The Construction of an Evaluation Model for After-school Programs

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Abstract

During the past few decades, various types of after-school programs for children have been set up dramatically in Taiwan due to social structure changes. This research aims to construct an evaluation model for after-school programs, based on the viewpoints of theories and practices and incorporated both the service quality and the marketing strategy. After a thorough literature review and interview with experts, an evaluation hierarchy, which consists of the factors that should be considered in evaluating after-school programs, is constructed. Experts are invited to fill out a questionnaire based on the hierarchy. Analytic hierarchy process (AHP) is used to calculate the relative importance of the factors. The developed evaluation model shall provide an effective and objective mechanism for evaluating after-school programs.

Keywords: *Service Quality, After-school Programs, Marketing Strategy,
Analytic Hierarchy Process*

1. Introduction

The tremendous growth of after-school programs is due to three major societal concerns [10][11]. First, a dramatic shift in employment patterns has resulted in many children who are home alone and unattended for long periods of time after school [10][11]. The second societal concern is that children can learn under the right environment [10][11]. After-school programs, when operated effectively, can support students in their academic learning by providing them with structure, supervision, academic assistance, and the opportunity to learn study skills [21]. The third societal concern is the increasing trend of youth crime and youth victimization. After-school programs can occupy students' after-school time so that they can avoid involving in dangerous or harmful behaviors and situations.

Research on after-school education has been increasing in recent years in various countries due societal changes. Cosden et al. [5] studied the influences of homework programs and after-school activities on school success in the U.S. and suggested to balance homework assistance with other aspects of the children's home lives to promote positive developmental outcomes. Huang and Cho [6] also studied the after-school programs in the U.S. and recommended that after-school programs should provide students with ample time and resources to complete their homework and teaching students particular study skills. Turmo et al. [22] studied the primary school students in Norway and found that after-school care is of significance on science achievement since it could provide increased number of learning opportunities.

Due to the changes in Taiwan's social structure, women's labor force participation rate increases consistently, and after-school care has become a second home for many children. In addition, because of the changes of traditional family structure and lifestyle, coupled with declining birthrate phenomenon of the modern family, parents expect more from their children and are willing to increase the spending on children's education. As a result, more and more parents decide to send their school-age children to after-school care and various classes.

In Taiwan, most after-school care services, such as after-school care centers, talent classes, and cram classes, are privately-owned. Basically, the course design is to meet the needs of the market and focuses on children's homework assistance and provide repeated practices on schoolwork. A variety of

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talent courses are also provided to enhance children's music, arts, mathematics, science, etc. Many parents believe that after-school education not only can take care of their children, but also can make good use of time to enrich the knowledge of all aspects of their children, in addition to the removal of their children from the dangers of unattended at home. The emergence of school cram classes in the market, however, also creates problems, including teaching quality, teachers' qualifications, transportation security, environment safety and many other issues [12].

Most of the existing studies on after-school care services focused on the understanding of the after-school care education market. For example, Chiu [2], Huang [7], Lee [13], Lu [16] and Ma *et al.* [17] used different research methods to study after-school care services in Taiwan and to explore its extension of primary school curriculum. These studies found that after-school care was primarily aimed at academic counseling, and the major reasons parents let children attend after-school care institutions are to take advantage of time to finish homework and to strengthen various talents. Lee [14] studied the behavior of parents in choosing after-school care institutions. Hung [8], studied the parents of primary after-school classes and found that the quality of teaching service was positively related with the satisfaction of parents. Hung [9], in considering the declining birthrate and the trend of after-school care competition, studied whether the amount of parental involvement would affect the degree of satisfaction. The results showed that the degree of parental involvement had a significant impact on service quality and on parents' satisfaction. Tsai [23] used a quality function deployment (QFD) model to examine the quality of primary after-school care services, and found that the important quality improvement items included service attitude, professional skill, communication ability, reaction ability, safe and comfortable environment, curriculum plans, advanced education training of teachers, administrative coordination and communication, administrative assistance in teaching and management, and propaganda and advertisement. Chen and Lu [1] studied the after-school time of adolescents in Taiwan and found that time spent on after-school academic-related activities had positive effects on the educational achievement of the students.

