



Improving Citizen Satisfaction in Dukuh Menanggal: A Six Sigma-Based Quality Enhancement Strategy

Mochammad Zulfikar Alfany^{1*}, Rizqa Amelia Zunaidi².

¹Industrial Engineering Department, Telkom Institute of Technology, Surabaya, Ketintang Street No.156, and 60231, Indonesia

ARTICLE INFORMATION

Article history:

Received:

Revised:

Accepted:

Category: select one (Research paper, Review paper, View point, Technical paper, Conceptual paper)

Keywords:

Quality of Services

Six Sigma

Public Services

Quality Improvements

ABSTRACT

This study aims to identify the service quality in Dukuh Menanggal Subdistrict, Surabaya City, explicitly focusing on population registration, correspondence, and social assistance management. The Six Sigma method is employed to initiate improvements in public services. Six Sigma is a quality management system that emphasizes customer satisfaction by measuring the Sigma Quality Level. The analysis is conducted through the DMAIC framework (define, measure, analyze, improve, and control). Data is collected by distributing questionnaires to members of the community who are users of public services in the Subdistrict. The research findings are expected to assist Dukuh Menanggal Subdistrict in considering the proposed improvements put forth by the researchers as initial steps toward better service provision. By implementing the Six Sigma approach, the Subdistrict can enhance service quality, resulting in increased satisfaction and trust among the public regarding the provided public services. This study provides valuable insights into applying the Six Sigma methodology in local governance and its potential to improve service quality, ultimately benefiting the community and the local administration.

*Corresponding Author

Mochammad Zulfikar Alfany

E-mail: zulfikaralfany01mare@gmail.com

This is an open access article under the **CC-BY-NC** license.



1. INTRODUCTION

The quality of service an institution provides is considered highly important in delivering services to customers (the public). Government officials carry out public service about population administration. According to the Decree of the Minister of Administrative and Bureaucratic Reform No.

63/KEP/M.PAN/7/2003 regarding the General Guidelines for Public Service Management, public service aims to fulfill the needs of service recipients and ensure compliance with applicable laws and regulations (Kementrierian et al., 2017). Considering the diverse nature of public service units, conducting surveys of public satisfaction is necessary to obtain a national public service index. Customer

satisfaction is a crucial indicator in determining the success of public service provision. Based on the Minister of Administrative and Bureaucratic Reform Decree No. 63 of 2003 regarding the general guidelines for public service management, including service procedures, service requirements, the capability of service personnel, and service schedule certainty, the government has the responsibility to enhance services in the public service sector (Kementrian et al., 2017). Dukuh Menanggal Sub-district has taken various steps to improve the performance of its employees, one of which is through the implementation of Standard Operating Procedures aimed at replacing the old system that was deemed to hinder service to the community. Six Sigma is a quality management system focusing on customer satisfaction by measuring Sigma quality levels. This method employs an analytical framework called DMAIC, which stands for Define, Measure, Analyze, Improve, and Control. This method aims to minimize variations toward perfection and zero defects (Sari, 2019). Previous research on service quality using the Servqual-Six Sigma method stated that utilizing the Six Sigma method can enhance or measure service quality. After identifying the core issues, improvements are made to enhance services to meet and exceed established standards (Rismawati, 2019). Several studies that utilize the Servqual, KANO, and QFD methods to enhance service quality in public services, including research conducted by Aldila, suggest that the Servqual method will be integrated with the KANO method to identify priority improvement attributes. Meanwhile, QFD provides improvement recommendations (Farah, 2018). Efforts for improvement to enhance the level of service quality in Dukuh Menanggal Sub-district, in this study, utilize the Six Sigma method. This research is expected to provide recommendations for Dukuh Menanggal Sub-district to improve its service quality, allowing the community to feel satisfied by receiving the expected value.

