Analysis of Healthcare Services Quality in Hospital "X" using Servqual - Fuzzy Method

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Abstract

Service Quality is a very important concept that must be understood if the company wants to remain competitive and evolving. Quality of service in hospitals should be directed to patient satisfaction, it is to maintain patient loyalty. With the development of business competition, it is important to make health care providers improving their service qualities. Customer satisfaction is an important key to service quality management. from the initial sampling, obtained the data of customer dissatisfaction in hospital "X" by 41.47%. It is necessary to do research to determine the cause of this customer dissatisfaction. The purpose of this research is to identify the gap between perception and expectation of customer to health service at inpatient unit of hospital "X". This paper used servqual method which was integrated with fuzzy method. Based on the results of this study, it was shown that the attributes of X_5 (bathroom hygiene and clean water availability) had the greatest gap of 25 health service attributes identified at the hospital "x", with gap score -0,0433. The second on attribute X_{18} (The availability of doctors and nurses at the time of patient need) with a gap score of -0,0364. And the third on attribute X_{10} (Fast, accurate examination, treatment and treatment services) with a gap score of -0,0354. Based on the results of this paper, it could be concluded that the results could assist the management of the hospital in determining the policy strategy by prioritizing attributes that have a big gap to improve the quality of its services.

 Keyword: Service quality, fuzzy, Healthcare.

INTRODUCTION

One of the important concepts in management and business is service quality. Service quality is a very important concept that companies must understand if they want to remain competitive and evolving. Service quality becomes increasingly important for today's business, particularly in high-customer involvement industries such as healthcare services (Punnakitikashem, et al., 2012). Health care service providers should disseminate correct information from time to time as more quality information leads to patient awareness and satisfaction (Dave & Dave, 2014). Service quality in hospitals should be directed towards the satisfaction of patients (Rafidah, et al., 2016). Service quality and customer satisfaction have been recognized as the main preserve of customer loyalty (Anderson & Mittal, 2000).

With the development of business competition, it is important to make health care providers improving their service qualities. Customer satisfaction is an important key to service quality management. from the initial sampling, obtained the data of customer dissatisfaction in hospital "X" by 41.47%. it is necessary to do research to determine the cause of this customer dissatisfaction. This research is to analyze how the quality of health service in inpatient unit of hospital "X" Surabaya. Based on the results of this study, it could be concluded that it can assist the management of the hospital in determining the policy strategy by prioritizing attributes that have a big gap to improve the quality of its services.

The purpose of this paper was to identify the gaps between customer expectations of a service and their perceptions of service at hospital "X", particularly in inpatient units. This paper used a Servqual approach that was integrated with the fuzzy method to gain a gap between the perceptions and expectations of consumers. This approach had been used extensively to assess the quality of private sector services, but there was little application to public services (Munhurrun, et al., 2010).

This paper had many literature to support the research, for example paper titled "A Conceptual Model of Service Quality and Its Implications for Future Research" (Parasuraman, et al., 1985) and other research such as SERVQUAL : A Multiple-Item Scale for Measuring Consumer Perceptions of Service Quality (Parasuraman, et al., 1988). Five Imperatives for Improving Service Quality (Parasuraman, et al., 1990). Health Care Service Quality: Case Example of a Hospital with Lean Implementation (Punnakitikashem, et al., 2012). A study on Service quality and customer satisfaction of selected Private hospitals of Vadodara City (Dave & Dave, 2014). Service Quality and Determinants Of Customer Satisfaction In Hospitals: Turkish Experience (Zaim, et al., 2010). A Comparative Study of Service Quality on Patient Satisfaction Between Public Hospital in Johor Bahru (Rafidah, et al., 2016). Impact of Service Quality on Customers' Satisfaction (Bharwana, et al., 2013). Essentials for improving service

quality in cancer care (Berrya & Mate, 2016). A Review of Dimensions of Service Quality Models (Yarimoglu, 2014). Service Quality in the Public Service (Munhurrun, et al., 2010).

The other literature supporting this paper was Measuring Consumer Satisfaction in Healthcare Sector: The Applicability of Servqual (Chakraborty & Majumdar, 2011). The Dimensions of Service Quality for Hospital (Duffy, et al., 2001). Factors influencing healthcare service quality (Mosadeghrad, 2014). Hospital Service Quality and its Effect on Patient Satisfaction and Behavioural Intention (Amin & Nasharuddin, 2013). The Assessment of Perceived Service Quality of Public Health Care Services in Romania Using the SERVQUAL Scale (Lorin, et al., 2013). SERVQUAL: Measuring higher education service quality in Thailand (Yousapronpaiboon, 2014). Service quality assessment in health care sector: the case of Durre's public hospital (Kalaja, et al., 2016). Assessing Obstetrics Perceived Service Quality at a Public Hospital (Martins, et al., 2015). (Lowrie, et al., 2015)

The results of this study can be used by the management of the hospital as a material consideration in determining the policy strategy to improve the quality of service. This paper was organized as follows. Section 1 is Introduction. Section 2 is about Material and Methodology. Section 3 is the result and discussion of the research. Finally, in section 5 presents the conclusion of this paper.

