

Quality Service Analysis at Pusat Pelayanan Pendidikan Terpadu (P3T) Universitas Malahayati Using Fuzzy and Service Quality Method

M W Wardana^{1*}, A Sidiq¹, H Wibowo¹, Y Pangestu¹

¹Industrial Engineering Department, Universitas Malahayati
Jl. Pramuka No.27 Kemiling, Bandar Lampung 35153

Corresponding e-mail: marcelly@malahayati.ac.id

Abstract. Each institution must try to provide the best service for costumers, but the level of customer satisfaction with a service is different. Every customer always expects to get the optimal service they want. This study aims to determine the level of service quality (Servqual) in the Quality Analysis of Pusat Pelayanan Pendidikan Terpadu (P3T) with Fuzzy Methods and Quality Services at Universitas Malahayati based on five dimensions of Tangible, Reliability, Responsiveness, Assurance and Empathy. This research was conducted by distributing questionnaires to P3T service users and then testing the validity and reliability. The method used is the fuzzy method followed by the calculation of the gap. Respondents in this study were 100 mixed students of various study programs at Universitas Malahayati with an error rate of 10%. The results of the calculation showed that the service performance provided by P3T was almost all the attributes whose performance must be improved. By improving the attributes that have high inequality values, it is expected to improve the quality of the P3T service so that it can increase the trust of service providers to customers.

1. Introduction

Pusat Pelayanan Pendidikan Terpadu (P3T) is one of the facilities engaged in the services provided for Universitas Malahayati students, in order to meet the information service needs of Universitas Malahayati students. Examples of service providers or other similar institutions in the Bandar Lampung area, for example, Universitas Teknokrat and IBI Darmajaya have provided online payment services (to banks) whose results will go directly to the institution and at the same time have been automatically validated, so students do not need to queue taking too long for payment or validation. Therefore, the P3T of Universitas Malahayati in Bandar Lampung needs to improve the quality of service. Its production is intangible and is not linked to a physical product so that service is the behavior of producers in order to meet the needs and desires of consumers for the achievement of satisfaction to consumers themselves [1]. This study aims to identify the perceptions, expectations of students and the level of gap P3T service quality at Universitas Malahayati with the Fuzzy and Service Quality methods. Fuzzy Method and Service Quality can translate students' wants and needs to service quality. This research are related to Fuzzy and Servqual in analyzing service quality as conducted in the hospital inpatient installation services [2], and the public transportation [3].



2. Methods

The data in this study is data obtained from student responses using the questionnaire method. This questionnaire method is used because of the importance of communication between service providers and users to improve service quality [4],[5]. Student response data obtained through questionnaires, observations, direct recording in the field. The data used in the form of a questionnaire relating to the quality of services dimensions tested from Tangible, Reliability, Responsiveness, Assurance and Empathy [2],[3]. They are called servqual that can define the perceptions and expectations of customers with serve received [3],[6]. Then test the adequacy of the data followed by testing the validity of using SPSS on the data collected if the data obtained invalid data then the data needs to be discarded or removed until there are all valid data and continued with reliability testing if the data is not reliable then it returns to the collector data if the data is reliable all the data processing can be done questionnaire. The data is processed using the fuzzy servqual method, namely by calculating fuzzification with TFN each attribute on the questionnaire [3],[7]. Then do the mean calculation again for each attribute. After that the results can be interpreted into defuzzification and then obtained servqual results per attribute and per dimension as a whole, after which the gap calculation is done to determine the quality of the service. Then conclusions can be made towards the end.

3. Results and Discussion

Table 1. Service Quality Attribute

No	Attributes
1	The room is spacious, clean and neat
2	There are enough seats for visitors
3	Availability of complete facilities (air conditioning, chairs, internet)
4	Arrangement of counters according to their function
5	Payment system, KRS input etc. based online
6	Start to work on time
7	Having the ability to process a job
8	Provide completion and handling services quickly
9	The ability to present information correctly
10	The attitude of employees gives trust to visitors
11	The queue time is too long
12	The officer is swift in serving
13	Officers have free time to help
14	All transactions are served or carried out quickly and precisely
15	Ease of getting and clarity of information
16	Officers always smiled and greeted the visitors
17	Polite the officers of treating visitors
18	Friendliness of the officers when serving
19	Honesty of the officers when providing information
20	Officers have the knowledge and ability to provide information
21	Give special attention to visitors
22	Able to help the visitors who are confused
23	Having seriousness in responding to visitor requests
24	Officers do not look at social status and treat visitors with respect and courtesy
25	Officers greets at the beginning and end of the service

