

Analysis of service quality on customer satisfaction using the service quality method and analytical hierarchy process

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ABSTRACT

This research aims to analyze service quality and customer satisfaction to find out the factors of consumer/customer complaints so that company performance can be improved and improved. This research uses the Servqual method, the company can then find out consumers' perceptions and expectations, while the company's AHP method can sort out which criteria are prioritized first to improve service quality so that the hospital becomes better. The results of the research were conducted with a sample of 100 respondents and 20 question items. In calculating the weighted servqual the priority for improving the quality of service in the Tangible dimension is the criterion "The company has a clean, comfortable waiting room and air conditioning" with a weighted servqual value of -0.020, Reliability is the criterion "doctor's availability according to schedule" with a weighted servqual value of -0.058, Responsiveness is the criterion of "officer's thoroughness in providing services" with a weighted servqual value of -0.074, Assurance is the criterion of "guaranteeing timeliness of service" with a weighted servqual value of -0.096, Empathy is the criterion of "officer's sincerity in handling consumers" with a weighted Servqual value of -0.072. The most satisfactory criterion is the Reliability dimension which has the criteria "fast and uncomplicated service procedures" with a weighted servqual value of -0.010.

Keywords: Servqual; AHP; customer satisfaction.

1. INTRODUCTION

Nowadays, health problems have become a basic need for society. As people's living standards increase, people's demands for quality health also increase. This requires health service providers such as hospitals to improve the quality of services, not only services that are healing for the disease but also include services that are preventive to improve the quality of life and provide satisfaction for consumers as health service users [1].

Health service management is not yet fully efficient, with quality still relatively low, especially when compared with the quality of services provided by foreign private hospitals which have advantages and are accustomed to professional management systems. The presence of foreign private hospitals provides benefits for certain groups of people because for them there will be more choices of quality health services, so national hospitals must undergo accreditation every 3 years and be able to compete with several other hospital services [2].

SERVQUAL is one of the most popular service quality measurement tools and is widely used as a reference in management and marketing research. SERVQUAL was created based on the gap analysis model. This tool was developed by A. Parasuraman, SERVQUAL consists of 20 instruments used to measure customer perceptions regarding service quality in service and retail organizations [3]–[5]. In this research, Servqual also contains 5 dimensions of Tangibles: physical facilities, equipment, and



personal appearance; Reliability: The ability to provide promised services accurately and reliably; Responsiveness: Willingness to help customers and provide service quickly; Assurance: Knowledge and courtesy of employees and their ability to create trust and comfort; Empathy: Caring, individual attention that a company provides to customers [6]–[8].

AHP was developed by Dr. Thomas L. Saaty from the Warthoon School of Business in the 1970s was a method for solving a complex and unstructured problem into groups, organizing the groups into a hierarchical arrangement, inserting numerical values as a substitute for human perception in making real comparisons and Finally, using a synthesis, the elements that have the highest priority are determined [9]–[11].

Wahid's research shows that AHP can determine indicators related to brand issues, warranties, training, spare part control and stock management, pricing, and service systems, including service centers and service facilities [12]. These indicators are the basis for evaluating the performance of power tools industry companies. Mahmudi's research has found that the service criteria in the servqual dimension have the 10 highest gaps to be fixed immediately, all gaps have negative values which means that the level of service expectations for customers is higher than the perceptions they receive so they need to be fixed [13]. Afwan's research has found that the service quality criteria that have the largest gaps in PT. Telkom Bangkalan's services are 15 criteria. All service quality gap values have negative values, which means that the level of customer expectations for service quality is higher than the level of perception received [14].

AHP is a method of breaking down complex problems in unstructured situations into parts. Organize the existing parts or variables into a form of hierarchical arrangement, then assign a numerical value to each variable and synthesize an assessment of which variable has the highest priority which will influence the resolution of the situation. AHP combines personal considerations and judgments in a logical way, and is influenced by imagination, experience, and knowledge to arrange a hierarchy of problems based on logic, intuition, and also experience to provide considerations [15]–[17]. AHP is a process of analyzing decision-making with a systems approach, where decision-making seeks to understand a system condition and provide estimates of overall system interactions in the AHP method.

