



# Marketing mix formulation for higher education

## An integrated analysis employing analytic hierarchy process, cluster analysis and correspondence analysis

Hsuan-Fu Ho and Chia-Chi Hung  
*National Chiayi University, Chiayi City, Taiwan*

### Abstract

**Purpose** – The purpose of this paper is to examine how a graduate institute at National Chiayi University (NCYU), by using a model that integrates analytic hierarchy process, cluster analysis and correspondence analysis, can develop effective marketing strategies.

**Design/methodology/approach** – This is primarily a quantitative study aimed at developing a marketing mix for a graduate institute at NCYU in Taiwan. A survey using stratified random sampling was conducted, with 14 universities from four different areas in Taiwan randomly selected for the study. Two questionnaires were conducted: a Likert's five-scale questionnaire regarding school images and an analytic hierarchy process (AHP) questionnaire regarding school selection factors were administered to 640 undergraduate students. Of the total number of questionnaires, 602 (94 percent) valid school image questionnaires and 570 (89 percent) valid school selection factors questionnaires were used.

**Findings** – The results of AHP revealed that the five most important factors for students' school selection were: employability, curriculum, academic reputation, faculty, and research environment. The results of clustering analysis identified five student groups for market segmentation, and they are the Prominence group, the Less aware group, the Pragmatic group, the Austerity group, and the Fastidious group. Finally, the results of correspondence analysis suggested that students of the Pragmatic Group are more likely to be attracted by NCYU, and also, students perceived NCYU to be strongly associated with lower tuition, fewer entrance-exam subjects, lower entrance-exam pass rates, and easier graduation requirements.

**Research limitations/implications** – It would be better to conduct a factor analysis before using AHP.

**Practical implications** – Particularly, NCYU should establish new curricula relevant to internationalization, develop curricula in school finance and educational economics, and form study groups to enhance graduating student employment opportunities. Generally, higher educational institutions may adopt the research model developed in this study to develop their marketing mix for better results.

**Originality/value** – This paper documents research that was the first to integrate AHP, cluster analysis, and correspondence analysis in developing a marketing mix for higher educational institutions.

**Keywords** Marketing, Analytical hierarchy process, Cluster analysis strategy, Higher education, Taiwan

**Paper type** Research paper

### Introduction

Higher education in Taiwan has expanded dramatically in recent years. The number of institutions of higher education in Taiwan grew from 22 in 1984 to 163 by 2006. In



accord with this trend, institutions of higher education specializing in teacher training increased from 12 in 1995, to nearly 70 by 2006. This growth has created fierce competition, necessitating the development of effective marketing strategies in graduate teacher training institutions.

The Graduate Institute of Educational Administration and Policy Development of National Chiayi University (NCYU – the university's abbreviation, through this article), a graduate level teacher training institution, aims to prepare educational organization leaders conducting advanced research in relevant fields. When this institution was established in 2001, the market was not particularly competitive, while the pool of students seeking admission was abundant. This pool has shrunk because of the rapid increase in the number of institutions of higher education, as well as sharply reduced birth rates in Taiwan. As a result, NCYU experienced a dramatic shrinkage of applications, from 249 applicants in 2004 to 133 applicants in 2005. During this time, NCYU realized that marketing was important, but it did not have sufficient funds to create sophisticated marketing approaches, which are expensive. While NCYU developed advertising and scholarship campaigns to attract students, the work was fragmentary, and the number of applicants decreased yet further, to 131 in 2007. Learning from these failures, NCYU has realized that it has to establish marketing policies based not only on advertising its specialties or offering scholarships, but which also better take into consideration the real requirements of prospective students. Additionally, because of the lack of funds, the school desires to incorporate market segmentation and market positioning techniques, in order to make its marketing strategies more cost-effective. Our research examines how NCYU can develop sound marketing strategies by using a new market model that integrates analytic hierarchy process (AHP), cluster analysis and correspondence analysis, so that the school will be able to excel in an increasingly competitive marketplace.

