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Improving Service Quality in a Tutoring Institutions Using Fuzzy-Servqual

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Abstract

Quality improvement is a business strategy that emphasizes fulfilling consumer desires. This study aims to determine consumer needs, in this case students, as a reference for improving the business quality of tutoring institutions by using the Fuzzy-Servqual method to sort out service quality values that can be used to determine priority handling. The evaluation criteria are determined based on the five dimensions of the servqual model. Fuzzy-servqual is applied to get the importance weight of each servqual model criterion. The dimension of physical evidence (tangibles) is a priority that needs to be evaluated, with a gap value of -0.08. The top priority is Availability of Green Areas -0.51, followed by Completeness, comfort and cleanliness of the library -0.44, and Comfort, cleanliness and safety of study rooms -0.24. The conclusion obtained is that the application of Fuzzy Servqual can be applied to measure the quality of service in a tutoring institution based on predetermined indicators. Future research should adopt a more comprehensive approach by considering various perspectives for a thorough understanding of improving the quality of services in tutoring institutions.

Keywords: Business Strategy; Educational Service; Fuzzy Servqual; Service Quality; Quality Improvement

Abstrak

Peningkatan kualitas merupakan strategi bisnis yang menekankan pemenuhan keinginan konsumen. Studi ini bertujuan untuk menentukan kebutuhan konsumen, dalam hal ini mahasiswa, sebagai referensi untuk meningkatkan kualitas bisnis lembaga bimbingan belajar dengan menggunakan metode Fuzzy-Servqual untuk memilah nilai kualitas layanan yang dapat digunakan untuk menentukan prioritas penanganan. Kriteria evaluasi ditentukan berdasarkan lima dimensi model Servqual. Fuzzy-Servqual diterapkan untuk mendapatkan bobot kepentingan dari setiap kriteria model Servqual. Dimensi bukti fisik (wujud nyata) merupakan prioritas yang perlu dievaluasi, dengan nilai gap -0,08. Prioritas tertinggi adalah Ketersediaan Area Hijau -0,51, diikuti oleh Kelengkapan, kenyamanan dan kebersihan perpustakaan -0,44, dan Kenyamanan, kebersihan dan keamanan ruang belajar -0,24. Kesimpulan yang diperoleh adalah bahwa penerapan Fuzzy Servqual dapat diterapkan untuk mengukur kualitas layanan di lembaga bimbingan belajar berdasarkan indikator yang telah ditentukan. Penelitian selanjutnya harus mengadopsi pendekatan yang lebih komprehensif dengan mempertimbangkan berbagai perspektif untuk pemahaman yang menyeluruh tentang peningkatan kualitas layanan di lembaga bimbingan belajar.

***Kata Kunci**: Strategi Bisnis; Layanan Pendidikan; Fuzzy Servqual; Kualitas Layanan; Peningkatan Kualitas*

INTRODUCTION

Quality improvement is a business strategy that emphasizes fulfilling consumer desires (Djunaidi, Setiawan, et al., 2018). Service is an effort to satisfy consumers, an obligation that must be improved (R. O. Putri & Martha, 2019). Performance has a direct effect on consumer satisfaction. Therefore, a business unit is expected to improve its performance by knowing consumers' satisfaction levels (Nguyen et al., 2021).

The service industry in Indonesia's education sector has experienced significant growth, demonstrated by the rapid establishment of various tutoring institutions. In 2019, 1,866 tutoring institutions businesses were recorded, a notable increase from 1,135 businesses in 2009 (Saputra, 2019). Tutoring institutions are establishments that offer support and instructional services to students with the aim of enhancing their academic achievements. The primary objective of these institutions is to assist students in achieving improved academic performance (Sohail & Hasan, 2021). In Figure 1 tutoring institutions occupy the 5th position out of 6 course programs that are widely established in Indonesia.

