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Analysis of Customer Satisfaction Level for Improving Efforts of Service Quality Using Fuzzy SERVQUAL Approach

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Abstract: ***In an effort to constantly improve the quality of care in authorized workshops Moto-X, we conducted research on customer satisfaction with the services in Moto-X. Where customers will determine whether service so far has been able to provide satisfaction of customer glasses or not. This study aims to determine the level of customer satisfaction as service users service, as well as identifying factors that services should be improved and enhanced its quality by comparison between the perceptions and expectations of customers. In this case is used to measure customer satisfaction SERVQUAL method (Sevice Quality). Fuzzy SERVQUAL approach allows to represent the uncertainty associated with vagueness,such as information regarding certain elements of the problem at hand, such as customer satisfaction, the level of perception, expectation and Quality of Service.***

Keywords: Service, Service Quality, Fuzzy ServQual, Perceptions and Expectations

1. Introduction

Moto-X is one of the motorcycle manufacturers that brings new technology to the engine and electricity. Moto-X products look different from technology on most motorcycles, so there are not many mechanics and general workshops who understand and are able to repair this Moto-X motorcycle if there is damage. Therefore, motorbike users of Moto-X type must always come to the official workshop to be able to do regular routine service, repair of damage and replacement of spare parts, because the availability of spare parts is also only available at the Official Moto-X Workshop.

At present it is believed that the main key in winning business competition is to provide qualityservice that can create customer satisfaction. And then Satisfied customers are expected to remain loyal to the company and will help to introduce products or services to others. To be able to continue to compete with other motorcycle manufacturers, Moto-X needs to measure customer satisfaction.

The method used to measure satisfaction is using the method Fuzzy SERVQUAL and it is expected that later on it will be known which variables must be considered to always be improved based on the potential value of customer satisfaction. Through this measurement the company can find out what facilities are considered important and influence customer satisfaction with the service of the workshop

2. Literature Review

2.1. Understanding Services and Service Quality

According to Kotler in Rambat Lupiyoadi, (2001:6)services are any actions or desires that can be offered by one party to another, basically services are intangible and do not result in any ownership. Production of services may be related to physical products or not. [1]

According to Engel, Blackwell and Miniard (2004:3) Consumer behavior is an action that is directly involved in acquiring, consuming, and consuming products and services, including the process of decisions that precede and follow that action. [2]

2.2. Service Quality

Service Quality is One way that a company's sales of services is superior to its competitors is by giving quality and quality services that meet the interests of consumers.[3]

Level consumer interests for the services they will receive can be formed based on experience and advice they get. Consumers choose service providers based on importance ranking. And after enjoying the service they are likely to compare it with what they expect. Service Quality can be defined as level mismatch between consumer expectations or desires and consumer perceptions (Zethaml, Parasuraman and Berry, 1980).[4]

2.3. Dimension to Measurement of Service Quality

There are five dimensions used to measure service quality, namely: 1. Reliability, 2. Responsiveness, 3. Assurance, 4. Empathy, 5. Tangible. Parasuraman et. all in Kotler and Keller (2009: 56) [5]

2.4. Fuzzy Logic

In perception research, expectations and weighting on the

servqual method, we will be faced with the fact that a person's assessment of a quality criterion is subjective and often biased. This is because the language used in expressing the level of assessment is often not in accordance with what is actually felt.The data to be processed is data from respondents, namely Moto-X motorcycle consumers who have filled out the questionnaire

Data processing to determine the gap will be carried out with the defuzzification process with the centroid method as follows [6] :

1) Determine the value of the TFN Linguistic Scale.
2) Determine the TFN Value and Crisp Value Every question.
3) Fuzzification of Input values in the form of Average SERVQUAL score calculation.
4) Integrate Fuzzy and Servqual with the Mamdani Method.
5) Defuzzification of the results of Fuzzy Processing Servqual.

3. Processing and Analysis Data

Data used in research this is :

1. Customer Expectations of Factors Service
2. Customer Satisfaction of Service Factors

Step 1 :

a) The data that has been collected will then be processed to be able to determine the average score of perceptions and expectations from customers regarding the quality of service shop.
b) Next will be calculated Gap between perception and expectations by subtracting the value of perception with the value of the expectation score.
c) After the gap value is obtained, then the score will be calculated SERVQUAL by counting average Gap between criteria.

