereas the British managers felt the need for more language training going forward. Their findings suggested that logistics managers have to take a more strategic approach to their work, requiring an international and interdisciplinary background.

From the viewpoint of American and European logistics managers, the importance of being a manager first and a functional/technical specialist second has been stressed (Poist, Scheraga, &Semeijn, 2001) Such results again illustrate the importance placed by industry on acquiring general managerial skills (e.g. communication, leadership, interpersonal relations, planning and control), with functional skills such as logistics and marketing coming second. Moreover, competent skills in a relevant foreign language as well as international work or management exchange experience have also been described as highly desirable. Finally, corporate social responsibility has been considered as a growing asset. Harrison and van Hoek2008 considered corporate social responsibility in the supply chain as dealing with both the social and environmental consequences of supply chain operations.

3. Methodology

Insofar, most of the methodologies in studies related to logistics education skill requirements have been based on surveys, interviews, and case studies (Grammelgaard& Larson, 2001; Mangan& Christopher, 2005; Mangan, et al., 2001; Poist, et al., 2001; van Hoek, et al., 2002). These methodologies, while having provided qualitative and in-depth analyses are more likely to be affected by subjective individual perspectives, research budgets, and inappropriate expression. Hence, this study utilized concept mapping to alleviate the inherent bias with such methods.

Concept mapping, originally proposed by Trochim1989, can be combined with other qualitative and quantitative methods to reinforce analytical validity, and the tool has been applied to various fields. Bigne et al. 2002 concluded that concept mapping is an effective technique which generates the important dimensions of a construct. Nabitz2005 demonstrated how concept mapping is a suitable strategy for generating meaningful and internally valid indicator frameworks for addiction treatment centers. Concept mapping has also been applied to explore customer loyalty for travel agencies in Spain (Bigne, et al., 2002). Trochim, Milstein, Wood, Jackson, and Pressler2004 applied concept mapping to plan a statewide health improvement initiative, believing the tool

provided an effective technique for (a) engaging geographically dispersed stakeholders, including local constituents and subject area experts across the country; (b) generating valid findings that are understandable for nonscientists and have clear implications for policy and practice; and (c) delivering useful results in a brief period of time at relatively low cost.

3.1. Preparation

The sample for this study included Executive Masters of Business Administration (EMBA) practitioners from the Global Logistics & Resource Management and Supply Chain Management & Global Logistics classes at National Sun Yat-sen University, which is a premier EMBA program in Taiwan and has been ranked as one of the top 50 global EMBA programs by the Financial Times in 2010.

3.2. Generation of Statements

The actual concept mapping process begins with the generation of a set of statements through brainstorming after the definition of the participants and focus statements. During the validation process, based on the 29 items from the first group, the second group was asked to resume the discussion, resulting in an expansion of the original 29 skills to 50 skills. After further discussion and refinement, this study divided the personnel traits into several scopes indicating the relative importance as weighed by EMBA professionals.

3.3. Structuring of Statements

Each of the brainstormed skill items was printed on a separate 3×5 index card. A complete set of cards was given to each participant for grouping or rating purposes. After each participant had finished the sorting task, the results of the sort were combined into a binary symmetric similarity matrix. Besides statement sorting, the relative importance of the various logistics skills as rated by the practitioners was determined. Such ratings were usually accomplished using a five-point Likert-type response scale.

3.4. Representation of Statements

To represent the conceptual domain, non-metric multidimensional scaling analysis based on the similarity matrix obtained from step 3 was conducted to group skill items into clusters. The final variables were composed of 50 logistics skills and later served as the inputs for the cluster analysis. Using SPSS

Statistics 17.0, nine clusters were adopted to uncover the relationships between the skill items. Based on the concept of stress value by Kruskal (1964), p-value was less than 0.05, and thus the framework was considered to have an acceptable goodness-of-fit.