The reasons why research tutoring institutions are because the quality of the services they provide can have a significant impact on student learning outcomes and development, due to fierce rivalry among tutoring establishments, these institutions have the opportunity to implement appropriate remedial measures in order to enhance the experience for both students and parents. These students always expect to get maximum service to achieve their learning output. The problem, however, is that a tutoring institution often has difficulties in measuring the quality of the services provided. Especially during the pandemic period, from 2019 to 2021 there was a decrease in the number of students and also changes in learning methods, from face-to-face, e-learning from March 2020 until June 2021, and blended learning from June 2021 until December 2022, and from January 2022 until now, face to face method is returned. Satisfaction assessment will be subjective where the nature of truth is not expressed. In its development until now, a tutoring institution, needs an instrument to measure the quality of service to find out existing problems to be resolved immediately. Because this is very important for the continuity of the business establishment of these tutoring institutions.

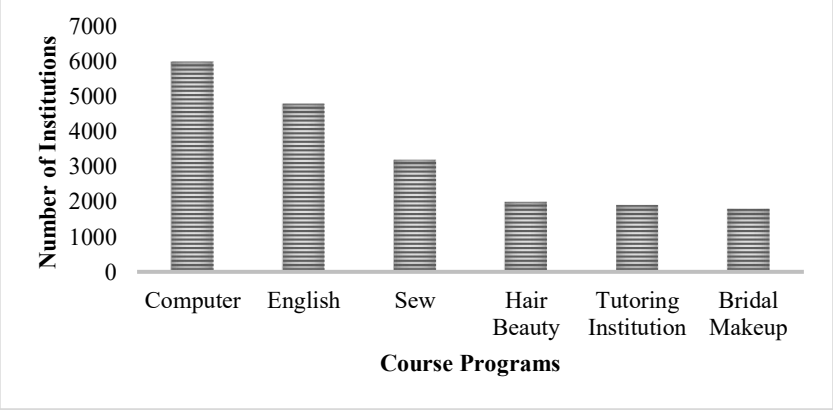


Figure1. Chart of The Top 6 Highest Number of Non Formal Education Institutions (Saputra, 2019)

The research conducted previously only focused on assessing the quality of its services using the servperf method without choosing which priorities were taken to measure problem handling in a tutoring institutions (Lewis, 2017). The servperf method can be used to determine the focus of attention on consumer demand, especially for factors that are important but do not yet meet satisfaction (Djunaidi, Alghofari, et al., 2018). By looking at

the backgrounds and research that have been done previously, it is necessary to develop a method in this research by adding the Fuzzy method to assess the level of student satisfaction with services provided at Tutoring Institutions that have been assessed using the servqual method. Priority decisions can be taken to handle problems that aim to improve the quality of service of the Tutoring institutions.

This study aims to determine the needs of consumers in this case students as a reference to improve the business quality of a tutoring institutions by using the fuzzy-servqual methods to sort out the value of service quality so that it can be used to determine the priority of handling. Servqual is a method of measuring service quality that is divided into five dimensions, namely tangible, reliability, responsiveness, assurance, and empathy (Nojavan et al., 2021). Fuzzy is typically used when we need to assess a person's complex and frequently ambiguous thought processes (H. M. Putri et al., 2021). In situations like this, the fuzzy theory provides consistent measurement results. With this method, researchers can analyze service attributes by the needs and desires of consumers and find out the gaps between services obtained with the expectations of consumers. In the end, it is known what service criteria are felt to have not satisfied consumers and it becomes an assessment for Tutoring Institutions to make improvements to improve service quality (Efendi et al., 2021).

RESEARCH METHODOLOGY

The research methodology of this study includes two main phases. In the first phase, the evaluation criteria are determined based on five dimensions of the servqual model. In the second phase, the fuzzy-servqual is applied to obtain the importance weight of each criterion of the servqual model (Saeedpoor et al., 2019). From the data obtained that there were problems during the pandemic where the learning system changed so that the level of student satisfaction changed. And it's not caused by just one factor.

Research Prosedure

A research technique and research framework are important to give direction in the planning of this investigation. This framework is a list of actions that will be implemented to address the issues covered in this study. The following figure depicts the research's overall structure:

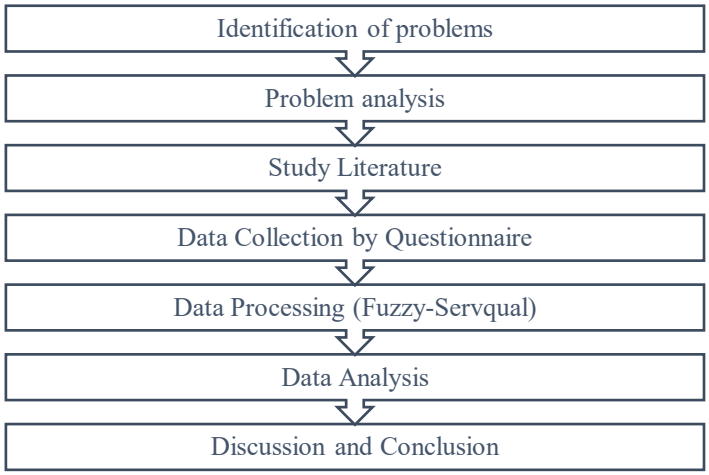


Figure 2. The Research Stage

Method and Collecting Data

In this study, questions or statements are created and disseminated to respondents after firsthand observations of the services in the Tutoring Institutions in Cilegon as the sample of research. Data collection took place over the course of one months. The questionnaire in this study served as a guide for gathering information that will be given to respondents (students) and contains a set of statements or questions to be answered about service quality. The preparation of the data, which was acquired from respondents who were high school students in grades 2 and 3 around 100 students, was the first part of the study.

Data from questionnaires comprised of 21 question attributes that were categorized into 5 servqual dimensions were used to generate the data. And literature review, this seeks to perform or gather data in addition to or as indirect data sources.

When creating the questionnaire, which yields 21 service quality indicators based on secondary data (item). A few examples of service quality factors are as follows:

Table 1. Question Attribute (Kartika, 2017)

No	Dimension and Attribute	Code
A	**Tangible**	
1	Convenience, cleanliness, and safety of the study room	A1
2	Completeness, comfort, and cleanliness of the library	A2
3	Convenience, cleanliness, and availability of parking space	A3
4	Hot spot bandwidth availability	A4
5	Convenience, cleanliness, and safety of the prayer room (Mushola)	A5
6	Comfort, completeness, cleanliness, and safety	A6
7	Availability of Green Area	A7
8	Convenience, completeness, and safety of public transportation	A8
9	Comfort, completeness, and cleanliness of the Toilet-WC	A9
B	**RELIABILITY**	
10	Interesting curriculum and learning process	B1
11	Tutor quality and qualifications are good	B2
12	Fun learning atmosphere	B3
13	The material delivered by the tutor is clear and easy to understand	B4
14	Quality of alumni through PTN	B5
C	**RESPONSIVENESS**	
15	Response and speed in service	C1
16	Overall service quality in supporting the smooth learning activities	C2
D	**ASSURANCE**	
17	Knowledge and skills acquired after tutoring	D1
18	Classroom safety	D2
E	**EMPATHY**	
19	Initiative to help	E1
20	Friendliness, courtesy, and attitude in service	E2
21	Good communication between students and Institutions	E3

Research Data Test

Validity Testing

The correlation of item scores with total scores was used to evaluate the Validity of the exam. "Spears Rank" is the idea of performing an "$r_{arithmetic}$ (r_{xy}) with r_{table}" test. If the $r_{arithmetic} > r_{table}$ process instrument series is deemed "legitimate," it is also expected that the

next process can be employed for this activity if the $r_{arithmetic}$ rtable is deemed "inValid" (Akdere et al., 2020)

$$r_{xy} = \frac{n\Sigma x_i y_i - (\Sigma x_i)(\Sigma y_i)}{\sqrt{(n\Sigma x_i^2 - (x_i)^2)(n\Sigma y_i^2 - (y_i)^2)}} \quad (1)$$

Reliability Testing

Cronbach's alpha, a measure of value that has a range of zero – one this measurement concept is done so that the size is appropriate and consistent (Siwi et al., 2021).

$$r_i = \frac{k}{(k-1)} \{1 - \frac{\Sigma s_i^2}{s_t^2}\} \quad (2)$$

Fuzzy-Servqual Process

In this method, the process is to process questionnaire data, then fuzzification, defuzzification, and measurement of Gap will be carried out for each servqual dimension (Stefano et al., 2020). Reduces the value of the perception variable by the value of the expectation variable for each question attribute to display the Gap value. Consequently, analyzing student satisfaction may be simple.