Table 2. Results of Attribute Validity of Code P1 (Perception) and H1 Code (Expectations) With SPSS 16.00

	Item_P1	Item_total	Item_H1	Item_total	Explanation
Pearson Correlation	1	0.445**	1	0.745**	VALID
Sig. (2-tailed)		0.000		0.000	
N	100	100	100	100	
Pearson Correlation	0.445**	1	0.745**	1	
Sig. (2-tailed)	0.000		0.000		
N	100	100	100	100	

Table 3. Results of Attribute Reliability of Code P1 (Perception) and H1 Code (Expectations) With SPSS 16.00

	Item_P1	Item_total	Item_H1	Item_total	Explanation
Pearson Correlation	1	0.757**	1	0.943**	RELIABLE
Sig. (2-tailed)		0.000		0.000	
N	100	100	100	100	
Pearson Correlation	0.757**	1	0.943**	1	
Sig. (2-tailed)	0.000		0.000		
N	100	100	100	100	

After recapitulating the perception and expectation questionnaire data, fuzzification is performed by forming Triangular Fuzzy Numbers (TFN). The TFN provisions are where when the minimum lower limit value is not reduced by 1 and when the maximum upper limit is not added 1, in the following way [8],[9]:

For the first respondent data that assesses the attribute P1 = 4 then;

Lower limit = $4 - 1 = 3$

Middle Value = 4

Upper limit = $4 + 1 = 5$

The calculation results for the mean attribute code P1 are (3.08;4.08;4.81). The next step is defuzzification to change TFN to:

Mean value of TFN = (3.08;4.08;4.81)

$$\text{Defuzzification} = \frac{(\text{Lower} + \text{Middle} + \text{Upper})}{3} = \frac{3.08 + 4.08 + 4.81}{3} = \frac{11.97}{3} = 3.99$$

Table 4. Value of Fuzzy Mean (TFN) of Respondents' Perception

No	Attribute Code	Triangular Fuzzy Numbers			Defuzzification	No	Attribute Code	Triangular Fuzzy Numbers			Defuzzification
		Low	Mid	Upp				Low	Mid	Upp	
1	P1	3.08	4.08	4.81	3.99	1	H1	3.64	4.64	4.98	4.42
2	P2	2.30	3.30	4.23	3.28	2	H2	3.68	4.68	4.99	4.45
3	P3	2.56	3.55	4.34	3.48	3	H3	3.72	4.72	4.99	4.48
4	P4	2.67	3.67	4.52	3.62	4	H4	4.24	4.24	4.86	4.45
5	P5	2.51	3.51	4.28	3.43	5	H5	3.81	4.81	4.98	4.53
6	P6	1.91	2.90	3.89	2.90	6	H6	3.78	4.78	4.98	4.51

7	P7	1.72	2.69	3.66	2.69	7	H7	3.75	4.75	4.97	4.49
8	P8	1.68	2.67	3.66	2.67	8	H8	3.75	4.75	4.98	4.49
9	P9	2.15	3.10	4.08	3.11	9	H9	3.81	4.81	4.97	4.53
10	P10	1.90	2.87	3.87	2.88	10	H10	3.69	4.69	4.97	4.45
11	P11	1.28	2.01	3.01	2.10	11	H11	3.87	4.87	5.00	4.58
12	P12	1.71	2.66	3.66	2.68	12	H12	3.73	4.73	5.00	4.49
13	P13	1.76	2.72	3.72	2.73	13	H13	3.69	4.69	4.99	4.46
14	P14	1.42	2.40	3.40	2.41	14	H14	3.81	4.81	4.98	4.53
15	P15	1.95	2.90	3.89	2.91	15	H15	3.81	4.81	5.00	4.54
16	P16	1.55	2.41	3.41	2.46	16	H16	3.79	4.79	4.98	4.52
17	P17	1.76	2.73	3.75	2.75	17	H17	3.81	4.81	4.99	4.54
18	P18	1.30	2.18	3.19	2.22	18	H18	3.82	4.82	4.99	4.54
19	P19	2.33	3.32	4.27	3.31	19	H19	3.80	4.80	4.99	4.53
20	P20	2.24	3.22	4.16	3.21	20	H20	3.77	4.77	4.98	4.51
21	P21	1.87	2.84	3.83	2.85	21	H21	3.71	4.71	4.98	4.47
22	P22	2.07	3.06	4.06	3.06	22	H22	3.69	4.69	5.00	4.46
23	P23	1.85	2.84	3.84	2.84	23	H23	3.71	4.71	4.98	4.47
24	P24	1.98	2.98	3.96	2.97	23	H24	3.81	4.81	4.98	4.53
25	P25	1.61	2.36	3.34	2.44	25	H25	3.80	4.80	4.99	4.53
Total					72.99						

