Lean Six Sigma Concept in The Health Service Process in The Universal Health Coverage of BPJS Healthcare (Healthcare and Social Security Agency)

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Abstract

Since the beginning of 2014 BPJS Kesehatan has been operating as a "single payer" by introducing a health service referral system is the provision of health services that regulate the delegation of duties and responsibilities of health services reciprocally both vertically and horizontally. With the adoption of new systems and quality improvement demands, hospitals are one of the providers of health care facilities, so all hospitals in Indonesia seem to be required to improve and make improvements in their service systems. To implement improvements, methods are needed so that improvements can be realized. One method that is currently developing in system improvement and process efficiency is the Lean Six Sigma method. By looking at the successful implementation of Lean Six Sigma in the health service sector (Lean Hospital) in several health service organizations in various countries, one of the hospitals in Indonesia that is currently improving health service governance is Rumah Sakit Ibu dan Anak Harapan Mulia also has the same potential in implementing Lean Hospital. Based on the results of Lean Six Sigma research, it was able to be applied with LCM tools on improving the BPJS tiered referral patient service process at RSIA Harapan Mulia by reducing the total time of service completion both from service users 351 minutes to 122 minutes or 65.2% and from the service provider 481 to 153 minutes or 68.2%. Activities with Added value also increased from 25.6% to 43.4% from the service user side and from 16.2% to 39.9% from the service provider side. While non-added value was reduced both from the service user side from 74.4% to 56.6% and service provider side from 83.8% to 60.1%.

Introduction

The Indonesian government continues to make various efforts to implement the national social security system in the health sector with the aim of covering the entire population, guaranteeing the majority of diseases, by reducing the portion of health costs borne by the population. In accordance with the mandate of the 1945 Constitution, every citizen without exception the poor and vulnerable has the right to receive adequate and quality health services. To realize health insurance for the entire population or universal health insurance in accordance with the mandate of the 1945 Constitution and Law no. 40 of 2004 concerning the National Social Security System (SJSN)), the government launched the National Health Insurance (JKN) program in early 2014 with the target that universal participation would be achieved within five years. That is, each individual must be a participant and be protected in the national social health insurance program. This universal health insurance aims to increase public access to comprehensive, quality and equitable health services for the entire population.

Since the beginning of 2014 BPJS Kesehatan has operated as a "single payer" by integrating membership from the former PT. Askes, ex Jamsostek, ex-TNI, ex-National Police and ex-Jamkesmas in one organizing body to achieve JKN. In addition to introducing the INA-CBG's (Indonesia Case Base Groups) payment system, the BPJS, which is a prospective health service system that only pays the cost of care and treatment according to standard rates by the government, also regulates the concept of health service providers through tiered referral systems.

The health service referral system is the implementation of health services that regulate the delegation of duties and responsibilities for reciprocal health care both vertically and horizontally that must be carried out by health insurance participants or social health insurance,

and all health facilities. Individual health services consist of three levels, namely: First level health services, second level health services, and third level health services. The health care referral system is carried out in stages according to medical needs, starting with first-level health services by first-level health facilities. If further specialist services are needed, the patient can be referred to a second level health facility. Second-level health services in secondary health facilities can only be provided with reference from primary health facilities. Third level health services in tertiary health facilities can only be provided with reference from secondary health facilities and primary health facilities. Health services in primary health facilities that can be referred directly to tertiary health facilities only for diagnosed cases and treatment plans, are repeat services and are only available in tertiary health facilities.

With the adoption of new systems and quality improvement demands, hospitals are one of the providers of health care facilities, so all hospitals in Indonesia seem to be required to improve and make improvements in their service systems. To implement improvements, methods are needed so that improvements can be realized. One method that is currently developing in system improvement and process efficiency is the Lean Six Sigma method that was first introduced by Toyota in 1956.

