



Implementation of Lean Six Sigma in Improving Competitive Advantage through Patient Satisfaction and Nurse Resources to Face the Covid-19 Pandemic at USU Medan Hospital

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Abstract

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BACKGROUND: Human resources (HR) are very important in a field, as well as hospitals which are service providers. Once the importance of HR to a development process, so it can be concluded that HR are the core of the development of an agency. The right strategy is needed to find what should be the priority of improvement so that the quality of service can be provided optimally.

AIM: One way that can be used is the application of lean six sigma. The application of the Lean six sigma concept can be done in the service and manufacturing industries. One of the service industries that is interesting to apply the Lean six sigma concept is health services through hospitals.

METHODS: This concept uses five stages, namely, define (problem identification), measure (measurement of quality performance), analyze (analyze the causes of defects), improvement (make improvement efforts to improve quality), and control or control. The method used in this research is action research with univariate and bivariate analysis.

RESULTS: The results of the application of the lean six sigma concept indicate that there are problems in nursing services where nurse services should be a competitive value or competitive advantage from Universitas Sumatera Utara (USU) Hospital in accordance with the hospital's motto. After the analysis, it was found that there was an influence between rewards on the performance of nurses.

CONCLUSION: There needs to be more attention from the hospital on the rewards given to nurses. Because of the nurse is satisfied with the reward given, the performance will be better. and there is no effect of training on the performance of nurses at USU Hospital. This improvement will certainly increase the competitive value or competitive advantage of USU Hospital.

Introduction

In 2019, the Coronavirus disease in Wuhan in Hubei Province and other regions in China has become a very serious epidemic throughout the world [1]. Unresponsive movements have caused COVID-19 to spread rapidly in the world, plus the common signs and symptoms of COVID-19 infection are the same as symptoms of acute respiratory distress, such as fever, cough, and shortness of breath [2]. Diagnostic X-ray examination which definitely shows extensive pneumonia infiltrates in both lungs can confirm the diagnosis of this virus. In severe cases, COVID-19 can cause pneumonia, acute respiratory syndrome, kidney failure, and even death [3].

Since February 29, 2020, Indonesia has declared a disaster emergency status related to the COVID-19 virus pandemic due to a very significant increase in the death rate in Indonesia [4]. On February

8, 2021, confirmed cases of COVID-19 reached 106,671,429 cases in Indonesia and 10,789 cases in Medan [5]. This emergency condition causes many Type C hospitals to become referrals for handling COVID-19, and of course, this will greatly affect the quality of hospital services, because type C hospitals have limitations because they only have 4 specifications including pediatricians, surgeons, internal medicine, and others. Type C hospitals are not prepared for lung disease, but are required to treat patients with a diagnosis of COVID-19 [6]. This will certainly be an obstacle for hospitals to provide optimal services, given the limitations they have. Of course, any field must have optimal service quality, because this will greatly affect the value of that field. Services that are not optimal can cause disappointment for consumers, customers, and the community.

Human resources (HR) are very important in a field, as well as hospitals which are service providers. HR is a result of the integration of the physical human

with the power of thought that is able to reflect the work effort and quality of the human effort to produce certain services or goods. Once the importance of HR to a development process, so it can be concluded that HR are the core of the development of an agency [7]. One of the professional HR in the hospital is a nurse. Nurses are health workers who interact more intensely with patients and have a major influence in providing information about the patient's health condition to colleagues, namely doctors and other medical officers in order to determine the right steps in determining treatment [8].

The right strategy is needed to find what should be the priority of improvement so that the quality of service can be provided optimally. One way that can be used is lean six sigma. Since being introduced by Motorola in the 1800s, six sigma has been widely adopted by various companies to improve the quality of their products [9]. Six Sigma is a tool to improve product quality by reducing the level of product defects through five stages, namely, define (problem identification), measure (measurement of quality performance), analyze (analyze the causes of defects), improvement (make improvement efforts to improve quality and control or control) [10].

The application of the Lean six sigma concept can be done in the service and manufacturing industries. One of the service industries that is interesting to apply the Lean six sigma concept is health services through hospitals. With the increasing public demand for health and increasing competition, hospitals are also required to be able to provide excellent service. Therefore, serious efforts to prepare health resources need to be maximized at all organizational levels in hospitals [11]. Currently, health has been considered as a necessity for society to live. The development of health services is quite rapid at this time, requiring hospital managers to manage their business properly. This condition creates increasingly sharp competition [12].

One way to win the intense level of competition is to gain public trust by giving satisfaction to the community or customers [13]. Customer satisfaction will be fulfilled if they get quality service and by being satisfied they will show their loyalty [14]. The right strategy obtained from the implementation of the lean six sigma concept will become a competitive advantage for the hospital. Competitive advantage is a position where an institution dominates business competition and has its own unique value to distinguish the institution from other institutions in the same sector [15].