MATERIALS AND METHODOLOGY

Service Quality

The first is that customers are the sole judge of service quality. Customers assess service by comparing the service they receive (perceptions) with the service they desire (expectations) (Parasuraman, et al., 1990). Majority of research pertaining to service quality has focused on the measurement of service quality based on the functional dimension (James & Kang, 2004). The techniques of measuring service quality and service quality dimensions have become a major area of marketing literature during the past few decades (Yarimoglu, 2014).

Service quality is identified into ten dimensions, which the customer uses to evaluate the service quality. They are reliability, responsiveness, competence, access, courtesy, communication, credibility, security, understanding/knowing the customer, and tangibles (Parasuraman, et al., 1985). Thus, Servqual is developed from a modification of ten dimensions to five principal dimensions customers, which are tangibles, reliability, responsiveness, assurance and empathy (Parasuraman, et al., 1990). The instrument in servqual is summarized in five dimensions called service quality model (The Gaps Models). Service Quality Model is a model that can analyze the gap between two main variables, the services expected by the customers (expectation) and services they receive (perception) (fig.1)
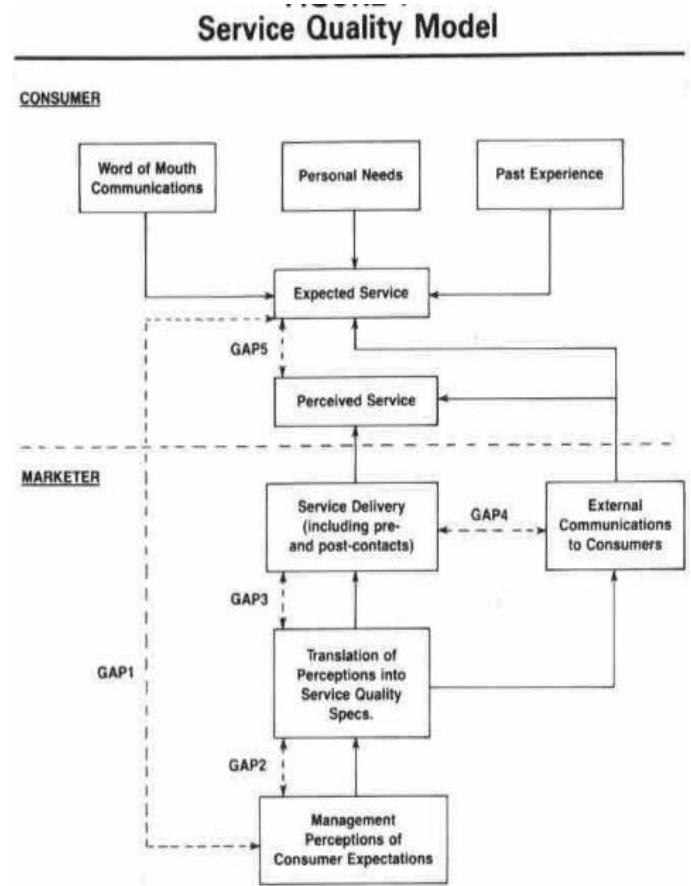

Figure 1. Service Quality Model
(Parasuraman, et al., 1985)

Fuzzy

Generally, the fuzzy set is an extension of the crisp set, the set that divides a group of individuals into two categories, namely members and non-members (Rose, et al., 2004). Fuzzy number is a special fuzzy set $F = \{(x,\mu_F(x)), x \in R\}$ where x where x is the values that lie on the line of real numbers. R^1 ; $-\infty < x < +\infty$ R :1 and μ_F is a continuous mapping of R^1 into the closed interval [0, 1] (Chan, et al., 1999). Fuzzy number is used to describe non-precise numerical concepts. A triangular fuzzy number (TFN), expressed by M = (a,b,c), where a<b<c, is a special fuzzy number and has the following type triangular membership function (Zadeh, 1965):

$$\mu_M(x) = \begin{cases} 0, & \text{if } x \leq a \\ (x-a)/(u-a), & \text{if } a < x \leq u \\ (x-b)/(u-b), & \text{if } u < x \leq b \\ 0, & \text{if } x \geq b \end{cases} \quad (1)$$