2. METHOD

This type of research is quantitative research based on explanatory research. Explanatory research is research whose aim is to reveal or explain in depth about certain variables [18]. This research was used to examine in depth the application of the SERVQUAL (Service Servqual) method and the AHP (Analytical Hierarchy Process) method in determining the level of service quality and corrective actions for Bhineka Bhakti Husada Hospital services, South Tangerang. The method and data analysis used in this research is a descriptive analysis method using the SERVQUAL (Service Quality) method, and the AHP (Analytical Hierarchy Process) method and using computer software in the form of SPSS 22 and software in the form of Microsoft Excel 2010, so that you can determine the level of quality of customer service at Rumah Bhineka Bhakti Husada, South Tangerang.

3. RESULT AND DISCUSSION

Service quality analysis

Service quality analysis is a way to analyze the services and needs of the company so that the condition of the company's after-sales service is known. The stages of the analysis are as follows:

Data processing perceived customer satisfaction level (X)

The design of the service quality questionnaire contains attributes arranged based on the Q-Rater dimensions, namely reliability, assurance, tangible, empathy, and responsiveness which are shown in Table 1.

Table 1. Questionnaire design attributes

No	Dimension	Attribute
1	<i>Tangible</i>	a. Completeness of medicines – A1

No	Dimension	Attribute
2	<i>Reliability</i>	b. Availability of ATM facilities that are easily accessible – A2
		c. Availability of a comfortable prayer room and availability of complete prayer equipment – A3
		d. Availability of a clean, comfortable waiting room (use of AC) – A3
		a. Registration procedures that do not confuse customers – B1
3	<i>Responsive</i>	b. Availability of doctors according to schedule – B2
		c. Accuracy of doctors in diagnosing diseases – B3
		d. Fast and uncomplicated service procedures – B4
		a. Accuracy of staff in providing services – C1
4	<i>Assurance</i>	b. Doctors provide explanations about the disease – C2
		c. Alacrity of staff in responding to customer complaints – C3
		d. Employees provide the information needed – C4
		a. Guarantee of service personnel having friendliness, expertise, and skills in serving – D1
5	<i>Empaty</i>	b. Guarantee of punctuality of service – D2
		c. Guarantee of orderly queues – D3
		d. Safe environment with security guards – D4
		a. Officers' concern for customers – E1
		b. Doctors' concern in responding to complaints – E2
		c. Doctors and nurses who are quite attentive – E3
		d. Officers' sincerity in dealing with customers -E4

The steps for calculating the satisfaction level value are as follows:

- a. Calculate the total value of each service attribute. The total value is obtained using the formula (1):

$$Total = (B1^2) + (B2^2) + (B3^2) + (B4^2) + \dots + (B35^2) \quad (1)$$

Remark:

B1= Number of respondents answering the question results

B2= Number of respondents answering the question results

B3= Number of respondents answering the question results

B4-B35 = Number of respondents answering the results of the Likert Scale questions in Table 2. The Likert scale uses the highest score for VERY SATISFIED and the lowest is VERY DISSATISFIED. The Likert scale used is 1-5.

Table 2. Likert Scale of Perceived Satisfaction Level (X)

Score	Satisfaction Level
5	Very satisfied
4	Satisfied
3	Normal
2	Dissatisfied
1	Very Dissatisfied

- b. Calculating this value with the number of respondents' Customer Satisfaction Level Value = $\frac{443}{100} = 4,43$

Data Processing Customer Satisfaction Level Expectation (Y)

The steps for calculating the satisfaction level value are as follows:

- a. Calculate the total value of each service attribute. The total value is obtained using the formula (2):

$$Total = (B1^2) + (B2^2) + (B3^2) + (B4^2) + \dots + (B35^2) \quad (2)$$

Remark:

B1 = Number of respondents answering the question results

B2 = Number of respondents answering the question results

B3 = Number of respondents answering the question results

B4-B35 = Number of respondents answering the results of the Likert Scale questions in [Table 1](#)

b. Calculating this value with the number of respondent customer satisfaction level value = $\frac{474}{100} = 4,74$

