Service Management of Agricultural Extension Quality Using Fuzzy ServQual

Dewi Suranti, Yupianti[**], Maryaningsih[**]

[*] Informatics Engineering Departement,Computer Science Faculty, Dehasen Bengkulu University
[**] Informatics Engineering Departement,Computer Science Faculty, Dehasen Bengkulu University
[**] Informatics Engineering Departement,Computer Science Faculty, Dehasen Bengkulu University

DOI: 10.29322/IJSRP.9.05.2019.p8948
http://dx.doi.org/10.29322/IJSRP.9.05.2019.p8948

Abstract- This study aims to measure the quality of service of agricultural extension workers at the UPT. BPP Sukaraja uses the Fuzzy Service Quality (serqual) method by grouping question attributes into five service dimensions criteria, namely the dimensions of Tangibles (Direct Evidence), Reliability (Responsibility), Responsiveness, Assurance, Empathy. Based on the results of the study showed that the value of the gap gap that requires the priority of improvement and improvement in service quality is the dimension of Tangibles with a negative gap value of -0.45, this means that the expectations of farmers are still not achieved. Based on the results of these gap can be a motivation to continue to improve the quality of service to farmers for UPT BPP Sukaraja.

Index Terms- Fuzzy Serqual, Service, Agricultural Extension)

I. INTRODUCTION

UPT. BPP Sukaraja Seluma Regency of Bengkulu Province is an instance that provides services in extension sector, regardless of the problems above. Service quality is the key to customer trust, in this case farmer groups / farmers. But UPT. BPP Sukaraja often has difficulty in measuring the quality of its services. According to the Head of the UPT. Agricultural Extension Office (UPT BPP) Sukaraja only has 24 agricultural instructors by fostering 20 assisted villages with 116 farmer groups with ± 628 members with an area of ± 867 ha. Therefore, a study is needed to determine the extent of service quality at UPT BPP Sukaraja on the quality of agricultural instructor's services. By knowing the level of farmer's satisfaction, it is expected that the quality of agricultural instructor's services in the UPT Agricultural Extension Office (UPT BPP) in the future can be better and more useful.

One method that can be used to solve the problem of measuring the service quality of agricultural instructors is using Fuzzy Service Quality (ServQual) [1]. The approach to the Fuzzy Service Quality (ServQual) method was chosen because this method can analyze satisfaction and service quality by grouping question attributes into five service dimensions criteria. In which generally, the assessment of perceptions and expectations on Servqual uses a linkert scale that has a range of values between 1 and 5 to express the level of satisfaction and the level of importance of service performance.

The purpose of this study is to evaluate the service quality of agricultural instructors at the UPT. BPP Sukaraja Seluma Regency of Bengkulu Province by implementing Fuzzy Service Quality as an effort to improve the service quality of instructors because it is feared it will have a negative impact on agricultural development.

II. LITERATURE REVIEW

It is important for an analyst and designer to be aware of the quality in the system. One of the reviews is the quality of the system in providing services called service quality (ServQual). ServQual can be used as a diagnostic tool to see areas of excellence and short service failures [1]. service quality is measured through the measurement of 5 gaps (difference in assessment). The five gaps are measured by reviewing the opinions of customers and management on service quality. The five gaps that exist can be explained as follows [2].

Thus, the value used in determining the score used to determine the level of service quality from the calculation of fuzzyfication is the category of Dissatisfaction with a score of 1,2,3 Satisfied Categories with a score of 3,4,5 and the category of Very Satisfied with stocks 5, 6, 7 . The value of fuzzyfication is the average value of a value (median), b (upper limit), c (lower limit). Calculation of questionnaire data fuzzyfication is done by the following formula [4],[5]:

Median (a_i) :

$$a_i = \frac{(b_1 \, x \, nj_1)+(b_2 \, x \, nj_3)+\cdots+(b_k \, x \, nj_k)}{nj_1+nj_2+\cdots+nj_k} \quad (1)$$

Upper Limit (b_i) :

$$b_i = \frac{(b_1 \, xnj_1)+(b_2 \, xnj_3)+\cdots+(b_k xnj_k)}{nj_1+nj_2+\cdots+nj_k} \quad (2)$$

Lower Limit (c_i) :

$$c_i = \frac{(b_1 \, xnj_1)+(b_2 \, xnj_3)+\cdots+(b_k xnj_k)}{nj_1+nj_2+\cdots+nj_k} \quad (3)$$

Notes:
b_i = average fuzzy set value per level of interest
n = number of respondents per level of interest