Methodology of Research

The methodology of this research is described as follows:
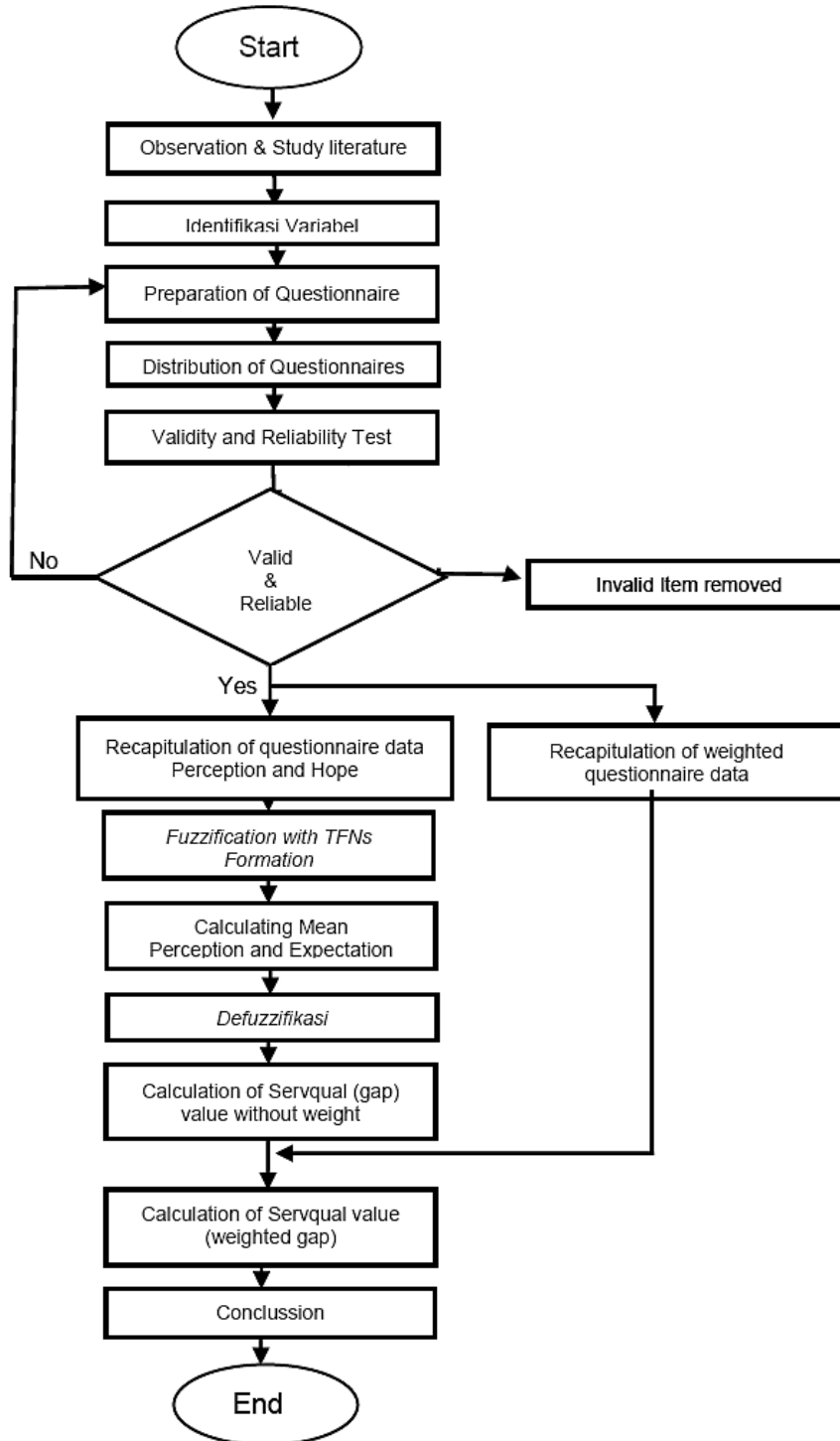
Figure 2. Flowchart of the research

The stages of this research were data collection, validity and reliability test, fuzzyfication, calculation of mean value, defuzzyfication, calculation of servqual value without weight, calculation of the weight of each variable, calculation of weighted servqual value. The stage of data collection in this study was performed to identify the attributes of health services, preparation of questionnaire, and the distribute the questionnaire to the respondents. Respondents used in this research were patient or family of a patient in hospital "X", especially in inpatient units In this research, a total amount of 25 attributes of health services had been identified to be assessed by the respondents, such attributes were:

Table 1. Attribute of health services

Tangibles	(X_1)	Convenient to Inpatient unit location
	(X_2)	Cleanliness, tidiness and comfort of the bedroom
	(X_3)	lighting and bedroom ventilation
	(X_4)	completeness of bedroom facilities
	(X_5)	Cleanliness of the bathroom and availability of clean water
	(X_6)	The availability of medication required by the patient
	(X_7)	Completeness, readiness and cleanliness of medical devices used
	(X_8)	Neatness and cleanliness of the appearance of doctors and nurses
	(X_9)	Taste and variety of food menu served
reliability	(X_{10})	Fast, accurate examination, treatment and treatment services
	(X_{11})	The patient's examination schedule is performed appropriately
	(X_{12})	The service procedure is not complicated
	(X_{13})	easy to contact the hospital staff
responsiveness	(X_{14})	The nurse's alertness when the patient needs help
	(X_{15})	The ability of doctors and nurses to resolve patient complaints
	(X_{16})	Doctors and nurses provide a clear and understandable information
assurance	(X_{17})	Attention to patients who need service
	(X_{18})	The availability of doctors and nurses at the time of patient need
	(X_{19})	The ability of doctors to analyze the disease
	(X_{20})	The accuracy of the medical team handles the patient
empathy	(X_{21})	Patience of nurses in caring for patients
	(X_{22})	Courtesy and hospitality of nurses and doctors
	(X_{23})	patient easy complaint submission
	(X_{24})	The ability of doctors and nurses to provide moral support to patients
	(X_{25})	Service to all patients regardless of social status

RESULT AND DISCUSSION

Result

In this study, the Likert scale was used as measuring tools in the questionnaire. Questionnaires were distributed to 98 respondents randomly at the inpatient unit of the hospital "X". The test validity and reliability of the results of the questionnaire were performed with SPSS 17.0 software.

Fuzzification of respondent's data (perception and expectation) was done by changing the result of respondent appraisal (in Likert scale) to form fuzzy number with formation TFNs (Triangular Fuzzy Number).

Table 2. Fuzzyfication perception for attributes X_1

Respondent	Nilai	Low	Crisp	Upp	Respondent	Nilai	Low	Crisp	Upp	Respondent	Nilai	Low	Crisp	Upp
1	3	2	3	4	34	4	3	4	5	67	2	1	2	3
2	3	2	3	4	35	4	3	4	5	68	4	3	4	5
3	3	2	3	4	36	3	2	3	4	69	4	3	4	5
4	3	2	3	4	37	3	2	3	4	70	4	3	4	5
5	5	4	5	6	38	4	3	4	5	71	4	3	4	5
6	4	3	4	5	39	3	2	3	4	72	5	4	5	6
7	5	4	5	6	40	4	3	4	5	73	5	4	5	6
8	3	2	3	4	41	3	2	3	4	74	4	3	4	5
9	3	2	3	4	42	2	1	2	3	75	4	3	4	5
10	3	2	3	4	43	3	2	3	4	76	5	4	5	6
11	3	2	3	4	44	3	2	3	4	77	4	3	4	5
12	4	3	4	5	45	5	4	5	6	78	3	2	3	4
13	3	2	3	4	46	4	3	4	5	79	3	2	3	4
14	3	2	3	4	47	4	3	4	5	80	4	3	4	5
15	3	2	3	4	48	3	2	3	4	81	5	4	5	6
16	4	3	4	5	49	4	3	4	5	82	3	2	3	4
17	3	2	3	4	50	4	3	4	5	83	3	2	3	4
18	5	4	5	6	51	3	2	3	4	84	3	2	3	4
19	5	4	5	6	52	3	2	3	4	85	4	3	4	5
20	3	2	3	4	53	2	1	2	3	86	3	2	3	4
21	5	4	5	6	54	3	2	3	4	87	3	2	3	4
22	3	2	3	4	55	4	3	4	5	88	3	2	3	4
23	5	4	5	6	56	4	3	4	5	89	3	2	3	4
24	4	3	4	5	57	5	4	5	6	90	4	3	4	5
25	3	2	3	4	58	3	2	3	4	91	4	3	4	5
26	4	3	4	5	59	4	3	4	5	92	4	3	4	5
27	4	3	4	5	60	4	3	4	5	93	3	2	3	4
28	2	1	2	3	61	3	2	3	4	94	4	3	4	5
29	5	4	5	6	62	3	2	3	4	95	4	3	4	5
30	3	2	3	4	63	3	2	3	4	96	4	3	4	5
31	4	3	4	5	64	4	3	4	5	97	3	2	3	4
32	3	2	3	4	65	4	3	4	5	98	3	2	3	4
33	3	2	3	4	66	3	2	3	4					

After all the fuzzification results obtained in each attribute, then the average (perceptions and expectations of respondents) from each attribute was calculated, and the defuzzification stage was subsequently performed.