After multidimensional scaling, the next step was an agglomerative hierarchical cluster analysis using average linkage (between groups) for differentiating each cluster. Cluster analysis is a statistical technique that sorts observations into similar sets or groups (Ketchen& Shook, 1996).Based on this method, each participant can easily read the skills from each cluster and describe or name the main area as a cluster. Nine clusters were chosen to best represent the relationships between each skill. To test the internal consistency and reliability of each cluster, reliability analysis was applied. The overall reliability statistics were favorable with Cronbach's Alpha values up to 0.948, substantially higher than the 0.7 threshold. All clusters achieved alpha’s above the 0.7 level except for Clusters three and seven (George &Mallery, 2003).

4. Analytical Results

The results for the logistics industry professional skill requirements were consistent. The analysis shows that in dealing with globalization a logistician should have the ability to integrate, to communicate, to analyze from an international perspective, to perform financial analysis, to maintain good industry and customer relations, have good people skills, stay healthy, and understand relevant laws and regulations. Meanwhile, according to the results, the clusters were divided into nine areas: personality, leadership, international perspective, logistics knowledge, resources integration, market knowledge, international trade, risk management and environmental consciousness. The areas were almost identical except for the concept of environmental protection.

Table 1 summarizes an overall picture of the nine clusters. Based on the Gran mean there was no doubt that all areas were considered significant and highly important. The numerals inside the brackets for each skill item stand for the importance, which can help to understand the relationships between each item. In particular, all practitioners emphasized internationalization, including international perspectives, culture, and foreign language and marketing capability, which is consistent with the current era of globalization. Most importantly, logisticians must learn a second language and cross-cultural sensitivity.

Table 1: Reliability statistics

No.	Area	Var.	Alpha	F	Sig.	Mean	%
1	Personality	.097	.935	23.151	.000	3.73	11.29
2	Leadership	.065	.762	11.293	.000	3.68	11.13
3	Internationalization	.089	.526	7.634	.000	4.28	12.95
4	Logistics-related	.012	.879	5.644	.000	3.36	10.17
5	Information integration	.060	.789	6.957	.000	3.79	11.47
6	Market trends	.086	.707	41.281	.000	3.64	11.01
7	International finance and trade	.104	.569	10.028	.000	3.44	10.41
8	Risk and profit management	.048	.701	36.035	.000	3.67	11.10
9	Environmental protection	n/a	n/a	n/a	n/a	3.46	10.47

Note: n/a= data not available

In Cluster 1 (personality), communication and negotiation skills are expected of a logistics expert, since logisticians have to connect with other units or departments such as suppliers or customers in the new supply chain era. This cluster was confirmed by Mangan et al. 2001 and Poist et al. 2001. Cluster 2 on leadership was also expected to be a key requirement for the logistics industry. That is to say that logisticians must have the ability to manage each department in the environment of global logistics. Beyond management, corporative responsibility has been gaining importance with practitioners.

Certainly, as a logistics expert in international business, it is essential to have expertise in the logistics field (Poist, et al., 2001). An effective logistician should have a combination of international business expertise and functional/technical skills rather than being primarily a functional/technical or logistics specialist. Cluster 5 (information integration) responds to the demands of both suppliers and consumers for on-time and reliable systems only possible through information applications integrated into supply chain management. In addition, logisticians must pay attention to world markets, especially considering fierce global competition. In Cluster 7 (international finance and trade), practitioners asserted that knowledge of international trade was the most important skill. Logistics experts need to be familiar with national laws and trade regulations in order to establish friendly relationships with other countries. At the same time, it is not possible to know every country's culture or management style, and thus risk and financial management capabilities are needed to avoid losses.

Unexpectedly, Cluster 9 (environmental protection) was included in global logistics. Recently, the logistics industry has been adopting the green supply chain, with the concept of environmental protection gradually growing among practitioners. Murphy and Poist2003 discussed how green concerns will broaden the scope of logistics as well as influence the way logistics managers do their jobs. Furthermore, U.S. and non-U.S. firms will have different policies

established for managing environmental issues, especially regarding specific regulations in overseas markets.