RESULTS AND DISCUSSION

Results

Respondent Information

Figures 3 and 4 show the data of respondents who filled out the Servqual questionnaire consisting of 100 Tutoring Institutions's students, namely 50% each of 2nd-grade high school students and 50% of 3rd-grade senior high school students. With data on parents' occupations, namely BUMN 21%, Private 46%, Civil Servants 15%, Entrepreneurs 18%.

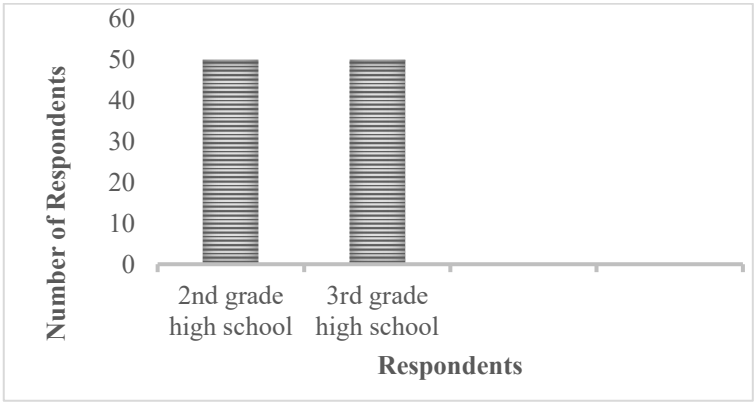


Figure 3. Number of Respondents

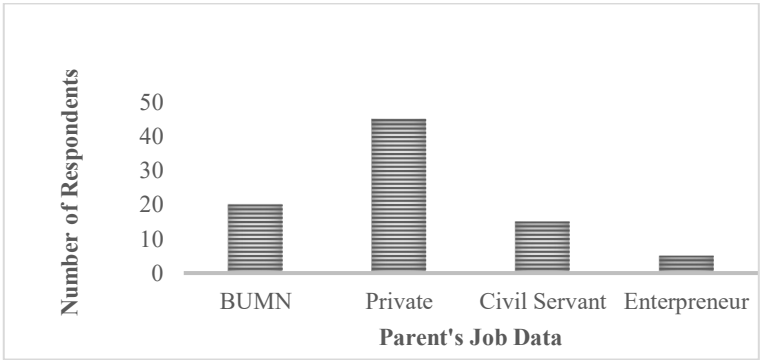


Figure 4. Parent's Job Data

Validation Test

To adjust the questionnaire's Validity to the sample that will be used, accuracy is required. The results of the Validity test are shown in the Table 2.

Table 2. Validity Test

Perception and Expectation Validity Test Result						
Dimension	**Code**	**r_{xy} (P)**	**r_{xy} (E)**	**r_{table}**	**Validation Status (P)**	**Validation Status (E)**
Tangible	A1	0,73	0,66	0.1966	Valid	Valid
	A2	0,42	0,50	0.1966	Valid	Valid
	A3	0,69	0,71	0.1966	Valid	Valid
	A4	0,75	0,74	0.1966	Valid	Valid
	A5	0,74	0,75	0.1966	Valid	Valid
	A6	0,73	0,69	0.1966	Valid	Valid
	A7	0,50	0,64	0.1966	Valid	Valid
	A8	0,59	0,60	0.1966	Valid	Valid
	A9	0,71	0,70	0.1966	Valid	Valid
Realibility	B1	0,77	0,78	0.1966	Valid	Valid
	B2	0,76	0,75	0.1966	Valid	Valid
	B3	0,75	0,76	0.1966	Valid	Valid
	B4	0,73	0,76	0.1966	Valid	Valid
	B5	0,61	0,66	0.1966	Valid	Valid
Resposiveness	C1	0,71	0,60	0.1966	Valid	Valid
	C2	0,77	0,66	0.1966	Valid	Valid
Assurance	D1	0,72	0,70	0.1966	Valid	Valid
	D2	0,75	0,70	0.1966	Valid	Valid
Empathy	E1	0,68	0,70	0.1966	Valid	Valid
	E2	0,70	0,68	0.1966	Valid	Valid
	E3	0,68	0,66	0.1966	Valid	Valid

Reliability Test

In reliability testing, the questionnaire was tested using the Cronbach's alpha method. Cronbach's alpha, measures the lower limit of the reliability value of a construct. The alpha value must be greater than 0.60.

