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Study of Educational Service Quality in Mongolian Universities

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Abstract: This research aims to define the degree of customer satisfaction in Mongolian higher educational services and determine quality characteristics that can be used to improve customer satisfaction based on the potential customer satisfaction improvement (PCSI) index using the Kano and SERVQUAL models. The Kano and Timko models were used through a questionnaire survey of students in Mongolian national universities based on a survey questionnaire aiming to classify the quality attributes by the SERVQUAL model to calculate the potential customer satisfaction improvement index. Moreover, the PCSI is used to assess the improvement possibilities with the Kano model's attributes. The PCSI index represents how much a service feature can increase the degree of customer satisfaction when the service feature is completely fulfilled. More than 50 undergraduate students participated in this study. According to the PCSI calculation results, this research can help Mongolian national universities improve customer satisfaction among students. The PCSI index suggested by this research can also be used for other service quality analyses.

Keywords: education service quality; SERVQUAL model; Kano model; TIMKO equation; PCSI index

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1. Introduction

Recent years have seen substantial political, social, and technological changes worldwide. These changes have significantly impacted lives, demands, and needs, ultimately affecting styles and approaches to meeting those needs. Therefore, these changes have required a new method with which to understand educational services. This research evaluates and classifies university education service quality using the Kano model and TIMKO's Customer Satisfaction Coefficient, and it derives a potential customer satisfaction improvement index to determine the necessary steps to improve university competitiveness. We aimed to draw some empirical implications for enhancing students' qualitative management.

Given the shift to a knowledge economy, education is an increasingly significant institution. Higher education has become a global business, and universities must continuously explore options for exporting higher educational services [1]. Moreover, in the education sector, in which no actual products are involved, the service provided will represent the competitive demarcation between institutions in terms of their superiority in creating unique experiences [2]. While there is competition in outcomes such as research and innovation, universities are also expected to deliver high service quality. Therefore, assessing the service quality in higher education can provide a significant contribution and inputs that will be helpful for management and staff to continue improving the quality of education [3].

The number of universities and colleges operating in Mongolia was 172 during the 2000–2001 academic year, and it steadily decreased from the 2005–2006 academic year. In the 2021–2022 academic year, the number was 88, and it dropped to 84 (48.8%) compared to the 2000–2001 academic year. The number of students at universities and colleges increased from 85 thousand in the 2000–2001 academic years to 148.9 thousand in the

2021–2022 academic years, and it increased 1.8 times compared to the 2000–2001 academic year. As such, the rapid change in the educational environment caused by the reduction in the school-age population is expected to reverse the existing supplier-centered education services. Therefore, universities should be able to maintain a competitive advantage solely by enhancing their competitiveness through improved education services and by satisfying students who are educated consumers and customers who can survive this change and expect sustainable growth [4–7]. In this context, universities have shown a tendency to understand students in terms of customers and are also strengthening various marketing strategies for all students, including prospective and new students attending universities. The need to introduce the concept of service quality, which has been studied in the service industry in modern times, has been submitted in the education field [8].

The concept of service quality has been introduced in environmental services and academic fairness, and education has been viewed as a service concept. Further, to improve educational service quality, active investments and improvements have been made through systematic planning and research. Therefore, the essential task is to measure the quality of education services provided by universities and improve student satisfaction to secure differentiated competitiveness from other universities. Since the satisfaction level of educational service quality is the most basic measure, many universities have come to recognize its importance and conduct regular satisfaction surveys based on the results. In particular, since students have differing perceptions regarding the quality of university education services, satisfaction with educational services becomes more critical. They must provide complete educational services of high quality and systematic quality to prevent student departure and expand new students' resources [9].

Since this type of educational service quality plays a crucial role in enhancing the competitive advantage and increasing the development of each university, it is necessary to strengthen the competitiveness by improving the educational service of the university to stay ahead of the competition [7,10]. It is therefore expected that the education provided by a university and the improvement of the quality of service related to various administrations will positively affect the students who are the consumers of the education, and the implementation of a customer-centered education administration system that provides efficient services to the students will be realized. Moreover, the mutual trust and cooperative relationship between the staff and the students that make up a school has emerged as a significant factor in creating educational outcomes. Providing high-quality educational services and strengthening customer relations contribute to student satisfaction and customer loyalty [11,12]. However, studies related to educational services have mainly measured the quality of educational services based on SERVQUAL or SERVPERF [13,14]. Existing research has been concentrated on causal analysis among variables such as loyalty [15–19]. Therefore, it is necessary to examine perceived satisfaction levels and dissatisfaction levels. Through this, universities will be able to identify the requirements and quality factors that require attention and find ways to utilize the quality of university education service to cope with the rapidly changing domestic and overseas university environment. The aims of this research are as follows.

- To define the degree of customer satisfaction among Mongolian higher education students and determine quality characteristics for improving customer satisfaction;
- To evaluate students' needs in the rapidly changing university structure and identify the needs of students;
- To derive theoretical and empirical implications for improving university competitiveness, as well as for the students' management and qualitative improvement in Mongolian Universities.

2. Review of the Literature

2.1. Quality of Educational Service

Education can be categorized as an education service industry as a system that produces the output of graduates through the process of the curriculum. The quality charac-

teristics of educational services are similar to the general features of services. Given the general nature of the assistance, they can neither be stored nor preserved in a particular form. When a service is provided, the supplier and the customer must exist simultaneously, and they cannot be separated [20]. Moreover, the same service cannot be reproduced equally in different spacetimes, and it is heterogeneous according to the characteristics of the service provider [21]. Educational institutions such as universities are organizations that provide intangible services rather than sell tangible products and are rewarded for them. The characteristics of educational services are that education providers, including schools and staff, interact with students to satisfy students [22,23]. According to Shank, Walker, and Hayes [24], even if the same subject or professor teaches a class, different classes or classrooms provide other services. Thus, universities are in an environment where the role and importance of quality of service are emphasized, and this environment is very competitive. Since university quality is either improved or deteriorated by the service environment consisting of physical facilities, schools have different components than other service industries. Therefore, in this research, educational service quality is defined as any activity that realizes material and mental satisfaction for consumers by providing tangible and intangible services related to the achievement of educational purposes to students who are consumers (universities, professors, staff, etc.).

2.2. Quality Evaluation of Educational Service

Service quality is the balance of satisfaction and expectations in the mutual relationship between customers and the organization addressing their needs. Quantifying service quality is complex, and different strategies have been formulated in attempts to extract its measurement. The previous research on the quality evaluation of education services can be summarized as follows Table 1.

Table 1. Quality evaluation of educational service.

Category	Evaluation Target	Research
Service quality measurement	Service level	[25]
	The gap between customers' expectations of service and their perceptions	[26]
	The customer experience in a service context	[20,26–34]
	The customer experience toward service delivery	[35–38]
Higher education service quality measurement	Potential mismatch between expected and perceived service quality	[39]
	The same models developed in commercial enterprises	[40]
	Satisfaction and dissatisfaction	[41]
	Determinant of service quality	[42,43]

The research to measure service quality from multidimensional factors had also been implemented. As shown in the Table 2, we summarized the previous research in three categories: quality measurement, service quality measurement, and the service quality measurement of higher education services. Research conducted for evaluating multidimensional factors of education could be classified into research for measuring educational quality and research measuring educational service quality. University educational service quality refers to the extent to which the university (university, professor, staff, assistant, etc.), as a supplier, provides tangible and intangible szervices related to the achievement of educational objectives to students who are consumers. The quality of education service refers to all activities provided by the university from the point of view of both the university and the student; it is a bundle of benefits [23,44,45].