2. RESEARCH METHOD

Six Sigma is an approach that has gained popularity across various organizations for eliminating deviations and reducing waste. The

Six Sigma method has been widely applied to enhance manufacturing, healthcare and safety, and environmental management systems performance. Six Sigma is a structured methodology for process improvement that concentrates on reducing process variations and minimizing defects (products or services that fall outside specifications) through intensive utilization of statistics and problem-solving tools (Sari, 2019).

Six Sigma has five stages, known as DMAIC, which stands for Define, Measure, Analyze, Improve, and Control. DMAIC is used as a problem-solving approach for making improvements (Setiadi & Willyo, 2021). Each stage can be explained as follows:

1. Define: In this stage, the problem or opportunity for improvement is clearly defined. The project's scope, goals, and objectives are set, and the key stakeholders' requirements and expectations are identified.

2. Measure: During this stage, relevant data is collected and measured to provide a baseline for the process performance. The team identifies key metrics, gathers data, and analyzes it to understand the current state of the process.

3. Analyze: In this phase, the data collected is analyzed to identify the root causes of problems or deviations from the desired outcome. The team uses various tools and techniques to uncover patterns and relationships in the data.
4. Improve: In the Improve stage, potential solutions are developed based on the insights gained from the analysis. These solutions are tested and implemented to address the identified issues and improve the process.

5. Control: The Control phase involves putting mechanisms in place to sustain the improvements achieved in the previous stages. This includes establishing monitoring systems, setting performance standards, and implementing controls to prevent the recurrence of issues.

Each of these stages within DMAIC plays a crucial role in the systematic process of identifying, addressing, and resolving issues to enhance the process's overall performance. The research uses several stages to analyze service quality using the Six Sigma method. The first thing the researchers did in this study was determine the object,

identify the problem, and conduct a literature study. The research object for the Dukuh sub-district, Surabaya City, was chosen because there

are problems that are felt by some people related to the services provided in Kelurahan. The level of consumer loss reflects the failure of agencies or institutions to fulfill their customer satisfaction. The next step is condition measurement. The research method used for measurement is Service Quality, or called servqual. From several Service Quality variables, several criteria can be found that can be used to determine and analyze service quality. These criteria include five quality dimensions: Tangibles, Reliability, Responsiveness, Assurance, and Empathy (Zeithaml, 2002).

The data collected to complete this research used a questionnaire distributed to service users in the Dukuh Menanggal Village. This test requires a minimum of 30 respondent data related to the questionnaire that has been designed. A questionnaire can be declared valid if it has validity test results with a significance value of less than 0.05. And it can be declared reliable if it has a Cronbach's Alpha value of more than 0.6. If the validity and reliability test results do not meet the specified value, another check will be carried out on the designed questionnaire. The results of distributing the questionnaires were then collected into data and used to determine the services provided in the Dukuh Menanggal sub-district. The data owned in this study is questionnaire data. Sampling in this study was taken from the Regulation of the Minister of Administrative Reform and Bureaucratic Reform of the Republic of Indonesia Number 14 of 2017 (Minister of Administrative Reform and Bureaucratic Reform of the Republic of Indonesia, 2017). The total population size of the Dukuh Menanggal Village, based on data from the Surabaya City Central Statistics Agency for 2020, is 9,156 people (Surabaya et al. Agency, 2019). The questionnaire was conducted using a Likert scale. The scoring system will use a 4-point rating scale (Rangga & Narendra, 2021).

3. RESULT AND DISCUSSION

At this research stage, data collection was carried out for one month, namely March 2023. Data was collected by distributing questionnaires about expectations and evaluation of services in Dukuh Menanggal Village. Researchers obtained data from 300 respondents. The survey data obtained was processed by researchers and analyzed using descriptive statistics. Calculation of the sample size in this study shows that the number of

respondents obtained during the distribution of the required questionnaire in data collection, as many as 300 respondent data, is considered sufficient. Figure 1 lists the data on the number of respondents who have filled out the service satisfaction questionnaire.