Table 3. Reliability Test

Cronbach's Alpha	**Reliability Test Result**
Reliable Coefficient (P)	Interpretation (P)
0.93	Very Reliable
Reliable Coefficient (E)	Interpretation (E)
0.92	Very Reliable

Data Analysis of Servqual Dimension

Tangible

Table 4 displays the discrepancy between the respondents' fuzzy responses and the tangible characteristics of the service quality questionnaire. This factor gauges how customers feel about the service provider's physical infrastructure in terms of its sufficiency (Harto, 2018). According to the findings, the characteristic with code A7, Availability of Green Area, has the biggest gap value among other tangible attributes with a value of -0.51. This is due to the unavailability of green areas in the Tutoring Institutions building area which should be made to make it comfortable and aesthetically good.

Table 4. Servqual Gap Score For Tangible Dimension

Code	Perception (Ap)			Expectation (Ae)			Δfuzzy			Δdefuzzified
	ap	bp	cp	ae	be	ce				
A1	4,76	6,76	8,76	5,00	7,00	9,00	-4,24	-0,24	3,76	-0,24
A2	4,11	6,11	8,11	4,56	6,56	8,56	-4,44	-0,44	3,56	-0,44
A3	4,55	6,55	8,55	4,56	6,56	8,56	-4,01	-0,01	3,99	-0,01
A4	4,34	6,34	8,34	4,11	6,11	8,11	-3,77	0,23	4,23	0,23
A5	4,69	6,69	8,69	4,56	6,56	8,56	-3,86	0,14	4,14	0,14
A6	4,61	6,61	8,61	4,78	6,78	8,78	-4,16	- 0,16	3,84	-0,16
A7	3,71	5,71	7,71	4,22	6,22	8,22	-4,51	-0,51	3,49	**-0,51**
A8	4,29	6,29	8,29	4,11	6,11	8,11	-3,82	0,18	4,18	0,18
A9	4,56	6,56	8,56	4,44	6,44	8,44	-3,88	0,12	4,12	0,12

Reliability

The reliability factor demonstrates a service provider's capacity to deliver accurate and trustworthy services (Che Rose et al., 2018). As shown in Table 5, four of the indicators in this dimension have gap values below 0, which indicates that Tutoring Institutions Cilegon's consumers are not entirely satisfy with its services. The B1 attribute in -0,12, which refers to an interesting curriculum and learning process, exhibits the largest gap value for this attribute, whereas the B3 and B4 attributes, which discuss the learning environment in the classroom, have the smallest gaps**.** However, the students were satisfied with the B5 attribute in 0.18, namely the quality of alumni accepted at state universities.

Table 5. Serqual Gap Score For Reliability Dimension

Code	Perception (Ap)			Expectation (Ae)			Δfuzzy			Δdefuzzified
	ap	bp	cp	ae	be	ce				
B1	4,55	6,55	8,55	4,67	6,67	8,67	-4,12	-0,12	3,88	**-0,12**
B2	4,48	6,48	8,48	4,56	6,56	8,56	-4,07	-0,07	3,93	-0,07
B3	4,53	6,53	8,53	4,56	6,56	8,56	-4,02	-0,02	3,98	-0,02
B4	4,53	6,53	8,53	4,56	6,56	8,56	-4,02	-0,02	3,98	-0,02
B5	4,40	6,40	8,40	4,22	6,22	8,22	-3,82	0,18	4,18	0,18

Responsiveness

In this dimension, there are 2 attributes, namely C1 regarding response and service speed then C2 service quality in supporting a smooth learning process (Abari et al., 2021). The biggest gap from this dimension is C1 but not excessive, only -0.1, for C2 students are satisfied. According to (Akdere et al., 2020), responsiveness is one of the most important dimensions of service quality.