Table 2. Evaluation of educational service based on multidimensional factors.

Category	Factors	Research
Quality measurement	Tangibles, Reliability Responsiveness, Competence Courtesy, Credibility Security, Access, Communication, Understanding the customer	[46]
Service quality measurement	Reliability Responsiveness Assurance Empathy Tangibles	[20,25–27,29,30,34,35]
	Expected Service, Perceived Service Technical Quality, Functional Quality	[28]
	Sacrifice, Service quality Service value, Satisfaction, Behavioral intentions	[31]
	Consumer responses, Individual characteristics Industry characteristics	[32]
	Service quality, Value satisfaction, Behavioral intention	[4]
	Emotion, Expectation Behavioral intention	[37]
	Customer satisfaction cognitive components Customer satisfaction effective components Customer loyalty	[38]
Higher educational service quality measurement	Perceived service performance, Service expectations, Disconfirmation Attributions, Service encounter satisfaction Perceived service quality	[39]
	Reliability, Responsiveness Assurance, Empathy, Tangibles	[40]
	Advising, Curriculum, Teaching quality Financial assistance and tuition costs, Facilities	[41]
	Non-academic aspects, Academic aspects Reliability, Empathy	[42,43]

3. Research Method

In this research, the framework shown in Figure 1 was proposed and used as a model to analyze the requirements of students regarding the quality of the university's educational service.

The measurement factor to evaluate the quality of education service will be identified by the SERVQUAL model. The service quality perceptions of the respondents will be categorized based on a two-dimensional quality classification scheme according to the KANO model. Then, the degree of customer satisfaction and dissatisfaction can be calculated based on the Timko equation. This provides a satisfactory level of quality indicators to improve customer satisfaction based on the PCSI index and ultimately create a customer satisfaction strategy. Finally, the degree of customer satisfaction will be defined.

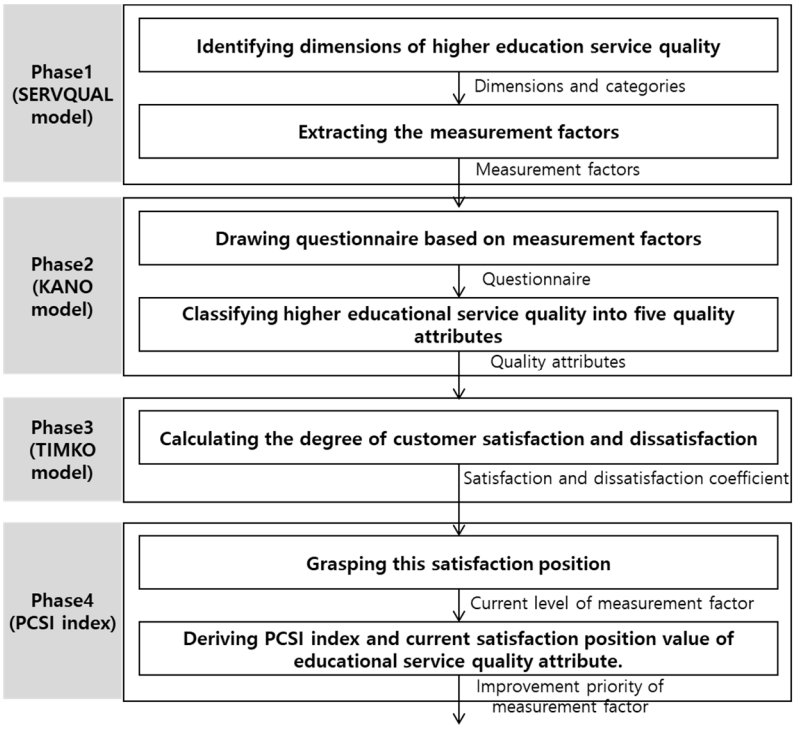

Figure 1. Research framework.

3.1. Phase 1: SERVQUAL Model

The original SERVQUAL scale was comprised of ten dimensions, which were further tested by Parasuraman, Zeithaml, and Berry [26] and consequently reduced from ten to five dimensions. The five key dimensions of service quality, namely reliability, responsiveness, assurance, empathy, and tangibles, are some of the most used models for evaluating customer expectations and their perceptions of service quality [2,3,47–49].

In higher education institutions, the dimensions of service quality dimensions are more demanding and take a more student-oriented approach, as proposed by Sangeeta [50], Owlia, and Aspinwall [51], and Hadikoemoro [52]. Tangibility refers to the physical element, credibility is the dimension of reliable and accurate mission performance; responsiveness is immediateness and helpfulness; and confidence is the dimension of ability, politeness, trustworthiness, stability, etc. Finally, empathy is a dimension of easy access, smooth communication, and a sufficient understanding of customers.

Along five dimensions, it is argued that the difference between an individual's expected and perceived service level determines the quality of service. In other words, comparing the gap between the customer's perceived performance with the desired service level and the service level provided, if the perceived performance is lower than expected, means that the service quality is low and vice versa [26].

3.2. Phase 2: Kano Model

In general, a company will establish a marketing strategy by assuming that if the customer's needs are satisfied, then the customer will be satisfied; by contrast, if they are not satisfied, they will be dissatisfied. However, modern consumers tend to be dissatisfied with their lack of products or services, but not enough to feel satisfied when it is sufficient [53]. In addition, customers accustomed to a particular service are expected to raise their expectation of the service and take it for granted rather than being satisfied. By contrast, complaints about the service may be more significant if the expected benefit is not met. To explain this situation, Kano et al. [54] proposed a method for classifying the role of quality according to the degree of satisfaction to the customer and simultaneously summarizing the customer's requirements from the company's point of view. It provides marketing

directions as to whether to develop products with priority. The analysis identifies the level of attitudes, satisfaction levels, and the importance of the product and service to the customer. This method is more appropriate for customer satisfaction research and image analysis. This questionnaire method will be subdivided into each product and service and evaluated for satisfaction. The questionnaire results are used to classify the product features into different categories. The five primary types are defined by Kano et al. [54]:

Figure 2 shows the dual interpretation of the concept of quality with physical satisfaction as the horizontal axis and customer satisfaction as the vertical axis. Specifically, we consider the subjective aspects (satisfaction and dissatisfaction) and the objective elements (satisfaction and dissatisfaction) of quality. This is classified into two factors (indifference quality and reverse quality).

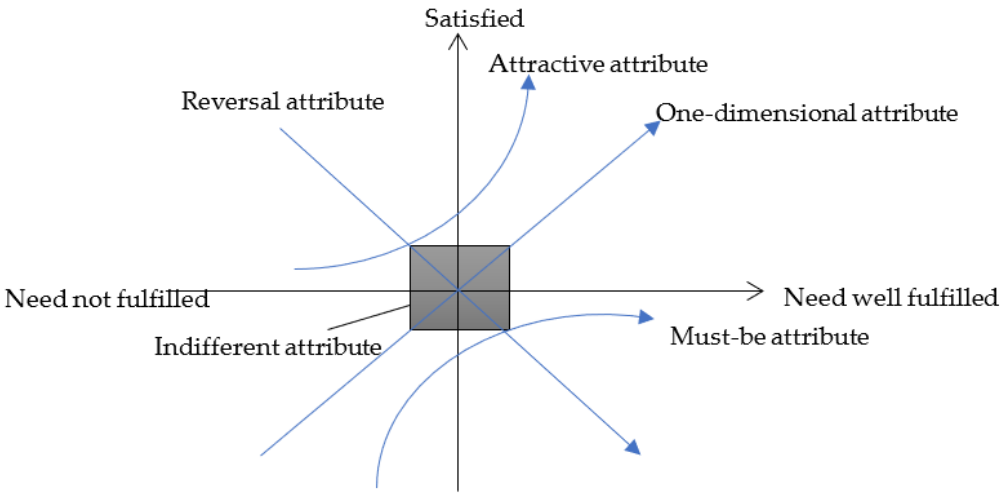

Figure 2. Kano's dual quality recognition method.