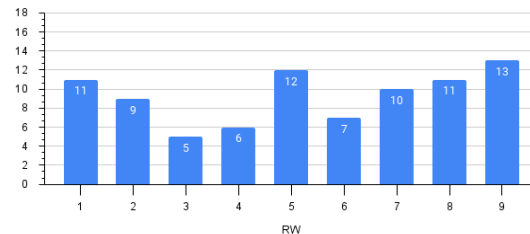


Figure 1. citizen association statistics

Based on the gender of the 300 respondents, there were 154 males sex and 146 female. Respondent data in filling out research questionnaires was dominated by men, with 51.3 percent compared to 48.7 percent for women. Based on the age of 300 respondents, the majority of respondents aged 33-40 years were 75 people with a presentation of 25 percent, and the least number of respondents were respondents aged 28-32 years with 50 people with a percentage of 16.7 percent. Based on the work of 300 respondents, most respondents have jobs as traders, namely as many as 66 people, with a percentage of 22 percent, and the number of respondents with minor other jobs, namely as many as 33 people, with a percentage of 11 percent.

The data processing approach used is Servqual and Six Sigma (Define, Measure, Analyze, Improve) for population administration services in Dukuh Menanggal Village. In order to obtain good research results, a measuring instrument was tested to determine whether the instrument used in this study was appropriate.

a. Define Stage

At the Define stage, identification of potential problems that occur in the service process is carried out (Petrus, 2012). The service flow process diagram has the elements used shown in Figure 5. The variables in the previous sub-chapter are still in the form of brief explanations so that operationalization tables need to be carried out to facilitate understanding and measuring the variables in the research. The following is a schematic of the Dukuh Menanggal Village service flow procedure that must be taken by

the applicant:

1. Customer: The customer in this service flow process is file registration and file equipment verification.
2. Service Employee: this service flow consists of verifying the validity of data, appropriate documents, initials and service ACC, data entry and printing of documents, and verification of field heads and administration.
3. Archiving Officer: After all the service flow processes, namely producing archiving, and submitting documents.

2. Measure Stage

In the measure stage of this study, questionnaires were distributed to 300 respondents to test whether the questionnaires were valid and reliable. The questionnaire is said to be valid if the question attributes are able to reveal what will be measured (Kusuma, 2019). While reliable is the consistency of respondents in answering questions in answering respondents. Data processing at this Measure stage uses the Servqual method and the Six Sigma method. The Servqual method uses levels (reality) and levels of importance (expectations) (Purnamawati, 2018). The validity test is used to determine the similarity between the data collected and the data that actually occurs in the object under study so that valid research results are obtained (Muhlisoh, 2019). Validity and Reliability Testing is a process for testing the questions in a questionnaire. This test begins with a questionnaire to 30 respondents and tested. The level of significance corresponds to the average of studies that use a 5% error rate (Rismawati, 2019).

Based on the results of the validity test, it can be seen that the data for all dimension attributes related to the expectations and reality of the respondents in the questionnaire show that they have met the requirements so that the attributes are declared valid. The measuring instrument is stated to be valid, concluded based on the significance value of each measuring instrument getting a value of less than 0.05 (Farah, 2018). Reliability test is used to test whether the research instrument can show its ability to measure without error and the results are always consistent. In this test, the method used is

Cronbach's Alpha Method. Cronbach's Alpha is used to measure the reliability of indicators used in research questionnaires (Babin & Anderson, 2010).

Based on the results reliable test, it can be seen that the data for the questionnaire as a whole is declared reliable for each attribute. The alpha value results have been described in the table above. Cronbach's Alpha value above 0.6 is in accordance with the requirements needed in the reliability test. The next stage is measuring the level of importance of the quality of services provided at this time. The measurement stage includes the average level of reality, the average level of expectation, the Gap value, the satisfaction target to be achieved, the satisfaction level, defects per million opportunity (DPMO), and the sigma value level (Gaspersz, 2002). In this study the satisfaction target to be achieved is a score of 4, which is very good, which comes from the answers of respondents based on the Likert scale of satisfaction from number 1, which is not good, to number 4, which is very good.