The existing studies on the after-school care in Taiwan are mostly about the understanding of the current conditions of the after-school care market, and the exposition of activities, services and service quality. There is a lack of study on the institutional evaluation criteria. Therefore, this study is to explore after-school care institutions through the viewpoint of service quality. The main purposes are to develop an effective and objective evaluation model for institution selection and to determine the weights and ranking of evaluation criteria.

The rest of this paper is organized as follows. Section 2 constructed an analytic hierarchy process (AHP) model for after-school program evaluation. Section 3 applies the model in a case study in Taiwan. Some conclusions and discussions are presented in the last section.

2. Methodology

This paper adopts the Delphi method and the analytic hierarchy process (AHP) approach to establish an evaluation model for after-school programs. The steps are as follows:

Step 1. Use the Delphi method to select the most important factors. A questionnaire with a five-point Likert-type scale (where 1 means "strongly unimportant" and 5 means "strongly important") is prepared, and experts are invited to fill out the questionnaire. The absolute value and the standard deviation of the difference between the mode and the mean are calculated for each factor to study the dispersion of the responses. When the absolute value is less than or equal to 1, the consistency of experts' opinions is high; otherwise, the experts are asked to re-do the part of the questionnaire until a convergence is met. Select the factors with a mean that is greater than or equal to a threshold.

Step 2. Construct a hierarchy with dimensions and factors for evaluating after-school programs based on the factors selected in step 1.

Step 3. Prepare a questionnaire based on the hierarchy. The AHP is adopted to develop relative pairwise comparison weights of dimensions (factors), and a nine-point scale is used to express preferences between dimensions (factors) as equally, moderately, strongly, very strongly, or extremely preferred (with pairwise weights of 1, 3, 5, 7 and 9, respectively). Values of 2, 4, 6 and 8 are the intermediate values for the preference scale.

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Step 4. Construct pairwise comparison matrices for each expert k. For example, if there are n factors, denoted by X_1, X_2, X_3, …, X_n, with relative weights, denoted by W_{1k}, W_{2k}, W_{3k}, …, W_{nk}, respectively, the pairwise comparisons can be represented in the form of a matrix [4].

$$\mathbf{A}_k = \begin{bmatrix} \dfrac{W_{1k}}{W_{1k}} & \dfrac{W_{1k}}{W_{2k}} & \cdots & \dfrac{W_{1k}}{W_{nk}} \\ \dfrac{W_{2k}}{W_{1k}} & \dfrac{W_{2k}}{W_{2k}} & \cdots & \dfrac{W_{2k}}{W_{nk}} \\ \vdots & \vdots & \vdots & \vdots \\ \dfrac{W_{nk}}{W_{1k}} & \dfrac{W_{nk}}{W_{2k}} & \cdots & \dfrac{W_{nk}}{W_{nk}} \end{bmatrix} = \begin{bmatrix} a_{11k} & a_{12k} & \cdots & a_{1nk} \\ a_{21k} & a_{22k} & \cdots & a_{2nk} \\ \vdots & \vdots & \vdots & \vdots \\ a_{n1k} & a_{n2k} & \cdots & a_{nnk} \end{bmatrix} \qquad (1)$$

Step 5. Compute the eigenvalue and eigenvector of each pairwise comparison matrix for each expert k.

$$\mathbf{A}_k \cdot w_k = \lambda_{\max} \cdot w_k \qquad (2)$$

where w is the eigenvector of $\mathbf{A}_k$, and $\lambda_{\max}$ is the largest eigenvalue of $\mathbf{A}_k$.

Step 6. Check the consistency property of each matrix. The consistency index (CI) and consistency ratio (CR) are defined as:

$$CI = \frac{\lambda_{\max} - n}{n - 1} \qquad (3)$$

$$CR = \frac{CI}{RI} \qquad (4)$$

where n is the number of items being compared in the matrix, and RI is random index [20]. If CR is greater than 0.1, it is an indication of inconsistent judgment, and the expert needs to revise the values in the pairwise comparison matrix.

Step 7. Aggregate multiple experts' responses and form aggregated pairwise comparison matrices. By employing geometric mean approach, an aggregated pairwise comparison matrix for K experts is:

$$A^* = \left[a_{ij}^* \right] \qquad (5)$$

where $a_{ij}^* = \left(a_{ij1} \times a_{ij2} \times \ldots \ldots \times a_{ijK} \right)^{1/K}$

Step 8. Compute the eigenvalue and eigenvector of each aggregated pairwise comparison matrix and check the consistency property of each matrix.

