A study of competency indicators of Web-based micro-entrepreneurs in the consumer leisure and entertainment electronics retail industry, using AHP for analysing the weights

Jun-Ren Wang†, Ya-Chun Chang‡, Chih-Wei Li‡ & Hsiu-Ching Li*

National Taiwan Sport University, Taoyuan County, Taiwan†
Chang Gung University of Science and Technology, Taoyuan County, Taiwan‡
Lee-Ming Institute of Technology, New Taipei City, Taiwan*

ABSTRACT: The study used the analytic hierarchy process (AHP) to weight and rank already developed competency indicators of Web-based micro-entrepreneurs in the consumer leisure and entertainment electronics retail industry. First of all, an AHP questionnaire was developed and, then, assessed by experts for appropriateness. Next, the AHP questionnaire was filled out by a total of 11 respondents. Then, the obtained data were statistically analysed and the overall order of weights with the dimension of the competency indicators were presented. Finally, the results can be used by universities, colleges, entrepreneurship programmes and other educational institutions for constructing courses, arranging the course contents and planning the sequence of the courses to be offered.

INTRODUCTION

Analytic hierarchy process (AHP) was developed by Thomas L. Saaty (a Professor at the University of Pittsburgh) in 1971, and it is mainly applied to decision making under uncertain circumstances or with multiple evaluation criteria. For decision makers, AHP is helpful for understanding these matters, but when it comes to choosing the most appropriate plan among many, an order of priority of all possibilities should be formed according to certain criteria, and the criteria have to include multiple aspects, such as technology, science, social science, economics and politics.

Making decisions based on any single aspect alone may lead to erroneous outcomes and that can be much more harmful than making no decision at all. Due to the above-mentioned considerations, a set of theories has been developed to handle complicated decision making problems related to economy, social science and management [1].

In the case of building comprehensive and appropriate courses for Web-based micro-entrepreneurs in the consumer leisure and entertainment electronics retail industry, AHP can be used to weight the various competency indicators, and so an order of priority of these indicators can be developed based on the weight. In other words, AHP is helpful for understanding which competency should be prioritised and which weighted less highly, and the information can be applied in constructing courses, arranging the sequence the courses to be offered, calculating hours required for the courses, and determining the key courses in order to make course planning more comprehensive and appropriate.

According to the background and motivation presented above, the objective of this study is as follows:

AHP was used to determine the weight and the order of priority of the competency indicators of Web-based micro-entrepreneurs in the consumer leisure and entertainment electronics retail industry [2].

CONSTRUCTING AND ANALYSING THE AHP QUESTIONNAIRE

A questionnaire based on AHP was constructed following on from work by Saaty, Sun and Syu [1][3-6].

The AHP questionnaire was developed based on the competency indicators of Web-based micro-entrepreneurs in the consumer leisure and entertainment electronics retail industry [1][3-6].

Hierarchical associations were built based on the vocational competency inventory. The number of levels was determined by the nature of the issue and the needs. If more than 7-8 items are to be compared, a lack of consistency may be a concern for the evaluation/assessment. Furthermore, the elements of each level should be independent. Together, the development of the hierarchical structure should qualify for the following principles. First, the number of elements of each level should

be fewer than seven-eight (7-8). If there are more, one should use more levels. Secondly, elements with a similar nature should be clustered into the same level. Third, elements within the same level should be independent [1][3-6].

Considering these principles, the AHP questionnaire was developed. Data were collected using the questionnaire survey method. Indicators within each level and between different levels were pairwise compared. Questionnaire respondents pairwise compared the competency indicators, as well as the dimensions in terms of the level of importance and, then, ticked the answer on the questionnaire. The study used a 5-point ratio scale, starting from equally important (score = 1) to slightly more important (score = 3) to very important (score = 5) to extremely important (score = 7) and to absolutely important (score = 9). There was an intermediate score, i.e. 2, 4, 6 or 8, between every two neighbouring points. In total, there were nine relative intensity levels [1][3-6].