This study aims to determine and improve the competitive advantage of the University of North Sumatra Hospital through patient satisfaction and nurse resource management using the application of lean six sigma theory concepts.

Methods

The design of this study is action research with a quantitative data analysis approach due to the direct involvement of researchers with nurse and patient resources at Universitas Sumatera Utara (USU) Hospital to improve nurse services by applying the Lean six sigma concept in increasing Competitive Advantage in the USU Hospital inpatient unit. The study was conducted in mahogany, meranti, and sandalwood inpatient rooms with the consideration that patients treated in this inpatient unit received comprehensive nursing care with a total of 58 nurses. This number does not include the number of nurses in the COVID-19 isolation room. The sampling technique used is total sampling. So that the number of samples is the same as the total population of 58 people.

Collecting data using a questionnaire or a list of statements and questions as a tool of research, the distribution of questionnaires is carried out directly by the researcher. Researchers first identified patient satisfaction with nurse services, nurse education and training, nurse work experience, nurse rewards, and nurse performance at USU Hospital and then formulated a Lean six sigma management strategy to identify the competitive advantage of USU Hospital Medan. This application uses five stages, namely:

Define (problem identification)

Define is the first step in the Six Sigma stage which is useful for determining the problems to be solved. At this stage, the identification of patient satisfaction with the services provided by nurses in the inpatient room will be carried out. The results of patient satisfaction will be the focus to improve nurse services and maintain a good level of patient satisfaction.

Measure (measurement of quality performance)

Measure is the stage of measuring the level of existing performance, with the aim of analyzing it based on a predetermined target. The measuring step aims to obtain a measurement of performance and process capability that is used to compare the performance of a process with predetermined specifications. At this stage, the identification of nurse resources will be carried out through four aspects, namely, nurse education and training, nurse work experience, nurse rewards, and nurse performance for decision making in determining further improvement steps.

Analyze (perform problem analysis)

Analyze is the stage of identifying the problem to be solved based on the results of the measure stage.

At this stage, the researchers analyzed the satisfaction, workload, and work arrangements of nurses. Analysis of existing systems and inconsistency detection. The data collected in the measuring phase is analyzed to identify the root causes behind the gap between current performance and the objectives identified in the first phase. Problem analysis (problem is a gap between expectations and reality): problem identification, problem formulation, and formulating the cause of the problem. Formulating the problem includes what the problem is, who is affected by the problem, how big the problem is, where the problem occurs and when the problem occurs (what, who, when, where, and how).

Improve (make improvement efforts to improve quality)

Improve is the stage of reducing the causes of existing problems. At this stage, corrective steps will be taken with the aim of minimizing existing problems from happening again. The improvement stage will provide recommendations on the steps that need to be taken to overcome existing problems based on the problem analysis that has been carried out in the previous stage.

Control (control)

The control stage is a stage to measure the success of the improvements that have been made. In this step, the sigma value before and after repair will be compared as an evaluation of the program that has been carried out in accordance with the predetermined target or not. Continuous system measurement and test on impact. This phase is control that confirms that the solution is effective and ensures that the solution lasts by setting new standards. The control phase concentrates on creating and implementing a monitoring and response plan to sustain improvement. In addition, this phase also includes documentation and publication of standards and operating procedures by involving stakeholders and the USU Hospital quality team.

Results

Identification and improvement of the competitive advantage of USU Hospital are carried out by applying the lean six sigma concept. In the stages of identification process using DMAIC which consists of Define, Measure, Analyze, Improve, and Control.

Define

At this stage, the identification of patient satisfaction has been carried out using a patient satisfaction questionnaire in the inpatient room with a

Table 1: Distribution of frequency and percentage of patient characteristics at the university hospital of North Sumatra

Characteristics of Respondents	Frequency (n)	Percentage
Age		
21–30 years old	18	19.1
31–40 years old	17	17.6
41–50 years old	10	10.3
51–60 years old	24	25.0
61–70 years old	27	27.9
Total	96	100
Gender		
Man	68	70.6
Woman	28	29.4
Total	96	100
Last education		
No school	4	4.4
Primary school	4	4.4
Junior high school	6	5.9
Senior High School	58	60.3
College	24	25.0
Total	96	100
Work		
Housewife	10	10.3
Government employees	14	14.7
entrepreneur	54	55.9
Farmer	4	4.4
And others	14	14.7
Total	96	100
Room		
Sandalwood	38	39.7
Meranti	17	17.6
Mahogany	41	42.6
Total	96	100

total of 96 people, and the following are demographic data of patient satisfaction respondents:

The majority of patients came from the mahogany inpatient room and were dominated by women. The average age of the patients was 55-70 years, with the majority having high school graduates (Table 1).