Step 9. Calculate the synthesized priorities of the factors. The overall priority of a factor can be obtained by multiplying the factor priority with the priority of its upper-level dimension.

3. Case study

Service quality management is currently a subject with considerable attention in the business community [15][18]. The concept of service quality can also be adopted in education to provide effective management and to enhance the service quality of education [3]. The marketing function of after-school care is also important to the successful fulfillment of educational mission and the enhancement of public and market satisfaction [19]. Therefore, the hierarchy for evaluating after-

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school programs is divided into two dimensions: service quality and marketing. Based on literature review and interview with experts, factors for achieving service quality are listed. A group of nine experts in the field of after-school programs are invited to determine the importance of these factors through the Delphi method. Five experts belonged to the parents group, and four represented the operators group. After the second-round questionnaire, stability in the results is achieved. The absolute value of the difference between the mode and the mean is less than 1, and the mean decreases from 0.58 in the first run to 0.51 in the second run. The factors with an importance greater than 4 are selected for further analysis. The five factors under the service quality dimensions are: fee and location, facility and hygiene, teacher qualification and counseling, administration and services, and communication and attentiveness. For the marketing dimension, five P's., i.e. product, price, people, place and promotions, are the factors. The hierarchy is depicted in Figure 1.

A questionnaire based on the hierarchy is filled out by the experts, pairwise comparison matrices for each expert are prepared. For example, the pairwise comparison matrix of the factors under the service quality dimension for the first expert is as shown in Table 1.
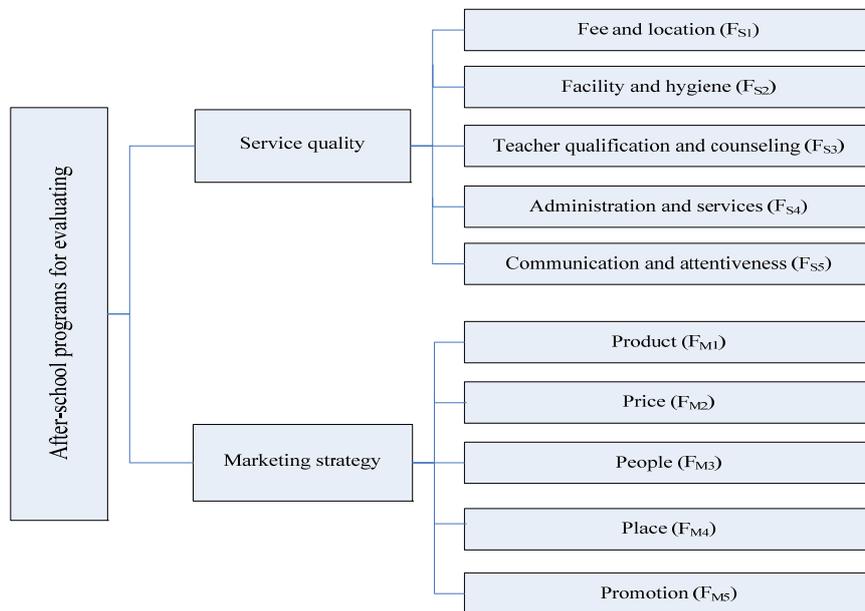

Figure 1. The hierarchy for evaluating after-school programs

Table 1. Comparison matrix for the factors under service quality by expert 1.

	Fee and location (F_{S1})	Facility and hygiene (F_{S2})	Teacher qualification and counseling (F_{S3})	Administration and services (F_{S4})	Communication and attentiveness (F_{S5})
Fee and location (F_{S1})	1	2	1/2	2	2
Facility and hygiene (F_{S2})	1/2	1	1	5	2
Teacher qualification and counseling (F_{S3})	2	1	1	6	2
Administration and services (F_{S4})	1/2	1/5	1/6	1	1/2
Communication and attentiveness (F_{S5})	1/2	1/2	1/2	2	1

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An eigenvector and an eigenvalue are calculated using the eigenvalue method by Equation (2).

