

Application of Analytic Hierarchy Process on Employability Criteria of College Graduates by the Tourism Industry of Taiwan

Ting-Wen Wang, Shun-Jhe Jiang, Chih-Ling Feng

Abstract – The study applies analytic hierarchy process (AHP) for exploration of employability criteria as perceived by the tourism industry of Taiwan. After two rounds of Delphi technique, the original questionnaire was reduced to four criteria and eleven sub-criteria through a self-administered Microsoft Excel spreadsheet calculation. The results rendered “General Skills”, “Professional Attitude”, “Disciplinary Skills”, and “Career Planning Skills”. Confirmation of the AHP results showed high importance (55%) for “work dedication” and “communication skill” which fall under “Professional Attitude” and “General Skills” respectively. Medium importance (30%) is composed of six sub-criteria. The results may provide college administrators with objective and suitable curricula designed to improve graduates’ employability in the tourism industry.

Keywords – AHP, Employability, General Skills, Disciplinary Skills, Professional Attitude, Career Planning Skills.

I. INTRODUCTION

There are many definitions of employability. Employability is not just about getting a job but about developing attributes and skills. The emphasis is less on “employ” but more on “ability” [1]. “Ability” or “competency” gained traction in the 1970’s when a scholar wrote a paper in the American Psychologist [2]. McClelland moved away from knowledge, skills, and attitude in “competency”, and focused instead on specific self-image, values, traits, and motive dispositions for “occupational competency”. Spencer and Spencer [3] proposed five components of competency: motives, traits, self-concept, knowledge, and skill.

Mixed messages as to a college graduate’s “employability” is too evident due to confusion associated with various definitions of “employability” [4]. How to match students’ competency with employers’ demands is the task of vocational colleges under a general notion of “employability”. Mixed messages may be apportioned to what businesses are seeking in a graduate and what colleges claim to have been providing. Employers tend to be favorably disposed towards graduates with work experience, which includes but not limited to, formal, non-formal, short employment or placement with a company [4].

Yorke and Harvey [5] argued that alignment of higher education with workforce needs should be based on careful action by institutions to embed skills and attributes within instructional programs”. Employers typically look for a more flexible, adaptable workforce in response to the volatility of market needs [6]. As part of this flexibility, employers are hiring and firing their employees more

readily across industries as life-long employment is now scarce [7]. At the same time, the notion of graduates developing their “employability” skills in their first job at the expense of their initial employer is also disappearing [8]. Thus, being work-related skills ready in addition to subject-specific skills ready are essential to a graduate’s employability [9].

Nabi [10] showed it is the portfolio of skill sets a graduate could offer being the differentiator between employment and underemployment. However, individual subject skills may not always meet employer requirements as there is a tension between formal education and vocational training [11]. Nonetheless, there is also no clear, formal and universally accepted distinction made between skills acquired through education and those acquired through training [6]. As a result, there is an incompatibility between supply and demand of skilled employees, potentially resulting in dissatisfaction and disappointment for all concerned [12].

Although close relations with business community are of crucial importance to schools in delivering employable graduates, this is not to say that colleges should deliver exactly what the industry requests. An important role for school is not only to follow trends and development in the industry but also to function as a medium between potential employers and employees (graduating students) in driving and stimulating industry development. Junghagen [13] stated that continuous input from industry is essential to define future practice. Hence, the study looks into the tourism industry to find out what the tourism industry view “employability” in a graduate.

II. LITERATURE REVIEW

Definitions of employability are abundant [4,14,15]. For example, Fugate et al. [15] argued three components of employability: career identity, personal adaptability, and social and human capital. General speaking, a number of studies have related the reality of the job market to employability [16,17]. Nonetheless, most studies pertaining to employability have focused on knowledge, skill sets, and policies across various nations and cultures [4, 18].

Employability is about being capable of getting and keeping fulfilling work. More comprehensively, employability is the capability to move self-sufficiently within the labor market to realize potential through sustainable employment [19]. Four elements of employability as proposed by Hillage and Pollard [19] are: employability assets (knowledge, skill, attitude), deployment (career management skills, including job

search skills), presentation (job getting skills, e.g. C.V. writing and interview techniques), and personal circumstances (family responsibilities and external factors such as opportunities in the labor market). However, van der Heijde and van der Heijden [20] presented an instrument for measuring employability based on a five-dimensional conceptualization of employability.