Table 1. Measure Tabel

Attribute	Gap	level of satisfaction	DPMO	sigma value
T1	-1.13	63,00%	370000	1,83
T2	-0.99	65,00%	350000	1,89
T3	-1.07	61,25%	387500	1,79
R1	-1.39	54,75%	452500	1,62
R2	-0.95	66,75%	332500	1,93
R3	-0.96	65,50%	345000	1,90
R4	-1.40	55,25%	447500	1,63
R5	-1.08	65,50%	345000	1,90
D1	-1.38	55,00%	450000	1,63

Atribute	Gap	level of satisfaction	DPMO	sigma value
D2	-0.91	67,00%	330000	1,94
D3	-1.02	64,75%	352500	1,88
A1	-1.19	63,50%	365000	1,85
A2	-1.80	54,25%	457500	1,61
A3	-1.32	67,00%	330000	1,94
A4	-1.51	62,25%	377500	1,81
E1	-0.78	67,00%	330000	1,94
E2	-0.92	65,25%	347500	1,89
E3	-1.08	65,00%	350000	1,89
Average	-1,16	62,67%	373333	1,83

Based on the calculation of the table above, the calculation of the Measure stage for the 18 attribute dimensions of service quality in Dukuh Menanggal Village shows that the performance of Dukuh Menanggal Village is currently at the 1.83 sigma level and the DPMO value is 373,333. This explains that if the service is provided 1,000,000 times, then there are 373,333 services that are not in accordance with the procedure and trigger dissatisfaction with service users (Setiadi & Williyo, 2021). Then based on the sigma value, the performance of the Dukuh Menanggal Village is good in providing services because the 1.83 sigma value is not far from the average industrial sigma value in Indonesia. However, these results are still far from the sigma target of 6.00 sigma and a defect per million opportunity value of 3.7.

3. Analyze Stage

After going through the measurement stage, the next stage is analysis stage to follow up on the analysis of the factors that cause failure/defects using Pareto diagrams and

fishbone diagrams.

Table 2 Dimensional Grouping

Dimension	GAP	Percentage	Cumulati ve
Assurance	-1,46	25,57%	25,57%
Reliability	-1,16	20.32%	45,88%
Responsive ness	-1,1	19.26%	65,15%
Tangible	-1,06	18.56%	83,71%
Emphaty	-0,93	16.29%	100 %
Average	-5,71		

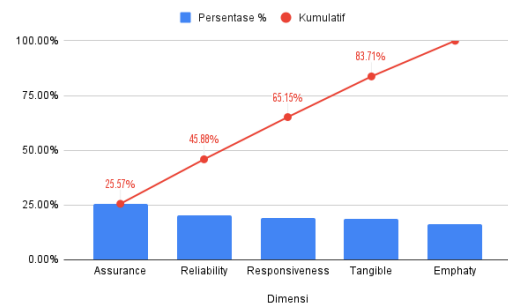


Figure 2. Pareto Diagram

Next will be analyzed the root of the problem which is suspected as a causative factor using the fishbone diagram tool (Widyarto, 2019). Cause and effect diagrams are used to determine the effect of a problem which will then be taken as a corrective action.