Lean Six Sigma was originally a concept commonly used in the business world and the private sector, especially in the manufacturing sector as a means of improving product quality through process improvement. The implementation of Lean Six Sigma in the business and private world in various companies has led to an increase in effectiveness and efficiency in the company's performance. Over time, Lean Six Sigma began to be used in other sectors such as in the service sector, health sector, financial sector and human resources sector.

The application of Lean Six Sigma concept outside the manufacturing sector, namely in the health service sector known as Lean Hospital or Lean Healthcare has been proven to be able to improve existing systems, improve process effectiveness, and reduce waste in various countries. Some examples of the application of Lean Hospital or Lean Healthcare include research conducted by (Papadopoulos, 2012), (Chen and Thota, 2012), (Lighter, 2014). However, other studies suggest that Lean Six Sigma cannot be used or cannot be used fully in the health service sector as disclosed by (Siu, et al, 2015), (D'Andreamatteo, et al., 2015), (Moraros, et a., 2016).

Meanwhile in Indonesia, there are not many studies on Lean Hospital, but similar studies on Lean Six Sigma in the service sector and in other public sectors have also shown that the program provides positive results as evidenced by previous studies, including: (Artadi and Syah, 2019), (Ginanjar and Syah, 2019), and (Sunaryanto and Syah, 2019). However, there are also those who reject that Lean Six Sigma can only be applied in the manufacturing world and does not recommend implementing Lean Six Sigma in the public service sector by stating that Lean Six Sigma does not have a significant impact on processes in the service sector (Secchi and Camuffo, 2019). There are still many who reveal that Lean Six Sigma is only suitable in the manufacturing industry or service industry (Arfmann dan Barbe, 2014). Moreover, based on the journals that have been described previously, it was found that the Lean Consumption Mapping (LCM) method has not been used in showing improvement in the conditions of Current State and Future State. The researcher also has never obtained a journal that uses the Lean Consumption Mapping (LCM) which is very suitable to describe the condition of Current State and Future State for public services or services. Many Lean Six Sigma studies in the services section are forced to use the Value Stream Map (VSM) as a tool for their assistance (Kumar and Bauer, 2010). Therefore, Lean research in a sector outside of manufacturing needs to be done in this case Lean Hospital in Indonesia to examine the above gap with the focus of Lean Six Sigma on the implementation of the Universal Health Insurance system which has never been studied.

By looking at the successful implementation of Lean Hospital in several health service organizations in various countries, one of the hospitals in Indonesia that is currently improving health service governance, Rumah Sakit Ibu dan Anak Harapan Mulia also has the same potential in implementing Lean Hospital. Lean Hospital is believed to be able to improve the business process of service and administration of BPJS patients, which is one of the most handled health

care processes today. For this reason, this study discusses the concept of Lean Hospital, namely by using the DMAIC and Lean Consumption Map (LCM) methods to improve the performance of service and administration services of BPJS patients at Rumah Sakit Ibu dan Anak Harapan Mulia.

Table 1. List of Processes Categorized as Wasting Category

No.	Waste	Process
1.	Transport	Transfer documents and files from poly checks to pharmacies
2.	Inventory	-
3.	Movement	Looking for medical record data
4.	Waiting	Queuing service process in registration, poly, pharmacy.
5.	Overproduction	-
		Check membership data in the Advanced Health Registration section
6.	Overprocessing	Data entry in the Advanced Health Registration section
		Data entry in the Advanced Health Registration section
7.	Defect	-

Based on observations or preliminary observations (prariset) that have been carried out on the service process of BPJS patients from March to September 2019 at Rumah Sakit Ibu dan Anak Harapan Mulia, Tigaraksa, Tangerang District, the researcher interviewed some patients and BPJS participants who were health service users at Rumah Sakit Ibu dan Anak Harapan Mulia, officers of this hospital, and made direct observations of the BPJS patient service and administration process regarding the accuracy and speed of service and administration found that there was still a lot of waste and ineffective processes. In accordance with the description, the objective of the study is to establish the Lean Six Sigma concept in the health service process in the Era of Universal Health Coverage of BPJS Kesehatan. In this case it was collected sample of research place from Rumah Sakit Ibu dan Anak Harapan. Given the breadth of the scope of the researcher limiting this study, namely only examining the tiered referral process of outpatients to get medication.