Attractive quality element: An attractive quality factor refers to an attribute that increases satisfaction when provided to a user and that does not cause complaints because it is unavoidable, as it does not know or anticipate the existence of such a quality factor even if it is not provided. This attractive quality factor is a source of customer delight that satisfies the customer's unexpected expectations or exceeds the customer's expectations [55].

One-dimensional quality element: The unified quality factor is satisfied if it is satisfied according to the performance level. If it is not satisfied, it is the same as general quality recognition. This quality factor is what consumers always want for a product or service, and the satisfaction level of the product also increases with the increasing quality level of satisfaction. These attributes result in satisfaction when they are fulfilled and dissatisfaction when they are not fulfilled.

Must-be quality element: Naturally, the quality factor refers to a quality factor that does not lead to user satisfaction, but if it is satisfied, it is taken as a matter of course and does not provide satisfaction by itself. In other words, if it is met as an essential quality factor that is a minimum expectation, it does not provide much satisfaction because it is considered to be natural. Still, if it is not satisfied, it can cause dissatisfaction. Kano [55] argued that other natural quality factors are the most important. If it is not met, customer satisfaction with the service drastically deteriorates, and this has a fatal effect on the recovery of reliability [56].

Indifferent quality element: The indifference quality refers to a quality factor that does not cause satisfaction or dissatisfaction regardless of whether it is satisfied. These attributes refer to aspects that are neither good nor bad and that do not result in customer satisfaction or dissatisfaction.

Reverse quality element: Reverse quality refers to a quality factor that either causes dissatisfaction even when it is met or that causes satisfaction even when it is not completed. In the concept of reverse quality, the term reverse quality is used to assume that there

may be quality factors that the producer tries to satisfy, but consequently, some users deem unsatisfactory.

Kano et al. [54] proposed a two-question survey method that opposes a quality item to classify quality factors in a binary manner.

Table 3 above is an example of a questionnaire form that presents positive and negative questions about team service quality among the different service items. The results of the respondent's questionnaire survey find the dual quality factors corresponding to the two-factor evaluation of quality factors in Table 4. Subsequently, the evaluation result of the evaluation binary table is aggregated by tabulating surveys [57].

Table 3. Questionnaire for KANO model.

	Question	Answer
1-a	What do you feel when the crew actively helps the customers?	1—Dislike 2—I can live with it that way 3—I am neutral 4—It must be that way 5—I like it that way
1-b	What do you feel when the crew does not actively help the customers?	1—Dislike 2—I can live with it that way 3—I am neutral 4—It must be that way 5—I like it that way

Table 4. KANO model for quality attributes checklist.

	Unmet / **Met**	**Negative Questions**				
		1—Dislike	**2—I Can Live with It That Way**	**3—I Am Neutral**	**4—It Must Be That Way**	**5—I Like It That Way**
Positive questions	1—Dislike	Q	R	R	R	R
	2—I can live with it that way	M	I	I	I	R
	3—I am neutral	M	I	I	I	R
	4—It must be that way	M	I	I	I	R
	5—I like it that way	O	A	A	A	Q
	A—Attractive quality attribute M—Must-be quality attribute R—Reverse quality attribute			O—One-dimensional quality attribute I—Indifferent quality attribute Q—Questionable quality attribute		

The evaluation table presented in Table 4 provides guidelines for quality evaluation by classifying pairs of convenience (satisfaction, dissatisfaction) in the data analysis process.

3.3. Phase 3: TIMKO Model

Timko's Customer Satisfaction can be applied to classify individual items into attributes that affect customer satisfaction and dissatisfaction and apply an effective Kano model to identify the strategic importance of each characteristic item. Some of the existing research on this topic has used coefficient models.

The Kano model has a problem in that it is difficult to grasp the extent of the attribute's intensity because it determines the property having the model in the response result of the survey as the attribute of the item. To overcome these limitations, Timko [58]

calculated the degree of customer satisfaction and dissatisfaction using the customer satisfaction/dissatisfaction coefficient, as detailed in Table 5.

Table 5. Timko's equation.

Satisfaction coefficient: $S = (A + O)/(A + O + M + I)$	Dissatisfaction coefficient: $D = (O + M)/(A + O + M + I) \times (-1)$
A—Attractive quality attribute O—One-dimensional quality attribute	M—Must be a quality attribute I—Indifferent quality attribute

The customer satisfaction coefficient, S, indicates the percentage of customers who are satisfied with the factor when the particular quality factor of the product or service is provided, and the unsatisfactory coefficient, D, is the value of the dissatisfied customer. This indicates the ratio. Satisfactory coefficients range from '0' to '1', while unsatisfactory coefficients range from '0' to '−1'. The reason for taking negative values to calculate dissatisfactory coefficients is the opposite value of satisfaction among respondents for specific quality factors.

- S = 1 if everyone is an attractive quality factor. D = 0
- If all of them are quality factors, S = 0, D = −1
- If all of them answer as a unity quality factor, S = 1. D = −1
- If all are considered indifferent quality factors, then S = D = 0.

That is, depending on whether or not a specific quality factor is provided, the closer the S value is to 1, the higher the percentage of people who are unsatisfied with the satisfaction, and the closer the D value is to −1. The closer to 0, the higher the rate of people who are not satisfied or dissatisfied with the element itself. In other words, the Timko model can be regarded as the ratio of people who feel that the Kano model classifies the attributes of a specific quality characteristic item.

The quality characteristics are classified by the values of S and D, as shown in Figure 3. The figure classification classifies attributes by four upper limits using S and D values, which may be inconsistent with the classification result of the previous Kano model. In the figure, each corner of the four upper bounds is a case where 100% of the respondents perceive a specific attribute. Therefore, the closer to the points, the stronger the attribute, and the farther away from the corner, the weaker the property. Thus, the items located near the boundary between the four upper bounds are not statistically significant, and results that differ from those of the Kano model can be obtained. In conclusion, although the Kano model adopts the attribute wherein the absolute optimum appears among the respondents, the Timko model shows the degree of intensity that can be classified as the attribute. In the weak case, the classification by quality is not meaningful.

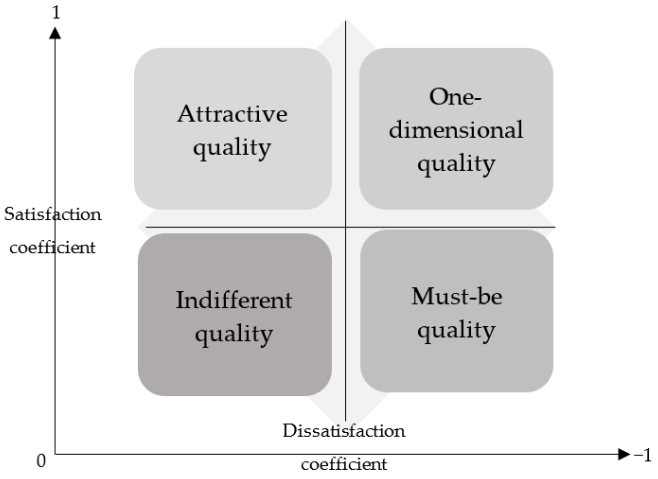

Figure 3. Timko model.

