Journal of Business and Economics, ISSN 2155-7950, USA
November 2014, Volume 5, No. 11, pp. 2062-2073
DOI: 10.15341/jbe(2155-7950)/11.05.2014/011

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Indicators of Core Competencies for Newly Recruited Employees: A Case Study of the Logistics Industry

Shu-Fang Lai
(Takming University of Science and Technology, Taipei City 11451, Taiwan)

Abstract: The logistics industry's progressive growth increases the need for human resources. Firms increasingly emphasize assessment of human resources because appropriate and competent personnel enable firms to improve competitiveness and reduce recruitment costs. Understanding indicators of human resource assessment allows recent graduates to improve core competencies, thereby increasing their competitiveness. This research used the Taiwanese logistics industry to study the job market, to understand how employers select new employees whom equipped with core competencies. Based on a review of the literature and in-depth interviews with logistics industry managers, we established the indicators of core competencies for newly recruited employees, and used the fuzzy analytic hierarchy process (FAHP) to calculate each principle's weightings. The results indicated that when assessing human resources, managers primarily emphasize individual qualities, followed by professional abilities and experience. Regarding secondary principles, knowledge of warehouse and logistics centers' management and problem-solving ability are highly valued. The results of this study enable logistics employers to understand necessary core competencies of employees and provide a reference for potential employees to improve competitiveness.

Keywords: core competence; logistics; human resources; fuzzy analytic hierarchy process (FAHP)
JEL code: J2

1. Introduction

Enterprises increasingly emphasize human resource management (HRM). HRM begins with human resource selection, which is one of the four domains of HRM: selection, education, deployment, and retention. Inadequate personnel can lead to inappropriate distribution of corporate resources and damage employees' career development. The most essential point of common understanding for enterprises and organizations is carefully selecting competent personnel. Enterprises must develop comprehensive and effective selection tools and adopt appropriate selection principles to select competent personnel. Enterprises can save on recruitment costs of finding competent personnel by using appropriate selection tools. For college and university graduates, it is worth investigating the following: necessary job competencies, suitability of their education for logistics employers' needs, and whether students can apply their competencies to the industry.

Using the logistics industry in Taiwan as the research subject, we collected indicators for recruiting employees through a literature review, and investigated opinions of logistics employers on qualifications of newly

Shu-Fang Lai, Assistant Professor, Department of Logistics Management, Takming University of Science and Technology; research areas/interests: transportation management and logistics management. E-mail: sflai@takming.edu.tw.

recruited employees through in-depth interviews. Based on the literature review and in-depth interviews, we established indicators of core competencies for newly recruited employees, and used the fuzzy analytic hierarchy process (FAHP) to assess the importance of indicators at each competence level. The study results enable logistics employers to understand the required characteristics of employees and provide potential employees with a guide to improve their weaknesses.

2. Literature Review

We collected statistical data and analyzed the conditions of the Taiwanese logistics industry by using the Department of Commerce of the Ministry of Economic Affairs (MOEA) and Taiwan Logistics Intelligent Knowledge E-hub (2014) of Taiwan's number of enterprises, number of employees, and revenue size of logistics firms. Moreover, we assessed the logistics industry's job market for the new labor force and employed statistical data released by the Department of Statistics of the Ministry of Education (MOE) to investigate college and university graduates of logistics departments in Taiwan.

2.1 Overview of the Logistics Industry

An analysis of the statistics released by the Department of Commerce, MOEA, indicated that economic fluctuations affect the logistics industry's trend in Taiwan. Revenues grew progressively between 2001 and 2006. Revenue in 2007 was less than in 2006, and revenue in 2008 to 2010 demonstrated a slightly positive growth with an average about NT$700 billion (Figure 1).