### Strategic marketing

Kotler and Fox (1995) suggest that educational institutions should take certain steps to develop sound marketing strategies. Such steps include the analysis of internal and external environments so that the educational institution can identify major marketing opportunities and determine which of these can be seized with limited resources. Additionally, educational institutions must come up with clear marketing objectives that consider issues such as market segmentation, targeting and positioning, and selected consumer demographics. This process is consistent with the concepts of Sarvary and Elberse (1995), who argue that after a market environment analysis three essential methods should be used for the design of a successful marketing strategy, including:

- (1) market segmentation;
- (2) target market selection; and
- (3) product positioning.

This research will employ this marketing strategy development process, and emphasize how NCYU may use these techniques to develop sound marketing strategies.

Market segmentation separates a market into groups of customers with similar needs and purchasing patterns. Sarvary and Elberse (1995) argue that there are two types of segmentation:

- (1) segmentation based on benefits sought by customers; and
- (2) segmentation based on observable characteristics of customers.

Based on this, Sarvary and Elberse suggest that marketers conduct thorough market analyses, which will typically segment customers into groups based on the benefits and needs they expect from particular products. By designing their products and marketing to match these customer expectations, organizations can serve these segments more efficiently and effectively. Sarvary and Elberse further note that although some marketers tend to delineate segments based on observable characteristics, such as gender, age, and geographic location, such segmentation is only effective to the extent that it is correlated with customer benefits and needs. With these findings in mind, this research will cluster prospective “customers” (students) based on their expected educational benefits and needs.

Churchill and Iacobucci (2007) suggests that cluster analysis is a very useful market segmenting tool to identify group of similar characteristics; such as brands, products, and most frequently, people. Myers and Mullet (2003) also suggests that the most appropriate interdependence statistical techniques for market segmentation are clustering methods, and they further stress that although there are several types of clustering methods, Ward’s linkage method is probably the most often used clustering method. Therefore, the Ward’s clustering method is used in this research for market segmentation.

In order to better understand the customers’ educational expectation and requirements, the AHP will be used to order these expectations. AHP has been applied to a wide variety of complex decision-making problems, and it is especially powerful in deciding the weight of factors. Because we may face many problems at any given time in our complex world, it is important to order priorities and objectives, structure problems within an organized (if complex) framework, in order to simplify decision making. The AHP is a valuable methodology for managing factors such as these. The AHP begins by determining pertinent factors, and then structuring these factors into a hierarchy. This hierarchy descends in successive levels from an overall objective to various dimensions and criteria, with numerical values assigned to each variable. This method especially aids decision-makers in maintaining coherent thought patterns as they reach conclusions (Saaty, 1990; Saaty and Vargas, 1994).

Target market selection is used to select one or more market segments, so that an organization can maximize profits. Generally speaking, there are three types of target market selection. Mass marketing (undifferentiated marketing) is generally used in situations where almost all customers have the same characteristics. Organizations using this strategy may save production and promotion costs, but find themselves at a disadvantage compared to competitors that target specific market groups. Targeted marketing (differentiated marketing) separates the market into groups of customers with somewhat different wants and needs. This strategy is often used in markets where customers have diverse characteristics. Organizations adopting this strategy often promote different marketing mixes tailored to the needs and requirements of customers in selected market sectors. Niche marketing (concentrated segmentation) focuses on relatively small numbers of customers in a market. This strategy has often been used by organizations that have highly specialized goods or techniques attractive only to small groups of consumers with certain common characteristics. Although

organizations adopting this strategy might create higher customer loyalty, they put themselves at risk by being firmly tied to specific groups, which may see diminished purchasing power or succumb to competitive appeals (Kotler, 1999).

Brand positioning is built around the specific perceptions of consumers, and this method articulates an organization's perceptual location relative to other organizations. Tybout and Sternthal (2005) claim that brand positioning better fulfills consumer needs because it not only addresses the specific meaning of a brand in consumers' minds, but also articulates the goal that consumers will achieve.