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3.4. Phase 4: PCSI

The PCSI index extracts the current customer satisfaction level when the customer's requirements for a product or service are partially satisfied. The Kano model and the customer satisfaction coefficient can be used to distinguish between the types of quality that customers take 'for granted' and those that they consider to be 'attractive'. Through this approach, strategies for prioritization between each quality attribute can be efficiently established. However, this model cannot grasp the "current" level value of how customers evaluate the quality attribute. In the end, there is an explicit limitation in that it is impossible to calculate how much the satisfaction will increase compared to the present if the quality attribute is satisfied by the customer. More attention to the latter is required to increase the final satisfaction level. Briefly, it is essential to identify the range of future satisfaction level values that can potentially be improved compared to the current satisfaction level values.

In this research, to grasp the extent of satisfaction improvement, the customer's current state is identified in the customer satisfaction coefficient to determine the extent to which customer satisfaction can be improved in the future when satisfying the customer's requirements. In this research, one additional questionnaire was added to the positive and negative questionnaire survey conducted in Kano's analysis to understand the customer's current state. In other words, the first and second positive and negative questionnaire items are used to identify quality characteristics using Kano's quality dual table. The third question is a questionnaire that can be used to locate the position of the current level. The process for calculating the potential customer satisfaction improvement index is as follows: Lim and Park [53] began with the Kano and Timko models and identified the level of customer satisfaction with specific quality characteristics of service. The following Equation (1) is used to grasp this satisfaction position (P).

$$P = \frac{(\mathrm{S} - \mathrm{D}) \times (\mathrm{Max} - \mathrm{L})}{\mathrm{Max} - \mathrm{Min}} + D \quad (1)$$

Here,
P: Current level;
S: Timko model satisfaction coefficient value;
D: Timko model dissatisfaction coefficient value;
L: Satisfaction level value as seen from the questionnaire scale;
Max: Most significant weight among the survey scales of the current satisfaction level;
Min: Smallest value among the current satisfaction level survey scales.

The next process is calculating the potential customer satisfaction improvement index. The value calculated in Equation (2) is obtained by grasping the current satisfaction position (P) from the satisfaction and dissatisfaction coefficients. It can therefore be seen that there is room for improvement from this value to the satisfaction coefficient. Equation (2) is used to determine the room for improvement.

$$\mathrm{PCSI} = \mathrm{S} - \mathrm{P} \quad (2)$$

Here,
PCSI: Potential customer satisfaction improvement index;
P: Current position;
S: Satisfaction coefficient.

The potential customer satisfaction improvement index represents the distance from the current satisfaction position (P) to the satisfaction coefficient (S). The PCSI has a value from 0 to 2, with a value of 0 indicating 100% satisfaction by all customers and no im-

provement. The value of 2 is the most critical factor (S – P = 2), where the satisfaction rate is 0, and the need for improvement is the most significant factor. This means that it is challenging to increase satisfaction further. The maximum value of the potential customer satisfaction improvement index, '2', indicates that the quality characteristic has a unitary quality characteristic, and the current customer satisfaction is the case where everyone feels unsatisfied and is the satisfaction position (P) of the dissatisfaction coefficient. There is potential improvement up to a satisfaction coefficient of '+1' with '−1'.

It is appropriate to rank all the quality factors according to the PCSI values rather than ordering them collectively by order of improvement necessity and to prioritize among other attributes strategically. Further, since the attractiveness quality factor is not dissatisfied even if the factor is not provided or is less, it is not necessary to use the value D of the dissatisfaction factor, and only the ratio S of the respondents who are satisfied with the offer will be used.

4. Case Study

In order to conduct a study on the educational quality of Mongolian universities, 103 graduate school students were selected. The research data were collected through an online questionnaire and were processed in the following phases. The survey was conducted using an internet Google form, and 123 students in four universities of Mongol responded. Data from 20 out of 123 respondents were excluded as insincere responses. Responses were made from October to 4 December 2022. Respondent data is shown in the Table 6.

Table 6. Respondent data.

Classification		Frequency (Persons)	Composition Percentage (%)
Age	17–20	24	23.3
	21–24	68	66.0
	More than 25	11	10.7
Sex	Female	81	78.6
	Male	22	21.4
Grade	3	15	14.6
	4	88	85.4

4.1. Phase 1: SERVQUAL Model

The research defined the educational service quality measurement factors by comparing and summarizing the theories of 15 research papers related to academic service published between 2004 and 2022. As presented in Table 7, researchers have been conducting extensive research on the education sector in recent years. They have come up with various indicators related to evaluating the quality of the educational service quality measurement.

Based on previous research, the measurement factors influencing education service quality have been identified, and the core dimensions of it have been identified through a detailed analysis of the SERVQUAL model.

Table 7. Measurement factors of educational service.

Dimensions	Category	Measurement Factors	References
Tangibles	Physical facilities	Appropriate physical facilities/infrastructure Adequate and proper classrooms (lighting system of university buildings)	[50,59]
		Completeness of academic-support facilities and visually appealing environment (university landscaping, design, and environment) The appearance of the university is based on complete and modern equipment and support services; e.g., accommodation, sports, and neat-appearing employees	[51,52]
		Modern and up-to-date equipment Visual appeal of physical facilities Neat and well-dressed staff Visual appeal of materials (access to computers and equipment in university classrooms) Convenient operating hours (university office hours)	[60]
	Infrastructure	High level of school equipment (computer labs, multimedia devices) Professional and useful website (access to data and databases necessary for university studies) Good localization of school Well-equipped library Well-equipped laboratories for vocational education	[61]
	Appearance of physical facilities, equipment, personnel, and communication materials	Recruiting staff who understand the importance of services and have the aptitude to provide the students with effective resolutions on the first contact whenever possible.	[62]
	Online facilities and equipment	Registration information Means of communication (Number of students in the class) Capacity of instruction/training Cost (service value) Virtual communication (possibility of using the Internet in the university environment) Regulation/rules Schedule and term Materials developed for competition Infrastructure (location, space, and working materials)	[63]
		The website properly uses audio, video elements, animations/graphics, and multimedia features The website provides useful, accurate, and high-quality information The information on the website is relevant The perception of the overall quality of the instruction received from online learning is (poor–excellent) The instructional website seems to be up to date, works well, and has explicit instruction	[64]
		Educational equipment Educational facilities Staff appearance Facilities needed (cleanliness of the university campus) An intimate and dynamic relationship with learners	[65]

Table 7. *Cont.*

Dimensions	Category	Measurement Factors	References
Responsiveness	Ability to respond to customers' requests on time	Ease of contact/access to teachers and administrative staff (opportunity to express feedback about the university directly to the university management)	[50,59]
		University willingness and attentiveness to help students and provide prompt service (access to help from university staff)	[52]
		Staff gives prompt service to students Staff always helps students Staff respond promptly to queries	[60]
	Efficiency of the educational process must refer to responsiveness.	Interesting extra-curricular activities High-quality vocational training (impact of services provided by the university on learning) Lessons in entrepreneurship are practical	[61]
	Willingness to help customers and provide prompt service	Measurement and monitoring of complaints are vital and the organization must have suitable systems and commitment to achieve this	[62]
	Helping students to provide services as soon as possible	Level of knowledge and ability to share Sharing of additional resources	[63]
		The instructor quickly and efficiently responds to student needs (time frame for receiving feedback about the university) The instructor is willing to go out of their way to help students The instructor always welcomes student questions and comments (department's handling of student issues)	[64]
		Interest in solving learners' problems (problem-solving by university staff when needed) Willingness to help learners (university students help each other) Provision of the required information to learners (ability to view course evaluations online) Preparedness for responding Convenient working hours	[65]
Reliability	Ability to deliver the desired service dependably, accurately, and consistently	Specified values and aims (university accreditation status) Consistency of practice Specified policies/guidelines Fairly and firmly enforced rules and regulations Adherence to course objectives	[50,59]
		Effective classroom management (adherence to class start and end times) Trustworthiness (employment status after graduation) Giving valid awards Keeping promises Matching the goals Handling complaints and solving problems	[51]

