Research Article

Establishing the Service Quality Indicators for the Counseling Service System: Analytic Hierarchy Process Approach

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ABSTRACT

The counseling service system is a case management tool used by professional guidance counselors and full-time teacher-counselor. However, even after multiple maintenances, system satisfaction and willingness to use it cannot be improved. This study used the modified Delphi method and analytic hierarchy process to construct the service quality index of the counseling service system by adding expert suggestions from different backgrounds. The study found that the service quality indicators of the counseling service system can be divided into five criteria and 21 subcriteria to explore, among which were "perfect confidentiality mechanism", "web design & layout meet the needs of the work", and "functional operation is simple and convenient" most valued by experts and users. Based on the research results, this study puts forward substantive implications for academics and management.

1. Introduction

The counseling service system developed by the Tainan Students Guidance and Counseling Center is a case management website, which is intended to track students' development effects and achieve the role of transmitting information between the center and schools. However, past research has found that users' satisfaction and willingness to use the system are both low [1],[2]. The interface of the counseling service system includes Instant Message, Individualized Intervention, Resource Integration Application, Other Services Application, Service Time Inquiry, and Confirmation [2]. In view of past related research, there are still opinions from other relevant units that have not been presented. This study attempts to fill in the evaluation basis for the service quality of the counseling service system by adding expert suggestions from different backgrounds. This study used the modified Delphi method (MDM) and analytic hierarchy process

(AHP) to construct the service quality criteria of the counseling service system, which can be used by system management units as a basis for improving system gaps and improving user satisfaction and willingness to use.

2. Theoretical Background

2.1 System service quality

The service quality point of view regards the organization as having the goal of providing customers with high-quality services and has a collection of multiple processes [3]. This study defines system service quality as "the information system provider's delivery of services to users through the website environment and the users' overall evaluation of the service".

In the past, there have been many studies to modify the measurement indicators of online or website service quality. For example, the Electronic Retailing Quality Scale (E-TailQ) uses 14 items to evaluate the quality of e-tailing commerce, including website design, Fulfilment /

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Reliability, Privacy / Security and customer service, and other four dimensions [4]. There are also the e-Core Service Quality Scale (ES-Qual) (including Efficiency, Fulfillment, System availability, and Privacy) and the e-Recovery Service Quality Scale (E-RecS-Qual) (including Responsiveness, Compensation, and Contact), both of which are a scale that can measure the performance of website services [5].

In summary, both the E-TailQ scale and the ES-Qual scale are derived from rigorous statistical analysis and empirical research and have been verified in subsequent studies [6],[7]. Therefore, this study adopts the structure of the two as the basis of the prototype of the system service quality index.

2.2 Prototype of system service quality index

This study refers to the system service quality [8],[9] and the related research of elementary school full-time teacher-counselor on the counseling service system [1],[2], and initially summarizes the system service quality index as five criteria: Tangible, Reliability, Assurance, Responsiveness, and Empathy, and develops 23 system

service quality sub-criteria.

3. Materials and Methods

This study uses MDM and AHP to conduct a two-stage expert questionnaire survey. The interviewees are experts and users who use the counseling service system and are familiar with the its functions. The first stage of the questionnaire is a two-round MDM screening the criteria of the system service quality, and the second stage uses AHP to find the criteria and their weights.

3.1 Subjects of the expert questionnaire

The expert scale of the research questionnaire has the lowest group error and the highest credibility when there are more than 10 people [10]. The experts in this study belong to a group with high homogeneity, so 16 experts are used as the expert group. The test subjects include professional guidance counselors, senior high school, junior high school, and elementary school full-time teacher-counselor. The seniority ranges from three to more than ten years. For this research topic, the tested subjects have rich experience in system use.

Table 1. Selection results of the second round of the revised Delphi questionnaire