Greenacre and Blasius (1994) suggest that since market positioning is a process of building and/or maintaining a distinctive image perceived in relation to competitors, the use of correspondence analysis and perceptual mapping techniques can better identify patterns of results and can reveal possible options for organizations. Hence, correspondence analysis is used in this research for target market selection and market positioning.

In this research, AHP was employed to examine the priority of consumer requirements. After this, cluster and correspondence analysis were used to segment and select target markets. A final correspondence analysis was conducted for improved market positioning. Based on the results, suggestions on marketing strategy were submitted to NCYU.

### **Analytic hierarchy process**

The first step toward the establishment of the strategic marketing plan in this research was to use AHP to identify the requirements of prospective students. A sample of 640 prospective students was selected from undergraduate programs in 14 universities around Taiwan, of which 570 (89 percent) were valid for analysis. Fourteen factors (prospective student requirements) were identified, derived from theory and from interviews with 20 students. The 14 factors were then grouped into five categories as shown below:

(1) *Living:*

- location;
- convenience; and
- campus.

(2) *Learning:*

- faculty;
- curriculum; and
- research.

(3) *Reputation:*

- academic reputation; and
- alumni reputation.

(4) *Economy:*

- tuition;
- subsidies; and
- employability.

(5) *Strategy:*

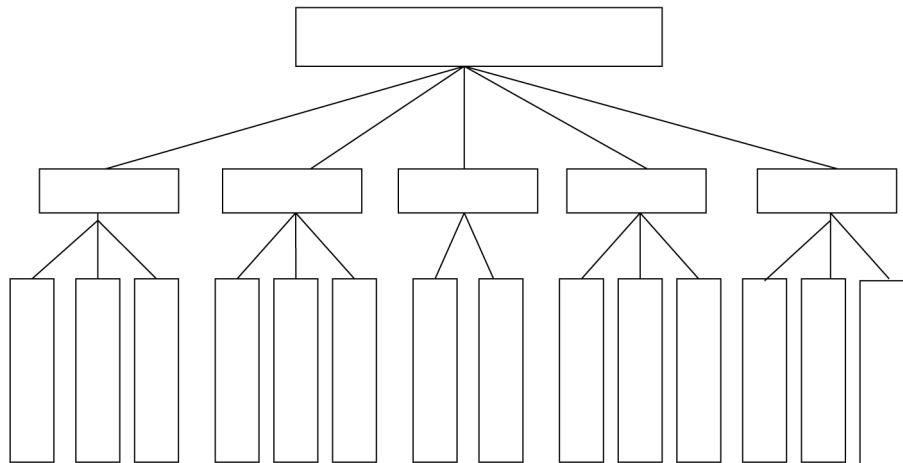
- exam subjects;
- exam pass rate; and
- graduation requirements.

A hierarchy structure was formed, as shown in Figure 1.

In Figure 1, the major marketing goal (topmost level) is the student's selection of an ideal school. The second level of the figure shows the five criteria that may help students achieve this goal. To obtain the weights for each of these criteria, a pair-wise comparison for each pair was conducted. This was done by using a nine-point scale questionnaire, which identified preference of one criterion over another. The weight of each criterion was calculated by using positive reciprocal matrix. The weight was then ranked as following: Learning (0.32), Economy (0.20), Reputation (0.17), Living (0.17), and Strategy (0.15). These results represented the relative importance of each of these criteria to student satisfaction. Thereafter, pair-wise comparisons of each pair of sub-criteria (on the third level in Figure 1) with respect to each criterion (on the second level) were conducted, and the weight of importance with respect to the criteria and to the major marketing objective was calculated. This data are presented in Table I. The five most important sub-criteria were: Employability (0.147), Curriculum (0.129), Academic reputation (0.106), Faculty (0.102), and Research environment (0.087).