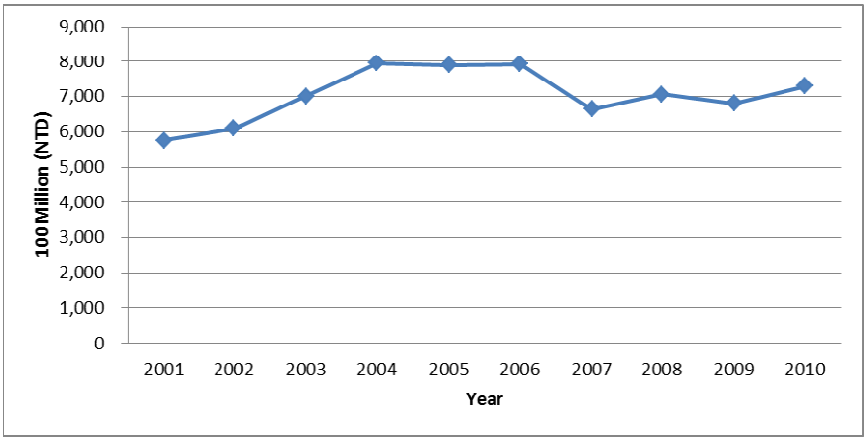

Figure 1 The Revenue Size of the Logistics Industry

Source: The Department of Commerce, MOEA (2008), Taiwan Logistics Intelligent Knowledge E-hub (2014); organized by this study

Although the statistical data from 2005 and 2006 were not released, we observed no significant change in the number of logistics enterprises (Figure 2), with approximately 11,000 to 12,000 enterprises. The number of employees decreased year by year between 2001 and 2006. From 2006 to 2007, the number of employees increased significantly to about 230,000 persons because of the inclusion of highway bus transport and postal and financial personnel. But from 2008 to 2010 the number of employees decreased to 190,000 persons (Figure 3).

2.2 Number of College and University Graduates from Departments Related to Logistics

Based on data released by the Department of Statistics of the MOE, college and university graduates from departments related to logistics (including logistics management, distribution management, and strategic logistics

management) reached 3,005 persons in 2010. Of these, 70% were 4-year college graduates (Table 1 and Figure 4).

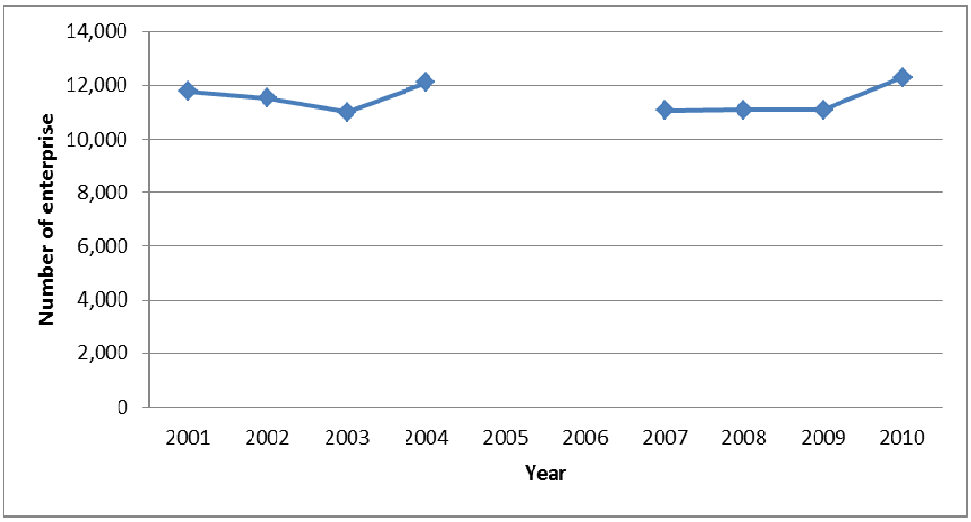

Figure 2 The Number of Logistics Enterprises

Source: The Department of Commerce, MOEA (2008), Taiwan Logistics Intelligent Knowledge E-hub (2014); organized by this study