The next step is to do defuzzification using the Geometric Mean formula to get a single value with the following formula [5]:

Defuzzification = $(a_i \times b_i \times c_i)^{1/3}$ (4)

Serqual value (gap) = Perception - expectation (5)

III. METHODOLOGI

System design model that describes the complete stages from the start of Analysis and Definition of Requirements, System and software design, implementation and unit testing, integration and
testing ystem, operation and maintenance. The respective stages can be explained as follows:

a. Analysis and Definitions Requirements, namely services, limits and objectives are determined in consultation with the user system. These requirements are then defined in detail and function as system specifications.
b. System Design and Software, namely the system design process dividing requirements in a software system. This activity determines the overall system architecture.
c. Unit implementation and testing, namely software design that is realized as a series of programs or program units. Unit testing involves verifying each unit whether it meets its specifications.
d. System Integration and Testing, that is, the individual program or program unit is integrated and tested as a complete system to ensure that the system requirements are met and after fulfilling then the program is sent to the customer to be tested by the customer whether in accordance with the wishes determined by the customer
e. Operation and Maintenance, which is the longest phase of the life cycle, because the system is installed, used and continues to be used by users who in this case are extension agents to find a correction factor that needs improvement.

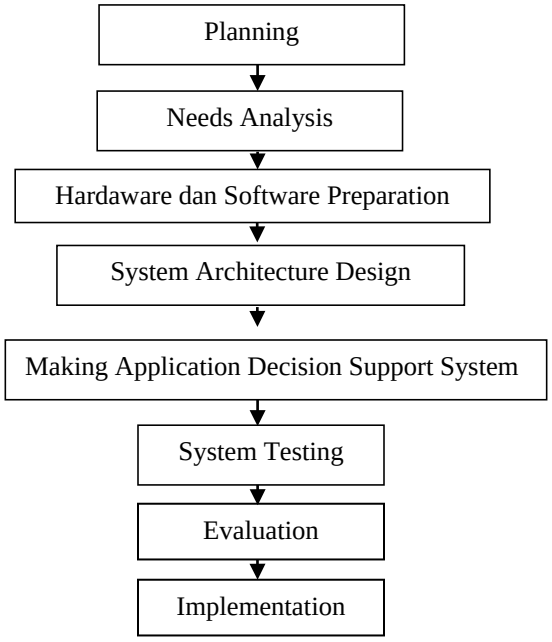

Fig. 1. Research Stage

IV. RESULTS

The research variables were obtained based on the services provided by the UPT BPP Sukaraja then grouped based on five dimensions (serqual) service quality, namely the dimensions of Tangibles (Direct Evidence), Reliability, Responsiveness, Assurance, Empathy with 15 variables/statement attribute [6], as shown in table 1.

Table 1. Dimensions and Variables / Statement Attribute

Dimension	No. Ques	Statements
Tangibles (Direct Evidence)	1	Instructors' skills in using local languages
	2	Instructors' ability to provide explanations in writing
	3	Completeness and readiness of instructors' equipments
Reliability	4	Instructors invite farmers to attend farmer group meetings
	5	Instructorsmake cooperative relations between farmer groups and other parties
	6	The materials offered are in accordance with what farmers needs
Responsiveness	7	The intensity of instructors' visits to farmer groups
	8	Instructors are quick to respond to service
	9	Instructors recap/ask problems to farmers and find solutions (proactive attitude).
	10	Instructorsteach a variety of farming skills and carry out guidance and application
	11	Instructors receive questions and answer directly and are able to answer questions correctly
Assurance	12	Instructors' ability to increase productivity, quantity and quality of farming commodities
	13	Providing training services/courses/ application of technology to farmers with a polite and friendly attitude
Empaty	14	Instructors attend meetings/deliberations held by farmer groups
	15	Instructors provide reading, food and drink materials during the extension

The recapitulation of perception scores and expectations is obtained from the sum of each respondent's answer score. The recapitulation results can be seen in table 2.