Literature Review

Tiered BPJS Referral Flow

The health service referral system is the implementation of health services that regulate the delegation of duties and responsibilities for reciprocal health care both vertically and horizontally that must be carried out by participants in health insurance or social health insurance, and all health facilities. Individual health services consist of 3 (three) levels, namely: First level health services, second level health services, and third level health services.

The health care referral system is carried out in stages according to medical needs, starting with first-level health services by first-level health facilities. If further specialist services are needed, the patient can be referred to a second level health facility. Second-level health services in secondary health facilities can only be provided with reference from primary health facilities. Third level health services in tertiary health facilities can only be provided with reference from secondary health facilities and primary health facilities. Health services in primary health facilities that can be referred directly to tertiary health facilities only for diagnosed cases and treatment plans, are repeat services and are only available in tertiary health facilities..

Provisions for tiered referral services can be excluded in the event of an emergency. The condition of the emergency follows the applicable provisions, namely, disasters, the specificity of the patient's health problems, for cases that have been enforced for therapeutic plans and the therapy can only be carried out in advanced health facilities, geographical considerations, consideration of the availability of facilities.

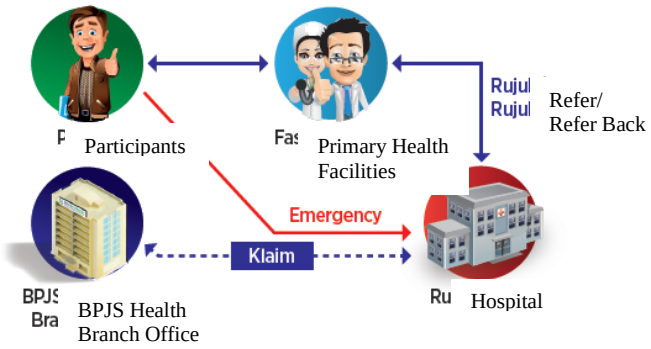

Figure 1. Tiered Reference Flow

Process of BPJS Patient Services at RSIA Harapan Mulia

The first procedure for patients who use BPJS to get health services at RSIA Harapan Mulia as a Level II health facility is to register. Documents that must be taken when going to medical treatment are Health Photocopying Card (KK), Photocopy of KTP, Original Health BPJS Card and photocopy, and Referral Letter made by doctor Faskes Level I. To get a referral letter, of course BPJS participating patients must request a referral letter at the selected Level I Health Facility. After all the required documents are complete, BPJS patients can submit these documents to register in the registration section. For new patients, the New Patient Form will be given, while for the old patient, or who have been treated at RSIA Harapan Mulia can show the patient card. The patient then fills out the form, if the patient is new, and is welcome to wait for the call.

The registration officer checks the required documents. If all documents are complete, the officer will check the elegance of BPJS participants through an online application vclaim BPJS Kesehatan. The registration officer will check the initial diagnostic code written by the referral doctor in Level I Health Facilities. After the initial diagnostic code is present and matched, the Participant Elegibility Letter will be issued. If not, the registration officer will confirm to the BPJS whether the doctor's initial diagnosis is a disease borne by the BPJS or not. If borne, the service process will be continued. If it is not covered, the patient will be given the choice to use independent fees or cancel health services.

In addition, filling out in the Elegance Letter Participants through the application vclaim BPJS Kesehatan, the registration officer will fill in the personal data, initial diagnosis, and other patient data into the hospital's software application. After all documents are in accordance with the procedure, the patient will be called based on the queue and given a medical record folder containing medical records to be taken to the destination poly. The patient then heads to the poly and gets an examination. After getting a doctor's prescription, the patient can take medication at the pharmacy section.