Table 7. *Cont.*

Dimensions	Category	Measurement Factors	References
		Providing servicea as promised (ability of the university to deliver services as promised) Sincere interest of personnel in solving problems Carrying out of the services right the first time Providing services at the appointed time (timeliness of services provided by the university to students) Telling when services will be performed (ability of university staff to provide specific information to the students about the timing of service delivery)	[60]
	Efficiency of the educational process must refer to reliability	Graduates are well-prepared for work High-quality workshops with school pedagogue of career planning High-quality workshops with school vocational counselor High-quality seminars on career planning with experts from outside the school	[61]
	Ability to perform the promised service dependably and accurately	Requesting feedback from the students regularly using surveys or representatives who closely interact with students	[62]
	Existence of knowledge, politeness and humility, and the ability to transfer trust and confidence to students by university staff and instructors	Awards/benefits Development of entrepreneurial knowledge Development of entrepreneurial skills Development of entrepreneurial attitudes	[63]
		The instructor consistently provides good lectures (skills of a university professor) The instructor is dependable The instructor reliably corrects information when needed	[64]
		Provision of safe and reliable service (reliability and accuracy of information provided by university staff) Sufficient knowledge to respond to learners Knowledge, skills, and abilities Knowledge necessary to provide education services Reliable behavior	[65]
Empathy	Ability to show personal care and attention to customers	Understanding student's needs (university's sensitivity to the special needs of students) Willingness to help Availability for guidance and advisory (readiness for use of university teaching material resources) Giving individual attention, emotion, and courtesy (fellow students' respect for the individual characteristics of the students)	[51,59]
		Giving individual attention (the department's respect for the individual characteristics of the students) Dealing with in a caring fashion Staff keeps students' interests at heart (staff's respect for the individual characteristics of the students) Understanding specific needs of students	[60]

Table 7. *Cont.*

Dimensions	Category	Measurement Factors	References
	Competencies of teachers are included as well as assurance and empathy	School pedagogues provide comprehensive information on career planning A vocational counselor offers complete data on career planning Assistant of vocational training helps in the organization of vocational training School supports the development of students' interests (free access to all types of student development training programs) Friendly atmosphere at school Helpful individual consultations with the school pedagogue Proper personal consultations with a vocational counselor Willing teachers, active in solving individual pupils' problems	[61]
	Caring, individualized attention provided by the firm	Encouraging students to share their ideas and use their opinions in educational planning	[62]
	Power of university staff and instructors to provide distinctive and caring attention to students	Presence and heterogeneity of the audiences Connection with different audiences and exchange of experience and knowledge Network of contacts	[63]
		The instructor is genuinely concerned about the students The instructor understands the individual needs of students The instructor has the students' best long-term interests in mind The instructor encourages and motivates students to do their best	[64]
		Creation of a peaceful environment (university's provision of health services requested by the students) Personal attention to students Respect for learners' feedback Students with an interest in hearing comments (university management and teachers promptly receive student feedback and make decisions) Patient response to students	[65]
Assurance	Ability to convey trust and confidence to customers through the services provided	Ability of the university to perform service dependably and accurately, have fairness in grading, and courteously handle student's problems (stability of university rules and regulations)	[52,59]
		Students trust staff Students feel safe while receiving services (university's confidentiality of student personal information) Staff is courteous with students (courtesy of university staff to provide prompt service to students) Professors know how to answer students	[60]
	Competencies of teachers are included as well as assurance and empathy	Teachers of vocational education subjects have excellent theoretical and practical knowledge (quality of services provided by university teachers and staff) Teachers of vocational education subjects are very competent—relate to the requirements of the labor market Teachers of general education subjects are very competent	[61]

Table 7. *Cont.*

Dimensions	Category	Measurement Factors	References
	Knowledge and courtesy of employees and their ability to convey trust and confidence	Reinforcing the staff capabilities through ongoing opportunities for training and development (university campus security)	[62]
	Ability of the university to provide the correct and reliable services it promised	Appearance of the team Education, friendliness, and politeness (reputation enjoyed by the university among employers) Ability to serve	[63]
		The instructor is knowledgeable in their field (reputation of the department's research activities in the country) The instructor is fair and impartial in grading The instructor answers all the questions thoroughly Confidence in the instructor having an expert understanding of the material	[64]
		Keeping promises (reputation of the university in the country) Provision of services without mistakes and errors Equal treatment of all learners Service provision at the determined times Speed in operation	[65]

4.2. Phase 2: KANO Model

Using Kano's theory, 40 questions related to educational service quality were classified into five quality categories: attractive, must-be, one-dimensional, indifferent, and reverse quality. The obtained results are presented in Table 8.

Looking at the analysis results, of the 40 quality factors, 11 factors were classified as attractive quality attributes, 5 were classified as must-be quality attributes, 14 were classified as one-dimensional quality attributes, and 10 were classified as indifferent quality attributes. An attractive quality function can give satisfaction and pleasure, but even if it is not, there is not much dissatisfaction. This attractive factor is essential for creating a positive response to service by satisfying the consumer's unexpected needs. Five factors, such as university office hours, ability to view course evaluations online, timeliness of services provided by the university to students, etc., were classified as must-be quality attributes. The quality features do not lead to user satisfaction, but if they are satisfied, it is taken as a matter of course and does not give satisfaction. If they are not satisfied, it can cause dissatisfaction.

Fourteen factors, such as cleanliness of the university campus; university landscaping, design, and environment; access to computers and equipment in university classrooms; etc., were classified as one-dimensional quality attributes. The quality features that students want are these 14 factors, and these include characteristics that can increase satisfaction according to the performance level of these attributes.

Indifference quality factor is a factor that does not significantly affect satisfaction or dissatisfaction, even if it is satisfied or not satisfied, and includes 10 factors, such as the number of students in the class (below 10), access to data and databases necessary for university studies, the opportunity to express feedback about the university directly to the university management, etc.

Table 8. Classification of educational service quality using Kano theory.

№	Quality Attribution	KANO Classification
6	Possibility of using the Internet in the university environment	Attractive
10	University students help each other	
16	Time frame for receiving feedback about the university	
18	Adherence to class start and end times	
23	Employment status after graduation	
25	Free access to all types of student development training programs	
33	University's confidentiality of student personal information	
35	Reputation of the department's research activities in the country	
37	Stability of university rules and regulations	
38	Reputation enjoyed by the university among employers	
40	Reputation of the university in the country	
1	Number of students in the class (Below 10)	Indifferent
8	Access to data and databases necessary for university studies	
11	Opportunity to express feedback about the university directly to the university management	
13	Department's handling of student issues	
15	Impact of services provided by the university on learning	
17	University accreditation status	
21	Ability of the university to deliver services as promised	
29	Staff's respect for the individual characteristics of the students	
30	Fellow students' respect for the individual characteristics of the students	
31	University's provision of health services requested by students	
4	University office hours	Must-be
9	Ability to view course evaluations online	
19	Timeliness of services provided by the university to students	
22	Ability of university staff to provide specific information to the students about the timing of service delivery	
32	University management and teachers promptly receive student feedback and make decisions	
2	Lighting system of university buildings	One-dimensional
3	Cleanliness of the university campus	
5	University landscaping, design, and environment	
7	Access to computers and equipment in university classrooms	
12	Access to help from university staff	
14	Problem solving by university staff when needed	
20	Skills of a university professor	
24	Reliability and accuracy of information provided by university staff	
26	The university's sensitivity to the special needs of students	
27	Readiness for use of university teaching material resources	
28	Department's respect for the individual characteristics of the students	
34	Courtesy of university staff to provide prompt service to students	
36	Quality of services provided by university teachers and staff	
39	University campus security	

4.3. Phase 3: TIMKO Model

Based on the Kano theory, the quality attribute classification classified quality characteristics according to the subjective aspect of satisfaction or dissatisfaction and the objective element of physical satisfaction or dissatisfaction through positive and negative questions. However, since the mode of the questionnaire response classifies quality characteristics, it has a limitation in that relative differences within the corresponding quality characteristics are excluded. Therefore, the customer satisfaction coefficient (CS-Coefficient) was applied to compensate for these limitations.