**Cluster analysis**

Table II below presents a profile of prospective students, determined through Ward's linkage clustering analysis. A sample of 640 prospective students was selected from undergraduate programs in fourteen universities around Taiwan, of which 602 (94 percent) were valid for analysis. Using cluster analysis was to understand underlying dimensions of student choice based on the above school selection criteria, and to segment students into identifiable groups. The clustering base included factors of Living, Learning, Reputation, Economy, and Strategy. We hold that a five-cluster solution is the most appropriate pattern. Table II lists five discernable clusters of



**Figure 1.**  
Hierarchy structure of  
school selection factors

**Table I.**  
Weights of school  
selection factors

First level (Major goal)	Second level (Criteria)	Third level (Sub-criteria)	Contribution to second level	Contribution to first level
Satisfaction	Living	Location	0.298	0.17
		Convenience	0.497	0.050
		Campus	0.204	0.083
	Learning	Faculty	0.302	0.034
		Curriculum	0.405	0.32
		Research	0.274	0.102
	Reputation	Academic	0.635	0.130
		Alumni	0.364	0.087
	Economy	Tuition	0.145	0.17
		Subsidies	0.103	0.106
		Employability	0.750	0.061
	Strategy	Exam subjects	0.341	0.20
		Exam pass rate	0.349	0.029
		Graduation requirements	0.308	0.020

**Table II.**  
Cluster characteristics

	Sample	Living	Learning	Reputation	Economy	Strategy	Group name
Cluster 1	104	1.013	1.311	1.476	1.061	- 0.080	Prominence
Cluster 2	61	0.328	0.404	0.279	0.301	- 0.087	Less aware
Cluster 3	100	0.843	1.273	- 0.020	1.260	0.713	Pragmatic
Cluster 4	122	- 0.109	1.358	1.123	1.183	0.402	Austerity
Cluster 5	218	0.938	1.472	1.431	1.390	1.450	Fastidious

prospective students, each with the corresponding number of students and the average criteria scores.

Each cluster represents a market segment. Students in Cluster No. 1 are called the Prominence group because they have very high scores in every criteria except strategy. Cluster No. 2 students are called the Less aware group because they had mediocre or low scores in all five criteria. Students in Cluster No. 3 are called the Pragmatic group because they emphasize learning and economy, but do not stress living, reputation, and strategy. Cluster No. 4 students are called the Austerity group because they had a lower score in living, a medium score in strategy, and very high scores in learning, reputation, and economy. Students in Cluster No. 5 are called the Fastidious group, because they strongly emphasize renowned reputation, outstanding learning environment, abundant economic support and easier graduation.

The Fastidious group had a larger population than the other four groups, which suggests that more students exhibit careful or even meticulous attention to detail in their education choices. Teacher-training programs in Taiwan must be aware of this

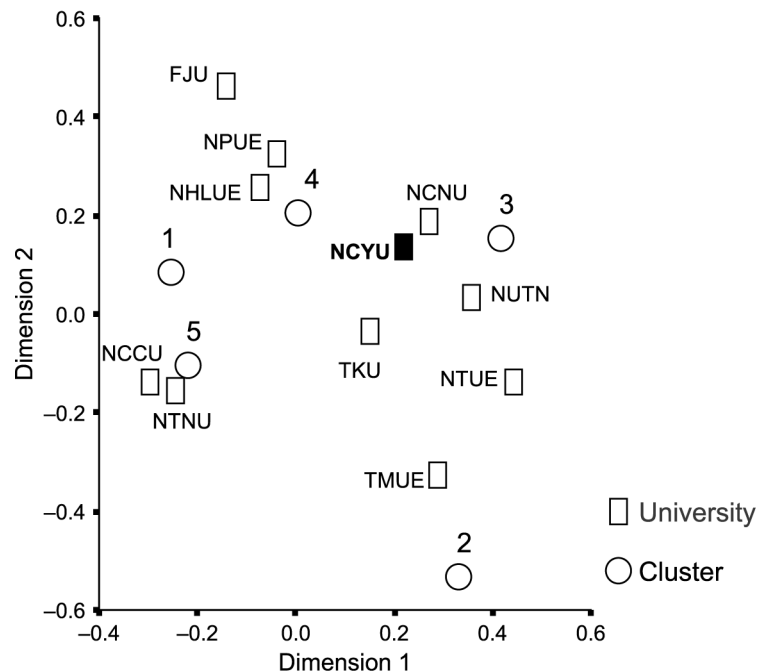
trend so they can better respond to student requirements. Moreover, students in almost all groups except the Less aware group had very high scores in learning, indicating that schools must improve their learning environments if they want to attract more students. Finally, the Less aware group did not emphasize any of the criteria, which may indicate that students in this group do not care much about *anything* relevant to their education, and may lack a strong willingness to get into a teaching and education program.