A pairwise comparison matrix was constructed. The investigators transformed the nominal scale into the ratio scale, forming a total of 17 relative ratios from 1:9 to 9:1. Questionnaire respondents had to carry out pairwise comparison for a total of C(n,2) = n (n - l)/2 times [1][3-6].

The weights were determined: after the questionnaire was filled out, a pairwise comparison matrix was established. Expert Choice computer software was used to compute the weight of each level, i.e., the relative level of importance among all and the weight within the dimension [1][3-6].

The level of consistency was tested. The purpose was to ensure that the questionnaire respondents carried out the pairwise comparison for determining the weight of indicators with a good consistency in order to ensure the reliability of the questionnaire survey. The test criteria used included a consistency index (CI), consistency ratio (CR) and random indicator (RI). A CR equal to 0 indicates that the pairwise comparison matrix has complete consistency. A CR greater than 0, on the other hand, indicates inconsistent judgments.

Nevertheless, because this kind of human error is common and hard to avoid, Saaty suggested that a CR $\leqq$ 0.1 is acceptable. On the other hand, if an expert/scholar's questionnaire response has a CR > 0.1, then, the expert/scholar has to check if the weights of the questionnaire items are logical and can qualify for a ratio relationship. The criterion CR $\leqq$ 0.1 should be met [1][3-6].

The priority of all levels was calculated. If the consistency ratio of the overall level is smaller or equal to 0.1, then, the relative weights of indicators of each level should be integrated to determine the weight of each level. The weight indicated the relative priority of each indicator and, it can be used to establish an overall weight system of the specific vocational competency [1][3-6].

METHOLOGY

As mentioned earlier, this study used AHP to determine the weight of existing competency indicators of Web-based micro-entrepreneurs in the consumer leisure and entertainment electronics retail industry and to rank the indicators based on the priority [2]. The investigators first developed an AHP questionnaire, which was confirmed by experts for appropriateness. The AHP questionnaire was then filled out by five experts from the academic field and six experts from the practical field (N = 11). The order of priority was determined after the statistical analysis.

DATA ANALYSIS AND DISCUSSION

According to the study objectives, AHP was used to determine the weight of existing competency indicators of Web-based micro-entrepreneurs in the consumer leisure and entertainment electronics retail industry and to rank the indicators based on the priority. Expert Choice 2000 (2nd Edn) was used for the statistical analysis. Results from the AHP questionnaire are analysed and summarised below:

Expert Responses Showing High Consistency

For Expert Choice computation analysis, the consistency rate of the questionnaire items has to be $\leqq$ 0.1 in order to qualify for the required logical consistency. The consistency ratio of all the studied dimensions, sub-dimensions and competency indicators were all below 0.1 and, therefore, the standard set by Saaty are satisfied, i.e., the questionnaire responses had high consistency [1].

The experts gave *Company Personnel Management (0.237)* the highest weight, followed by *Company Operating Strategies (0.180), Company's On-site Business Operation and Administration (0.141), Company Finance Management (0.114), Crisis Management (0.105), Entrepreneurship (Work and Attitude) (0.099), Marketing Management of the Company (0.098)* and *Web-based (e-commerce) Entrepreneurship Plan (0.027)*.

According to the weight of the dimension overall and the consistency test results, experts considered that *Company Personnel Management (Work List)* should be the focus of Web-based entrepreneurship. The operational performance of Web-based micro-business should be determined by the entrepreneurship and management competency of the

entrepreneur or whether the members of the micro-entrepreneur business are capable of keeping the company run and developed continuously.

The next important dimensions are *Company Operating Strategies (Work List)*, *Company's On-site Business Operation and Administration (Work List)*, *Company Finance Management (Work List)* and *Crisis Management (Work List)*. Experts seemed to put the focus on basic competency. That is, after establishing the company, it is important to verify whether the entrepreneur or the micro-entrepreneur business group is equipped with fundamental business skills, including company management, business operation, finance and crisis responses.