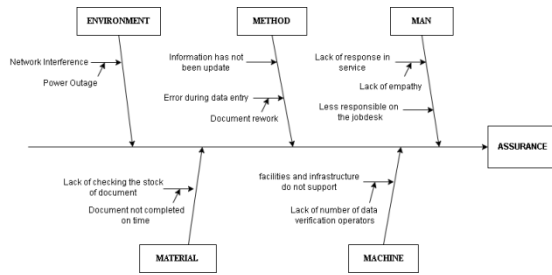


Figure 3. Analyse's Fishbone Diagram

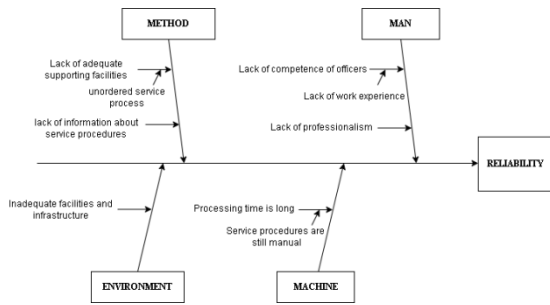


Figure 4. Reliability's Fishbone Diagram

4. Improve Stage

In the improve stage, it is the improvement stage by providing a design in the form of a solution that will be given to the Dukuh Menanggal Village as a design to improve service quality.

Table 3. Assurance's RPN Table

Dimension	Highest RPN	RPN	Improvement Recommendations.
Assurance	Document Reworking	210	Create a check sheet to make checking easier
	Lack of Verification Operators	105	Adding HR services or open recruitment for administration
	The information used is not updated yet	84	Conduct regular population censuses so that the information used is updated

Table 4. Reliability's RPN Table

Dimension	Highest RPN	RPN	Improvement Recommendations.
Reliability	Lack of information about service procedures	240	- Make information regarding document requirements in writing using x-banners - Create information on agency web portals
	The number of spectators is uncontrollable	224	Provide SOP quota limits for receiving registration files
	There is still a manual service process	140	Performing system improvements to facilitate service and improve service time efficiency

5. Control Stage

At the control stage, control and supervision are carried out on the suggestions for improvement given at the improve stage. With clear and easy-to-understand knowledge of customer service procedures, it is hoped that customer satisfaction can be met with a six sigma value. Dukuh Menanggal Village regularly conducts

surveys of service users to measure community satisfaction index. This has become the first step to improve and improve the quality of services provided so far. In addition, Dukuh Menanggal Village can maintain and improve services in accordance with service SOPs by conducting training and repairs are reviewed every 3 months for improvement efforts that lead to successful service improvement for Dukuh Menanggal Village.

4. CONCLUSION

Based on the results of the study, it can be concluded that based on the results from the collection stage, the data processing stage to the discussion analysis stage, it can be concluded that the quality of public services provided in Dukuh Menanggal Village is still not optimal. Efforts to improve service performance are carried out by applying the Servqual dimension and the Six Sigma method through service user assessments, this is based on the average of 18 attribute DPMO values and level values, namely DPMO 373,333 and sigma value 1.83 sigma. Where the sigma level that has been achieved is still far from the desired target, namely 6 sigma. Then the highest negative Gap shows a value of -1.46, namely the Assurance dimension, based on the Gap value shows negative satisfaction which means there is a gap between reality and service user expectations. This explains that the service user wants the performance of the Dukuh Menanggal Kelurahan to be further improved so that it is closer to the expectations of service users. Based on the analysis of the pareto diagram, the most dominant causes of defects are in the assurance, reliability and responsiveness dimensions. In the analysis of the fishbone diagram, there are several causes of defects, namely human factors, methods, machines, materials, and the environment. Proposed improvements that can be made to reduce these defects are to make written information regarding document requirements using x-banners, conduct training on SOPs for service time, and perform system improvements to facilitate service and improve service time efficiency.