Table 6. Servqual Gap Score For Responsiveness Dimension

Code	Perception (Ap)			Expectation (Ae)			Δfuzzy			Δdefuzzified
	ap	bp	cp	ae	be	ce				
C1	4,55	6,55	8,55	4,56	6,56	8,56	-4,01	-0,01	3,99	**-0,01**
C2	4,52	6,52	8,52	4,44	6,44	8,44	-3,93	0,07	4,07	0,07

Assurance

In this dimension, there are 2 attributes, namely D1 regarding knowledge and skills acquired after tutoring then D2 safety in class. The biggest gap from this dimension is D1

but not excessive, only -0.07, for D2 students are satisfied. This means that the security conditions in the classroom are very good. Apart from responsiveness, assurance is also the most important dimension of service quality (Akdere et al., 2020). This dimension indicates the ability and courtesy of the service personnel of a company as well as the ability of the company and its employees to foster trust and confidence in customers.

Table 7. Servqual Gap Score For Assurance Dimension

Code	Perception (Ap)			Expectation (Ae)			Δfuzzy			Δdefuzzified
	ap	bp	cp	ae	be	ce				
D1	4,48	6,48	8,48	4,56	6,56	8,56	-4,07	-0,07	3,93	**-0,07**
D2	4,58	6,58	8,58	4,44	6,44	8,44	-3,86	0,14	4,14	0,14

Empathy

In this dimension, there are 3 attributes regarding the communication relationship between Primagama and students. All of them were rated very satisfactory by the students. This attribute explains the service provider can position himself as a customer and considers all the problems experienced by customers are important (H. M. Putri et al., 2021).

Table 8. Servqual Gap Score For Empathy Dimension

Code	Perception (Ap)			Expectation (Ae)			Δfuzzy			Δdefuzzified
	ap	bp	cp	ae	be	ce				
E1	4,55	6,55	8,55	4,44	6,44	8,44	-3,90	2,10	4,10	1,44
E2	4,68	6,68	8,68	4,56	6,56	8,56	-3,88	2,12	4,12	1,46
E3	4,68	6,68	8,68	4,67	6,67	8,67	-3,99	0,01	4,01	0,01

Selection of Quality Improvement Priorities Based on Gap

Measuring Rank of Gap based on Servqual Dimension

Table 9. Gap Based On Servqual Dimension

Code	Gap	Gap Dimension	Rank
A1	-0,24		
A2	-0,44		
A3	-0,01		
A4	0,23		
A5	0,14		
A6	-0,16		
A7	-0,51		
A8	0,18		
A9	0,12		
Tangible		**-0,08**	**1**
B1	-0,12		
B2	-0,07		
B3	-0,02		
B4	-0,02		
B5	0,18		
Reliability		**-0,01**	**2**
C1	-0,01		
C2	0,07		
Responsiveness	**0,03**	**3**	
D1	-0,07		
D2	0,14		

Table 9. Gap Based On Servqual Dimension (Continued)

Code	Gap	Gap Dimension
Assurance	**0,03**	**4**
E1	1,44	
E2	1,46	
E3	0,01	
Empathy	**0,97**	**5**

Two dimensions have a negative gap value, which suggests that students do not receive the satisfaction they expect, according to the results of the computation of the gap between dimensions. If the negative value is significant, the gap's value is expanding. According to the aforementioned tabulation, physical proof (tangibles) is the dimension that has the largest negative difference, with a gap of -0.08; consequently, students give this dimension the highest dissatisfaction scores. If the highest negative gap value is used to rank the gaps between dimensions, then:

1). Physical evidence (tangibles) with a gap of -0.08.
2). Reliability with a gap of -0.01.
3). Responsiveness, assurance, and empathy are at a positive value, which means that students are satisfied with services related to these three dimensions.

Measuring Rank of Gap based on Dimension Indicator

The Servqual Gap based on the dimension indicator is compared. It is possible to employ the value of perception and expectations to increase students' desire for tutoring institutions to enhance their quality services. This condition is depicted in Table 10.

Table 10. Gap Based On Dimension Indicator

Code	GAP	Ranking
A7	-0,51	1
A2	-0,44	2
A1	-0,24	3
A6	-0,16	4
B1	-0,12	5

Five indicators that can be improved are known from the data above based on the biggest Gap, and they are as follows:

1). Availability of Green Area (A7) with gap -0.51.
2). Completeness, comfort, and cleanliness of the library (A2) with a gap of -0.44.
3). Convenience, cleanliness, and safety of the study room (A1) with a gap of -0.24.
4). Comfort, completeness, cleanliness, and safety of the waiting room during class breaks (A6) with a gap of -0.16.
5). Interesting curriculum and learning process (B1) with gap -0.12.