In terms of pairing related skills, pairings were based on each attribute's correlations (Megaputer data analysis software PolyAnalyst 6.0). The results linked quality management with information gathering, customs and regulations with raw material planning, environmental consciousness with CSR, cultivating human resources with coaching successors, and innovation with industry analysis (Figure 1). This study further conducted method triangulation to strengthen the data reliability of the link analysis in order to observe the appropriateness and the correlations between these skills. Table 8 is a comparison of each skill and their relative significance. The linkage of skills may allow instructors to module related trainings: organizational leadership with EQ management, CSR with environmental consciousness, etc.

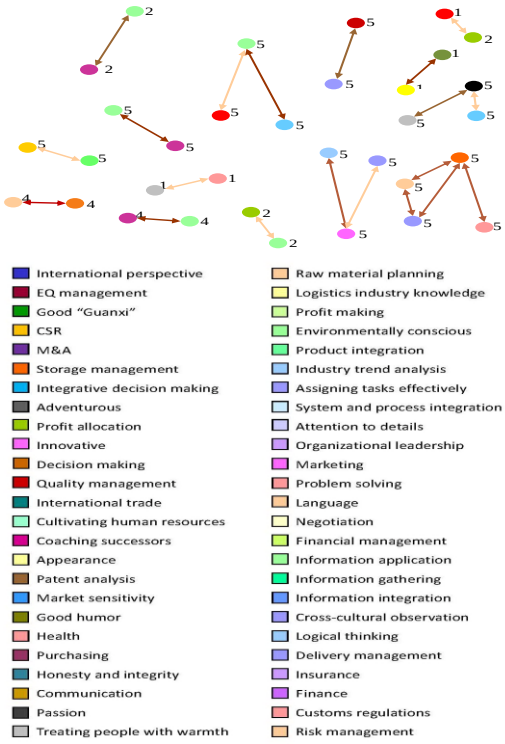


Fig. 1: Link analysis.

5. Discussion

Here we will outline the critical comparison of the educator and industry practitioner viewpoints. In addition, to attempt to rectify the gap between

industry demand and school curriculums, this section lays out a proposed logistics management curriculum, based on the business, logistics and management skills (BLM) framework put forth by Murphy and Poist (1991) and Murphy and Poist (2006).

5.1. Differences between Industry Practitioners and Educators

A central goal of this research was to assess differences between university educators and industry practitioners regarding the essential logistics management skills deemed required. To integrate identified logistics skills into actual curriculum requires deep discussion with frontline educators. Through week-long survey, this study collected opinions from 13 supply chain and logistics professors from five universities across Taiwan, with the aim to incorporate these results into curriculum design.

As we can see from Table 2, both industry practitioners and university educators agreed that having an international perspective, language ability, communication skills, and decision making ability under pressure are indispensible for logistics personnel. Surprisingly however, in addition to these four skills, industry practitioners were concerned with risk management and market profitability whereas scholars mainly focused on information integration. To maintain sustainable operations it is imperative to reduce costs and increase profit; consequently, having a solid command of risk control may be more important than having an international perspective. From the academic perspective, most scholars believed that information management is crucial which is reflected in the curricula through the teaching of ERP systems, JIT systems, and e-commerce.

Another striking disparity was the ranking of logistics demand forecast planning, ranking 41st for industry practitioners but 9th from the academic perspective. Even more interestingly, other hard skills related to logistics such as storage and delivery did not make it into the top ten ranking of industry practitioners; however, this should not be read to imply that these skills are not important. As Poist et al. 2001 pointed out, there are often such differences in terms of skill ranking reflecting the emphasis on being a manager first and a functional/technical specialist second.

Table 2: Ranking differences between industry practitioners and educators.