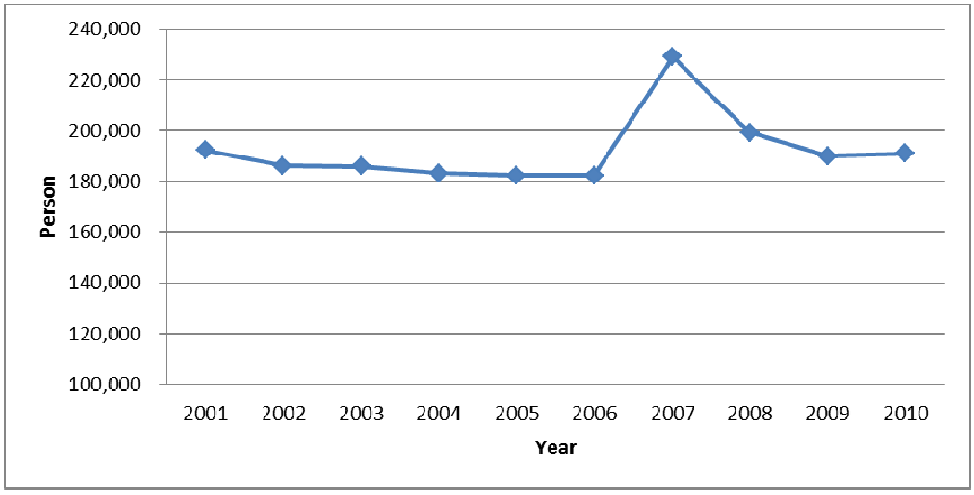

Figure 3 The Number of Employees in the Logistics Industry

Source: The Department of Commerce, MOEA (2008), Taiwan Logistics Intelligent Knowledge E-hub (2014); organized by this study

Table 1 The Number of Graduates from Departments Related to Logistics in 2010

Category	Regular students	Evening school(advanced and in-service programs)	Total
4-year college graduates	1418	703	2121
2-year college graduates	114	214	328
2-year junior college	-	3	3
Bachelor'sdegree holders	328	57	385
Master'sdegree holders	106	62	168
Total	1966	1039	3005

Source: The Department of Statistics, MOE (2011); organized by this study.

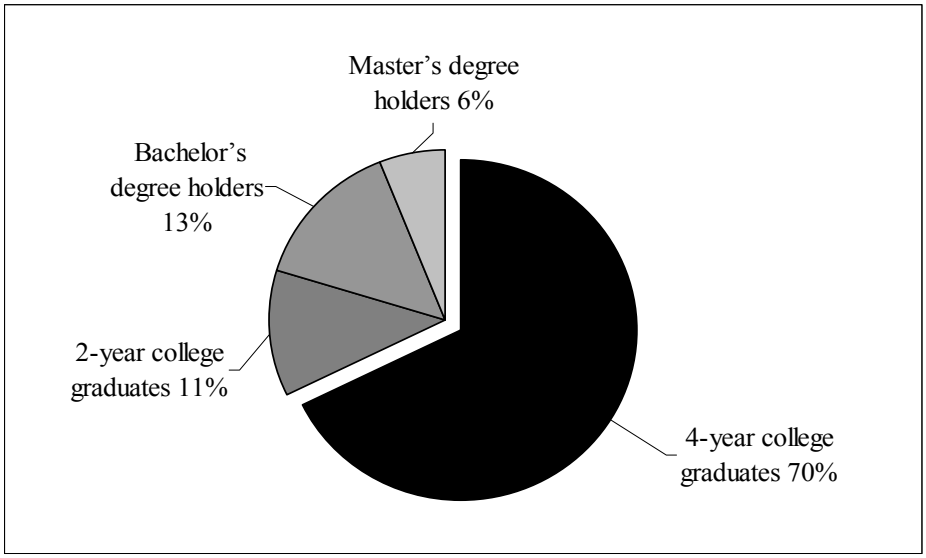

Figure 4 The Proportions of Graduates from Departments Related Departments

Source: The Department of Statistics, MOE (2011); organized by this study

2.3 Literature Review

Gibson and Cook (2001) investigated necessary competencies of entry-level managers from the perspective of third-party logistics suppliers and students. Their research indicated that employers and students have similar opinions and both groups agree that necessary competencies include being able to work in teams, written and oral communication skills, the ability to prioritize, and being able to see the big picture. Through investigation and five case studies, Gammelgaard and Larson (2001) contended that when hiring managers, there are three core competencies for the logistics industry: basic interpersonal and managerial skills, quantitative and technological skills, and supply chain management skills.

Myers et al. (2004) indicated that problem-solving and decision-making abilities are the key competencies of entry-level managers. Murphy and Poist (2006) investigated differences in competency between senior and entry-level management within the U.S. logistics industries. Their results showed that both senior and entry-level management must be equipped with three competencies, and that the most vital competency is management skills, followed by logistical and business skills. Regarding logistical and business skills, both senior and entry-level management agreed that necessary sub-competencies are similar. However, different sub-competencies are required in management skills. The top five management skills for entry-level management are personal integrity, self-motivation, self-confidence, adaptability, and written communication skills. The top five management skills for senior management are the ability to motivate others, personal integrity, decision-making ability, oral communication skills, and being persuasive.