REFERENCES

- A. C. Kusuma. (2019). "Analisis Kualitas Pelayanan Publik Dengan Metode Servqual," *ISSN*, Vol. 5.
- A. Mahendingraty, I. Gede, And A. W. Herawan. (2020). "Implementasi Dmaic Six sigma Dalam Meningkatkan Layanan Puskesmas X Di Kota Malang". *jurnal*, vol. 6, No 1.
- A. N. Farah. (2018). "Perancangan Perbaikan Sistem Layanan Publik Dengan Integrasi Metode Servqual, Kano, Dan Qfd (Studi Kasus: Kantor Kecamatan Ceper)".
- A. Rangga and A. Nalendra. (2021). *Statistika Seri Dasar dengan SPSS*, vol. 1. Bandung.
- A. Zeithaml. (2002). "Servqual A Multiple Item Scale For Measuring Consumer Perceptions Of Service Quality," *Journal Of Retailing*, Vol. 64.
- Badan Pusat Statistik Kota Surabaya, "Data Penduduk Kecamatan Gayungan". (2019). <https://Surabayakota.Bps.Go.Id/Statictable/2020/06/26/859/Banyaknya-Penduduk-Menurut-Agama-Dan-Jenis-Kelamin-Kecamatan-Gayungan-Tahun-2019.Html> (Accessed Jan. 18, 2023).
- E. Purnamawati. (2016). "Analisis Kualitas Layanan Dengan Metode Servqual Dan AHP Di Dinas Kependudukan Dan Pencatatan Sipil Di Surabaya".
- Erika And S. Muhliso. (2019). "Analisa Kepuasan Pelanggan Di Kantor Kelurahan Kalimulya Kota Depok Dengan Metode Service Quality," *ISSN*, Vol. 29.
- H. Setiadi, And M. Willyo. (2021). "Analisis Peningkatan Pelayanan Pelanggan Pada Bisnis Jasa Kurir Menggunakan Metode Six Sigma-Dmaic Studi: Pada Mail Processing Centre-Pt Pos Indonesia (Persero)," Vol. 11, No. 2.
- J. Hair, W. Black, B. Babin, and R. Anderson. (2010). *Multivariate Data Analysis*, 7th ed. Boston, United States: Pearson.
- Kementrian Pendayagunaan Aparatur Negara. (2017, May). "PERMENPAN NOMOR 14 TAHUN 2017,".
- M. Siswanto. (2018). "Continuous Quality Improvement Dalam Manajemen Mutu," *Jurnal Manajemen Mutu*, vol. 1, pp. 120–132. doi:10.31219/osf.io/ev7x2
- Pemerintahan Kota Surabaya, "Kelurahan Dukuh Menanggal". (2019). <https://Pemerintahan.Surabaya.Go.Id/Home/>

- Kelurahan_Dukuh_Menanggal (Accessed May 29, 2023).
- Rismawati. (2019). “Analisis Kualitas Layanan Dengan Menggunakan Metode Servqual-Six Sigma (Studi Kasus: Dinas Kependudukan Dan Pencatatan Sipil Kabupaten Gowa)”
- R. Sari. (2019). “Metode Six Sigma Untuk Tingkatkan Kualitas,”*jurnal* ,vol 5.
- S. A. Mustaniroh. (2010). “Penilaian Kepuasan Konsumen Terhadap Kualitas Pelayanan Menggunakan Metode Servqual (Service Quality) (Studi Kasus Pada “Waroeng X” Cab. Soekarno Hatta-Malang)” Vol. 11.
- T. A. Petrus Wisnubroto. (2012). “Analisis Kualitas Pelayanan Jasa Dengan Metode Six Sigma Pada Hotel Malioboro Inn Yogyakarta”.
- V. Gaspersz. (2002). *Pedoman Implementasi Six Sigma Terintegrasi Dengan ISO 9001:200, MBNQA, & HACCP*. Jakarta: PT Gramedia Pustaka Utama. Accessed: May 21, 2023
- V. Gasperz. (2003). *Metode Analisis Untuk Peningkatan Kualitas*, Jakarta: Gramedia Pustaka Utama.
- W. Widyarto. (2019). “Analisis Pengendalian Kualitas Air Minum Dalam Kemasan Menggunakan Metode Six Sigma,” *INTECH*, Vol. 5.