Criteria	Sub-criteria	First round				Second round				Results
		Mean	Q.D.	S.D.	Consistency	Mean	Q.D.	S.D.	Consistency	
Tangible	A1 The proper layout	4.00	0.00	0.63	Yes	3.88	0.38	0.81	Yes	Unuse*
	A2 Information on all options is available	4.19	0.50	0.75	Yes	4.56	0.50	0.51	Yes	Use
	A3 Easy to learn how to use	4.56	0.50	0.51	Yes	4.63	0.50	0.62	Yes	Use
	A4 The function is simple and convenient to operate	4.75	0.38	0.45	Yes	4.81	0.00	0.40	Yes	Use
	A5 Easy to find the information you need	4.31	0.50	0.95	Yes	4.56	0.50	0.63	Yes	Use
Reliability	B1 Web design & layout are rich and complete	3.88	0.38	0.81	Yes	4.19	0.50	0.75	Yes	Use
	B2 Web design & layout meet the needs of the work	4.44	0.50	0.63	Yes	4.75	0.00	0.58	Yes	Use
	B3 Improve the confidentiality mechanism	4.44	0.50	1.03	No	4.75	0.38	0.45	Yes	Use
	B4 Stable use and operation	4.31	0.50	0.70	Yes	4.69	0.50	0.48	Yes	Use
	B5 Web-to-web connections are fast and smooth	4.00	0.88	1.03	No	4.31	0.50	0.87	Yes	Use
Assurance	C1 Helps communicate work matters	3.81	0.88	0.91	Yes	4.00	0.75	0.73	Yes	Use
	C2 Helps to improve work efficiency	4.06	0.50	0.93	Yes	4.38	0.50	0.50	Yes	Use
	C3 Improve the efficiency and convenience of paperwork	4.31	0.50	1.01	No	4.56	0.50	0.51	Yes	Use
	C4 Reduce the cost of physical information or archives	4.44	0.50	0.63	Yes	4.44	0.50	0.81	Yes	Use
Responsiveness	D1 Be able to quickly resolve questions and special needs	3.88	1.00	1.09	No	4.19	0.50	0.66	Yes	Use
	D2 Can inform the service response time	3.50	0.50	0.73	Yes	3.69	0.50	0.95	Yes	Unuse*
	D3 Have good professional training	4.06	0.88	0.77	Yes	4.06	0.38	0.68	Yes	Use
	D4 There are regular maintenance personnel	4.13	0.50	0.72	Yes	4.38	0.50	0.81	Yes	Use
	D5 Website system failures are dealt with immediately	4.06	0.38	0.68	Yes	4.25	0.50	0.58	Yes	Use
Empathy	E1 The expression of the web page is clear	4.50	0.50	0.52	Yes	4.63	0.50	0.50	Yes	Use
	E2 Protection of information	4.63	0.38	0.81	Yes	4.88	0.00	0.34	Yes	Use
	E3 Be able to understand the problem quickly	4.06	0.50	0.85	Yes	4.38	0.50	0.72	Yes	Use
	E4 Have a good service attitude	4.00	0.75	0.73	Yes	4.13	0.38	0.62	Yes	Use

*The average score < 4

3.2 Using MDM to screen the criteria of system service quality

The MDM uses a literature review to organize and develop a prototype questionnaire, which replaces the open questionnaire of the typical Delphi method as the first survey [11]. Based on the use of the MDM, it can fully reflect the experts' opinions, brainstorming, and high accuracy. [12].

This study used three criteria: mean, quartile (Q.D.) and standard deviation (S.D.) to verify the expert consensus [10]. In the average score standard, this study uses the average score ≥ 4 as the sub-criteria selection criterion. On the standard of interquartile difference, when the question interquartile difference ≤ 0.6, it means that the expert opinions are highly consistent, and the range of 0.6-1.00 means that the expert opinions are moderately consistent. In the standard deviation standard, when the standard deviation of the item is less than 1.0, it means that the expert opinions are consistent. If the expert opinions of more than 85% of the items agree, the questionnaire will be completed [13].

After two rounds of the modified Delphi questionnaire, the average score of the two sub-criteria did not reach four points, so they were deleted. After deletion, they became five criteria and 21 sub-criteria (Table 1).

3.3 Establishing AHP hierarchy and conduct expert questionnaire

AHP is mainly used in uncertain situations and decision-making problems with multiple evaluation criteria and provides a systematic decision-making mode to reduce the risk of decision-making errors [14]. AHP can provide scientific and quantitative comparison results and use the professional evaluation of experts to generate variable factors that can be ranked. Therefore, this study uses AHP to evaluate the weight of system service quality criteria. Regarding the use of AHP, the criteria selected in this study have avoided unreasonable or incorrect correlations between criteria, so as to improve the accuracy of the AHP results.

The consistency index (C.I.) and the consistency ratio (C.R.) [14] are used to verify the consistency of the paired comparison matrix. When C.I. = 0, it means that the before and after judgments are completely consistent, and C.I. <0.1 is an allowable error. When C.R. <0.1, the consistency of the matrix is satisfactory.