Chiang (2006) and Su and Tsai (2006) surveyed recruitment principles of the logistics industry from the perspectives of employers and scholars. These studies discussed the course deployment of logistics departments, focusing on requirements and adjustment of professional knowledge and courses. Wang (2008) explored differences in professional competencies and job performance between graduates from public and private universities. Chang (2008) investigated cognition of different work attitudes between logistics employers and students. Based on the literature review, most international studies have focused on core management competencies. Most Taiwanese studies have explored requirements of primary personnel based mainly on the use

of professional courses instead of newly recruited personnel's core competencies. Considering the gap between overseas and domestic research, the purpose of this study is to investigate the assessment principles of new primary personnel (administrative staff and management associates) using Taiwanese logistics employers as research subjects.

3. Research Methods

3.1 Research Framework

This study referenced the research by Yang (2004), who discussed recruitment principles for new industrial designers. We employed the three main principles of core competencies as defined by Yang (2004): individual qualities, experience, and professional abilities. Regarding the sub-principles of individual quality and experience, we only included sub-principles proposed by two or more studies. For the sub-principles of professional abilities, we adopted the sub-principles verified by Wang (2008). Finally, we constructed a framework of indicators of core competencies for new employees, as shown in Tables 2 to 4 and in Figure 5.

Table 2 Indicators of Individual Qualities

Individual Qualities	2005 Su and Tsai	2006 Chiang	2008 Chang	2008 Wang
Listening	●			
Negotiation abillities[1]		●	●	
Communication abilities	●	●	●	●
Problem-solving/Response abilities[2]	●			●
Social skills			●	●
Adaptation to teams			●	
Teamwork	●			
Managerial abilities		●		
Conflict management			●	●
Time management	●			
Creativity			●	
Resilience to pressure				●
Responsibility				●
Carefulness				●
Decision-making ability			●	
Cooperation				●
Loyalty				●
Judgment	●			
Strategic planning ability		●		
Analytical ability		●	●	
Planning ability	●			
Self-motivated attitude				●
Seriousness				●
Professional dedication Spirit				●
Ethics				●
Discipline				●
Honesty				●
Reasoning ability	●			

Source: Su and Tsai (2005), Chiang (2006), Chang (2008), and Wang (2008).

Table 3 Indicators of Experience

Experience	2004 Yang	2009 Hong	2010 Lin
Degree	●	●	
Work experience	●	●	
Job training		●	
Certifications	●		
Foreign language skills	●		●
Awards	●		

Source: Yang (2004), Hong (2009), and Lin (2010).

Table 4 Indicators of Professional Abilities

Professional Abilities	Cognition of logistical systems	Assessment of freight risks
	Concept of supply chains	Actual tariff work experience
	Knowledge of warehouse and supply chains management	Familiarity with the flow of international trade
	Order management	Knowledge of international trade laws
	Demand forecast	Knowledge of logistics center rules
	International logistics analytical abilities	Air cargo management
	Freight management	

Source: Wang (2008).

3.2 Research Methods

This study established a hierarchical framework for indicators through a literature review. We then selected essential indicators based on in-depth interviews with logistics industry managers and adopted the FAHP to evaluate the weighting of principles. We selected logistics industry managers responsible for recruitment as the subjects of the in-depth interviews. We first used open-ended, unstructured questionnaires to investigate the type and number of new employees that employers search for and employers' principles for recruitment. We then asked interview subjects to use a 5-point Likert scale to evaluate the importance of the main principles and the degree of adequacy of the classifications proposed by this study. Finally, we adopted the results of the interviews to modify the indicator framework.