Table 1 : Results of SERVQUAL and GAP calculations

No	ServQual Dimensions	Question	Perceive	Expetation	GAP	Perceive Average	Expectation Average	ServQual
1	*Tangible*	Q1	3	4	-1	3,6	4	-0,4
2		Q2	4	4	0			
3		Q3	4	4	0			
4		Q4	4	4	0			
5		Q5	3	4	-1			
6	*Reability*	Q6	4	4	0	3,6	4,4	-0,8
7		Q7	3	4	-1			
8		Q8	4	4	0			
9		Q9	3	5	-2			
10		Q10	4	5	-1			
11	*Responsiveness*	Q11	3	5	-2	3,75	5	-1,25
12		Q12	4	5	-1			
13		Q13	4	5	-1			
14		Q14	4	5	-1			
15	*Assurance*	Q15	3	4	-1	3,5	4,25	-0,75
16		Q16	4	5	-1			
17		Q17	3	4	-1			
18		Q18	4	4	0			
19	*Empathy*	Q19	4	4	0	4,4	4,6	-0,2
20		Q20	4	5	-1			
21		Q21	5	4	1			
22		Q22	5	5	0			
23		Q23	4	5	-1			
Total			87	102	-15	18,85	22,25	-3,4
Average			3,7826087	4,43478261	-0,65217	3,77	4,45	-0,68

Based on the SERVQUAL and Gap calculation tables1 at below, it can be seen that the dimension that has the largest Gap value is the Responsiveness dimension, which is (-1.25), meaning that this dimension according to respondents has not been able to meet the quality of service as expected by the customer. This means that the workshop must pay more attention to this dimension in order to improve its service quality

Step 2 :

Order SERVQUAL calculation results more accurate then the next score will be calculated SERVQUAL uses techniques Fuzzification by the Mamdani method.

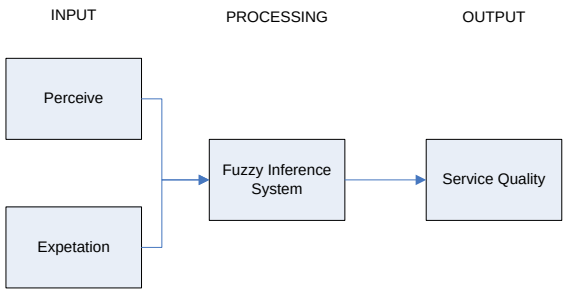

Figure 1: Fuzzy Analyze Processing

From Figure 1 above it appears that There are two input variables namely Hope and Perception and one output variable, namely: service quality, which is for variables expectations will be given a value with 5 parameters that is

Very Important, Important, Netral, Not Important and Very unimportant And to Perception variable is also given a value of 5 the parameter is Very Satisfied, Satisfied, Netral, Not Satisfied and Diagram of membership function for variables Hope can be seen in the picture as following: Very Dissatisfied, then from these two variables will be formed fuzzy inference of the Mamdani method for produce output that is the level of quality service and will be rated with 3parameters namely: High, Medium and Low

Step 3 :

The next step is inference, this is the stage where the determination of the rules of fuzzy logicset. Rules are formed for states the relation between existing inputs and outputs in accordance with existing facts. The operator used to connect between the two inputs is the AND operator, and IF-THEN is the one that determines between the input-output. The rules used are based on a questionnaire that is distributed from the formed maximum of questions most respondents chose to state the relationship between input and output.

Step 4 :

Stage after inference is Defuzzyfication, also called the affirmation stage where the input from the defuzzyfication process is a fuzzy set obtained from predetermined fuzzy rules, while the resulting output is a number on the fuzzy set itself. So that if given a fuzzy set within a certain range then real values can be taken as output.

Table 2: Fuzzy set of Hope variables

	Member of Fuzzy	Domain	Range
0-100	Very Importance	65-100	65 80 100 100
0-100	Importance	50-80	50 65 80
0-100	netral	35-65	35 50 65
0-100	Not Importance	20-50	20 35 50
0-100	Very Uninportance	0-35	0 0 20 35

The membership function diagram for the Expectation variable can be seen in the figure 2.

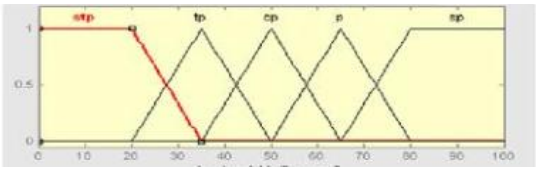

Figure 2: Membership function for Expectation Variable

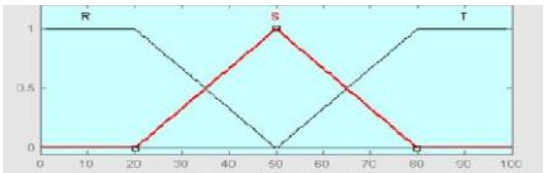

Figure 3: Membership Function for Service Variable

Rule Fuzzyfication

Based on the number of input variables,along with the number of alternative answer choices it will produce 25 Rule. Following is an example of the Rule obtained based on the number of input and alternative variables the answer is Rule [R3], [R9], [R15],[R17] and [R25]:

Case in point for respondent 1 there is an average value of perception weight (56) and an average expectation weight of (89), then the level of service is obtained, with a value (63,492).