If the micro-entrepreneur business possesses the competency, training and learning on *Entrepreneurship (Work and Attitude)*, *Marketing Management of the Company (Work List)* and *Web-based (e-commerce) Entrepreneurship Plan (Work List)* can be given. Entrepreneurship training can fortify entrepreneurs' confidence and attitude in starting their own business, whereas marketing management and Web-based entrepreneurship plans are practical for starting a business. Therefore, when constructing relevant courses, the courses can be arranged according to the order of priority provided here to create a practical and suitable course structure.

The experts provided the following order of priority of the competency indicators of each dimension:

The *Web-based (e-commerce) Entrepreneurship Plan (Work List)* dimension comprised operational laws and regulation (0.735), company establishment (0.201), and marketing expertise (0.064) as three sub-dimensions. These three sub-dimensions were weighted and tested for consistency.

According to the experts, the order of priority of these three sub-dimensions should be company establishment, followed by operational laws and regulations, and marketing expertise the last. First, the experts considered that to establish a company, funding, hardware and software are basic requirements. Second, it is important to understand legal matters related to tax, insurance and products. The least important dimension is marketing expertise, which is about product selling models.

Under the *Web-based (e-commerce) Entrepreneurship Plan (Work List)* dimension, the competency indicators of operational laws and regulations were weighted, and these indicators in the order of priority were: *Understanding tax related knowledge (coordinating with bookkeeper or accountant) (0.174)*, *Exploring required legal protection, e.g. trademarks, patents, copyrights (0.156)*, *Receipt registration and business registration (coordinating with bookkeeper or accountant) (0.143)*, *Preparing market plans for computers, communications and consumer-electronics (0.136)*, *Understanding laws and regulations related to on-line business (0.120)*, *Establishing the company's organisation rules (coordinating with the bookkeeper or accountant) (0.093)*, *Understanding laws and regulations related to computers, communications and consumer electronics products (0.090)* and *Purchasing insurance for the proprietor(s) and the employees (0.087)*.

The experts considered that to run a company, one has to understand about tax, legal protection, receipt application and business registration. In other words, these three types of competency are critical and fundamental.

Under the *Web-based (e-commerce) Entrepreneurship Plan (Work List)* dimension, the competency indicators of company establishment were weighted, and these indicators in the order of priority were: *Applying for a merchant account for accepting credit card payment (0.246)*, *Determining the stop-loss point for the business operation (0.191)*, *Determining the operating model and software/hardware planning before starting the business (0.183)*, *Setting up an independent corporate Web site (0.114)*, *Naming the Web-based company (0.125)*, *Conducting acceptance check of the business location (0.074)* and *Determining the stop-loss point for the business operation (0.067)*.

For *company establishment*, *Applying for a merchant account for accepting credit card payment* was the most important competency indicator. The experts considered that because credit cards are very commonly used in this information technology era, it is necessary for Web-based business to accept credit card payments in order to survive in the virtual community.

Under the *Web-based (e-commerce) Entrepreneurship Plan (Work List)* dimension, the competency indicators of marketing expertise were weighted and in the order of priority, these indicators were: *Vision and potential (0.221)*, *Determining shareholder exist mechanisms (0.153)*, *Verifying the quality of computers, communications and consumer electronics products for the retail (0.132)*, *Offering proprietor and staff training (0.128)*, *Conducting pre-sale activities for computers, communications and consumer electronics products (0.122)*, *Confirming the sources of computers, communications and consumer electronics products for the retail (0.120)*, *Developing computers, communications and consumer electronics for the retail business (0.068)* and *Searching for potential market for computers, communications and consumer electronics on-line (0.055)*, *Vision and potential* was weighted as the most important one.

The experts considered that a company has to have vision and expectation in order to advance itself. In other words, having the ability and insight for choosing products with a good potential and using creative and innovative marketing approach are critical for developing market trends.