According to Knight and Yorke [21], graduate employability is “a set of achievements, understandings and personal attributes that make individuals more likely to gain employment and be successful in their chosen occupations” (p. 22). The USEM model [5,21,22] includes Understanding, Skills, Efficacy beliefs, and Metacognition. McQuaid and Lindsay [23] presented a broad framework for analyzing employability built around individual factors, personal circumstances, and external factors. McQuade and Maguire [24] identified a number of learning models for the delivery of technical skills, interpersonal and intrapersonal skills via Programme for University-Industry Interface (PUII).

Dacre Pool and Sewell [25] saw employability as having a set of skills, knowledge, understanding, and personal attributes that make a person more likely to choose and secure occupations in which they can be satisfied and successful. The essential components of graduate employability as defined by the Career EDGE model [25-27] are: Career (development learning), Experience (work and life), Degree subject knowledge (understanding and skills), Generic skills (including enterprise skills), and Emotional intelligence. Generic skills may also be referred to as core skills, key skills, or transferable skills. From the five components of Career EDGE, Reflection and Evaluation is derived. The derived Reflection and Evaluation would render Self-esteem, which also comes from Self-efficacy and Self-confidence. With self-esteem, self-efficacy, and self-confidence, employability may be followed.

In the job market, top-level managers mainly need conceptual skills while supervisors strongly need technical skills in order to manage employees in their specific area of specialty. People employed at all levels of management need human skills in order to interact and communicate with their employees and other managers, while technical skills have significant importance for newcomers’ success [17]. Bhanugopan and Fish [28] found employers are generally satisfied with the skill levels of graduates at a technical level but concerned with “general skills” and “personal attributes”.

In relation to skills development, teamwork is useful in learning real-world communications and decision-making, as well as in business planning and subsequent tracking and rectification of individuals’ and teams’ oversights. For example, in Sri Lanka, graduates of both genders identified problem-solving, self-confidence, teamwork, and learning skills as important employability skills [29]. However, only male graduates identified creative and innovative thinking to be important while a positive attitude towards work was identified only by female graduates,.

III. METHODOLOGY

Formation of the preliminary questionnaire was based on the analytic hierarchy process (AHP) [30]. The literatures review and interviews with scholars and travel agency managers provided the basis for the construct of the questionnaire. Four constructs were identified for vocational college graduates’ employability as perceived by travel agency managers. They are: (1) generic skills, (2) disciplinary skills, (3) professional attitude, (4) career planning skills, and (5) presentation skills.

The questionnaire was rated on a five-point Likert-type scale ranging from 1 (very unimportant) to 5 (very important). Delphi Method was used to eliminate items deemed inappropriate. The initial questionnaire was first distributed to three professors, five hoteliers, three managers of theme parks, and four travel agents. Result of the first round Delphi was conducted by statistical software SPSS 20.0, as shown in Table I. Consensus is reached for items with low coefficient of variance (C.V.). After deletion and modification to the initial questionnaire, the adjusted questionnaire was then distributed again to the same eight experts for the second round of Delphi. As shown in Table II, result of the second round Delphi rendered eleven items for the evaluation of college graduates’ employability by in the tourism industry.

After the Delphi, each expert was asked to weigh pair-wise comparisons based on a scale of 1:1, 1:3, 1:5, 1:7, and 1:9. For example, if an expert believes that “General Skills” is as important as “Disciplinary Skills”, he or she may give an answer of 1:1 for this particular pair. If he or she feels that “General Skills” is slightly more important than “Disciplinary Skills”, 3:1 is given. Conversely, if “General Skills” is slightly less important than “Disciplinary Skills”, 1:3 is given. Similarly, if moderately more important renders 5:1, and moderately less important renders 1:5. Thus, the average of the experts’ responses would be converted into pairwise comparison matrix, such as Table III that is explained more in the next section.