Stage 1 : Fuzzyfication

1. Expectation variable = 84 included in Very important membership (Vi) withcalculation :
   μsp [89] = 1; 84 ≥ 80
2. Perception variable = 54 included in membership is quite satisfied (p) and also into satisfied membership (p), with calculation:

μp [56] = (xi-50) / (65-50); 50 ≤ xi ≤ 65
= (56-50) / (65-50)
= 6/15
= 0,4
μcp [56] = (65-xi) / (65-50); 50 "xi" 65
= (65-56) / (65-50)
= 9/15
= 0.6

Stage 2 : Inference Rule

Based on the results of fuzzification found that the rules involved amounted to 2 rules, namely:
[R1] If "Hope" is "Very Satisfiction" and "Perception" is Satisfiction" then"Is" service "
[R2] If "Hope" is "Very Satisfiction" and "Perception" is . "Satisfiction" then "Service" is high.

Stage 3: Defuzification

After making an inference rule, then the next stage will be carried out defuzification, can be seen in the following analysis this:
Rule 1: Z1 = min (μsp (89), μcp (56))
= min (1, 0.4)
= 0.4
Rule 2: Z1 = min (μsp(89),μp(56))
= min(1, 0,6)
= 0,6

Stage 4 : Integrate Fuzzy and Servqual

Based on the calculation results using the Fuzzy Servqual method, the results obtained value of service quality is 56,254. Meaning according to customer service quality so far Official workshop of Moto-X is considered moderate, There are several service factors that are assessed have not been able to meet customer expectations.

Table 3: Results of Fuzzy Calculations Servqual between dimensions

No	ServQual Dimensions	Dimension Average		ServQual	FuzzyServQual
		Perceive	Expetation		
1	Tangible	71	88	-17	69,55
2	Reability	67	77	-10	61,78
3	Responsiveness	43	80	-37	56,12
4	Assurance	62	73	-11	62,57
5	Empathy	75	82	-7	74,26

Based on the results of Fuzzy Servqual calculations on each dimension of service quality, the results show that the dimension that has the lowest assessment is the Responsiveness dimension, the possibility of customers assuming that so far the workshop has not been able to meet customer expectations, especially on the problem of the availability of employees in helping solve problems that faced by consumers, both in terms of speed of completion time and in terms of the accuracy of handling and solutions to the constraints of their motorbikes, this can be seen from the results of the calculation of fuzzy servqual to the dimension of Responsivness that is equal to 56.12. This means that this dimension should be a concern for the workshop to be evaluated and improved the quality of its services.

Stage 5 : Fuzzy System Testing

Results of Fuzzy Servqual Processing with the Fuzzy Logic ToolBox

Results from level measurements Quality of Service at the Moto-X Official Workshop, based on Perception and Customer expectations, by using the Fuzzy Servqual Method approach will produce judgments like onesshown in table 4

Table 4: Results of Fuzzy Calculations

Respondent	Score Average		
	Perceive	Expetation	ServQual
R1	59, 6	83,4	64,1
R2	63,8	81,9	73,1
R3	69,2	89,7	82,2
R4	61,3	89,2	72,94
R5	71,4	90,4	81,3
R6	76,9	91,7	72,6
R7	66,4	88,3	83,9
R8	65,4	83,2	76,1
R9	63,6	86,9	74,3
R10	70,2	89,7	81,2
Average	67,6	87,4	76,2

Based on the data in the table above, it can be concluded that overall Workshop service has been considered sufficient well or MEDIUM, this is indicated by The average score for the SERVQUAL score obtained from 10 respondents indicated figures [74.66] of the range [0-100], however if examined in more detail, towards each service attribute, it will service factors found which is still not able to fulfill customer expectations, meaning that there must be an effort from the workshop to further improve again the quality of service on the service factor and these dimensions, so that the quality of service can be of high value and able to fulfill desires and expectations from customers, in other words the level of customer satisfaction will be fulfilled so that customers aresatisfied will always be loyal to the service provided by the workshop.

4. Conclusion

From the results of data analysis and discussion in the previous chapter, it can be summarized as follows:

1) Score the quality of service in this study was measured using Quality of Service (SERVQUAL), namely by measuring the level of perception and customer expectations through a questionnaire arranged according to dimensions SERVQUAL. Than score Perceptual values are subtracted from scores expectation value. Difference in value between perceptions and this hope is later called with the term Gap.If Gap negative value (-) means quality service has not been as expected customers or also called unable satisfy customer desires.
2) Based on calculations obtained results that the average rating customers towards the level of quality workshop service has been valued is, it means that the garage needs to make improvements in several attributes service to match that expected customer.
3) Based on measurements of 5 Service quality dimensions, the results obtained that the quality services that have low value, that is Dimensions of responsivness. This means that this service dimension must be considerate and be priorities to be evaluated and improved again the quality of service by parties workshop.

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