Table 3. Mean Perceptions of Respondents (Fuzzy) and Defuzzyfication

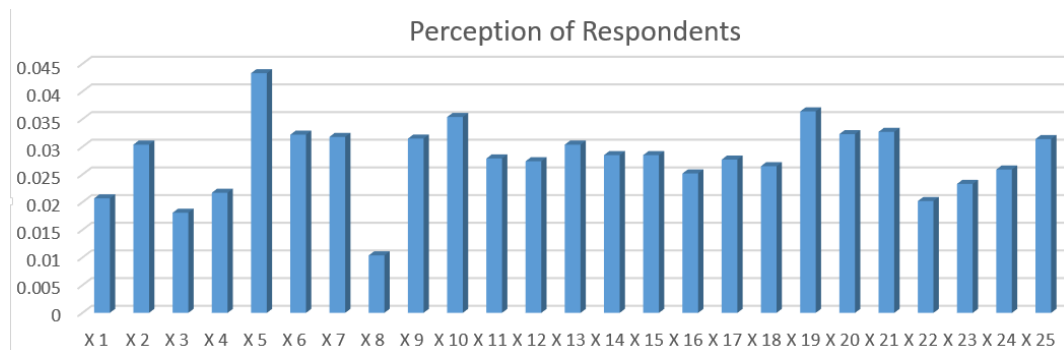| Attribute	Fuzzy			Defuzzyfication	Attribute	Low	Crisp	Upp	Defuzzyfication
	Low	Crisp	Upp						
X_1	2.59	3.59	4.59	3.50	X_{14}	2.87	3.87	4.87	3.78
X_2	2.58	3.58	4.58	3.49	X_{15}	2.85	3.85	4.85	3.76
X_3	2.82	3.82	4.82	3.73	X_{16}	2.79	3.79	4.79	3.70
X_4	2.60	3.60	4.60	3.51	X_{17}	2.86	3.86	4.86	3.77
X_5	2.31	3.31	4.31	3.20	X_{18}	2.73	3.73	4.73	3.64
X_6	2.70	3.70	4.70	3.61	X_{19}	2.68	3.68	4.68	3.59
X_7	2.65	3.65	4.65	3.56	X_{20}	2.88	3.88	4.88	3.79
X_8	2.97	3.97	4.97	3.88	X_{21}	2.70	3.70	4.70	3.61
X_9	2.39	3.39	4.39	3.29	X_{22}	2.94	3.94	4.94	3.85
X_{10}	2.64	3.64	4.64	3.55	X_{23}	2.72	3.72	4.72	3.63
X_{11}	2.68	3.68	4.68	3.59	X_{24}	2.68	3.68	4.68	3.59
X_{12}	2.62	3.62	4.62	3.53	X_{25}	2.72	3.72	4.72	3.63
X_{13}	2.59	3.59	4.59	3.50					

Figure 3. Perception of Respondents

Table 4. Mean Expectation of Respondents (Fuzzy) and Defuzzyfication

| Attribute	Fuzzy			Defuzzyfication	Attribute	Low	Crisp	Upp	Defuzzyfication
	Low	Crisp	Upp						
X_1	3.16	4.16	5.16	4.08	X_{14}	3.54	4.54	5.54	4.47
X_2	3.34	4.34	5.34	4.26	X_{15}	3.45	4.45	5.45	4.37
X_3	3.29	4.29	5.29	4.21	X_{16}	3.44	4.44	5.44	4.36
X_4	3.17	4.17	5.17	4.09	X_{17}	3.48	4.48	5.48	4.40
X_5	3.40	4.40	5.40	4.32	X_{18}	3.44	4.44	5.44	4.36
X_6	3.47	4.47	5.47	4.39	X_{19}	3.54	4.54	5.54	4.47
X_7	3.41	4.41	5.41	4.33	X_{20}	3.58	4.58	5.58	4.51
X_8	3.23	4.23	5.23	4.15	X_{21}	3.48	4.48	5.48	4.40
X_9	3.27	4.27	5.27	4.19	X_{22}	3.44	4.44	5.44	4.36
X_{10}	3.45	4.45	5.45	4.37	X_{23}	3.31	4.31	5.31	4.23
X_{11}	3.36	4.36	5.36	4.28	X_{24}	3.34	4.34	5.34	4.26
X_{12}	3.32	4.32	5.32	4.24	X_{25}	3.47	4.47	5.47	4.39
X_{13}	3.35	4.35	5.35	4.27					
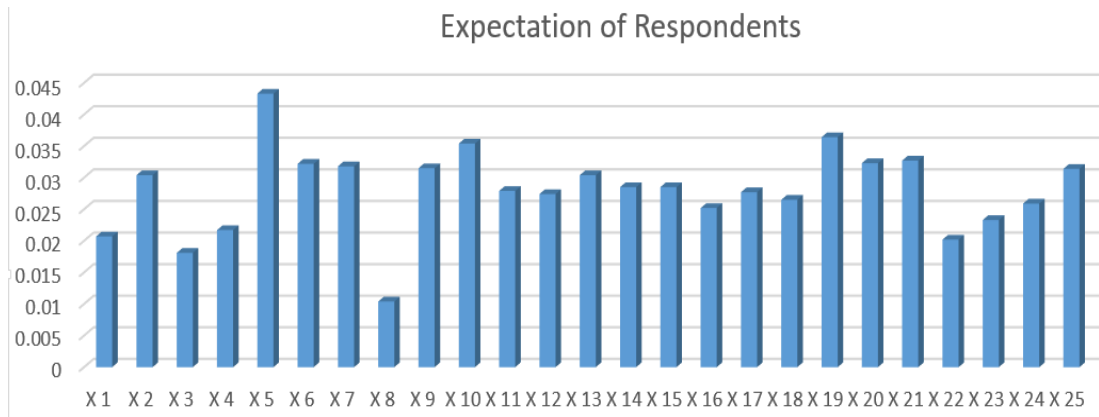
Figure 4. Expectation of Respondents