GAP Score calculation

Assessment of the service quality using the service quality method includes calculating the difference between the scores given by customers for each pair of questions related to perceptions and expectations. Calculation of the gap between customer perceptions and what consumers expect, which includes analysis of 5 gaps (Gap) that will affect service quality. Gap calculations can use a formula and can be seen below:

$$\text{Gap Score} = \text{Perceived Value} - \text{Expected Value}$$

$$\text{Gap Score} = 4.43 - 4.74 = -0.31$$

Analysis of average gap service quality

Based on a population of 25,268, for 6 months the researcher used 100 customers as a sample of respondents, based on proportionate random sampling, namely sampling that takes into consideration the elements in the research population, then the sampling was continued by lottery, namely a sampling technique by drawing lots for each group to be used as a sample.

$$\text{Gap Score} = \text{Perceived Value} - \text{Expected Value}$$

$$\text{Gap Score} = 4.10 - 4.77 = -0.60$$

The recapitulation of the average assessment of the service quality gap can be seen in [Table 3](#).

Table 3. Average assessment of service quality gap

NO	Servqual Dimensions	Perception	Expectation	Average Gap
1.	Tangible	4,17	4,77	-0,60
2.	Reliability	4,18	4,62	-0,44
3.	Responsive	4,17	4,76	-0,59
4.	Assurance	4,01	4,80	-0,14
5.	Empaty	3,79	4,65	-0,86

Based on how to calculate the gap between the average value of perception and the average value of expectations, it is obtained. Once the gaps or discrepancies are known, the next stage is to conclude. According to Wahid and Hasibuan, a negative satisfaction value (<0) indicates a gap between consumer expectations and perceptions. If the satisfaction value is positive (>0), then the service quality has exceeded the level of consumer satisfaction. If the satisfaction value is equal to zero ($=0$), it indicates that the service quality is in line with consumer expectations.

The average value of the Service Quality Gap is in [Table 2](#). In [Table 2](#) it can be seen that the gap is less than zero (<0), indicating that there is a gap between consumer expectations and perceptions. There are still some consumers who are not satisfied with the services provided by the Bhineka Bhakti Husada Hospital services. This dissatisfaction is caused by the consumer's perception that when they enjoy the service it does not meet expectations. However, this does not mean that the company is considered bad at all. The company can still improve its customer satisfaction service if it takes points that need to be improved and corrected so that the service becomes better, therefore weighting is carried out using the analytical hierarchy process method and weighted service quality.

Weighting calculation with AHP and weighted servqual

This research used the AHP method to determine weight. The weights obtained from the results of the analytical hierarchy process are carried out by taking data to obtain data based on the Servqual

Dimension. The five (5) dimensions include tangible, reliability, responsiveness, assurance, and Empathy. The weighting can be seen in Table 4. Table 4 explains the comparison between the values of Factor A and Factor B. This value is used as a weight to analyze the level of importance of the two factors. The value of 9 is the largest and explains that the Factor has a strong relationship.

Table 4. Comparison of main criteria

No	Factor A	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Factor B
1	Tangible													V					Reliability
2	Tangible											V							Responsiveness
3	Tangible										V								Assurance
4	Tangible												V						Empathy
5	Reliability									V									Responsiveness
6	Reliability							V											Assurance
7	Reliability										V								Empathy
8	Responsiveness								V										Assurance
9	Responsiveness									V									Empathy
10	Assurance											V							Empathy

The description of the values above is as follows:

1 = Equally important

3 = Slightly more important (slightly)

5 = Strongly more important

7 = More important in a very strong way (very strong) 9 = More important in an extreme way (extreme)

Besides from the values above, other values can also be used, namely 2, 4, 6, and 8. These values describe the relationship of importance between the odd values mentioned above. Filling in the column to the left of number 1 indicates that the option on the left has a more important weight than the option on the right. On the other hand, filling in the column to the right of number 1 indicates that the option on the right has a more important weight than the option on the left. In determining the final weight, the (IR) random consistency index is used which can be seen in Table 4. To determine the level of consistency, the results of using the AHP method will be measured by the consistency index. If the ratio with the Random Index standard >0.10 then it is concluded that the degree of consistency is satisfactory, meaning that the AHP method produces an optimal solution. However, if <0.10 then there is an inconsistency in determining the comparison that allows the AHP method not to produce a meaningful solution.