For *Company's On-site Business Operation and Administration*, the competency indicators were weighted, and the indicators in the order of priority were: *Using smart phones, tablet computers or mini laptops for remote management (0.217), Controlling the product and service quality (0.212), Setting up the business operation goals (0.140), Implementing the business operation goals (0.139), Implementing and supervising the work standard procedures (0.096), Procurement decision for company operating supplies and equipment (0.092), Holding operation and review meeting (0.065)* and *Reviewing the business operation goals (0.039)*.

This result from the experts is consistent with the features of Web-based micro-enterprises. In general, Web-based shops, such as those on PChome and Yahoo, often use email or the mobile phone to communicate with the customers, which implies that these shops are likely to be managed by few people. As a result, remote management is critical here. Furthermore, sources of products and service quality are crucial too. If a shop can provide popular products, good advice and satisfying post-sale services, their customers are likely to give good feedbacks and revisit the shop.

For *Company Finance Management (Work List)*, the competency indicators were weighted, and the indicators in the order of priority were: *Controlling the operating cost of the company (0.181), Product cost control (0.157), Setting up zero inventory goals (0.142), Searching for sources of funding (0.133), Establishing fixed time inventory check system (0.101), Establishing good financial social relationships* (e.g. banks and investor companies) *(0.100), Invoicing and payment handling (0.097)* and *Operating cash flow management (0.088)*.

The most important three were: *Controlling the operating cost of the company*, *Product cost control* and *Setting up zero inventory goals*. These results from the experts and the features of Web-based micro-entrepreneur business are consistent. For micro-entrepreneurs, they are likely to have limited personnel and funds and, thus, the three most important types of competency mentioned here are all related to the use of the funds.

For *Company Operating Strategies (Work List)*, the competency indicators were weighted, and the indicators in the order of priority were: *Research and development of computers, communications and consumer electronics products (0.220), Pricing strategies of computers, communications and consumer electronics products (0.219), Innovation of company's operating strategies (0.142), Integration and application of relevant resources (0.124), Adjustment of the operating condition of computers, communications and consumer electronics products (0.102), Market survey and analysis of computers, communications and consumer electronics products (0.080), Future development and planning of the company's retail of computers, communications and consumer electronics products (0.063)* and *Marketing positioning of computers, communication and consumer electronics products (0.050)*.

The top three types of competency were: *Research and development of computers, communications and consumer electronics products*, *Pricing strategies of computers, communications and consumer electronics products* and *Innovation of company's operating strategies*. For companies to make profits, innovation is fundamental and indispensible. In the highly competitive market of Web-based consumer leisure and entertainment electronics products, survival of the fittest is the rule.

The experts considered that the three most important types of competency are innovative operational strategies, marketing strategies, and product research and development. One of the investigators of this study once found a Web-based seller selling a 6,000 NTD worth of LCD TV for 3,000 NTD. After inquiries and on-site visit, that investigator realised that that merchandise came from foundries; while some are new, others can be outdated or with flaws. Although the shop has no attractive Web site and only a warehouse at a not so optimal location, its sales figures are impressive. The investigators believe that innovative product research and development is the key factor leading to the success.

For *Marketing Management of the Company*, the competency indicators were weighted, and the indicators in the order of priority were: *International marketing (0.279), Establishing customer service system (0.177), Promotional programmes for computers, communications and consumer electronics products (0.138), Becoming franchisee of the large-scale domestic on-line shopping companies, e.g. Yahoo, PCHOME for opening on-line stores (0.121), Establishing products related social network (0.090), Integrating virtual and physical retail channels (0.077), Marketing plan for computers, communications and consumer electronics products (0.068)* and *Selecting media for computers, communications and consumer electronics products (0.050)*.

The three most important types of competency were: *International marketing*, *Establishing customer service system* and *Promotional programmes for computers, communications and consumer electronics products*. The researchers considered that international marketing is an area worth developing; after all, the virtual world is borderless. Two keys here are selling points and uniqueness. Of course, one does have to take cultural and market differences of the target market into consideration.