**Correspondence analysis**

Although market segmentation is important in establishing market strategies, additional steps are needed in a comprehensive market strategy. These steps should consider the student need to position brands (schools) effectively. Toward this end, this research employed correspondence analysis in order to select target markets and to accomplish market positioning.

We first employed a positioning strategy to determine NCYU’s desired target market. A correspondence analysis was then used to explain how NCYU is different from its competitors. Based on our findings, Figure 2 maps five clusters and 11 universities, revealing a number of possible differences between the image perceived by prospective students and the implicit positioning of institutions. These findings helped us to develop more effective marketing strategies for NCYU.

Recognition of the differences noted in text above and illustrated in Figure 2 is important for identifying directions for market repositioning. The closer a cluster is to a university on the map, the stronger is the perceived identification of that university



**Figure 2.**  
Perceptual map of  
universities and clusters

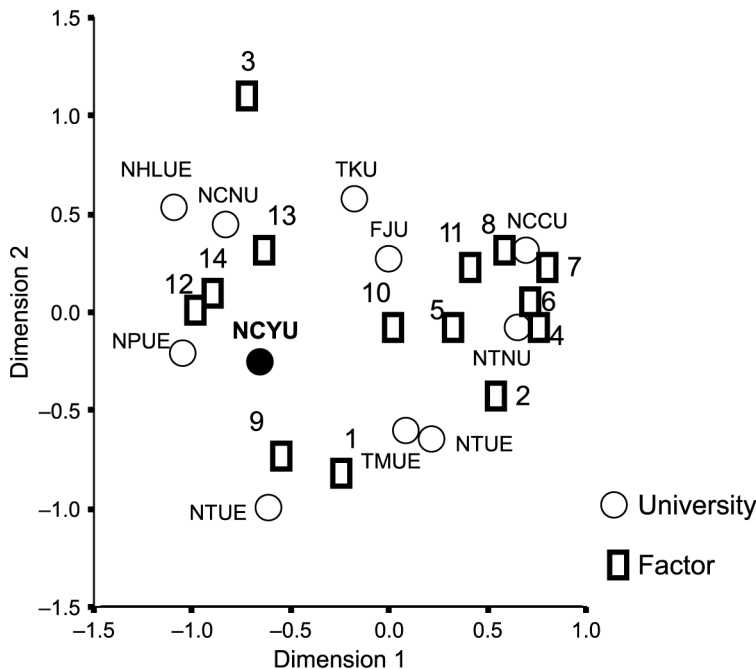
with that cluster. Figure 2 suggests that students in clusters 1 and 5 tend to be attracted by NTNU and NCCU, while cluster 3 students are more likely to be attracted by NCNU, NUTN, and NCYU. Students in Cluster 4 might be attracted by NPUE and NHLUE.

A second correspondence analysis, shown in Figure 3, displays the relative positions of the 14 school selection factors and the 11 universities.

