



## THE QUALITY OF HEALTH SERVICES IMPROVEMENT BASED ON SIX SIGMA METHOD IN DENTAL POLYCLINIC AT PUSKESMAS DEMPO PALEMBANG

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### ABSTRACT

Service quality has become the main focus of implementing health services. One of method that can be used to see service quality improvement in customer perception is the six sigma method. There are problems related to service at the Dental Polyclinic at Puskesmas Dempo, which can be seen from unstable number of patients in last few months, which is right target for implementing the six sigma method. Purpose of this study was to determine aspects that can improve the quality of health services using the six sigma method. Design research is descriptive. Data was obtained through interviews, observation and documentation from various information sources such as: health workers, patients, and others. Data analysis used the six sigma method consist of: define, measure, analyze, improve and control. Based on the review of the data obtained, it shows that each dimension of quality improvement has problems related to service. Based on the calculation results at the measure stage, the quality dimension of service quality improvement has the highest DPMO value of 250,000 and the lowest sigma level of 2.25 is on the responsiveness dimension. Through analysis of the FMEA and 5W + 2H tables, an action plan is obtained by adding doctors and dental nurses and utilizing the duration of service as effectively as possible in treating patients. Aspects that can improve the quality of health services in the perspective of patient satisfaction in The Dental Polyclinic at Puskesmas Dempo are by adding dentists and dental nurses and making the most effective use of the duration of service in treating each patient.

**Keywords:** Six Sigma, Service Quality, Dental Poly, Health Center

### Introduction

The Public Health Development Index (IPKM) is a combination of several single indicators combined into one and then used to measure the success of public health development.<sup>1</sup> Community health centers are health service providers at the primary level in the community in treating certain diseases before being handled by health service providers at the secondary level, namely district/city hospitals or provincial hospitals.<sup>2</sup>

In its implementation, the health center must have service standards such as meeting all patient needs in order to achieve community safety and comfort.<sup>3</sup> Providing maximum service quality is the responsibility of the Community Health Center as one of the health service facilities

in their respective work areas. Customer loyalty will arise when the customer has more confidence in the quality of the health service provider they use.<sup>4</sup>

The implementation of dental and oral health services has a service process starting from registration, waiting for service in the patient waiting room, receiving diagnostic examination services, and finally receiving treatment services.<sup>5</sup> When someone feels sick or is in good health but wants to have a dental and oral health check-up at a professional health service provider, this can be interpreted as a dental and oral health service activity.<sup>6</sup>

Patient satisfaction is the feeling that exists in patients who feel very good and happy when their hopes for health services either after or before receiving health services.<sup>7</sup> Therefore, patient satisfaction is a benchmark for the quality of dental and oral health services.

In looking at customer satisfaction indicators, the Dempo Community Health Center saw from the satisfaction survey evaluation report that this activity had not been implemented optimally in the first year, in mid-2022. According to the report on the results of the QR Code Customer Satisfaction Survey for March to June 2022, several of the recorded patients filled out In the survey, many people still complained about dental clinic services. This can also be seen from the visit data which decreased that month. The following is data on patient visits from March to June 2022:

**Table 1. Data on Patient Visits at the Dempo Health Center Dental Clinic in 2022**

Dempo Health Center Dental Clinic Patient Visit Data for 2022	
<b>January</b>	276 people
<b>February</b>	251 people
<b>March</b>	314 people
<b>April</b>	250 people
<b>May</b>	229 people
<b>June</b>	336 people
<b>July</b>	274 people

Source: Dental Poly Patient Visit Data for 2022

Based on the data above, it can be seen that the number of dental clinic patient visits has experienced instability since the beginning of 2022. This needs to be identified further to find out the cause in order to get several solutions that can be implemented at the Dempo Health Center dental clinic.

One method that can be used to see improvements in service quality through customer perceptions is using the six sigma method. Six sigma is one of many methods that have principles for improving the quality of goods or services in the field of quality management.<sup>8</sup> In the Six Sigma method, when the sigma value is at a high value, the existing system is getting better.

The principle of the six sigma method is to improve the product in the process carried out so that the process can produce the best product in the institution.<sup>9</sup> Apart from having five stages, the six sigma method also requires a quality assessment element using the dimensions of improving

service quality. The dimensions of improving service quality have five dimensions, namely, tangibles, reliability, assurance, responsiveness, empathy.

Through these things, the researcher has an interest in finding out more about improving the quality of health services from the perspective of dental poly patient satisfaction at the Dempo Health Center, Palembang City using the Six Sigma method. Therefore, the aim of this research is to find out aspects that can improve the quality of health services from the perspective of patient satisfaction at the Dempo Palembang Dental Clinic using the six sigma method.