Table I First round of Delphi

Criterion	Mean (%)	S.D.	Sub-criterion	Mean (%)	S.D.	Decision
General Skills	4.60 (92%)	0.73	Communication skill	4.13 (82.6%)	0.834	Accept
			Second language	3.86 (77.2%)	0.834	Accept
			Teamwork skill	4.06 (81.2%)	0.961	Accept
			Physical strength	2.93 (58.6%)	0.884	Reject
Professional Attitude	4.33 (86%)	0.61	Work dedication	4.46 (89.2%)	0.640	Accept
			Resist pressure	4.06 (81.2%)	0.884	Accept
			Learning initiative	3.80 (76.0%)	1.014	Reject
Disciplinary Skills	4.26 (85%)	0.88	Crisis management	4.46 (89.2%)	0.640	Accept
			Operational skill	4.06 (81.2%)	0.961	Accept
			Planning/execution	4.13 (82.6%)	0.834	Accept
Career Planning Skills	3.60 (72%)	0.82	Lifelong learning	4.06 (81.2%)	0.961	Accept
			Self-marketing	3.53 (70.6%)	0.915	Accept
			Professional awareness	3.80 (76.0%)	0.862	Accept
Presentation Skills	2.53 (50%)	0.91	Oral skill	3.46 (69.2%)	0.994	Reject
			Body gesture	3.00 (60.0%)	1.369	Reject
			Attire appearance	2.45 (49.2%)	1.216	Reject

Table II Second round of Delphi

Criterion	Mean (%)	S.D.	Sub-criterion	Mean (%)	S.D.	Decision
General Skills	4.66 (93.2%)	0.49	Communication skill	4.40 (88.0%)	0.737	Accept
			Teamwork skill	4.13 (82.6%)	0.743	Accept
			Second language	3.86 (77.2%)	0.640	Accept
Professional Attitude	4.53 (90.6%)	0.52	Work dedication	4.53 (90.6%)	0.640	Accept
			Resist pressure	3.80 (76.0%)	0.862	Accept
Disciplinary Skills	4.13 (82.6%)	0.74	Crisis management	4.26 (85.2%)	0.704	Accept
			Planning/execution	3.86 (77.2%)	0.834	Accept
			Operational skill	3.80 (76.0%)	0.676	Accept
Career Planning Skills	3.86 (77.2%)	0.92	Lifelong learning	4.33 (86.6%)	0.816	Accept
			Professional awareness	4.00 (80.0%)	0.743	Accept
			Self-marketing	3.93 (78.6%)	0.676	Accept

IV. RESULTS

From a self-administered Microsoft Excel spreadsheet, numerical priorities (weights) were calculated for each of the decision alternatives. Results of the analytic hierarchy process (AHP) for the four constructs are shown in Table III. In the first row of the aggregated pairwise comparison matrix, experts viewed “General Skills” to be 2.214 times more important than “Professional Attitude”, being 3.024 times more important than “Disciplinary Skills”, and being 2.880 times more important than “Career Planning Skills”. Thus, the weight of “General Skills” is determined by the following calculation.

$$w_i = \frac{1}{n} \sum_j \frac{a_{ij}}{\sum_{i=1}^n a_{ij}} = \frac{1}{4} \left(\frac{1}{2.130} + \frac{2.214}{3.688} + \frac{3.024}{9.615} + \frac{2.880}{9.241} \right) = 0.424$$

$$v_i = \frac{1}{w_i} \sum_{j=1}^n w_j a_{ij} = \frac{1}{0.424} \left(0.424 \times 1 + 0.349 \times 2.214 + 0.125 \times 3.024 + 0.102 \times 2.880 \right) = 4.406$$

$$\lambda_{\max} = (4.406 + 4.398 + 4.080 + 4.111) / 4 = 4.249$$

$$CI = (\lambda_{\max} - n) / (n - 1) = (4.249 - 4) / (4 - 1) = 0.083$$

$$CR = CI / RI = 0.083 / 0.90 = 0.092$$

Table III Aggregated pairwise comparison matrix

Criterion	A	B	C	D	Weight	Rank
A. General Skills	1	2.214	3.024	2.880	.424	1
B. Professional Attitude	0.452	1	5.013	3.634	.349	2
C. Disciplinary Skills	0.331	0.199	1	1.727	.125	3
D. Career Planning Skills	0.347	0.275	0.579	1	.102	4
Sum	2.130	3.688	9.615	9.241	1	