Rank	Variables	Cluster	Weight	S.D.	Rank	Variables	Cluster	Weight	S.D.
1	International perspectives	3	4.4923	0.7530	26	Integration of system and process	5	3.7231	1.0970
2	Foreign language	3	4.4769	0.7520	27	Information search	5	3.6462	1.1240
3	Communication	1	4.3846	0.9130	28	Quality management	5	3.6250	1.1790
4	Decision-making	1	4.3385	0.9230	29	Financial knowledge	7	3.5692	0.8830
5	Risk management	8	4.2615	0.7960	30	Production integration	5	3.5385	1.0170
6	Cross-culture observation	3	4.2462	0.8670	31	Health	1	3.5077	1.4370
7	Application and integration of resources	5	4.2462	0.8300	32	Cultivating human resources	2	3.5077	1.1060
8	Negotiation	1	4.2154	0.9100	33	Enthusiasm	1	3.4769	1.1870
9	The ability to make a profit	8	4.2000	0.9050	34	Carefulness	1	3.4615	1.1050
10	Market sensitively	6	4.1692	0.9930	35	Concept of environmental protection	9	3.4615	1.0320
11	Analysis of industrial trends	6	4.1538	0.7120	36	Treating people with warmth	1	3.4000	1.1700
12	Integrity, Honesty	1	4.1077	1.1470	37	Customs laws	7	3.3846	1.2340
13	Leadership	2	4.1077	1.0480	38	Purchasing	4	3.3231	1.1330
14	EQ management	1	4.0615	1.0290	39	Coaching successors	2	3.2923	1.2960
15	Logical thinking	1	4.0615	0.9160	40	Distribution management	4	3.2769	1.1790
16	Human networks	1	4.0462	0.9910	41	The materials management	4	3.2222	1.2050
17	Information integration	5	4.0308	1.0750	42	Decision making	6	3.2000	0.9870
18	The courage to solve problems	1	4.0000	1.0160	43	Warehousing	4	3.1846	1.2490
19	Marketing	3	3.9231	1.0940	44	Adventure	1	3.1563	1.1490
20	Knowledge of international trade	7	3.8308	0.9610	45	Financial insurance	8	3.0769	1.0050
21	Corporate responsibility	2	3.8000	1.1070	46	Patent analysis	6	3.0462	1.0960
22	Knowledge of logistics	4	3.7846	1.1520	47	Profit distribution	8	3.0308	1.1040
23	Financial management	8	3.7692	0.9810	48	Merger & Acquisitions	7	2.9846	1.0680
24	Assigning tasks effectively	1	3.7538	1.0610	49	Humor	1	2.8750	1.1520
25	Innovation	1	3.7385	1.1760	50	Appearance	1	2.8154	1.1980

In addition, independent t-tests were applied to compare the evaluations of industry practitioners and educators (Table 3).Using a p-value of < 0.05 as the standard, the results indicated that marketing, logistics demand planning, risk control, cross-culture sensitivity, system and operational integration, financial management, and ethics and leadership differed significantly between these groups. Industry practitioners believed that in addition to logistics knowledge it is critical to have cross-functional marketing skills. Especially with regards to the recent financial crisis, industry practitioners also emphasized the importance of risk and financial management. On the other hand, educators considered professional logistics skills such as demand forecasting, sourcing planning, and system integration as priorities, all of which took a backseat from the industry perspective.

The overall trend was for educators to place more emphasis on logistics professional training than industry practitioners (Table 1) which explain why most logistics curricula are divided based on professional specialization. Furthermore, Figure 2 shows that industry practitioners focused more on risk

management and financial return. In addition, in light of the eco-friendly trend as governments start to tighten environmental regulations as well as with the growing surge in public environmental awareness, industry practitioners have begun to pay attention to environmental related training for which the educational community is still lagging behind (Figure 2). Thus, it is clear that current curricula has to be more in-sync with the needs of industry.

Table 3: Independent t-tests.

Capabilities	t-tests for Equality of Means					
					95% Confidence Interval of the Difference	
	t	Sig.(2-tailed)	Mean difference	Std. Error difference	Lower	Upper
Marketing	2.061	.043	.692	.336	.023	1.361
Raw material planning	-2.26	.026	-.778	.343	-1.461	-.095
Risk management	2.237	.028	.569	.254	.062	1.076
Cross-cultural observation	2.475	.016	.708	.286	.138	1.277
System & process integration	-2.58	.012	-.815	.316	-1.445	-.186
Financial management	2.726	.008	.769	.282	.207	1.331
Honesty & integrity	2.912	.005	1.031	.354	.326	1.736
Organizational leadership	2.029	.046	.646	.318	.012	1.280