Table 5. (IR) random consistency index

Ukuran Matriks	Nilai IR
1,2	0,00
3	0,58
4	0,90
5	1,12
6	1,24
7	1,32
8	1,41
9	1,45
10	1,49

The comparison results from Table 5 above will be converted into a comparison matrix like Table 6.

Table 6. Paired comparison matrix of the main criteria

	Tangible	Reliability	Responsiveness	Assurance	Empathy
Tangible	1	0,2	0,25	0,5	0,25
Reliability	5	1	1	3	0,5

Responsiveness	4	1	1	2	2
Assurance	2	0,33	0,5	1	0,33
Empathy	4	2	0,5	3	1
Total	16	4,53	3,25	9,5	4,08

a. Tangible sub-criteria weight value

Calculating the weight values of the Tangible sub-criteria, the first thing to do is create a comparison matrix for the Tangible sub-criteria. The comparison matrix can be seen in Table 7

Table 7. Pairwise comparison matrix of tangible subcriteria

Sub criteria	A1	A2	A3	A4
A1	1	4	0,5	1
A2	0,25	1	0,5	0,5
A3	2	2	1	2
A4	1	2	0,5	1
////				

After getting the sub-criteria values, then calculate the normalization matrix by dividing the value of each column by the number of related columns in Table 8. The normalization of this pairwise comparison matrix aims to make all values equal. The normalization data can be seen in Table 8

Table 8. Normalization of the Tangible sub-criteria matrix

Sub criteria	A1	A2	A3	A4
A1	0,235	0,444	0,200	0,222
A2	0,059	0,111	0,200	0,111
A3	0,471	0,222	0,400	0,444
A4	0,235	0,222	0,200	0,222
Total	1	1	1	1

Because the CR value = $0.075 < 0.1$, the preference for the Tangible sub-criteria value is consistent. To determine the weight for the Tangible sub-criteria is obtained by dividing the WSM column value by the total of the WSM column values, so the weight value for each Tangible subcriteria can be seen in Table 9.

Table 9. Tangible sub-criteria weights

Sub criteria <i>Tangible</i>	WSM	Sub Criteria Weight
A1	1,171	0,293
A2	1,082	0,271
A3	0,961	0,240
A4	0,990	0,247
Total	4,204	1,051

b. Reliability sub-criteria weight value

The reliability sub-criteria comparison matrix is shown in Table 10

Table 10. Pairwise comparison matrix of reliability sub-criteria

Sub criteria	B1	B2	B3	B4
B1	1	0,5	1	0,5
B2	2	1	2	0,33
B3	1	0,5	1	0,5
B4	2	3	2	1

Calculating the weight values of the reliability sub-criteria. The first thing to do is create a comparison matrix for the reliability sub-criteria in Table 10. Then calculate the normalization matrix by dividing the value of each column by the number of related columns in Table 11. The normalization

of this pairwise comparison matrix aims to make all values equal. The normalization data can be seen in Table 11.

Table 11. Normalization of Reliability Subcriteria Matrix

Sub criteria	B1	B2	B3	B4
B1	0,167	0,100	0,167	0,214
B2	0,333	0,200	0,333	0,143
B3	0,167	0,100	0,167	0,214
B4	0,333	0,600	0,333	0,429
Total	1	1	1	1

Because the CR value = $0.072 < 0.1$, the preference for the Reliability sub-criteria value is consistent. To determine the weight for the Reliability subcriteria, is obtained by dividing the WSM column value by the total WSM column values, so the weight value for each Reliability subcriteria can be seen in Table 12.

Table 12. Reliability sub-criteria weights

Sub criteria <i>Reliability</i>	WSM	Sub Criteria Weight
B1	0,971	0,243
B2	1,262	0,315
B3	0,971	0,243
B4	0,989	0,247
Jumlah	4,194	1,048

c. Responsiveness sub-criteria weight value

Calculating the weight value of the Responsiveness sub-criteria. The first thing to do is create a comparison matrix for the Responsiveness sub-criteria in Table 13.

Table 13. Responsiveness Subcriteria comparison matrix.

Sub criteria	C1	C2	C3	C4
C1	1	0,25	1	2
C2	4	1	2	3
C3	1	0,5	1	2
C4	0,5	0,333	0,5	1

Then calculate the normalization matrix by dividing the value of each column by the number of related columns in Table 14. The normalization of this pairwise comparison matrix aims to make all values equal. The normalization data can be seen in Table 14.