After classifying university educational service quality attributes based on the Kano theory, Tables 9 and 10 below present the results of calculating the satisfaction coefficient and dissatisfaction coefficient of the expected concept suggested by Timko [58]. In the case of dissatisfaction, items that can reduce customer dissatisfaction can be derived to provide implications on which parts to supplement.

Table 9. Satisfaction coefficient by rank.

№	Quality Attribution	Satisfaction
3	Cleanliness of the university campus	0.73
38	Reputation enjoyed by the university among employers	0.72
6	Possibility of using the Internet in the university environment	0.72
40	Reputation of the university in the country	0.71
5	University landscaping, design, and environment	0.67
37	Stability of university rules and regulations	0.67
7	Access to computers and equipment in university classrooms	0.65
35	Reputation of the department's research activities in the country	0.65
18	Adherence to class start and end times	0.64
23	Employment status after graduation	0.62
16	Time frame for receiving feedback about the university	0.60
25	Free access to all types of student development training programs	0.59
20	Skills of a university professor	0.58
14	Problem solving by university staff when needed	0.57
33	University's confidentiality of student personal information	0.57
10	University students help each other	0.57
26	The university's sensitivity to the special needs of students	0.55
24	Reliability and accuracy of information provided by university staff	0.55
12	Access to help from university staff	0.54
39	University campus security	0.52
2	Lighting system of university buildings	0.51
13	Department's handling of student issues	0.51
34	Courtesy of university staff to provide prompt service to students	0.51
28	Department's respect for the individual characteristics of the students	0.50
36	Quality of services provided by university teachers and staff	0.49
17	University accreditation status	0.49
11	Opportunity to express feedback about the university directly to the university management	0.48

Table 9. *Cont.*

№	Quality Attribution	Satisfaction
8	Access to data and databases necessary for university studies	0.48
27	Readiness for use of university teaching material resources	0.48
15	Impact of services provided by the university on learning	0.48
31	University's provision of health services requested by students	0.46
29	Staff's respect for the individual characteristics of the students	0.45
30	Fellow students' respect for the individual characteristics of the students	0.41
21	Ability of the university to deliver services as promised	0.38
9	Ability to view course evaluations online	0.35
22	Ability of university staff to provide specific information to the students about the timing of service delivery	0.34
32	University management and teachers promptly receive student feedback and make decisions	0.32
4	University office hours	0.32
19	Timeliness of services provided by the university to students	0.32
1	Number of students in the class (below 10)	0.24

Table 10. Dissatisfaction coefficient by rank.

№	Quality Attribution	Dissatisfaction
3	Cleanliness of the university campus	−0.85
2	Lighting system of university buildings	−0.72
22	Ability of university staff to provide specific information to the students about the timing of service delivery	−0.69
27	Readiness for use of university teaching material resources	−0.65
5	University landscaping, design, and environment	−0.64
4	University office hours	−0.64
14	Problem solving by university staff when needed	−0.61
32	University management and teachers promptly receive student feedback and make decisions	−0.61
19	Timeliness of services provided by the university to students	−0.60
39	University campus security	−0.59
36	Quality of services provided by university teachers and staff	−0.59
20	Skills of university professors	−0.58
26	The university's sensitivity to the special needs of students	−0.57
7	Access to computers and equipment in university classrooms	−0.57
24	Reliability and accuracy of information provided by university staff	−0.56
9	Ability to view course evaluations online	−0.54
34	Courtesy of university staff to provide prompt service to students	−0.54
28	Department's respect for the individual characteristics of the students	−0.51
12	Access to help from university staff	−0.50
29	Staff's respect for the individual characteristics of the students	−0.47
15	Impact of services provided by the university on learning	−0.46
21	Ability of the university to deliver services as promised	−0.46

Table 10. *Cont.*

№	Quality Attribution	Dissatisfaction
11	Opportunity to express feedback about the university directly to the university management	−0.44
8	Access to data and databases necessary for university studies	−0.44
31	University's provision of health services requested by students	−0.44
13	Department's handling of student issues	−0.43
17	University accreditation status	−0.42
38	Reputation enjoyed by the university among employers	−0.42
18	Adherence to class start and end times	−0.40
37	Stability of university rules and regulations	−0.40
30	Fellow students' respect for the individual characteristics of the students	−0.39
16	Time frame for receiving feedback about the university	−0.36
6	Possibility of using the Internet in the university environment	−0.36
33	University's confidentiality of student personal information	−0.35
10	University students help each other	−0.31
35	Reputation of the department's research activities in the country	−0.31
25	Free access to all types of student development training programs	−0.29
23	Employment status after graduation	−0.27
40	Reputation of the university in the country	−0.26
1	Number of students in the class (below 10)	−0.10

For university students, the comfort of the learning environment directly impacts satisfaction, so it can be seen that factors, such as the cleanliness of the university environment, reputation enjoyed by the university among employers, the possibility of using the internet in the university environment, and the reputation of the university in the country, all have a high value. Conversely, if factors with high coefficient values are met, they can significantly reduce customer dissatisfaction; this can then significantly reduce dissatisfaction.

The following Figure 4 shows the results of the customer satisfaction coefficient in a diagram. The left and right sides are equal to 0, while on the right side, the satisfaction coefficient is close to +1. When the dissatisfaction coefficient shows a value close to 0, it can be said to be an "attractive quality", and a value close to 0 is "indifference". If the dimensions on both sides are large and similar, then it is a "one-dimensional quality." Among the quality composite factors, the item "cleanliness of the university campus", which has the highest value, means that customers are relatively more satisfied than the other 39 factors. The factor "number of students in the classroom" has the lowest satisfaction coefficient. It can be understood that the expected user satisfaction for the number of students in the classroom is not relatively high.

Among the coefficient results, it can be assumed that "cleanliness of the university campus" and "reputation enjoyed by the university among employers" are the factors that can reduce customer dissatisfaction the most compared to the other 38 factors. Moreover, this means that even if the service provided is suitable for the "Number of students studying in the class," which shows the lowest value among the dissatisfaction coefficients, it cannot reduce customer dissatisfaction compared to other factors.