The next stage was the calculation of servqual value (gap) without weight (Table 5).

Servqual Value (gap score) = Mean of Perception - Mean of Expectation

Table 5. Servqual value (gap score) without weight

| attribute	Percep tion	Expec tation	Gap score		attribute	Percep tion	Expec tation	Gap score
X_1	3.50	4.08	-0.59		X_{14}	3.78	4.47	-0.69
X_2	3.49	4.26	-0.77		X_{15}	3.76	4.37	-0.61
X_3	3.73	4.21	-0.48		X_{16}	3.70	4.36	-0.67
X_4	3.51	4.09	-0.59		X_{17}	3.77	4.40	-0.64
X_5	3.20	4.32	-1.12		X_{18}	3.64	4.36	-0.72
X_6	3.61	4.39	-0.78		X_{19}	3.59	4.47	-0.88
X_7	3.56	4.33	-0.77		X_{20}	3.79	4.51	-0.72
X_8	3.88	4.15	-0.27		X_{21}	3.61	4.40	-0.79
X_9	3.29	4.19	-0.90		X_{22}	3.85	4.36	-0.51
X_{10}	3.55	4.37	-0.82		X_{23}	3.63	4.23	-0.59
X_{11}	3.59	4.28	-0.69		X_{24}	3.59	4.26	-0.67
X_{12}	3.53	4.24	-0.71		X_{25}	3.63	4.39	-0.76
X_{13}	3.50	4.27	-0.77					
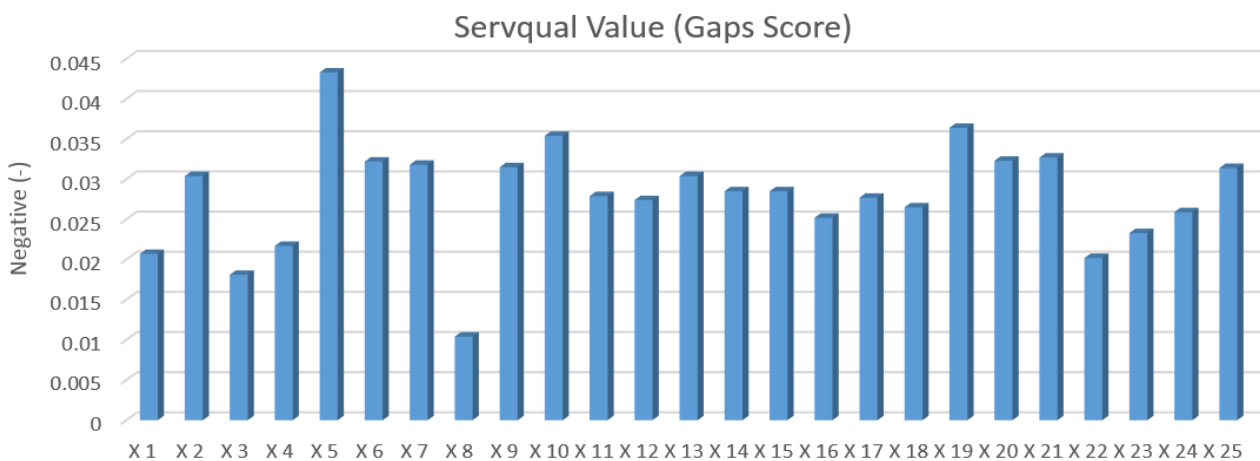
Figure 5. Servqual value (gap score) without weight