$$w = \begin{matrix} F_{S1} \\ F_{S2} \\ F_{S3} \\ F_{S4} \\ F_{S5} \end{matrix} \begin{bmatrix} 0.239 \\ 0.244 \\ 0.323 \\ 0.067 \\ 0.127 \end{bmatrix} \text{ and } \lambda_{max} = 5.3292$$

The eigenvector shows the priority of the five factors assessed by the first expert. To check the consistency of this combination of values in the matrix, λ_{max} is substituted into Equation (3) to obtain *CI*, and *CR* is calculated by Equation (4).

$$CI = \frac{\lambda_{max} - n}{n-1} = \frac{5.3292 - 5}{5-1} = 0.0823 \text{，} \quad CR = \frac{CI}{RI} = \frac{0.0823}{1.12} = 0.0735$$

Since *CR* is less than 0.1, the comparison matrix is consistent.

Table 2 shows the weights of dimensions and factors and the consistency test results generated for each individual expert (E1 to E9). After all the comparison matrices have passed the consistency test, the opinions of the experts are aggregated by a geometric mean method. For example, the pairwise comparison results between *fee and location* (F_{S1}) and *facility and hygiene* (F_{S2}) from the nine experts are (2:1), (1:1), (1:4), (7:1), (4:1), (2:1), (4:1), (1:3) and (1:1). The opinions are aggregated by the geometric mean method, and the synthesized rating is $(2 \times 1 \times 0.25 \times 7 \times 4 \times 2 \times 4 \times 0.33 \times 1)^{1/9} = 1.495$. A combined matrix for the five factors under service quality dimension is calculated:

$$A^S = \begin{matrix} F_{S1} \\ F_{S2} \\ F_{S3} \\ F_{S4} \\ F_{S5} \end{matrix} \begin{array}{ccccc} F_{S1} & F_{S2} & F_{S3} & F_{S4} & F_{S5} \\ \begin{bmatrix} 1 & 1.495 & 0.558 & 1.501 & 0.573 \\ 0.669 & 1 & 0.524 & 1.107 & 0.381 \\ 1.790 & 1.908 & 1 & 2.273 & 0.740 \\ 0.666 & 0.903 & 0.440 & 1 & 0.312 \\ 1.744 & 2.621 & 1.351 & 3.198 & 1 \end{bmatrix} \end{array}$$

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Table 2. Results from individual experts.

Dimensions/Factors	Weights by experts		E1	E2	E3	E4	E5	E6	E7	E8	E9
	Dimensions	Service quality	0.870	0.750	0.833	0.833	0.875	0.750	0.833	0.750	0.857
		Marketing strategy	0.125	0.250	0.167	0.167	0.125	0.250	0.167	0.250	0.143
Factors	Service quality	Fee and location (F_{S1})	0.239	0.210	0.033	0.389	0.208	0.075	0.431	0.046	0.086
		Facility and hygiene (F_{S2})	0.244	0.203	0.079	0.043	0.069	0.054	0.141	0.157	0.065
		Teacher qualification and counseling (F_{S3})	0.323	0.064	0.452	0.092	0.385	0.200	0.130	0.224	0.389
		Administration and services (F_{S4})	0.067	0.037	0.223	0.043	0.039	0.066	0.234	0.377	0.059
		Communication and attentiveness (F_{S5})	0.127	0.485	0.212	0.433	0.299	0.605	0.065	0.197	0.401
	Marketing strategy	Product (F_{M1})	0.052	0.248	0.116	0.033	0.446	0.033	0.430	0.070	0.047
		Price (F_{M2})	0.141	0.079	0.532	0.356	0.100	0.107	0.218	0.482	0.217
		People (F_{M3})	0.135	0.173	0.036	0.102	0.050	0.382	0.130	0.159	0.140
		Place (F_{M4})	0.062	0.051	0.083	0.149	0.352	0.068	0.092	0.195	0.088
		Promotion (F_{M5})	0.610	0.450	0.233	0.360	0.052	0.410	0.130	0.093	0.508
Consistency test	Service quality	λ_{max}	5.329	5.426	5.305	5.376	5.203	5.322	5.356	5.407	5.345
		CI	0.082	0.106	0.076	0.094	0.051	0.081	0.089	0.102	0.086
		RI	1.120	1.120	1.120	1.120	1.120	1.120	1.120	1.120	1.120
		CR	0.073	0.095	0.068	0.084	0.045	0.072	0.080	0.091	0.077
	Marketing strategy	λ_{max}	5.417	5.439	5.391	5.328	5.374	5.372	5.430	5.335	5.363
		CI	0.104	0.110	0.098	0.082	0.094	0.093	0.108	0.084	0.091
		RI	1.120	1.120	1.120	1.120	1.120	1.120	1.120	1.120	1.120
		CR	0.093	0.098	0.087	0.073	0.084	0.083	0.096	0.075	0.081