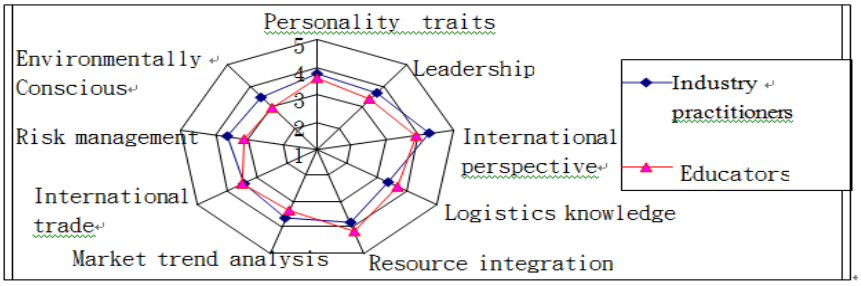
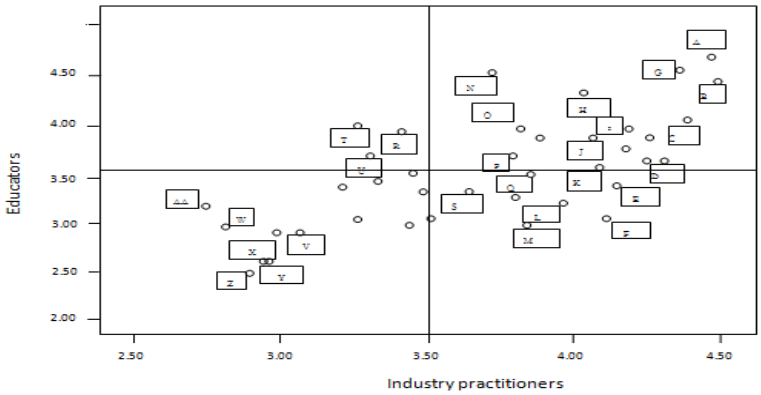


Fig. 2: Capability radar map.

Finally, through a matrix diagram together with Faherty's (1979) concept of quartile deviation, this study further compared the differences in terms of skills evaluation between industry practitioners and educators. Both industry practitioners and educators placed language, international perspective, communication, and the ability to make decisions under pressure as critical skills. However, differences were stark. Based on quartile deviation (Figure 3), the results show the diverse ranking difference between the two sides across more than half of the fifty skills. The results were further divided based on BLM as proposed by Murphy and Poist (1991, 2006). The twelve managerial skills identified were organization, leadership, good guanxi (personal relation) networks, understanding cross-cultural differences, adventurous, problem solving, innovative, honesty and integrity, health, EQ management, coaching

successors, appearance and good sense of humour. The ten business skills were comprised of marketing, international trade, market sensitivity, information gathering, corporate social responsibility, patent analysis, M&A, profit allocation, finance and insurance, and profit creation. The specific logistics related skills included system and process integration, storage management, and logistics knowledge. Practitioners tended to emphasize organizational leadership, honesty and integrity, EQ management, and marketing whereas educators focused more on logistics related professional skills. Each side thus had fundamentally different opinions on the essential skills necessary for this industry.



Code	Skill	Code	Skill
A	Language	B	International perspective
C	Decision making	D	Risk management
E	Organizational leadership	F	Honesty and integrity
G	Communication	H	Information integration
I	International trade	J	Good "Guanxi"
K	EQ management	L	Marketing
M	Financial management	N	System & process integration
O	Logistics knowledge	P	Innovative
Q	CSR	R	Customs regulation
S	Assigning tasks effectively	T	Raw material planning
U	Delivery management	V	Adventurous
W	Good sense of humor	X	Patent analysis
Y	Profit allocation	Z	M&A
AA	Appearance		

Fig. 3: Comparison of weighted results between industry practitioners and educators.