Table 2: Distribution of frequency and percentage of patient satisfaction levels in nursing services in inpatient rooms at the University of North Sumatra Hospital

Satisfaction Level	Frequency (n)	Percentage
Very Dissatisfied	0	0
Not satisfied	1	1.04
Quite satisfied	18	18.8
Satisfied	69	71.9
Very satisfied	8	8.3
Total	96	100.0

Determination of the problem is based on data on the level of patient satisfaction with the services provided by nurses in the USU Hospital inpatient room. The results of the data show that there are still patients who are dissatisfied with the services provided by nurses, this is certainly a problem considering the motto of USU Hospital, one of which is to improve the quality of doctors, specialist doctors, and health

Table 3: Distribution of frequency and percentage of characteristics of nurse respondents in the USU hospital inpatient room

Characteristics	Frequency	Percentage
Gender		
Woman	51	87.9
Man	7	312.1
Total	58	100
Age		
26–35	41	70.0
36–45	17	30 0.0
Total	58	100
Education		
S-1	44	76.7
DIII	14	23.3
Total	58	100
Length of work		
1–5	35	60.0
6–10	23	40.0
Total	58	100

USU: Universitas Sumatera Utara.

workers and the quality of health services, especially in North Sumatra (Table 2).

Measure

The measuring step aims to obtain a measurement of performance and process capability that is used to compare the performance of a process with predetermined specifications, at this stage the study identifies nurses' resources through education and training, experience, rewards, and performance on 58 nurses in the ward stay.

The majority of nurses in the inpatient ward are women with an average age of 36-45 and most of them are undergraduate graduates and have <5 years of work experience (Table 3).

The data shows that there is no unfavorable performance of nurses, but the value of good nurse performance is less than that of nurses who are quite good (Table 4).

Analyze

At this stage, the problems that have been found previously in the measuring stage will be analyzed for causes. For this reason, a simple linear regression analysis was carried out between nurse performance and reward, and nurse performance with education and training. The results show that there is an influence between reward and nurse performance.

Table 4: Frequency distribution of performance variable categories

Performance	Frequency (F)	Percentage
Well	17	30
Pretty good	41	70
Not good	0	0

The results of simple linear regression analysis in the table can be written with the following equation:

$$Y = 25.170 + 1.021 X1 \tag{1}$$

From this equation, it can be interpreted that the nurse's performance will be 25.170. The reward variable has a value of 1.021. This shows that if the reward increases by 1%, the nurse's reward will increase by 1.021%. Based on Table 5, it is found that the t-count value is 2.236, while the t-table value is 20.05553. This shows that count 2.236 >t-table 2.05553, so it can be concluded that there is an effect of reward on nurse performance.

Table 5: Simple linear regression analysis (Reward)

Model	Unstandardized coefficients		Standardized coefficients Beta	t	Sig.
	B	Std. Error			
1					
(Constant)	25.170	7.344		3.427	0.002
Rewards	1.021	0.456	0.389	2.236	0.033

While the simple linear regression analysis between performance with training and education did not find any effect.

The results of simple linear regression analysis in the table can be written with the following equation:

Table 6: Simple linear regression analysis (Training)

Model	Unstandardized Coefficients		Standardized Coefficients Beta	t	Sig.
	B	Std. Error			
1					
(Constant)	39.098	6.283		6.223	0.000
Training	0.117	0.308	0.072	0.382	0.705

$$Y = 39.098 + 0.117 X2 \tag{2}$$

From this equation, it can be interpreted that the nurse's performance will be 39.098. The job training variable has a value of 0.117. This shows that if the training increases by 0.117%. Based on Table 6, it is found that the t-count value is 0.382, while the t-table value is 2.0553. This shows that t-count 0.382 <t-table 2.0553, so it can be concluded that there is no effect of training on nurse performance.

Improve

At this stage, the researcher must make efforts to reduce the occurrence of problems and take corrective steps with the aim of minimizing the problem. The recommendations or steps that must be taken are to increase the hospital's awareness of providing tangible rewards for performance or outstanding employees. In addition, the hospital can work together well with employees, so that employee performance can be maximized.

The level of salary received by nurses must be based on the workload, duties, and responsibilities assigned. The higher the salary, the greater the task that will be given. The higher the salary, the better the quality of service provided. Salary is a form of appreciation that is able to guarantee the satisfaction of service providers, providing positive aspects to service providers in completing tasks and responsibilities.

Control

This stage aims to measure the success of the improvements that have been made in accordance with the steps that have been described in the improve stage. The level of salary received by nurses must be based on the workload, duties, and responsibilities assigned [16]. The higher the salary, the greater the task that will be given [17], [18]. The higher the salary, the better the quality of service provided [19]. Salary is a form of appreciation that is able to guarantee the satisfaction of service providers, providing positive aspects to service providers in completing tasks and responsibilities [20].

Conclusion

Research shows that the nurses' resources owned by USU Hospital are good, as evidenced by

the results of the patient satisfaction assessment, but they still need improvement in order to increase the competitive advantage of USU Hospital. The application of lean six sigma is very effective in identifying problems and determining appropriate corrective steps.

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