Discussion

To find out the performance of a tutoring institution business, we can measure it with the fuzzy-servqual method. The Servqual method is a method for measuring service quality which consists of 5 dimensions of service quality as follows: Tangibles (Appearance of physical facilities, equipment, personnel, and communication), Reliability (Promises delivery, service provision, problem solving and costs), Responsiveness (Emphasizes attentiveness and timeliness in dealing with customer requests, questions, complaints, and

problems), Assurance (It is defined as an employee's knowledge of the company and its employee's capacity to inspire trust and confidence in customers), and Empathy (Empathy is delivery through personalized service).

The advantage of using the Servqual method is that it is easier to capture perceptions or views from the results of data collection with a questionnaire. And also superior for determining which variables should be given more attention to improve service (Kartika, 2017). The fuzzy method is usually used when we need to assess a person's thought process which is complex and often ambiguous (H. M. Putri et al., 2021). In situations like this, fuzzy theory provides consistent measurement results. With this method researchers can analyze service attributes based on consumer needs and desires and find out the gap between the services obtained and consumer expectations. In the end, it is known what service criteria are felt to have not satisfied consumers and become an assessment for Tutoring Institutions in Cilegon to make improvements to improve service quality (Efendi et al., 2021).

The proposed model gives the result that the dimensions of physical evidence (tangibles) are a priority that needs to be evaluated, with a gap value of -0.08. The main priority is A7 (Availability of Green Areas -0.51), followed by A2 (Completeness, Comfort and Cleanliness of the Library -0.44), and A1 (Comfort, Cleanliness and Safety of Study Rooms -0.24) compared to the Servqual dimension other.

These results verify that the Fuzzy Servqual method for sorting out service quality values can be used to determine priority handling. Previous research only focused on assessing the quality of its services using the Servperf method without choosing which priority to take to measure problem-solving in a tutoring institutions (R. O. Putri & Martha, 2019). The Servperf method can be used to determine the focus of attention on consumer demand, especially for factors that are important but have not met satisfaction (Djunaidi, Setiawan, et al., 2018).

CLOSING

Conclusion

The conclusion obtained is that the application of Fuzzy-Servqual can be applied to measure service quality. A tutoring institutions's service quality is measured based on predetermined indicators. Customer expectations and satisfaction can be analyzed accurately. The gap calculation based on the servqual indicator or attribute shows negative, it is assumed that students are dissatisfied with the service quality of Tutoring Institutions in Cilegon. The biggest gap in the A7 attribute (-0.51) is the availability of green space in the Tutoring Institutions in Cilegon building environment.

Then from the gap calculation based on the Servqual dimension, the biggest gap is tangibles (-0.08). Whereas in the dimensions of responsiveness, assurance and empathy the value of the gap is positive, which means that students as customers are satisfied with its service quality.

The dimension of physical evidence (tangibles) is a priority that needs to be evaluated and the quality of service is improved. The main priority is A7 (Availability of Green Areas -0.51), followed by A2 (Completeness, Comfort and Cleanliness of the Library -0.44), and A1 (Comfort, Cleanliness and Safety of Study Rooms -0.24).

In improving services to students, the results of this study can be used as material for consideration for a tutoring institution to improve service quality. However, this research has a limited research scope, only based on one tutoring institutions in Cilegon City, Indonesia. Further research can be developed that is more general and does not focus on one tutoring institutions. In the future, the author is interested in conducting research on what affects the purchase intention for a tutoring institution.

Suggestions

This study is limited to a single tutoring institution in Cilegon. Future research should expand to multiple institutions and different cities to gain more generalizable results. It is also recommended to add variables such as price, tutor quality, and promotion to analyze factors influencing students' purchase intention toward tutoring services.

Since the tangibles dimension shows the largest negative gap, the institution should prioritize improving physical facilities, particularly the availability of green areas, library cleanliness, and the comfort of study rooms. Further qualitative analysis, such as interviews, can help identify the root causes of dissatisfaction in these areas.

Combining Fuzzy-Servqual with methods like Importance Performance Analysis (IPA) or Structural Equation Modeling (SEM) in future studies will enrich the analysis and provide practical insights for service quality improvement in tutoring institutions.

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