This study proposes a global logistics curriculum design based on the concept of BLM, including business, logistics, and management skills. Business skills are defined here as a manager's ability to perform cross-functional tasks such as economics, finance and so forth. Management skills include planning and organization in addition to personal traits that are valued in the industry. Finally, specific logistics skills are those that logisticians require of their education in order to be competent in the numerous and diverse fields of logistics. Current

curriculum designs are based on global logistics skills; however, it is very difficult to improve a student's skill based on just one course area. Language skills are highly valued by both industry and educators. However, language training requires significant time and effort with dramatic improvements in competency unlikely to be observed in a typical sixteen week semester. As the result, this study proposes language training through specialized second language courses or national language certification.

The planning of a global logistics curriculum based on the weighted level and significance of the link analysis. The design is based on nine functional areas and four major blocks that span a sixteen week semester. Each block is based on the link analysis of related abilities as discussed previously. The core content between weeks one and four provides an international perspective and focuses on communication. The idea is to improve communication ability through case study and group activity. Case studies would generally be on issues related to national or business crises, the objective of which would be to train student's problem solving and decision making skills (Johnson &Pyke, 2000). As well, instructors can include elements of cross-cultural understanding in order to broaden the perspective of students. Instructors must be equipped with sufficient knowledge of cross-cultural understanding for students to abandon their stereotypes in order for such a class to work (Egan & Marc Bandick, 2008).

The main content for weeks five thru eight would be on risk management and resources planning and integration. Risk management is currently lacking in most global logistics courses in Taiwan, and if present, is often placed in the last two chapters based on this study's observations of course descriptions. This may be due to the specialization areas of the instructors. This study thus proposes that instructors invite risk management professionals to classes in order for students to have a basic understanding of the subject.

The major topics for weeks nine to eleven would include market sensitivity and organizational leadership. Smith and Forbes 2001 believe that to cultivate such skills, instructors can utilize experiential days or allow students to participate in a series of class meetings that include lectures, role-plays, and student presentations. The idea is to bridge the gap between the class and industry environments. As well, corporate social responsibility and environmental consciousness would be taught at this point, since environmental issues have especially been gaining significant attention in recent years, predominately due to concerns over global warming.

As the curriculum approaches the final four weeks the objective would shift to logistics related professional knowledge and international trade, which are

inter-related. Lectures and class discussion are the proposed teaching methods for this section. Instructors can make the appropriate adjustments since these are the fundamental subjects that have been offered by most schools. Based on Nguyen, Yoshinari, and Shigeji2005, schools should offer attractive and easy-to-understand course contents and clear and concise lecture notes. Students tend to prefer tangible educational material during the teaching process (such as course content and lecture notes) to intangible ones (such as teacher communication and teaching method).

It might be fruitful to invite industry practitioners to speak on the essential skills that are needed in the industry. In addition, class field trips or industry internships might also foster student experiences. Finally, trips abroad may help to broaden the international perspective of students if financially feasible.

5.2. Research Limitations

The major limitation of this study concerns the sample scope, which was comprised mainly of industry practitioners enrolled in an EMBA class in Taiwan. In light of participant background differences such as education and industry type, Dadzie (1998) points out that different samples may yield different results. In this case, the survey was directed to high-level supply chain managers while requesting data on entry to mid-level logistics managers. Supply chain professionals clearly considered transportation, inventory management, warehousing, computer systems and quantitative analysis techniques as the skills worthy of strong emphasis for the professional development of their subordinates. Marketing, financial control, and economics were those courses considered useful to supervisors, but of little use to subordinates. Thus, results may differ when utilizing a different population. Such deficiency could be corrected in future studies and it may be further fruitful to conduct a larger scale cross-national investigation of the subject. Finally, another logical next step would be to learn more about how to identify and develop skills within the employee base.

As well, the application of concept mapping has been questioned on the grounds that the samples are not representative, questionnaires are neither clear nor well-structured and the results are, accordingly, not standardized, agreed upon, or reliable (Bigne, et al., 2002). Clayton (2006) argued that the existing research on concept mapping is too limited for drawing generalizations. There is a further lack of between-group studies and pretest to posttest research on knowledge acquisition. Furthermore, the sample sizes were small resulting in a lack of instrument reliability and validity, as well as a lack of control for

extraneous variables. Therefore, the results reported here should be interpreted with caution.

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