Table 14. Normalization matrix of responsiveness subcriteria

Subcriteria	C1	C2	C3	C4
C1	0,154	0,120	0,222	0,250
C2	0,615	0,480	0,444	0,375
C3	0,154	0,240	0,222	0,250
C4	0,077	0,160	0,111	0,125
Jumlah	1	1	1	1

Calculating the total weight matrix using the sum formula for each criterion in the normalization table. The results of the total weight matrix calculation can be seen in Table 15.

Table 15. Responsiveness sub-criteria weights

Sub criteria <i>Responsiveness</i>	WSM	Sub Criteria Weight
C1	1,212	0,303
C2	0,997	0,249
C3	0,974	0,244

C4	0,946	0,237
Total	4,130	1,033

d. Assurance sub-criteria weight value

The Assurance subcriteria comparison matrix is shown in Table 16.

Table 16. Pairwise comparison matrix of Assurance subcriteria

Subcriteria	D1	D2	D3	D4
D1	1	0,3	0,5	1
D2	3	1	2	3
D3	2	0,5	1	3
D4	1	0,3	0,3	1

Calculating the weight values for the assurance sub-criteria. The first thing to do is create a comparison matrix for the Assurance sub-criteria in Table 16. Then calculate the normalization matrix by dividing the value of each column by the number of related columns in Table 17. The normalization of this pairwise comparison matrix aims to make all values equal. The normalization data can be seen in Table 17.

Table 17. Normalization of the assurance subcriteria matrix

Subcriteria	D1	D2	D3	D4
D1	0,143	0,154	0,130	0,125
D2	0,429	0,462	0,522	0,375
D3	0,286	0,231	0,261	0,375
D4	0,143	0,154	0,087	0,125
Total	1	1	1	1

e. Empathy sub-criteria weight value

Calculating the weight value of the Responsiveness sub-criteria. The first thing to do is create a comparison matrix for the Responsiveness sub-criteria in Table 18.

Table 18. Paired comparison matrix for Empathy sub-criteria

Sub criteria	E1	E2	E3	E4
E1	1	0,5	3	0,5
E2	2	1	4	1
E3	0,333	0,25	1	0,5
E4	2	1	2	1

Calculating the weight value of the empathy sub-criteria. The first thing to do is create a comparison matrix for the empathy sub-criteria in Table 18. Then calculate the normalization matrix by dividing the value of each column by the number of related columns in Table 19. Normalization is used for the process of changing data into a standard or 'normal' form to facilitate data processing and analysis. Table 19 shows that each variable has selected sub-criteria. These selected criteria are based on the largest serqual weight value in each variable. Sub-criteria A4 represents Tangible, B2 represents Reability, C1 represents Responsive, D1 represents Assurance, and E3 for empathy.

Table 19. Normalization of the empathy sub-criteria matrix

NO.	Code	Main Criteria Weight	Sub Criteria Weight	Final Weight Criteria	ServQual	ServQual TerBobot	(%)	Ranking
1	A1	0,190	0,293	0,056	-0,31	-0,017	3	7
2	A2	0,190	0,271	0,052	-0,32	-0,016	3	6
3	A3	0,190	0,240	0,046	-0,32	-0,015	2	5
4	A4	0,190	0,247	0,047	-0,43	-0,020	3	9

5	B1	0,232	0,243	0,056	-0,44	-0,025	4	14
6	B2	0,232	0,315	0,073	-0,79	-0,058	9	16
7	B3	0,232	0,243	0,056	-0,39	-0,022	3	12
8	B4	0,232	0,247	0,057	-0,17	-0,010	1	1
9	C1	0,192	0,303	0,058	-1,17	-0,068	10	19
10	C2	0,192	0,249	0,048	-0,53	-0,025	4	15
11	C3	0,192	0,244	0,047	-0,38	-0,018	3	13
12	C4	0,192	0,237	0,045	-0,28	-0,013	2	4
13	D1	0,204	0,242	0,049	-1,95	-0,096	15	20
14	D2	0,204	0,242	0,049	-0,37	-0,018	3	11
15	D3	0,204	0,276	0,056	-0,21	-0,012	2	2
16	D4	0,204	0,254	0,052	-0,41	-0,021	3	8
17	E1	0,229	0,279	0,064	-0,38	-0,024	4	9
18	E2	0,229	0,253	0,058	-0,26	-0,015	2	2
19	E3	0,229	0,263	0,060	-1,42	-0,086	13	17
20	E4	0,229	0,238	0,055	-1,38	-0,076	12	17
Total				1,086		-0,655	100%	

f. Calculation of weighted servqual values.