Lean Six Sigma

The development of the Lean concept originated from the Toyota Production System (TPS), which originated in Japan after the Second World War was developed by Taiichi Ohno and assisted by Shigeo Shingo in 1956. At this point, Toyota operated in an environment that had limited resources when it arrived at land as well as technology, iron investment and finance. This special situation made Toyota change its efficiency in its own way in improving its performance in terms of QCD (Quality, Cost, Delivery) and proposes new basic principles to overcome scarce resources. The basic idea of Lean is to focus on flow efficiency rather than resource efficiency and to focus on customers, only produce what the customer wants, according to the customer's desires, and when the customer wants it (Larsson, 2008).

Liker et al. (2006) suggested that *Lean* briefly means eliminating waste (waste/youth) in the entire process flow. Another term is NVA Time (Non Value Add Time) or time that is not

value added. There are seven types of waste that were introduced with the term TIMWOOD. "T" is an abbreviation of Transportation, which is a type of waste due to the activity of moving goods, raw materials, products and others from one place to another, even in close proximity throughout the process. "I" is an abbreviation of Inventory, which is a type of waste due to excess raw materials, semi-finished products, or finished goods that cause the Lead Time to be long, obsolescence, damage, transportation and storage costs in the warehouse. "M "stands for Movement, which is a type of waste due to excessive movement of employees during the process and does not provide Value Add to products/services such as searching activities, stacking raw materials, picking up, rotating bodies, stacking equipment and so on. Walking around is also considered a waste. Then "W" is an extension of Waiting, which is a type of waste because workers wait or do not do productive activities that can be caused by waiting for the next processing step, raw materials run out, machinery or equipment damaged, excessive engine capacity or processes that do not balanced. Then the first "O" is an extension of Overproduction, which is a type of waste due to producing goods/products earlier or in more quantities than what is needed by the customer. Producing earlier or more than needed results in other waste, such as oversupply, storage and transportation costs due to excess inventory. Inventories can be physical supplies or information queues. Then the next "O" is an extension of Over processing, which is a type of waste due to performing process steps that are not ideally needed in the process. Inefficient processing is caused by several things such as partially damaged equipment, poor product design and so on. "D" stands for Defect, which is a type of waste due to the process that results in a damaged/defective/failed product, reprocessing, replacing defective production, destruction of defective goods along with the time, cost and effort that must be spent by the company.

Lean develops into a set of principles, practices, tools and techniques that focus on reducing waste, coordinating workflows and dealing with Lean as a business philosophy based on minimizing the use of resources (including time) in various company activities. Lean focuses on identifying and eliminating non-value-adding activities in design, production (for manufacturing) or operations (for services), and supply chain management, which is directly related to customers. There are five principles from the Lean Process, namely the first to identify the value of the product (goods and/or services) based on the customer's perspective. The second principle is to identify the value stream process mapping (mapping process in the value stream) for each product. The third principle is to eliminate unnecessary added waste from all activities throughout the value stream process. The fourth principle is to organize so that the material, information and products flow smoothly and efficiently throughout the value stream process. The fifth principle is to continually look for various improvement tools and techniques to achieve excellence and continuous improvement.

Six Sigma was developed for the first time by employees at Motorolla, Bill Smith, assisted by Mikel J. Harry in 1987 in the United States. Motorolla runs the program as a strategic initiative as a global company. This initiative is specifically designed to deal with any problems that originate from variations, both by reducing variation and by improving average values, and is also useful for ongoing improvements and breakthrough improvements.

According to Pojasek (2003), Six Sigma is a means to reduce variation in processes, while maintaining the basic process as it is. The focus on reducing variation is motivated by excess costs, because variation is described as the main cause of dissatisfied customers, unsatisfactory margins, various delays, and poor supply chain performance, among others. Variations are often divided into two types; Variations in common causes, namely natural variations connected to the system, and variations in specific causes, which are associated with certain special conditions. Both types of variation must be addressed to achieve real breakthrough improvements (Magnusson et al., 2003). Six Sigma is a powerful, focused and highly effective method based on prinsics and quality techniques. From the pioneers of quality, Six Sigma aims to virtually eliminate errors in business performance (Pyzdek, 2003).