The next step after the obtained of servqual value without weight performed was the weighting of each attribute. In this study, the weighing of the attribute was performed by calculating the value average of each service quality attribute given by the respondent. Weighted questionnaires were distributed to experts in the health sector, in this case the staff of hospital "X" as many as 10 respondents. Based on the distributed questionnaire data, the results of weighting each attribute were obtained as follows (Table 6):

Table 6. Weight value of attribute

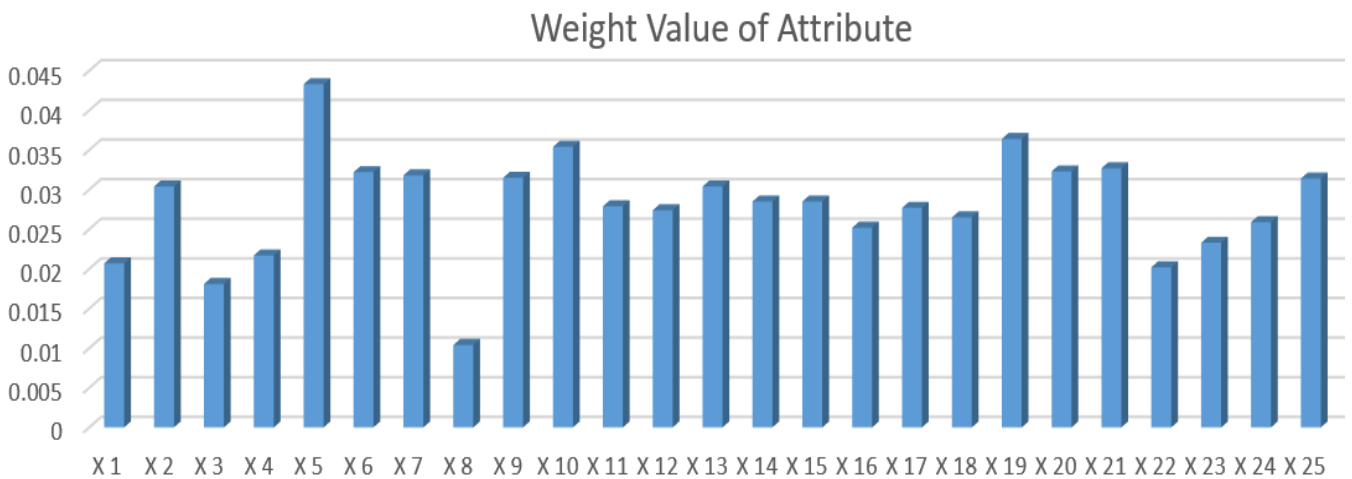| No	Attribute	Weight	No	Attribute	Weight
1	X_1	0.0350	14	X_{14}	0.0413
2	X_2	0.0395	15	X_{15}	0.0413
3	X_3	0.0377	16	X_{16}	0.0413
4	X_4	0.0368	17	X_{17}	0.0413
5	X_5	0.0386	18	X_{18}	0.0422
6	X_6	0.0413	19	X_{19}	0.0413
7	X_7	0.0413	20	X_{20}	0.0449
8	X_8	0.0386	21	X_{21}	0.0413
9	X_9	0.0350	22	X_{22}	0.0395
10	X_{10}	0.0431	23	X_{23}	0.0395
11	X_{11}	0.0404	24	X_{24}	0.0386
12	X_{12}	0.0386	25	X_{25}	0.0413
13	X_{13}	0.0395			

Figure 6. Weight value of attribute

After the result of weighting each attribute were obtained, servqual weighted value was subsequently counted by multiplying servqual value without weight with weight value of each attribute (Table.7)

Table 7. Result of final Servqual value (gap score)