From the calculation of the perception defuzzification value obtained, an average search is $72.99/25 = 2.92$. Value 2.92 is the value of service quality. This value if represented by the value of satisfaction (in the questionnaire column) is not satisfied.

After obtaining the perception value and the expectation value of respondents in the form of defuzzification, then the servqual value is calculated using the following formula to find the gap value [9],[10]:

GAP Value = Mean Perception - Mean Expectation

For the 1st attribute = $3.99 - 4.42 = -0.43$

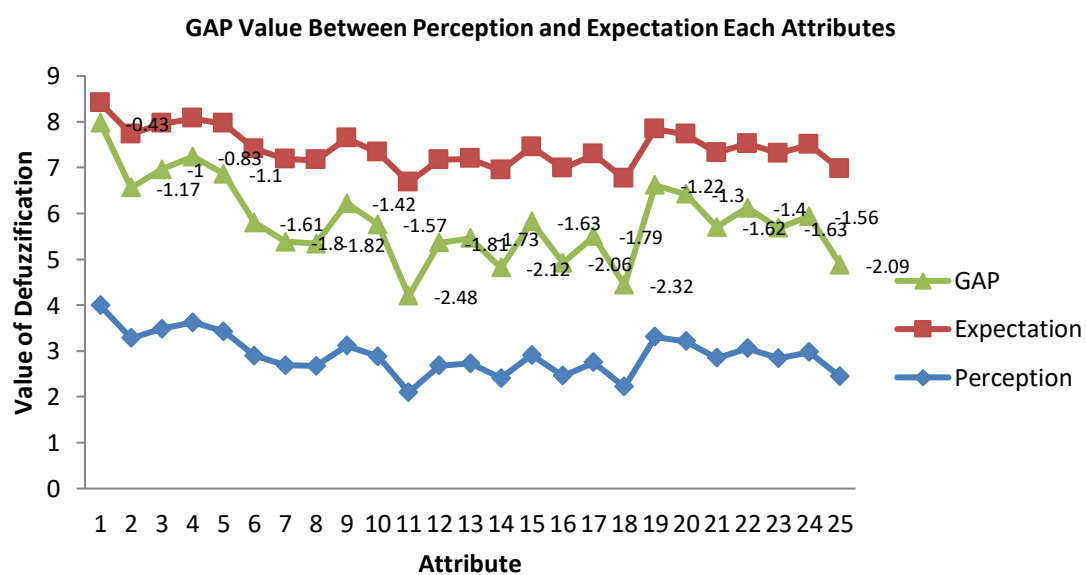


Figure 1. Gap Between Perception and Expectation

The largest gap value indicates that the attribute has a low value of customer satisfaction while the attribute that has the smallest gap value indicates that the quality of services provided is almost in line with the expectations of the respondent. It turned out that respondents considered that the queue time was too long, something that needed to be considered and had to be minimized by P3T. Especially for financial counters by students who want to make payments at financial counters, there is often a queue build-up due to too long service time and too few employees at financial counters. Service providers or other similar institutions in the Bandar Lampung region, for example, Universitas Teknokrat and IBI Darmajaya have provided online payment services (to banks), the results of which will go directly to institutions and at the same time have been automatically validated, so students do not need to queue too for payment or validation. Electronic payments via banks or others are automatically validated at the Universitas Teknokrat and IBI Darmajaya can be used as a good example for the future in financial services at the Universitas Malahayati.

The criteria that have almost met the respondents' expectations are the spacious, clean and tidy room, the majority of service users feel quite comfortable because every time there is a janitor who always controls the cleanliness of the P3T room.