An example here is related to one of the investigator's on-line DVD purchasing experience. It is known that some Web-based shops sell recent movies for a relatively low price. When the investigator received the merchandise, it was found that the product had been shipped from Hong Kong, meaning that the product had likely been made in China. How the seller can make a profit may be copyright related. It is also important to set up a customer care and service system.

One example is about one of the investigator's on-line toner cartridge purchasing experience. Some sellers would record the email account of the buyers, send advertisements to those customers routinely and give discounts to loyal customers. As a result, the investigator tends to purchase toner cartridges from the same seller. This example shows the importance of product promotion and customer care.

For *Company Personnel Management (Work List)*, the competency indicators were weighted, and the indicators in the order of priority were: *Establishing job contents and responsibilities of employees (0.197)*, *Setting up the incentives/bonus system for full-time employees and partner(s) (0.139)*, *Setting up employees appraisal system (0.134)*, *Setting up the personnel system and regulations of the company (0.125)*, *Employee on-job training and supervising (0.111)*, *Severance package (0.110)*, *Setting up the pay structure/system of employees (0.099)* and *Talent seeking and recruitment (0.085)*.

The most important three were: *Establishing job content and responsibilities of employees*, *Setting up the incentives/bonus system for full-time employees and partner(s)* and *Setting up employees appraisal system*. The investigators considered that these three most important types of competency are related to performance. In other words, having a reasonable performance system, as well as an incentives/bonus system can increase the company's sales figures. As for developing job contents and employee responsibilities, it enables the company to clearly define the tasks and business of each employee.

For *Crisis Management (Work List)*, the competency indicators were weighted, and the indicators in the order of priority were *Legal dispute between employees and the company (0.239)*, *Legal handling of customer complaint (0.167)*, *Customer complaint follow-up (0.150)*, *Handling of legal disputes with opponents or the government (0.131)*, *Public safety and accident handling (0.108)*, *Setting up a spokesperson system (0.081)*, *Occupational injury handling (0.068)* and *Customer complaint handling*.

The three most important types of competency were: *Legal dispute between employees and the company*, *Legal handling of customer complaint* and *Customer complaint follow-up*. This finding indicates that the relationships between the company and employees and between the company and customers are important. If any matter related to these relationships cannot be well handled, legal problems may arise.

For *Entrepreneurship (Work and Attitude)*, the competency indicators were ranked, and the indicators in the order of priority were: *Being capable of accepting the risk of company failure (0.169)*, *Being highly ambitious (0.158)*, *Taking challenges and implementing reform continuously (0.147)*, *Being the first discovering market opportunities (0.141)*, *Organising and managing the company (0.132)*, *Being capable of implementing innovative management and decision-making (0.127)*, *Being capable of profit making (0.068)* and *Being capable of resource integration (0.057)*.

The most important indicators were: *Being capable of accepting the risk of company failure*, *Being highly ambitious* and *Taking challenges and implementing reform continuously*. This finding indicates that entrepreneurs should be independent and be responsible for the consequences. In addition, ambition, as well as ability to reform is important too. That is a lack of ambition or the ability to reform or to take challenges can compromise the survival of a company.

Taken together, the competency indicators of Web-based micro-entrepreneurs in the consumer leisure and entertainment electronics retail industry were weighted using data collected from the AHP questionnaire survey. Important competency indicators were analysed, explained, summarised and illustrated. The investigators considered that educators should understand, learn and apply the order of priority of competency indicators. Aside from the competency indicators proposed by learning experts, it is also important to use the order of priority of a specific competency indicator when providing relevant courses or training in order to get Web-based micro-enterprise entrepreneurs in the consumer leisure and entertainment electronics retail industry ready for successful business.

CONCLUSIONS AND RECOMMENDATION

The study used the analytic hierarchy process (AHP) to weight and to rank the already developed competency indicators of Web-based micro-entrepreneurs in the consumer leisure and entertainment electronics retail industry.

The results can be used by universities, colleges, entrepreneurship programmes and other educational institutions for constructing relevant courses, arranging the course contents, and planning the sequence of the courses to be offered.

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