## Methods

This research uses a descriptive research design. The stages in this research relate to the process of collecting descriptive data through related individuals who can provide important information for the smooth running of the research.<sup>10</sup> Therefore, data collection in this research was carried out through an interview and observation process. An interview is a stage in obtaining research data in the form of information and answers by asking about things needed for research.<sup>11</sup>

Informants in this study were determined using criterion sampling techniques. The Criterion Sampling technique is a sampling method when the researcher knows exactly the sample criteria needed and then determines who will be the sample in the research process in order to obtain the data needed to solve the problem.<sup>12</sup> This research was conducted with 10 informants consisting of the head of the community health center, dentist, head of quality, 3 dental nurses, and 5 dental patients.

The variables in this research are the quality of health services, dimensions of service quality, and the six sigma method. The quality of health services is the quality of a health service provider in providing services to each patient and being able to meet the expectations of each patient when using their services.<sup>13</sup> Initially, the quality of health services had several dimensions, namely ability, goodness and knowledge which were combined into assurance so that in the end the dimensions of service quality consisted of reliability, tangible, responsiveness, assurance and empathy.<sup>14</sup>

Data processing in this research uses the six sigma method. At the measure stage, the DPO, DPMO and Sigma Level values are calculated. The following formula is used in the calculation:

### 1. DPO

Failure measurement that shows defects per one product inspected.

$$\text{Grade DPO} = \frac{\text{many products are defective}}{\text{many products checked (CTQ)}}$$

### 2. DPMO

Failure measurement that shows defects per million products inspected.

$$\text{Grade DPMO} = \text{DPO} \times 1.000.000$$

### 3. Sigma Level

Determining the Six Sigma level through the DPMO value that has been obtained.

$$Normsinv = \left( \frac{1.000.000 - DPMO}{1.000.000} \right) + 1,5$$

Explanation :

DPO : *Defect per Opportunities*

DPMO : *Defect per Million Opportunities*

CTQ : *Critical to Quality*

In this research, the data validation stage uses the data triangulation method. Triangulation defines the quality of a health service provider in providing services to each patient and being able to meet each patient's expectations when using their services.<sup>13</sup> Initially, the quality of health services had several dimensions, namely ability, goodness and knowledge which were combined into assurance so that in the end the dimensions of service quality consisted of reliability, tangible, responsiveness, assurance and empathy.<sup>14</sup>

Data processing in this research uses the six sigma method. At the measure stage, the DPO, DPMO and Sigma Level values are calculated. The following formula is used in the calculation:

#### 4. DPO

Failure measurement that shows defects per one product inspected.

$$\text{Grade DPO} = \frac{\text{many products are defective}}{\text{many products checked (CTQ)}}$$

#### 5. DPMO

Failure measurement that shows defects per million products inspected.

$$\text{Grade DPMO} = \text{DPO} \times 1.000.000$$

#### 6. Sigma Level

Determining the Six Sigma level through the DPMO value that has been obtained.

$$Normsinv = \left( \frac{1.000.000 - DPMO}{1.000.000} \right) + 1,5$$

Explanation:

DPO : *Defect per Opportunities*

DPMO : *Defect per Million Opportunities*

CTQ : *Critical to Quality*

In this research, the data validation stage uses the data triangulation method. Triangulation is defined as the process of checking that the data used in research is correct in describing the problems in the research.<sup>15</sup>

## Discussion

Six Sigma is a system that aims to improve activity processes, activity rates, and shorten activity processes.<sup>9</sup> One of the methods in six sigma is DMAIC.

Define is the process of determining objectives and aspects of activities, collecting information from informants, and knowing what activity processes will be analyzed.<sup>16</sup> At this stage, the problems that exist in the service process are defined. The existing problems are based on the dimensions of service quality which consist of Reliability, Tangibility, Responsiveness, Assurance, and Empathy. The formulation of service problems at the Dempo Health Center Dental and Oral Health Polytechnic is as follows:

**Table 2. Table of Service Problem Formulation**

Statement Attributes	Dimensions
Examination, treatment and maintenance services are carried out less quickly and accurately	<i>Reliability</i>
The facilities and infrastructure at the Dental Polyclinic are incomplete	<i>Tangibles</i>
Dentists have difficulty attending and carrying out every service while also serving as the head of the community health center	<i>Responsiveness</i>
Doctors and nurses are slow in resolving/handling patient complaints	<i>Responsiveness</i>
Doctors and nurses are less skilled in providing services	<i>Assurance</i>
Health workers explained that the patient's diagnosis was not good and clear	<i>Empathy</i>