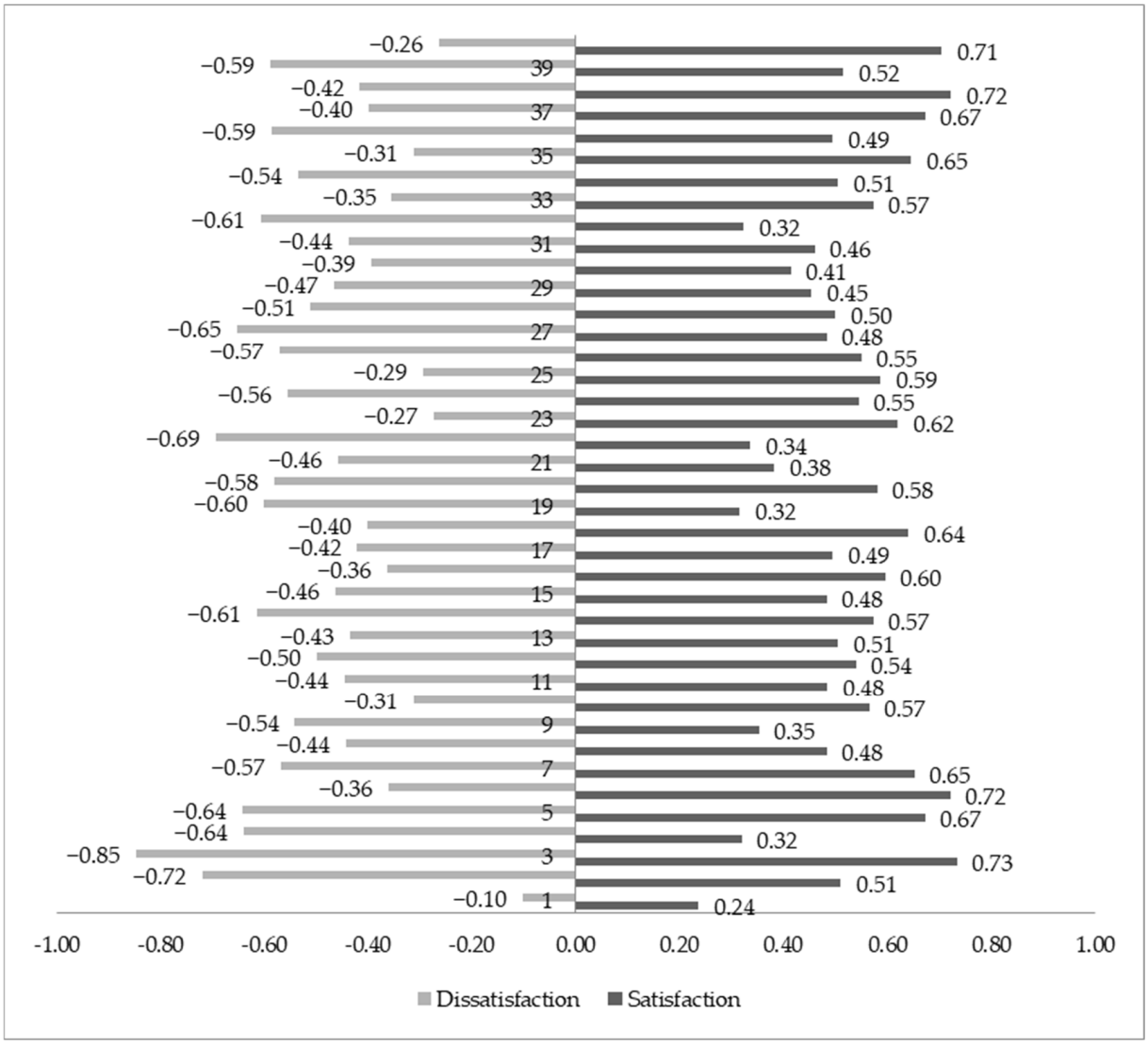

Figure 4. Customer satisfaction coefficient.

4.4. Phase 4: PCSI Index

Through the research process, using Kano's theory and customer satisfaction coefficient, it was possible to classify the quality characteristics of university education services and examine the range of customer satisfaction. However, the ability to analyze the characteristics in this way was limited because it was impossible to understand the present value of customer satisfaction as a quality attribute. It was also not possible to estimate how much quality satisfaction increases or decreases when the customer's actual desires are met. A potential customer satisfaction improvement (PCSI) index was calculated to overcome these limitations. Using this index, it was possible to improve absolute satisfaction by preferentially improving quality factors considered to be relatively unsatisfactory by calculating the increase in customer satisfaction.

According to the results of Table 11, the PCSI index ranked "University accreditation" and "Adherence to class start and end times" as having the highest indicators. When the level of satisfaction exceeds the current level, satisfaction increases significantly, so it is first necessary to expand and improve the quality of service.

Table 11. PCSI index results of university educational service quality attributes.

№	Quality Attribution	Evaluation	KANO Classification	Satisfaction	Dissatisfaction	Current Satisfaction Position (P)	PCSI Index	PCSI Ranking
1	Number of students in the class (below 10)	I	Indifferent	0.25	−0.11	−0.09	0.34	25
2	Lighting system of university buildings	O	One-dimensional	0.52	−0.73	−0.08	0.60	3
3	Cleanliness of the university campus	O	One-dimensional	0.75	−0.86	0.26	0.49	7
4	University office hours	M	Must-be	0.33	−0.65	0.01	0.32	31
5	University landscaping, design, and environment	O	One-dimensional	0.68	−0.65	0.13	0.55	4
6	Possibility of using the Internet in the university environment	A	Attractive	0.73	−0.37	0.38	0.35	23
7	Access to computers and equipment in university classrooms	O	One-dimensional	0.66	−0.58	0.20	0.46	9
8	Access to data and databases necessary for university studies	I	Indifferent	0.48	−0.44	0.16	0.32	30
9	Ability to view course evaluations online	M	Must-be	0.35	−0.54	−0.05	0.40	12
10	University students help each other	A	Attractive	0.56	−0.31	0.10	0.46	10
11	Opportunity to express feedback about the university directly to the university management	I	Indifferent	0.48	−0.45	0.13	0.35	24
12	Access to help from university staff	O	One-dimensional	0.56	−0.51	0.18	0.38	18
13	Department's handling of student issues	I	Indifferent	0.51	−0.44	0.13	0.38	19
14	Problem solving by university staff when needed	O	One-dimensional	0.56	−0.62	0.20	0.36	22
15	Impact of services provided by the university on learning	I	Indifferent	0.50	−0.48	0.12	0.38	17
16	Time frame for receiving feedback about the university	A	Attractive	0.60	−0.36	0.23	0.37	21
17	University accreditation status	I	Indifferent	0.49	−0.42	−0.17	0.66	1
18	Adherence to class start and end times	A	Attractive	0.63	−0.40	0.00	0.63	2
19	Timeliness of services provided by the university to students	M	Must-be	0.32	−0.61	−0.19	0.51	6
20	Skills of a university professor	O	One-dimensional	0.59	−0.59	0.06	0.53	5
21	Ability of the university to deliver services as promised	I	Indifferent	0.38	−0.46	−0.05	0.43	11
22	Ability of university staff to provide specific information to the students about the timing of service delivery	M	Must-be	0.34	−0.69	−0.13	0.47	8