Regarding the FAHP, after verifying the indicator framework, this study conducted a second-phase survey on the logistics managers. Research subjects compared the importance of two given principles, and we calculated the weight of the main principles. Based on the traditional analytical hierarchy process (AHP), the FAHP uses fuzzy numbers to present uncertain values and implement decision-making analysis through the fuzzy numbers algorithm and the principle of original models. Chang (2003) indicated that application of the FAHP can modify the inadequacy of the traditional AHP to obtain more realistic decision-making results. Advantages of the FAHP identified by Chang (2003) are as follows:

(1) Enables processing of research problems that are difficult to quantify;

(2) Reduces uncertainty when scholars and experts assess elements;

(3) Presents the fuzzy phenomena of expert cognition without omitting any unique opinion;

(4) Presents the fuzzy zone of collective expert decision-making, which can serve as a flexible space for decision makers to make judgments based on personal experiences.

Figure 5 Indicator Framework of the Core Competencies of the Logistics Industry for Newly Recruited Employees

Source: Organized by this study

4. Demand and Core Competency Indicators for Newly Recruited Employees of the Logistics Industry

4.1 Analysis of the Demand of the Logistics Industry for Newly Recruited Employees

The Department of Commerce of the MOEA of Taiwan (2007, 2008) divided the Taiwanese logistics industry into 19 industries, including railway and highway passenger transportation, warehouse, logistics, and postal services. Considering that the majority of university courses are related to logistics, warehouse, and supply chains, this study used the vehicle freight industry, the express industry, logistics centers, the warehouse industry, and bonded warehouses as the subjects for investigating the job market of graduates from departments of logistics management.

This study conducted in-depth interviews with one employer of each category to evaluate the job markets of five logistics industries. We determined the annual average number of new employees and the percentage of new and senior employees in the five industries. The evaluation equations are presented as follows:

$$N = \sum_{i=1-5}^{5} N_i \tag{1}$$

$$N_i = E_i \times R_i \tag{2}$$

$$R_i = \frac{n_i}{e_i} \tag{3}$$

The terms used in the equations are:

N : the necessary number of new employees in the logistics industry (person/year);

N_i : the necessary number of new employees in logistics industry *i*;

E_i : the number of employees (persons) in logistics industry *i*;

R_i : the percentage of newly recruited employees (%) annually in logistics industry *i*;

n_i : the average number of newly recruited employees annually (person/year) in a sample firm of logistics industry *i*;

e_i : the number of employees (persons) in a sample firm of the logistics industry *i*.

Based on the in-depth interviews, new employees of the logistics industry occupy positions such as order pickers, drivers, administrative staff, and management associates. Because order pickers and drivers do not require much professional background, this study selected administrative staff and management associates of the logistics industry as its research subjects. Basic information about the research subjects and the percentage of new employees in sample firms are presented in Table 5. As the table shows, the warehouse industry has the highest percentage of annual new employees (5.3%), followed by logistics centers and the domestic express industry (3%), the international express industry (1.5%), and the vehicle freight industry (0.83%). The majority of job opportunities in the vehicle freight industry are for inventory managers and drivers.

The percentages of new employees in the logistics firms were multiplied by the total number of employees to calculate the annual required number of administrative staff and management associates. Finally, this study totaled the number of new employees of the five logistics industries to obtain the total required number of new employees for the industry as a whole (Table 6); the average was 1,178 persons ((1,253+1,103)/2).

Table 5 Sample Firm and Research Subject Backgrounds

Item	Vehicle freight	International express	Domestic express	Logistics centers	Bonded warehouse
Research subjects	Sales Department, Manager Lee	Customs Department, Manager Wu	Human Resources Department, Director Chang	Human Resources Department, Manager Liu	Management Department, Deputy Manager Ku
Work experience of subject (years)	7	14	10	14	9
Total number of employees (persons)	4,000	1,000	1,635	500	150
Annual required number of employees (persons)	1,472	30-50	—	40	20
Annual required administrative staff and management associates (persons)	10-15	10-15	50	10-15	5-8
Annual required percentage of administrative staff and management associates	0.83%	1.50%	3.10%	3.00%	5.30%

Table 6 Estimate of the Number of Office Staff for the Logistics Industries

Year	Vehicle freight industry		Express industry		Logistics centers and warehouse industry (bonded warehouses)		Total (N)	
	2007	2008	2007	2008	2007	2008	2007	2008
Total number of employees (E_i)	74,992	75,287	3,833	3,848	13,067	9,403	91,892	88,538
Required percentage of administrative staff and management associates (R_i)	0.83%	0.83%	2.30%	2.30%	4.15%	4.15%	-	-
Required number of administrative staff and management associates ($N_i = E_i \times R_i$)	622	625	88	89	542	390	1,253	1,103

Based on statistics released by the MOE of Taiwan (2010), 3,005 people graduated from departments related to

logistics, and the job market can provide 1,178 job opportunities for administrative staff and management associates. Even without considering graduates from other departments, if all of these graduates entered the job market, the ratio of demand to supply would be 0.39, indicating an average of 2.6 graduates competing for one position.