Table 2. The results of the recapitulation of scores on perceptions and expectations

No. Quest	Perceptions			Expectations		
	Not satisfied	Satisfied	Very satisfied	Not important	Important	Very important
Q 1	10	45	31	1	39	46
Q 2	5	55	26	0	57	29
Q 3	20	48	18	0	63	23
Q 4	4	56	26	0	61	25
Q 5	4	65	17	1	49	36
Q 6	6	50	30	1	51	34
Q 7	5	51	30	0	41	45
Q 8	8	44	34	0	47	39
Q 9	13	44	29	1	45	40
Q 10	18	35	33	0	55	31
Q 11	5	41	40	0	49	37
Q 12	3	55	28	0	50	36
Q 13	5	43	38	1	55	30
Q 14	6	46	34	0	48	38
Q 15	23	40	23	1	61	24

Table 3.Fuzzification results of perceptions and expectations

No. Quest	*Fuzzification of Perceptions*			*Fuzzification of Expectations*		
	a	b	c	a	b	c
Q 1	3,49	4,49	5,49	4,05	5,05	6,05
Q 2	3,49	4,49	5,49	3,67	4,67	5,67
Q 3	2,95	3,95	4,95	3,53	4,53	5,53
Q 4	3,51	4,51	5,51	3,58	4,58	5,58
Q 5	3,30	4,30	5,30	3,81	4,81	5,81
Q 6	3,56	4,56	5,56	3,77	4,77	5,77
Q 7	3,58	4,58	5,58	4,05	5,05	6,05
Q 8	3,60	4,60	5,60	3,91	4,91	5,91
Q 9	3,37	4,37	5,37	3,91	4,91	5,91
Q 10	3,35	4,35	5,35	3,72	4,72	5,72
Q 11	3,81	4,81	5,81	3,86	4,86	5,86
Q 12	3,58	4,58	5,58	3,84	4,84	5,84
Q 13	3,77	4,77	5,77	3,67	4,67	5,67
Q 14	3,65	4,65	5,65	3,88	4,88	5,88
Q 15	3,00	4,00	5,00	3,53	4,53	5,53

The following is an example of a Defuzzification calculation for the level of perception and expectation of the Q1 statement variables using equation 5. The results of all calculations can be seen in Table 4.

Table 4.DefuzzificationResults of perceptions and expectations

No. Quest	*Defuzzification*	*Defuzzification*
Q 1	4,41	4,98
Q 2	4,41	4,60
Q 3	3,87	4,46
Q 4	4,44	4,51
Q 5	4,22	4,74
Q 6	4,48	4,70
Q 7	4,51	4,98
Q 8	4,53	4,84
Q 9	4,29	4,84
Q 10	4,27	4,65
Q 11	4,74	4,79
Q 12	4,51	4,77
Q 13	4,70	4,60
Q 14	4,58	4,81
Q 15	3,91	4,46

The results of Gap value calculation per dimension are obtained based on the difference in dimensions value of perception level and dimension value of expectations. This is used to show the extent to which the quality of agricultural instructors services in UPT BPP Sukaraja per service dimension in providing services to farmer groups. The calculation results of Gap values per dimension can be seen in Table 5.

Table 5. Results of Gap per statement dimension

Serqual Dimension	No. Quest	*Defuzzification* of Perception	*Defuzzification* of expectation	Gap	Rank
Tangibles (Direct evidence)	1	4,41	4,98	-0,57	
	2	4,41	4,60	-0,19	
	3	3,87	4,46	-0,59	
Total		**4,23**	**4,68**	**-0,45**	**1**
Reliability	4	4,44	4,51	-0,07	
	5	4,22	4,74	-0,52	
	6	4,48	4,70	-0,21	
Total		**4,38**	**4,65**	**-0,27**	**4**
Responsiveness	7	4,51	4,98	-0,47	
	8	4,53	4,84	-0,31	
	9	4,29	4,84	-0,54	
	10	4,27	4,65	-0,38	
	11	4,74	4,79	-0,05	
Total		**4,47**	**4,82**	**-0,35**	**3**
Assurance	12	4,51	4,77	-0,26	
	13	4,70	4,60	-0,09	
Total		**4,60**	**4,68**	**-0,08**	**5**
Empathy	14	4,58	4,81	-0,24	
	15	3,91	4,46	-0,55	
Total		**4,25**	**4,64**	**-0,39**	**2**

The role of the overall Gap will provide information on how big the level of importance is and how far the statement role is in the level of service quality on instructors at UPT BPP Sukaraja. The results of the overall Gap value calculation can be seen in Table 6.