Table 11. *Cont.*

№	Quality Attribution	Evaluation	KANO Classification	Satisfaction	Dissatisfaction	Current Satisfaction Position (P)	PCSI Index	PCSI Ranking
23	Employment status after graduation	A	Attractive	0.62	−0.27	0.29	0.33	28
24	Reliability and accuracy of information provided by university staff	O	One-dimensional	0.55	−0.56	0.17	0.38	16
25	Free access to all types of student development training programs	A	Attractive	0.60	−0.30	0.21	0.39	14
26	University's sensitivity to the special needs of students	O	One-dimensional	0.56	−0.58	0.16	0.40	13
27	Readiness for use of university teaching material resources	O	One-dimensional	0.50	−0.65	0.19	0.31	33
28	Department's respect for the individual characteristics of the students	O	One-dimensional	0.52	−0.52	0.19	0.33	27
29	Staff's respect for the individual characteristics of the students	I	Indifferent	0.46	−0.47	0.16	0.30	35
30	Fellow students' respect for the individual characteristics of the students	I	Indifferent	0.43	−0.41	0.14	0.29	37
31	University's provision of health services requested by the students	I	Indifferent	0.47	−0.45	0.17	0.30	36
32	University management and teachers promptly receive student feedback and make decisions	M	Must-be	0.31	−0.61	−0.01	0.32	29
33	University's confidentiality of student personal information	A	Attractive	0.59	−0.35	0.25	0.34	26
34	Courtesy of university staff to provide prompt service to students	O	One-dimensional	0.52	−0.55	0.24	0.28	40
35	Reputation of the department's research activities in the country	A	Attractive	0.66	−0.31	0.37	0.29	39
36	Quality of services provided by university teachers and staff	O	One-dimensional	0.51	−0.60	0.20	0.31	34
37	Stability of university rules and regulations	A	Attractive	0.70	−0.41	0.41	0.29	38
38	Reputation enjoyed by the university among employers	A	Attractive	0.74	−0.43	0.37	0.37	20
39	University campus security	O	One-dimensional	0.53	−0.61	0.14	0.39	15
40	Reputation of the university in the country	A	Attractive	0.71	−0.27	0.39	0.32	32

The PCSI index can predict an increase in satisfaction with the quality of services provided relative to the current level. Therefore, when university management implements improvement activities, such as improving the learning environment to increase customer satisfaction, adequate profits can be achieved if service characteristics are chosen that significantly increase customer satisfaction, such as service quality with a high PCSI index. By contrast, for service characteristics with a low PCSI index, it is difficult to expect direct satisfaction results because of the relatively low level of satisfaction growth, i.e., it is not an urgent priority. Although the PCSI index is relatively low for attractive quality factors, it is believed that the range of customer satisfaction needs to be increased so that customer satisfaction can be continuously maintained in these items.

As shown in Figure 5, an index of satisfaction and dissatisfaction is derived from the evaluation table of Kano's theoretical quality characteristics, and then the current satisfaction is determined. The value of position P, the coefficient of customer satisfaction, is shown on the graph.

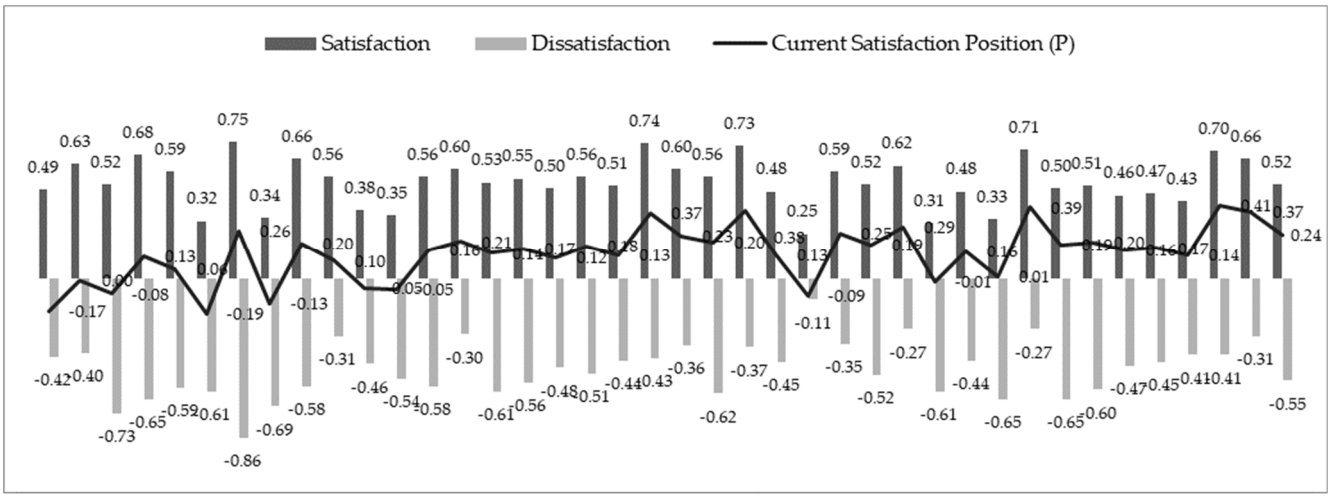

Figure 5. Derivation of PCSI index and current satisfaction position (P) value of educational service quality attribute.

If the P-value of the current satisfied position is large, the distance to the satisfaction coefficient is close, so the PCSI index has a low value. The distance between the P-value of the current satisfactory position and the satisfaction coefficient is the PCSI index.

5. Conclusions

Mongolia's higher education sector is not only the nation's educational sector but also a part of society and the economy. Recently, due to the rapid changes in the social and economic environment, the aspirations of consumers of higher education services have become more diverse, and the trust and expectations of their quality have increased. As the scale of the educational sector has increased, competition among universities has intensified. Ultimately, a university now must secure quality competitiveness, and the goal of each university is to maximize student satisfaction. To achieve that purpose, universities must concentrate on their educational service. Since the resources are limited when the university attempts to minimize students' dissatisfaction, the efficiency must be improved. To overcome this situation, it is necessary to have a clear understanding of students' requirements and quality characteristics and a strategic plan to improve efficiency. The research described above is conducted to obtain the following conclusions.

- SERVEQUAL model: First, research using the SERVQUAL method usually has five main dimensions: reliability, tangibles, responsiveness, empathy, and assurance. The measurement factors for publication were detailed. These five core dimensions

covered all the factors necessary to measure the quality of university educational services and provided the primary basis for objective evaluation;

- KANO model: Secondly, according to KANO theory, the results of classifying the quality factors of Mongolian higher educational services are defined as follows: the items identified as attractive quality factors that can improve customer satisfaction are the time frame for receiving feedback about the university, university's confidentiality of student personal information, stability of university rules and regulations, employment status after graduation, free access to all types of student development training programs, reputation enjoyed by the university among employers, reputation of the university in the country, etc. Therefore, setting these factors that customers perceive to be attractive and focusing on service or technology improvement will elicit customer satisfaction. Of course, it is also helpful to have a marketing strategy that prioritizes these factors;
- TIMKO model: Third, the results of calculating the customer satisfaction and dissatisfaction coefficient proposed by TIMKO are as follows. The dissatisfaction coefficient was found to be relatively high in terms of quality factors, such as the cleanliness of the university campus, the lighting system of university buildings, and the ability of university staff to provide specific information to the students about the timing of service delivery. This is because, if the customer's needs are not met in the relevant element, then customer dissatisfaction will be relatively high compared to other factors. The satisfaction coefficient was relatively high for items such as the university environment's cleanliness, the reputation enjoyed by the university among employers, and the possibility of using the internet in the university environment. In the long run, universities that want to increase development sustainability should consider these factors;
- PCSI index: Fourth, as a result of the calculation of the potential customer satisfaction improvement (PCSI) index, the most significant potential quality characteristic for improving the level of satisfaction with the quality of educational services was 'the university accreditation status'. The next factors in order were 'adherence to class start and end times', 'lighting system of university buildings', 'university landscaping, design, and environment', and 'skills of a university professor'. In other words, the factor that can most improve customer satisfaction is the university's accreditation. It is possible to increase student satisfaction by paying increased attention to factors with a high index of potential customer satisfaction improvement.

The limitations of this research are as follows. First, this research attempted sampling of various classes but limited the sample hierarchy to students of the department of four-year universities. Second, there is a lack of precedent research on the quality of university educational services. Specifically, there is a limitation in that previous studies focusing on monolithic studies have rarely been conducted.

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