Figure 3 suggests that students perceived NCYU to be strongly associated with lower tuition (No. 9), fewer exam subjects (No. 12), lower exam pass rates (No. 13), and easier graduation requirements (No. 14). NTNU and NCCU scored strongest with students in faculty composition (No. 4), distinguished curriculum design (No. 5), better research environment (No. 6), good academic reputation (No. 7), good alumni reputation (No. 8), and higher graduating student employability (No. 11). NTUE and CTUE were more attractive to students because of location (No. 1), and convenience (No. 2).

**Formulating strategy mix for NCYU**

The results of the AHP in this research reveal that students most emphasize employability, with curriculum placing second. This is somewhat different from traditional perceptions that students who graduate from teacher-training programs do not worry about employability. The source of this perception is that jobs in this field were previously guaranteed by the government. However, the dramatic expansion of teacher training programs and the sharp reduction of birth rates in Taiwan brought an end to this job guarantee, and students nowadays have to compete with one another for limited job opportunities. This in turn has further shrunk the application pool of



**Figure 3.** Perceptual map of universities and factors



students for teacher-training programs. This phenomenon represents both a challenge and an opportunity for NCYU, which now has to build up effective new marketing strategies to improve its major product – curricula – and to enhance its graduate student employability rate. If such strategies are successfully implemented, NCYU could distinguish itself from its major competitors, and gain a niche in the increasingly competitive higher education market (see Figure 4).

Of the five student groups this research identified:

- (1) Prominence;
- (2) Less aware;
- (3) Pragmatic;
- (4) Austerity; and
- (5) Fastidious – students in the Fastidious group (Cluster No. 5, the most-populous group) exhibit strong learning ambitions.

NCYU may thus have to seriously consider this group as its major target market. The Less aware group (Cluster No. 2, the smallest group), contains students who care least about almost all school-selection criteria, and thus do not constitute a good target market (see Figure 5).

The combination of market segmentation and market positioning offers an even better foundation for developing effective market strategies. Regarding the perceptual map of the marketplace acquired from correspondence analyses, the best targets are the Pragmatic Group (Cluster No. 3) and the Austerity Group (Cluster No. 4), because

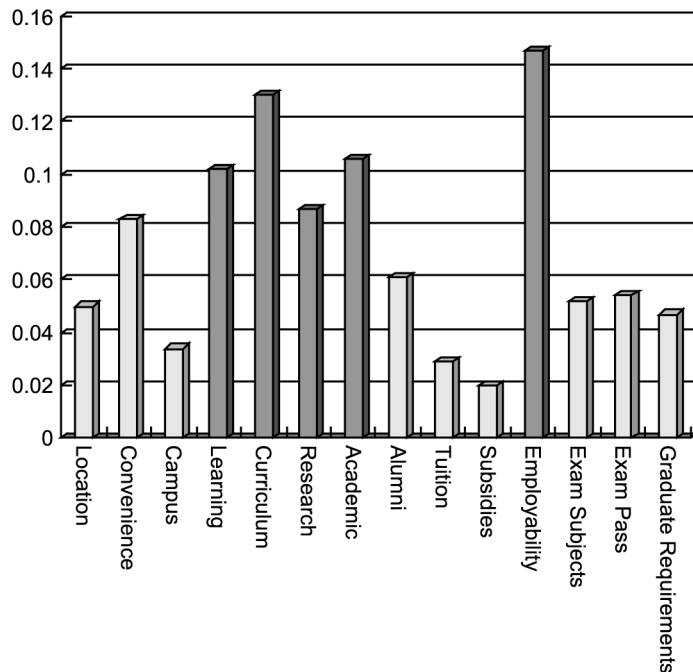
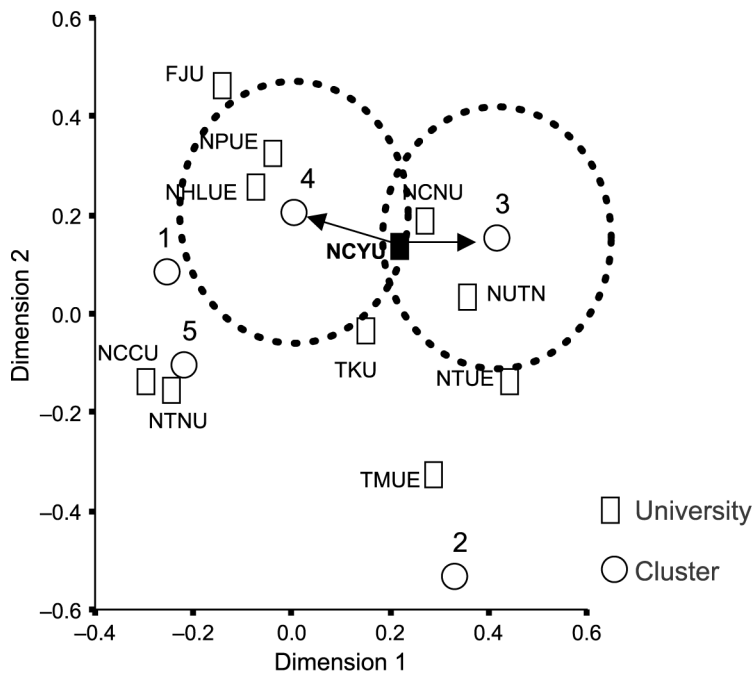