Table 6. The results of Overall Gap value

Serqual Dimension	*Defuzzification* of Perception	*Defuzzification* of expectation	Gap	Rank
Tangibles	4,23	4,68	-0,45	1
Reliability	4,38	4,65	-0,27	4
Responsiveness	4,47	4,82	-0,35	3
Assurance	4,60	4,68	-0,08	5
Empathy	4,25	4,64	-0,39	2

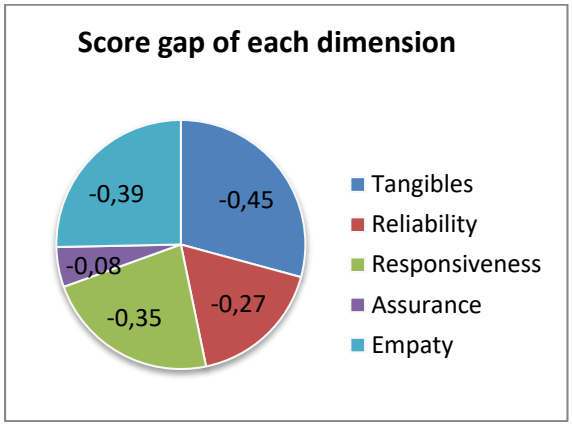

Fig. 2. Score gap of each dimensi

Figure 2 tells that gap score of each dimension is less than 0, it means that expectation of service given is still higher than perception received by users. Form thoses five dimensions, tangible dimension has the highest gao; which is -0,45, and assurance dimension has the smallest gap, which is -0,08. It shows that there is a need to do refinement of service related to attributes existing on tangible dimension to fulfill standard of quality expented. The gap score of each dimension is shown in picture 2.

V. CONCLUSION

1. From the calculation of serqual (gap) per variable and dimension that gets the highest score on the dimensions of Tangibles with variable of instructor ability in using local language, the ability of instructors in providing written explanations, completeness and readiness of extension equipment with total value of -0.45 . Variable statements on the Tangibles dimension can be made a priority in improving the service quality of agricultural instructor's services.
2. From the calculation results of the Defuzzyfication, the highest expectation value of service quality is the ability of instructor to use the local language and the intensity of instructor's visit to the farmer group with a value of 4.98 and for the lowest value the completeness of the instructor provides reading material, food and drink during counseling with the value of 4.46.
3. From the calculation of Defuzzyfication, the highest perceptual value of service quality is instructor receives questions and answers directly. Then agricultural instructor's services is also able to answer the questions correctly with a value of 4.74.For the lowest value is the completeness and readiness of the instructor with the value obtained 3.87.

ACKNOWLEDGMENT

We accept the most profound expressions: Directorate of Research and Community Service Directorate General of Strengthening Research and Development Ministry of Research, Technology and Higher Education in accordance with the 2019 Funding Year Research Contract

REFERENCES

[1] Mujilan, A. 2013. Analysis and Analysis of Accounting Competency Perspective System Issue *1*. Madiun. Universitas Widya Mandala.60 Hal.
[2] Tjiptono, F. (2007), Manajemen Pemasaran Jasa, Yogyakarta: Andi Offset
[3] Wijaya, T., Service Quality Management Design of Serqual, Qfd, and Kano Accompanied by Application Examples in Research Cases. Jakarta Barat : Pt Indeks., 2010.
[4] Sutinah, E., Simamora, R, O. 2018. Fuzzy Servqual Method in Measuring Patient Satisfaction with the Quality of BPJS Health Services. *Jurnal Informatika*. Vol.5. No.1 April 2018.
[5] Fajriyah, N, N. 2014. Analysis of Customer Satisfaction by Using Fuzzy Servqual Method in Restaurant X inMalang City. Skripsitip.staff.ub.ac.id/files/2014/09/Nindya-Nur-Fajritah.pdf.
[6] Peraturan Menteri Pertanian Nomor 91/Permentan/OT.140/9/2010
[7] Yulis, A., Measurement of Customer Satisfaction Index with Partial Least Square (PLS) Approach(Study Kasus : Pelanggan Kartu Im3)., Oktober 2010.

[8] Suharyanta, D., A'yunin, Q. 2012. Analysis of Service Quality Level Using Service Quality (Servqual) Fuzzy Method in Radiology Installation of Regional General Hospital (RSUD) Panembahan Senopati Bantul. KESMAS, 27-50.

AUTHORS

First Author – Dewi Suranti, Lecturer, Informatics Study Program, Computer Science Faculty, Dehasen Bengkulu University, dewisuranti@unived.ac.id

Second Author – Yupianti, Lecturer, Informatics Study Program, Computer Science Faculty, Dehasen Bengkulu University, yupiantiprana@gmail.com

Third Author – Maryaningsih, Lecturer, Informatics Study Program, Computer Science Faculty, Dehasen Bengkulu University, maryaningsihkrs@unived.ac.id

Correspondence Author – dewisuranti, dewisuranti@unived.ac.id, mrs.dewisuranti@gmail.com, +6285269430677.