$\lambda_{\max} = 4.249$; C.I. = 0.083; C.R. = 0.092

In the calculation, the random index (R.I.) is 0.58 for $n = 3$, R.I. = 0.90 for $n = 4$, R.I. = 1.12 for $n = 5$, R.I. = 1.24 for $n = 6$... etc. As shown in Table III, it was determined that the ranking of each criterion by weight follows: General Skills, Professional Attitude, Disciplinary Skills, and Career Planning Skills. The findings indicate that the tourism industry prioritizes “General Skills” and “Professional Attitude”, with weights of 0.424 and 0.349 respectively. Conversely, “Disciplinary Skills” and “Career Planning Skills” were viewed as lower priorities of employability, with weights of 0.125 and 0.102 respectively. The result supports a growing body of research that had identified “General Skills” as the most important competencies employers often look for when

hiring graduates [10,31-33]. It must be noted that “General Skills” were referred as “key skills” in Nabi [10] and “soft skills” in Finch et al. [32,33]. What repeatedly contributed to existing findings that had suggested “key skills” or “soft skills” as the dominant factor of employability by employers are written and/or verbal communication skills. Discrepancies may exist between written and verbal communication skills among various literatures. For example, Nabi [10] found written communication skills to be more important than verbal communication skills while Finch et al. [32,33] found verbal communication skills to have a much higher factor loading than written communication skills. Therefore, it is also of particular interest to examine individual items of each construct.

The study did not find the necessity to divide written and verbal communication skills for employability in the tourism industry. Instead, it was identified that college graduates who demonstrate communication skills (under the construct of “General Skills”) will be more competitive in the tourism industry than those who do not have adequate General Skills. In Table IV, it was shown that ‘communication skill’ has a much higher weight, at 0.624, than any other item

Table IV Sub-criterion comparison of General Skills

A. General Skills	A1	A2	A3	Weight	Rank
A1. Communication skill	.628	.702	.542	.624	1
A2. Teamwork skill	.160	.179	.275	.205	2
A3. Second language	.212	.119	.183	.172	3
Sum	1	1	1	1	

$\lambda_{\max} = 4.249$; C.I. = 0.083; C.R. = 0.092

Under the construct of “General Skills”, the next highest weight is “teamwork skill”, at 0.205. Recall that Nabi [10] identified “team work” as important as written and/or verbal communication skills if not higher. Finch et al. [33] referred to “interpersonal skill” instead of “teamwork skill” as of significant importance. Wickramasinghe and Perera [29] identified “working as a team member” as of high importance by employers ($M = 4.35$) but not as highly of an importance as perceived by female graduates ($M = 4.67$) and male graduates ($M = 4.40$).

Sub-criteria comparisons of “Professional Attitude”, “Disciplinary Skills”, and “Career Planning Skills” are similarly shown in Table V, Table VI, and Table VII. Because it is difficult to compare sub-criteria from different Tables, an overall rank of each sub-criterion is presented in Table VIII.

Table V Sub-criterion comparison of Professional Attitude

B. Professional Attitude	B1	B2	Weight	Rank
B1. Work dedication	.822	.822	.822	1
B2. Resist pressure	.178	.178	.176	2
Sum	1	1	1	

$\lambda_{\max} = 2$; C.I. = 0; C.R. = 0 (criteria met with C.I. < 0.1, C.R. < 0.1)

Table VI Sub-criterion comparison of Disciplinary Skills

C. Disciplinary Skills	C1	C2	C3	Weight	Rank
C1. Crisis management	.506	.533	.487	.509	1
C2. Planning/execution	.300	.263	.289	.284	2
C3. Operational skill	.193	.204	.224	.207	3
Sum	1	1	1	1	

$\lambda_{\max} = 3.004$; C.I. = 0.002; C.R. = 0.003

Table VII Sub-criterion comparison of Career Planning Skills

D. Career Planning Skills	D1	D2	D3	Weight	Rank
D1. Lifelong learning	.618	.706	.476	.600	1
D2. Professional awareness	.181	.207	.370	.253	2
D3. Self-marketing	.201	.087	.155	.148	3
Sum	1	1	1	1	

$\lambda_{max} = 3.108$; C.I. = 0.054; C.R. = 0.093

Table VIII Overall rank of each sub-criterion

Criterion	Criterion Weight	Sub-criterion	Sub-criteria Weight	Overall Weight	Rank
General Skills	.424	Communication skill	.624	.2645	2
		Second language	.205	.0869	3
		Teamwork skill	.172	.0729	4
Professional Attitude	.349	Work dedication	.822	.2868	1
		Resist pressure	.178	.0621	6
Disciplinary Skills	.125	Crisis management	.509	.0636	5
		Operational skill	.207	.0258	9
		Planning/execution	.284	.0355	8
Career Planning Skills	.102	Lifelong learning	.600	.0612	7
		Professional awareness	.253	.0258	9
		Self-marketing	.148	.0150	11