Figure 4.  
Weights of school  
selection factors

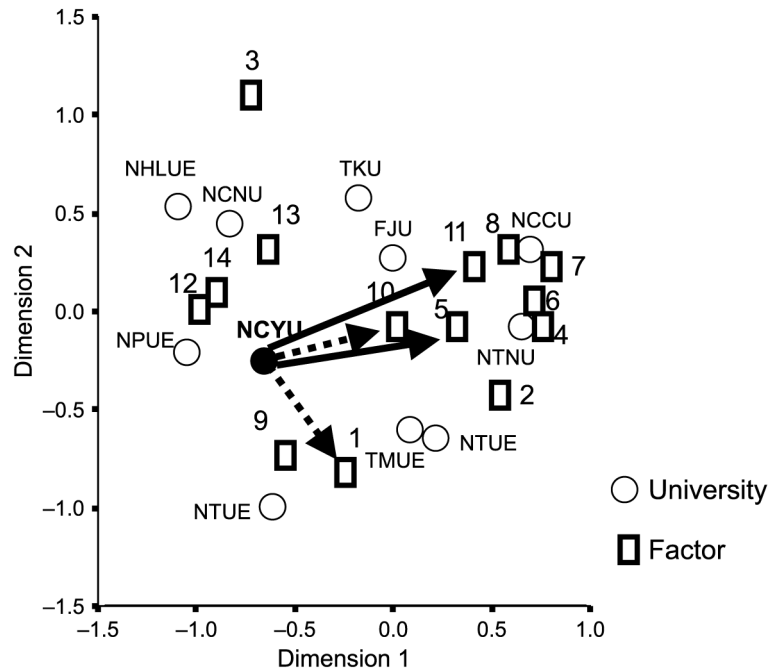


**Figure 5.**  
Perceptual map of  
universities and clusters  
for target marketing

their requirements align with NCYU products. Additionally, the populations of these two groups are large enough to be considered target markets. Although the Prominence group (Cluster No. 1) and the Fastidious group (Cluster No. 5) contain more diligent students, and are relatively larger, they are well beyond the reach of NCYU (circled area). Moreover, since the two universities closest to these two clusters are NCCU and NTNU, and they are schools deemed by almost all students in Taiwan to be excellent educational universities, it would be very difficult for NCYU to prevail in competition with them. As a result, NCYU, in the short-term, has to concede these two groups. On the other hand, although the Less aware group (Cluster No. 2) is less competitive and is not far away from NCYU, its population is relatively small and it primarily comprises students who do not care much about their education. Therefore, it may not be cost-effective for NCYU to select this group as its target market.