| No	Attribute	Servqual without weight	Weight	Gap score		No	Attribute	Servqual without weight	Weight	Gap score
1	X_1	-0.59	0.0350	-0.0207		14	X_{14}	-0.69	0.0413	-0.0285
2	X_2	-0.77	0.0395	-0.0304		15	X_{15}	-0.61	0.0413	-0.0285
3	X_3	-0.48	0.0377	-0.0181		16	X_{16}	-0.67	0.0413	-0.0252
4	X_4	-0.59	0.0368	-0.0217		17	X_{17}	-0.64	0.0413	-0.0277
5	X_5	-1.12	0.0386	-0.0433		18	X_{18}	-0.72	0.0422	-0.0265
6	X_6	-0.78	0.0413	-0.0322		19	X_{19}	-0.88	0.0413	-0.0364
7	X_7	-0.77	0.0413	-0.0318		20	X_{20}	-0.72	0.0449	-0.0323
8	X_8	-0.27	0.0386	-0.0104		21	X_{21}	-0.79	0.0413	-0.0327
9	X_9	-0.90	0.0350	-0.0315		22	X_{22}	-0.51	0.0395	-0.0202
10	X_{10}	-0.82	0.0431	-0.0354		23	X_{23}	-0.59	0.0395	-0.0233
11	X_{11}	-0.69	0.0404	-0.0279		24	X_{24}	-0.67	0.0386	-0.0259
12	X_{12}	-0.71	0.0386	-0.0274		25	X_{25}	-0.76	0.0413	-0.0314
13	X_{13}	-0.77	0.0395	-0.0304						
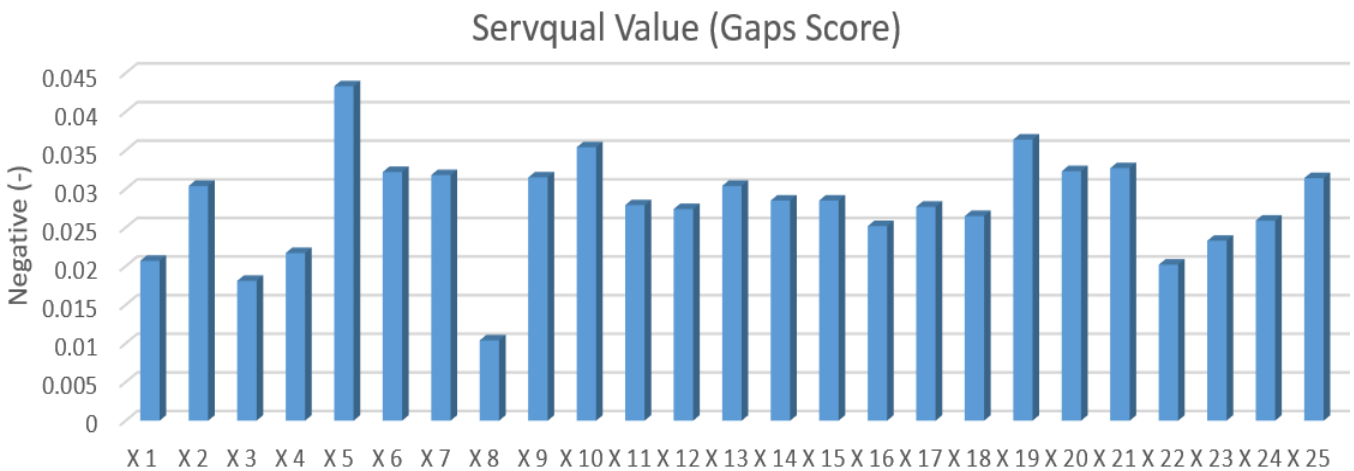
Figure 7. Final of Servqual value (gap score)

Discussion

The respondent's perception value indicated the level of service quality received by the patient during the use of health services at hospital "X". Based on the average value of respondent perception, attribute X5 (Cleanliness of the bathroom and availability of clean water) had the lowest value, while the attribute X8 (Neatness and cleanliness of the appearance of doctors and nurses) had the highest value. The expectation value of the respondent showed the respondent's willingness to the quality of service that should be given by hospital "X". The highest expectation value was the attribute of doctors' ability to analyze the disease (X_{19}). While the smallest expectation value attribute X_1 (Convenient to Inpatient unit location).

The analysis of servqual without weight was performed to find out how big the gap between perception and expectation of respondent to health service in hospital "X". Based on the results of this calculation, the attribute X_5 (Cleanliness of the bathroom and availability of clean water) had the largest gap, this showed the biggest gap between the perception and expectations of respondents to this attribute. While the smallest gap value was the attribute of Neatness and cleanliness of the appearance of doctors and nurses (X_8).

From the weighting of each attribute by the hospital management, the highest value of weight on attribute X_{19} (The ability of doctors to analyze the disease) was obtained. While the lowest weight value was in the Convenient to Inpatient unit location (X_1) attribute. In the final result, a weighted servqual

value with the highest gap was obtained in the attribute of Cleanliness of the bathroom and availability of clean water (X_5) with a score of -0,0433, The availability of doctors and nurses at the time of patient need (X_{18}) with a score of -0,0364, and attribute of Fast, accurate examination, treatment and treatment services (X_{10}) with a score of -0,0354. this indicated that these attributes should be a prioritized to improve service quality.

CONCLUSION

Based on the results and discussion above, the policy strategy that can be taken by hospital management to improve the quality of service was prioritizing service quality improvement, the first on attribute X_5 (Cleanliness of the bathroom and availability of clean water) with a gap score of -0,0433. The second on attribute X_{18} (The availability of doctors and nurses at the time of patient need) with a gap score of -0,0364 and the third on attribute X_{10} (Fast, accurate examination, treatment and treatment services) with a gap score of -0,0354. Attributes these services assessed by customers was the least quality.

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