This Servqual value is the GAP obtained from the difference between the respondent's perception of the quality of service received and the respondent's expectation of the quality of the existing service, then multiplied by the final weight so that a value will be obtained which will then be chosen, whichever is smallest first, which is prioritized for improving service quality. The results of calculating the weighted servqual value can be seen in Table 20. Table 20 shows that each variable has selected sub-criteria. These selected criteria are based on the largest servqual Weight value in each variable. Sub-criteria A4 represents Tangible, B2 represents Reability, C1 represents Responsive, D1 represents Assurance, and E3 for Empathy.

Table 20. Calculation results of weighted servqual and ranking values

NO.	Code	Main Criteria Weight	Sub Criteria Weight	Final Weight Criteria	ServQual	ServQual TerBobot	(%)	Ranking
1	A1	0,190	0,293	0,056	-0,31	-0,017	3	7
2	A2	0,190	0,271	0,052	-0,32	-0,016	3	6
3	A3	0,190	0,240	0,046	-0,32	-0,015	2	5
4	A4	0,190	0,247	0,047	-0,43	-0,020	3	9
5	B1	0,232	0,243	0,056	-0,44	-0,025	4	14
6	B2	0,232	0,315	0,073	-0,79	-0,058	9	16
7	B3	0,232	0,243	0,056	-0,39	-0,022	3	12
8	B4	0,232	0,247	0,057	-0,17	-0,010	1	1
9	C1	0,192	0,303	0,058	-1,17	-0,068	10	19
10	C2	0,192	0,249	0,048	-0,53	-0,025	4	15
11	C3	0,192	0,244	0,047	-0,38	-0,018	3	13
12	C4	0,192	0,237	0,045	-0,28	-0,013	2	4
13	D1	0,204	0,242	0,049	-1,95	-0,096	15	20
14	D2	0,204	0,242	0,049	-0,37	-0,018	3	11
15	D3	0,204	0,276	0,056	-0,21	-0,012	2	2
16	D4	0,204	0,254	0,052	-0,41	-0,021	3	8
17	E1	0,229	0,279	0,064	-0,38	-0,024	4	9
18	E2	0,229	0,253	0,058	-0,26	-0,015	2	2
19	E3	0,229	0,263	0,060	-1,42	-0,086	13	17
20	E4	0,229	0,238	0,055	-1,38	-0,076	12	17
Total				1,086		-0,655	100%	

Discussion

The results of this study by study Wahid and Hasibuan [12], that with AHP significant criteria can be found that need to be improved. This research has obtained priority criteria from each variable. Each criterion can be said to be the cause of many customer complaints and requires corrective action. The strategy to improve performance and maintain quality is to develop top priorities so that the basic elements of service that have been successfully implemented are maintained and focused on customer desires.

4. CONCLUSION

Based on the results of research conducted using the Servqual and AHP methods, it can be concluded that the following are the factors for the level of analysis of service quality and the suitability between patient/customer expectations of the quality of health services. Which causes many customer complaints. Several factors the level of customer expectations. From the Tangible criteria, the Weighted Servqual Value is -0.020. From the Reliability criteria, the Weighted Servqual Value is -0.058. From the Responsiveness criteria, the Weighted Servqual Value is -0.068. From the Assurance criteria, the Weighted Servqual Value is -0.096. From the Emphaty criteria, the Weighted Servqual Value is -0.086. Service quality influences the satisfaction of outpatients and inpatients. to increase customer satisfaction, based on calculations (respondents, validity tests, reliability tests, Servqual weight tests, and AHP sub-criteria), from the results of the analysis, namely by providing clear information, improving performance, and maintaining quality, to be further developed as a main priority so that The basic elements of service that have been successfully implemented are maintained and focused on customer desires.

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