4.2 Identifying Indicators of Core Competency

This study employed in-depth interviews coupled with a questionnaire on the importance of indicators to identify essential core competencies. This study then investigated the importance of framework indicators and the appropriateness of the classifications. The research results indicate that research subjects agreed with the classification of principles. However, several employers suggested that extracurricular activities and computer software certifications be included in the sub-principles of experience, and that office software operation abilities be added into the sub-principles of professional abilities. Therefore, we retained indicators that averaged a score over 3 points (with a maximum of 5 points), and included three indicators suggested by research subjects. The modified indicator framework of core competencies is presented in Figure 6.

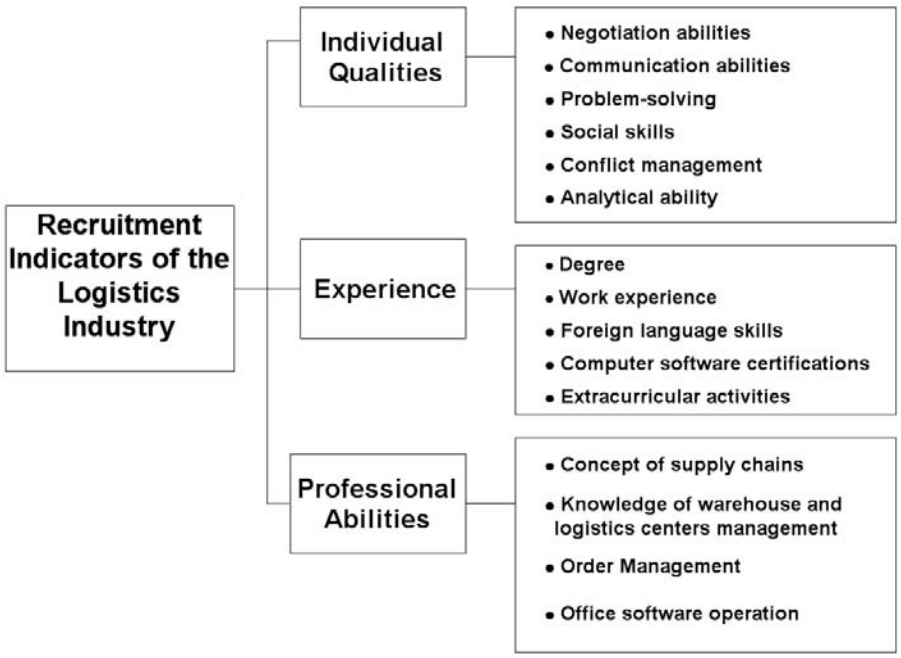

Figure 6 Modified Indicator Framework of the Core Competencies for New Employees of the Logistics Industry

5. Weightage Computation

After verifying the essential indicator framework of core competencies, we asked a panel of experts to compare the importance of any two principles through questionnaires, and adopted the FAHP to calculate the weight of each principle. The expert panel comprised senior managers in the logistics industry. Ten questionnaires were distributed and retrieved, accumulating a return rate of 100%. Of the retrieved questionnaires, eight were valid, accumulating the effective return rate of 80%. The basic data of surveyed subjects are shown in Table 7.

The result of the FAHP is shown in Table 8. As shown in Table 8, the consistency ratio (CR) of both main principles and sub-principles was less than 0.1, reaching a level of consistency. Regarding main principles, personal quality (0.441) has the highest weightage, followed by professional abilities and experience, indicating that logistics managers mostly focus on individual qualities when selecting new staff. Regarding the

sub-principles of individual qualities, problem-solving ability has the highest weightage, followed by communication and analytical abilities. In the sub-principles of experience, work experience has the highest weightage, followed by foreign language skills and computer software certifications. Regarding the sub-principles of professional abilities, knowledge of warehouse and logistics centers management has the highest weightage, followed by knowledge of supply chain concepts, office software operation, and order management.