C.I. = .083; C.R. = .092

From Table VIII, it was found that “work dedication” is the most important sub-criterion overall. Its number one status was achieved from the second important criterion (0.349) and the most important sub-criterion (0.822) which arrives to $0.349 \times 0.822 = 0.2868$. Similarly, the second most important sub-criterion is “communication skill” ($0.424 \times 0.624 = 0.2645$). By and large, the data of “Professional Attitude” and “Career Planning Skills” would suggest these two constructs to be “personal attributes”. Recall that Bhanugopan and Fish [28] defined “general skills”, “technical skills”, and “personal attributes” as criteria of employability among senior-level undergraduate business students.

Summarization of the AHP is shown in Table IX, in which the overall ranking of each individual item is categorized under three levels of importance: “High”, “Medium”, and “Low”. The “High” importance group, accounting 55% of the total importance, is composed of only two items lead by “work dedication” (weight = 0.2868) and “communication skill” (weight = 0.2645). The “Medium” importance group, accounting 30% of the total importance, is composed of six items and lead by “second language” (weight = 0.0869). The “Low” importance group, accounting 15% of the total importance, is composed of three items and lead by “operational skill” and “professional awareness” (both having weight = 0.0258).

Table IX Importance level by AHP

Rank	Importance Level	Sub-criterion	Weight	Criterion
1	High importance 55%	Work dedication	.2868	Professional Attitude
2		Communication skill	.2645	General Skills
3	Median importance 30%	Second language	.0869	General Skills
4		Teamwork skill	.0729	General Skills
5		Crisis management	.0636	Disciplinary Skills
6		Resist pressure	.0621	Professional Attitude
7	Low importance 15%	Lifelong learning	.0612	Career Planning Skills
8		Planning/execution	.0355	Disciplinary Skills
9		Operational skill	.0258	Disciplinary Skills
9	15%	Professional awareness	.0258	Career Planning Skills
11		Self-marketing	.0150	Career Planning Skills

V. CONCLUSION

The study showed that the tourism industry viewed “general skills” and “professional attitude” to be much more important than “disciplinary skills” and “career planning skills” as exemplified by the disparity of the weights (0.424 and 0.349 for the top two criteria as compared to 0.125 and 0.102 for the two lower criteria). Tremendous implication of the findings would contradict with what most college students had in mind while attending college. In other words, students often thought that acquiring “disciplinary skills” (or “technical skills” by most literatures) would be the route leading towards employability and the reasons of attending college. Contrary to what students had believed that employers view “general skills” and “professional attitude” to be much more important than “disciplinary skills” when it comes to employability.

As of individual items, experts viewed “work dedication” and “communication skill” to be the most importance sub-criteria for employability. Skill sets pertaining to “second language”, “teamwork skill”, “crisis management”, “resist pressure”, “lifelong learning”, and “planning/execution” are other individual items that cannot be overlooked that may come from personal traits and schooled development. It is recommended that colleges shall focus more on the aforementioned areas for the preparation of students’ employability upon graduation.

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He had been a full-time teacher at Tsing Hua High School in Taoyuan, Taiwan. He is currently the chairman for the Department of Food & Beverage Management at Lee-Ming Institute of Technology (New Taipei City, Taiwan). He holds authorships to a number of internationally acclaimed journal papers, most notably an SCI publication in the *Journal of Renewable and Sustainable Energy*, "Application of an ice thermal energy storage system as ways of energy management in multi-functional building" (<http://dx.doi.org/10.1063/1.4913646>). His research interests include but not limited to food science, hospitality management, and culinary education.

Chairman Feng holds a variety of certifications pertaining to culinary science, Advanced Chinese-Style Wheat Manufacturing, Chinese-Style Rice Manufacturing, Chinese Culinary, Hospitality Service, Cocktail Making, and Beverage Making. Chairman Feng has lead students to award winning performances in the 2014 International Culinary Competition for Healthy Culinary Innovation and the 2015 Taiwan Culinary Challenge.