Based on the research results, it is necessary to define problems from these five dimensions in order to obtain a formulation of the problems that exist in the Dempo Health Center dental clinic services. The explanation above is in line with research conducted by Bahri that the use of five

dimensions of service quality can make it easier to obtain the formulation of existing service problems.<sup>17</sup>

Based on the research results, there are several problems that are always a topic in dental clinic services. In the reliability dimension, namely the examination, treatment and care services provided by health workers are felt to be less fast. Reliability can be defined as an institution's ability to carry out services in accordance with what is informed to the wider community properly and with quality.<sup>18</sup>

In the tangibles dimension, there is a problem related to the lack of dental clinic facilities and infrastructure at the Dempo Community Health Center. Tangibles in this dimension can be defined as things related to physical quality, infrastructure, required materials, and employee costumes.<sup>13</sup>

In the responsiveness dimension, there are two problems, namely regarding the speed of service and the difficulty of dentists in attending and carrying out each service because they are also heads of community health centers. Responsiveness is the ability of health workers to handle all customers, have the will and carry out services responsively.<sup>18</sup>

In the assurance dimension, there is one problem, namely that doctors and nurses are less skilled in providing services. Assurance is a guarantee that health workers are able to provide health services well, are skilled, and have high knowledge so that they can answer every complaint given by customers.<sup>13</sup>

In the empathy dimension, there is one problem, namely that health workers are not good and clear in explaining diagnoses to patients. Empathy is the ability of health workers to provide sincere personal service to customers and be able to understand every customer complaint.<sup>18</sup>

Measure is the stage in determining a measurement that can help in quantifying an existing problem.<sup>16</sup> In the second stage, Critical to Quality (CTQ) which was found in the define stage will be analyzed further. Problems that exist in each dimension can produce DPMO values. The DPMO value obtained is then converted into a sigma value so that the sigma level of each dimension of service quality can be seen. This explanation is in line with research conducted by Bahri who carried out calculations on each dimension of service quality.<sup>17</sup>

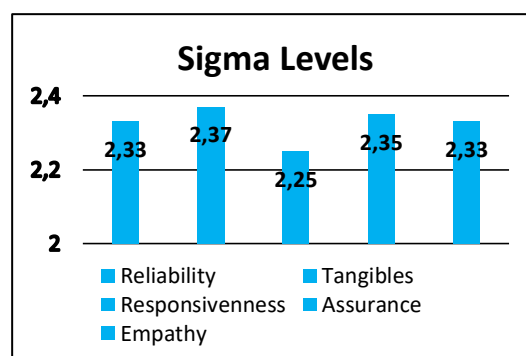
From the research results, at the end of this measurement stage, the highest DPMO level and the lowest six sigma level were obtained, namely in the responsiveness dimension. So it can be said that the problem priority lies in the responsiveness dimension.

The following is a table of the results of the process of measuring the DPMO value and sigma level for each quality dimension:

**Table 3. Table of sigma and DPMO level measurements**

Dimensi	DPO	DPMO	Sigma Levels
<i>Reliability</i>	0,16666 66667	166.666, 6667	2,33
<i>Tangibles</i>	0,125	125.000	2,37
<i>Responsive ness</i>	0,25	250.000	2,25
<i>Assurance</i>	0,14285 71429	142.857, 1429	2,35
<i>Empathy</i>	0,16666 66667	166.666, 6667	2,33

Analyze is the stage of analyzing available data, the root causes of problems found, the gaps between current capabilities and desired capabilities in the future.<sup>16</sup> At the analyze stage, an analysis of the six sigma level measurement results is carried out using the Pareto diagram. This Pareto diagram is in the form of a bar chart which is arranged systematically based on existing data.<sup>9</sup> The following is Figure 1 of the sigma level Pareto diagram for each dimension of service quality:



**Figure 1. Pareto Diagram Sigma Level Calculation Results**

From the Pareto diagram above, it can be seen that the lowest sigma level is in the responsiveness dimension. This shows that the main problem lies in the responsiveness dimension.

Analysis was carried out using the FMEA table as a solution to existing problems. FMEA is an analysis tool that has several characteristics, namely, identifying failure modes, product or process failure modes, and their consequences.<sup>19</sup> Using this FMEA table will increase service reliability in order to increase customer satisfaction. This explanation is in line with research conducted by <sup>17</sup> that used the FMEA method to obtain the root cause of the failure.