Since NCYU's best target markets are the Pragmatic group and the Austerity group, we should now go back and examine what the major concerns of students in these two groups are. We find from Table II that students in both of these groups stress learning and economy, and thus, NCYU should develop a strategy mix toward the improvement of these two criteria. Furthermore, since the AHP (see Table I) revealed that curriculum accounts for 40.5 percent of the importance of the learning criteria, and employability accounts for 75 percent of the economy criteria, it is crucial for NCYU to emphasize these areas when developing its marketing plan (see Figure 6).

Analysis of target-customer perceptions can help identify factors contributing to the success or failure of a marketing strategy, and allow an institution to deliver high-quality products that correspond to the demands of its customers. Therefore, this research conducted a second correspondence analysis and created a perceptual map



**Figure 6.**  
Perceptual map of  
universities and factors for  
strategy formulation

comprising NCYU’s target-market customer requirements, as well as those of competitive schools. The results show that NCYU attracts students principally through strategies of lower tuition (No. 9), fewer examination subjects (No. 12), higher entrance exam passing rates (No. 13), and lesser graduation requirements (No. 14). This does not coincide with NCYU’s target students’ prioritized requirements, such as employability and distinguished curricula. Therefore, NCYU has to focus on developing new curricula (No. 5), which could distinguish it from its main competitors, and at the same time enhance graduate employability (No. 11). Moreover, since factors of school location (No. 1) and subsidies (No. 10) are relatively adjacent to NCYU – a relative strength compared to its major competitors – NCYU will benefit by advertising or promoting these two factors.

Combining the findings of the above analyses, a strategy mix with three major strategies was established for NCYU. The first strategy is to establish courses relevant to internationalization. This strategy is sound because in the current socioeconomic environment, the government and Taiwanese society place particular emphasis on internationalization. Thus, graduate students with good English skills are much more attractive to employers. NCYU finds that it has a competitive advantage over its major competitors in this area because NCYU faculty all earned their doctoral degrees from top educational institutions in the USA, UK, and Australia, and all of them speak fluent English. The major tactics of this strategy include: revamping curricula by integrating faculty member knowledge and experience gained in different countries; establishing English-speaking courses; attracting overseas students with subsidies; subsidizing

students who seek English certificates; and strengthening linkages with universities abroad.

Since Taiwan's economic status has worsened recently, shortages of funding are common in many schools, and the subjects of educational economics and school finance have become very popular. Thus, another effective strategy is to establish courses in these areas. There are only five scholars specializing in these fields in Taiwan, with two of the five teaching at NCYU. The school can thus take advantage of this asset and attract students studying these subjects.

The final strategy is to form study groups focusing on enhancing graduate student employability. Thus far, three study groups have been formed, with the aim of helping students pass different government career exams. The study groups were free of charge. Each group was led by a volunteer faculty member, and students could freely participate.

### Conclusion

Although universities and colleges in Taiwan have increasingly realized the importance of having sound marketing strategies to stay competitive, they have concentrated their marketing strategies on promotion – advertising, tuition reduction, scholarships, etc. This trend has often obscured the fact that marketing should be based on customer needs, with better efforts made to fulfill these needs. Although market segmentation and positioning enable marketers and institutional planners in higher education to understand customer needs, and to visualize institutional advantages in relation to their competitors' positions, these are relatively new endeavors in educational marketing in Taiwan.

This research employed market segmentation and positioning techniques to help NCYU, a teacher-training institution, establish its marketing strategies. It also highlighted the effectiveness and usefulness of a model integrating Analytic Hierarchy Analysis, cluster analysis and correspondence analysis for marketing mix development. The findings have not only been adopted by NCYU to enhance its market position, but have also been used by other universities for their own marketing strategy development.

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**Corresponding author**

Hsuan-Fu Ho can be contacted at: [hfo@mail.ncyu.edu.tw](mailto:hfo@mail.ncyu.edu.tw)

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