The eigenvector, eigenvalue, *CI* and *CR* of the synthesized matrix are:

$$w^s = \begin{matrix} F_{S1} \\ F_{S2} \\ F_{S3} \\ F_{S4} \\ F_{S5} \end{matrix} \begin{bmatrix} 0.172 \\ 0.125 \\ 0.260 \\ 0.111 \\ 0.332 \end{bmatrix}, \ \lambda_{max} = 5.0148, \ CI = 0.0037, \ CR = 0.0033$$

After all calculations, the final priorities and rankings of the dimensions and factors are shown in Table 3. Under the *service quality* dimension, the most important factor is *communication and attentiveness*, with a local priority of 0.332, followed by *teacher qualification and counseling* (0.26), *fee and location* (0.172), *facility and hygiene* (0.125), and *administration and services* (0.111). As a result, communication and attentiveness is the most important issue in selecting after-class institutions. Teachers should maintain contact with parents to inform students' learning conditions, as well as focus on their qualification and counseling. Institutions need to provide services with efficiency and help resolve the problems of students and parents promptly.

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Table 3. Synthesized results of the dimensions and factors.

Dimensions	Factors	Local priorities	Local ranking	Integrated priorities	Integrated ranking
Service quality (0.823)	Fee and location (F_{S1})	0.172	3	0.1413	3
	Facility and hygiene (F_{S2})	0.125	4	0.1027	4
	Teacher qualification and counseling (F_{S3})	0.260	2	0.2139	2
	Administration and services (F_{S4})	0.111	5	0.0913	5
	Communication and attentiveness (F_{S5})	0.332	1	0.2733	1
Marketing strategy (0.177)	Product (F_{M1})	0.129	5	0.0229	10
	Price (F_{M2})	0.259	2	0.0459	7
	People (F_{M3})	0.152	3	0.0269	8
	Place (F_{M4})	0.137	4	0.0243	9
	Promotion (F_{M5})	0.324	1	0.0574	6

Under the *marketing strategy* dimension, *promotion* (0.324) ranks the first, followed by *price* (0.259), *people* (0.152), *place* (0.137), and *product* (0.129). The result shows that promotional campaign of educational products to communicate to and to persuade potential customers, as well as the price of products and services, is particularly important.

Because the *service quality* dimension has a very high priority of 0.823, the top five factors in the hierarchy all belong to this dimension, and they are, in sequence of importance, *communication and attentiveness* (0.273), *teacher qualification and counseling* (0.214), *fee and location* (0.142), *facility and hygiene* (0.103), and *administration and services* (0.091).

4. Conclusions

This paper constructs a model for evaluating the performance of after-school institutions in Taiwan by adopting the AHP. The results show that factors from the *service quality* dimension are highly emphasized. In the educational services market, how to provide effective services and incorporate quality into marketing strategy enable institutions to offer superior service quality. The use of promotional activities to sell their services and to increase the interests of potential customers is also important. Government should, through evaluation and reward systems, help after-school care institutions to set up good-quality childcare and to create a happy learning environment. The management and operation of an institution, in addition to consider the parents' expectations and the market trend, needs to focus more on the needs of students in order to provide students the best after-school care services. Finally, the developed evaluation model can be used or tailored by interested parties as an effective and objective mechanism for evaluating after-school programs. The proposed model can be tailored in the aspects studied or the factors being considered to suit the different after-school needs and after-school programs in different countries. In addition, children of different age categories may require different after-school cares; therefore, different after-school programs can be categorized, and evaluating hierarchies can be revised accordingly to meet the needs of different age groups.

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