Table 7 Data of the AHP Questionnaires

Service unit	Title	Work experience (years)
Vehicle freight industry	Sales manager	7
International express industry	Customs manager	13
Logistics centers	Human resource manager	14
Warehouse industry(bonded warehouses)	Human resource deputy manager	9
Logistics centers	Regional manager	26
	Human resource personnel	6
Scooter express industry	Special assistant	2[1]
Domestic express industry	Sales manager 1	8
	Sales manager 2	6
	Sales personnel	5
Total	10	-

Note: 1: Only work experience at the specific firm was calculated.

Based on weights of the main and sub-principles, this study inferred that the most essential core competency for new logistics industry employees is knowledge of warehouse and logistics centers management, followed by problem-solving abilities, knowledge of supply chains concepts, and communication abilities.

Table 8 Weights of the Principles for the Logistics Industry

Main principle[1]	Weight (sequence) (CI/CR)[2]	Sub-principle	Weight (sequence)	Total weight (sequence)
Individual Qualities	0.441 (1)	Negotiation	0.121 (5)	0.053 (9)
		Communication abilities	0.200 (2)	0.088 (4)
		Problem-solving abilities	0.285 (1)	0.126 (2)
	(0.026/0.021)	Social skills	0.097 (6)	0.043 (12)
		Conflict management	0.133 (4)	0.059 (7)
		Analytical abilities	0.164 (3)	0.072 (5)
Experience	0.190 (3)	Degree	0.157 (4)	0.030 (14)
		Work experience	0.282 (1)	0.054 (8)
	(0.027/0.024)	Foreign language skills	0.249 (2)	0.047 (11)
		Computer software certifications	0.202 (3)	0.038 (13)
		Extracurricular activities	0.110 (5)	0.021 (15)
Professional abilities	0.368 (2)	Concepts of supply chains	0.262 (2)	0.097 (3)
		Knowledge of warehouse and logistics centers Management	0.401 (1)	0.148 (1)
	(0.015/0.017)	Order management	0.143 (4)	0.053 (10)
		Office software operation	0.194 (3)	0.071 (6)

Note: 1: The consistency ratios of the main principles were CI = 0.004 and CR =0.007; 2: The CI and CR values denote the consistency ratio of the sub-principles.

6. Conclusions and Suggestions

6.1 Conclusions

(1) Based on government statistics, the Taiwan logistics industry's annual revenue is approximately NT$700 billion, comprising approximately 10,000 enterprises that employ between 180,000 and 190,000 people. Changes within the past 10 years have not been significant.

(2) The Taiwan Logistics Yearbook divides the logistics industry into 19 industries. Industries that are relatively connected with departments of logistics management are the vehicle freight industry, the express industry, logistics centers, the warehouse industry, and bonded warehouses. This study inferred that newly recruited administrative personnel and management associates in these five industries total 1,178 persons, and that graduates from departments related to logistics in Taiwan in 2010 total approximately 3,005 persons. The ratio of demand to supply for the logistics industry administrative personnel and management associates is approximately 39%.

(3) This study constructed a recruitment framework of the logistics industry through a literature review and in-depth interviews. We constructed core competencies of the logistics industry: three main principles (individual qualities, experience, and professional abilities) and 15 sub-principles. Knowledge of warehouse and logistics centers management and problem-solving abilities had the highest weightage of the principles.

6.2 Suggestions

(1) Based on the results of this study, graduates from departments related to logistics should regard problem-solving and communication abilities as essential to successfully entering the job market, in addition to the enrichment of logistics and supply chains knowledge. We suggest that students polish their problem-solving and communication abilities by participating in extracurricular activities. We also suggest that education organizations consider rearranging their courses based on the results of this research to meet the demands of logistics industry.

(2) From in-depth interviews, we learned that employers evaluate work attitudes and consistency of potential candidates through their school attendance records, part-time work experience, and internship courses, because they believe that fresh graduates lack full-time work experience. Therefore, to enhance competitiveness, students should focus on their school attendance records, enhance work-study job stability, and actively participate in internship courses.

(3) The scope of this research focused on firms related to logistics in Taiwan. We suggest that future research investigate recruitment principles of the logistics industry in different countries and analyze regional differences.

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