After two rounds of a modified Delphi questionnaire survey, this study divided the system service quality index

structure into three layers. The first layer is the goal of the research, the second layer is the main dimensions of system service quality indicators, which are five criteria of Tangible, Reliability, Responsiveness, Empathy and Assurance, and the third layer contains 21 system service quality criteria. The measurement index design of this AHP questionnaire adopts the nine grades suggested by Saaty for pairwise comparison, and Expert Choice 11.5 is used for data calculation and analysis to obtain the element weight value of the questionnaire selection.

4. Data Analysis and Results

4.1 Weight analysis of primary and secondary criteria

After calculating the weights of the five criteria and 21 sub-criteria selected by the system service quality index, the C.I. and C.R. of all items are less than 0.1, which meets the consistency requirements. The criteria have the highest relative weight of Reliability, showing that the key to the service quality index of the counseling service system is to measure Reliability. Under the five criteria, each is the service quality index with the highest weight in the sub-criteria. "The functions are simple and convenient to operate", "Improve the confidentiality mechanism", "Helps to improve work efficiency", "Be able to quickly resolve questions and special needs", and "Protection of information" (Table 2).

Table 2. Weights of criteria and Sub-criteria

Criteria	Weight (Rank)	Sub-criteria	Weight (Rank)	Integrated weight (Rank)
Tangible	0.257 (2)	A2	0.132 (18)	0.033 (13)
		A3	0.326 (4)	0.082 (4)
		A4	0.362 (2)	0.091 (3)
		A5	0.179 (14)	0.045 (8)
Reliability	0.310 (1)	B1	0.137 (17)	0.049 (7)
		B2	0.290 (9)	0.104 (2)
		B3	0.309 (6)	0.110 (1)
		B4	0.154 (16)	0.055 (6)
		B5	0.111 (19)	0.040 (10)
Assurance	0.214 (3)	C1	0.207 (12)	0.032 (15)
		C2	0.487 (1)	0.076 (5)
		C3	0.195 (13)	0.031 (16)
		C4	0.111 (20)	0.017 (20)
Responsiveness	0.112 (4)	D1	0.314 (5)	0.040 (9)
		D3	0.294 (8)	0.037 (12)
		D4	0.158 (15)	0.020 (19)
		D5	0.234 (11)	0.030 (17)
Empathy	0.108 (5)	E1	0.303 (7)	0.032 (14)
		E2	0.359 (3)	0.038 (11)
		E3	0.235 (10)	0.025 (18)

	E4	0.103 (21)	0.011 (21)

4.2 The overall weight analysis of the criteria

The primary and secondary criteria were comprehensively evaluated, and the overall weight was the highest for the top five sub-criteria, in order to "Improve the confidentiality mechanism", "Web design & layout meet the needs of the work", "The function is simple and convenient to operate", "Easy to learn how to use", and "Helps to improve work efficiency" (Table 2). Since reliability and tangibility have the highest weight in the criteria, the sub-criteria under the criteria also have the higher overall weight.

In summary, from the results of the weight analysis, we can see the importance of the criteria. Experts attach great importance to the data security and rigor of the online system, followed by whether the system actually helps the work. Past research has also shown that Design, Availability, Security and Privacy are positively related to overall electronic service quality [6],[7],[9]. This study is different from the past research purposes of shopping or social networking sites, but non-profit sites as the object of discussion, using the conclusion is roughly the same.

Overall, system security and compliance with work requirements are the keys to affecting system service quality. Since the counseling service system used by Tainan City at this stage has not been universally recognized by users, the results of this study can be used by its management and maintenance units as a direction for improvement.

5. Conclusions and Suggestions

In addition to the counseling service system being used in Tainan City, counselors in other counties, cities, or institutions also use similarly functional student counseling record systems. This study used MDM and AHP to collect the opinions of experts from various units to obtain indicators of system service quality. Practical suggestions for improving system service quality include providing users with complete authority descriptions, reducing unnecessary items to fill in, and improving Reliability; the layout is mainly concise, avoiding complicated operation steps to improve Tangible; through linking related systems, common data is automatically brought in to improve work efficiency and help improve Assurance. The system service quality indicators of this study are not only provided to the system management unit of Tainan City as reference indicators for regular maintenance, but can be used as a basis for other government agencies or school institutions to construct and maintain case management websites. With a view to the system in the development process, the users' point of view and the importance of subsequent maintenance and management can be considered.

Conflicts of Interest

The author declares no conflicts of interest.

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