**Table 4. Table of Failure Mode Identification and Corrective Actions Responsiveness Dimensions with FMEA**

No	Process	Potential Failure Modes	Potential Effects	Recommended Action
1	Services at Dental Poly	<p>1. It is difficult for dentists to be present in the service room because of their concurrent duties as head of the community health center</p> <p>2. The proportion of dentists and dental nurses is not proportional to the number of patients</p>	<p>1. Service duties were replaced by nurses</p> <p>2. The patient's trust becomes doubtful</p> <p>3. There was a backlog of patients</p> <p>4. Patients often refuse and have to wait the next day</p>	<p>1. Increase the number of dentists in the clinic</p> <p>2. Increase the number of dental nurses in polyclinics</p> <p>3. Increase effectiveness in the process of handling patient examinations so that each service can be carried out quickly and precisely</p>

From the FMEA table above, you can see the problem process that occurs, potential failure modes, potential effects, and recommended actions that can be taken to overcome existing problems. The first potential failure mode in dental clinic services is the difficulty of dentists being present in the service room due to their concurrent duties as head of the community health center. This is due to the limited number of dentists in the dental clinic, who only has one who doubles as the head of the community health center. The large amount of other work that must be done by the head of the community health center makes it difficult for him to always be present in every service process.

The second potential failure mode is that the number of health workers is not balanced with the number of patients in the work area of the health center. This has a potential effect, namely the accumulation of patients at each service. The low number of health workers is one of the causes of patient complaints regarding the speed of service which results in long waits for service.

Improve is the stage of determining the characteristics of the activity process that must be improved as well as any causes of defects that must be reduced.<sup>16</sup> The fourth step in the DMAIC method is improve which can be defined as the process of providing detailed action plans for improvements that have been analyzed from the analyze stage. At this stage the 5W+2H method was used in developing this action plan. This research is in line with Bahri's previous research which stated that using the 5W+2H method can produce action plans that can be implemented in solving problems and improving quality.<sup>17</sup> The 5W+2H method is a basic analysis method for general questions. The following Table 4 is the action plan formulation:



**Table 4. Table of Action Formulation Table**

<i>What</i>	<i>Where</i>	<i>When</i>	<i>Who</i>	<i>Why</i>	<i>How</i>	<i>How Much</i>	
						<i>Benefit</i>	<i>Cost</i>
1. Addition of dentists and dental nurses 2. Utilize the duration of service as effectively as possible in handling each patient examination	Dental clinic services	During the implementation of Dental Poly services	1. So that there are no delays in service 2. So that there is no accumulation of patients	1. Submit an application for permission to add a dentist to the health department 2. Carry out independent recruitment by the community health center to add dentists and dental nurses 3. Improve the quality and effectiveness of the service process within the service duration determined by the puskesmas	1. Increase service time efficiency 2. Increase patient satisfaction	1. Community Health Center Management 2. BLUD funds	

Based on the research results, two action plans were found that could be carried out at the dental clinic. The first action plan is to add dentists and dental nurses. This action plan can be determined by the health center management and carried out by dental health workers. This is done to avoid delays in services so that patients do not complain about the long wait for service. The advantage of implementing this action plan is to increase the efficiency of service time so that patients get satisfaction in dental poly services.

The second action plan is to utilize the duration of service as effectively as possible in handling each patient examination. This action plan is carried out by doctors and nurses at the dental clinic. This is done so that there is no more accumulation of patients and rejection of patients who are already waiting in line. This action plan can be realized by improving the quality and effectiveness of the service process within the service duration that has been determined by the puskesmas. The advantage of implementing this action plan is to increase patient satisfaction and reduce complaints from dental poly patients. The budget for this action plan can be carried out by the puskesmas management.

The action plan produced in Bahri's research is, making improvements to service management and Standard Operational Procedures (SOP) as well as carrying out an evaluation process on officer performance techniques.<sup>17</sup>

Control is the process of controlling production activities and establishing the latest plans resulting from analysis of existing problems.<sup>16</sup> After obtaining an action plan, supervision is carried out by the community health center itself so that the quality of dental clinic services is maintained. The supervision in question is a form of process of assessing and evaluating the action plans being implemented. However, at this stage the researcher does not have direct authority to carry out supervision. Based on the research results, this stage cannot be carried out directly by researchers because it is beyond their authority to carry out supervision. This explanation is in line with research conducted by Hasan that the six sigma project was not carried out directly by the researcher because it was outside the authority of the researcher.<sup>20</sup>

## **Conclusions and Recommendations**

Based on the research results, it can be concluded that the dimension of service quality improvement that needs to be improved is in the responsiveness dimension with the highest DPMO value, namely 250,000 and the lowest sigma level, namely 2.25. Aspects that can improve the quality of health services from a patient satisfaction perspective are adding more dentists and dental nurses and utilizing the duration of service as effectively as possible in handling each patient examination.

Recommendations that can be given to Community Health Centers are that they are expected to be able to add more health workers, especially dentists, utilize the duration of existing services

as effectively as possible in handling each service process, and monitor the action plans carried out in order to determine the increase in the quality of customer satisfaction.

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