The main priorities in improving the quality service of P3T are some of the attributes of the questionnaire that are too long to queue, the friendliness of the officers when serving, the officers greeting at the beginning and end of service, all transactions are served or carried out quickly and accurately, the officer always smiles when greet customers, have the ability to process a job. After knowing which attributes are influential, companies need to immediately fix related to the queue time that is too long for students of Universitas Malahayati, at least there is a change in the queuing system or accelerate transactions to students so that the quality of services provided is able to meet customer expectations. Settling gradually from the largest gap to the smallest value in the attributes mentioned in the questionnaire.

Table 5. Highest and Lowest Gap Value

No.	Attribute	Expectations	Explain
1	Too Long to Queue Time	-2.48	Lowest
2	Spacious, Clean and Neat Room	-0.43	Highest

To observe the dimensions of service quality, the gap value must be added by grouping the number of each dimension which can be seen in the Table 6.

Table 6. Gap Value for Dimensions Quality

No.	Dimensions Quality	Gap Value
1	Tangible	-4.53
2	Reliability	-8.22
3	Responsiveness	-9.77
4	Assurance	-8.69
5	Empathy	-8.30

Based on Table 6 the lowest value gap dimension quality is Responsiveness that is -9.77 and the highest is the value gap dimension quality from Tangible which is -4.53. The gap value must be reduced by increasing all the attributes that exist in the service provider.

Based on the value of perception shows the quality of service felt by respondents while using the P3T. Defuzzification value after sorting in data processing is known that the attribute that has the greatest value is a spacious, clean and tidy room (P1) with a value of 3.99. Meanwhile, the smallest value, the worst attribute, is the queue time that is too long (P11) with a value of 2.10. From the acknowledgment of some respondents of a spacious, clean and tidy room, P3T is indeed good and students also feel happy because the cleaning staff always do cleaning to keep the P3T room clean, while regarding the queue time that is too long indeed the P3T uses a queue number for each transaction at

each counter, but with the queue number not accompanied by the speed to conduct transactions, especially at the financial counter so there is a build up at the financial counter so students feel bored and disappointed while waiting too long.

While the respondent's expectation value indicates the level of desire of the respondent to the quality of service that should be provided by P3T. Defuzzification value after the highest ranking is too long queuing time (H11) with a value of 4.58, while the lowest value in the respondents' expectations is a spacious, clean and tidy (H1) room with a value of 4.42. Queuing time is too long a person's top priority in choosing services and this is also desired by students. Service providers must minimize queuing time for students too long so that the value of the service providers is higher and trusted. Spacious, clean and tidy room turned out to have a fairly low value. This shows that the spacious, clean and tidy room turned out not to be the main priority in the service. But it is better if the service provider provides a spacious, clean and tidy room so that students feel comfortable when entering the service room.

4. Conclusion

The results of the analysis that using Fuzzy and Servqual method reveals that the level of service quality at P3T Universitas Malahayati based on the level of visitor satisfaction is not good, hence, service improvements are needed to increase customer satisfaction.

References

- [1] Kotler P and Keller K L 2012 *Marketing Management* Vol **13** (New Jersey : Pearson Prentice Hall, Inc).
- [2] Khikmawati E Wibowo H Farla Z 2019 *Jurnal Teknik Industri* **51** pp 56-61.
- [3] Deveci M, Öner SC, Canitez F, Öner M. 2019 *Research in Transportation Business & Management* 100387.
- [4] Achrol, R.S., Kotler, P., Ahmed, P.K., Rafiq, M. and Albrecht, K. 2017 In *Internal Marketing: Another Approach to Marketing for Growth* (Vol. **55**, No. 4, pp. 1-3).
- [5] Liu R, Cui L, Zeng G, Wu H, Wang C, Yan S and Yan B 2015 *Applied Soft Computing* **26**:508-12
- [6] Tjiptono F 2006 *Manajemen Jasa* Vol **1**
- [7] Kusumadewi S dan Purnomo H 2004 *Aplikasi Logika Fuzzy Untuk Pendukung Keputusan* Vol **2**
- [8] Kusumadewi S .2010. Analisa dan Desain Sistem Fuzzy Menggunakan Tool Box Matlab Vol **2**
- [9] Perçin S.2018 *Journal of Air Transport Management* **68**:48-60.
- [10] Herdiyanti A, Adityaputri AN, Astuti HM 2017 *Procedia Computer Science* **124**:60, 1-7.