The improvement methodology in Six Sigma for existing processes is called DMAIC and consists of five phases (Andersson et al., 2006). The first phase is "D", which stands for Define, which identifies the process or product that needs to be improved, prepares the project structure, and identifies the target desired by the customer. The second phase is "M" which is an extension of Measure, which is identifying the most important patterns of influence, understanding the process map and determining how to measure it. The third phase is "A" which stands for Analyze, namely identifying and determining the root cause of the problem and the steps to be corrected. The fourth phase is "I" which is an extension of Improve, which is designing and testing the implementation of the most effective solutions. The fifth phase is "C" which is an extension of Control, which confirms that the solution is effective and ensures it lasts long by setting a new standard.

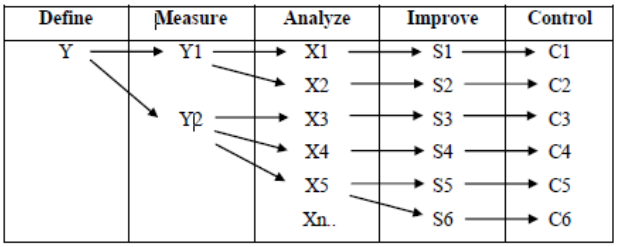

Figure 2. DMAIC Method

Six Sigma, which was initially applied in the manufacturing industry, has now developed in the service industry. For example in a hospital, there are many mistakes that can be helped by implementing Six Sigma, for example dose calculation errors, medication errors, errors in prescription interpretations, confusion about drug names, poor labeling, wrong drug administration, wrong administration of patient payments and so on (Syukron et al., 2013).

Lean and Six Sigma are ultimately initiatives to improve business processes. The ultimate goal of better process improvement is the same for methodology, but focus on different process elements and therefore complement each other. Six Sigma is described as a systematic methodology with the DMAIC concept to find important elements for the performance of a process and set it to the best level, while Lean is described as a systematic methodology to eliminate waste/waste and reduce the complexity of a process.

Lean Six Sigma Tools

Process map

Process Map is a workflow diagram used for understanding a process of producing goods or service activities easily. Activity observation of the process in the context of making a process map is usually done by parties involved in the process of producing goods/services. Process Map can varies from the simplest consisting of boxes and arrows that describe the process, up to complicated diagram containing process parameters along with its products (George et al., 2005).

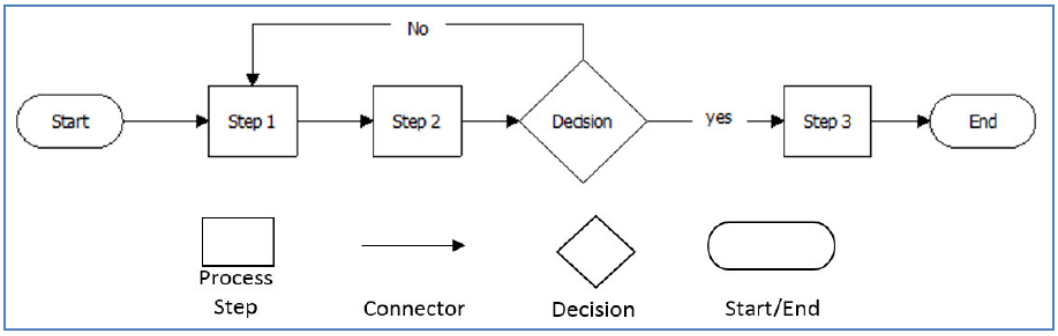

Figure 3. Process Map

Time series plot

A time series plot is a graph where some measure of time is the unit on the x-axis. The y-axis is for the variable that is being measured. Data points are plotted and generally connected with straight lines, which allows for the analysis of the graph generated. From the graph generated by the plotted points, we can see any trends in the data. A trend is a change that occurs in general direction (George et al., 2005).

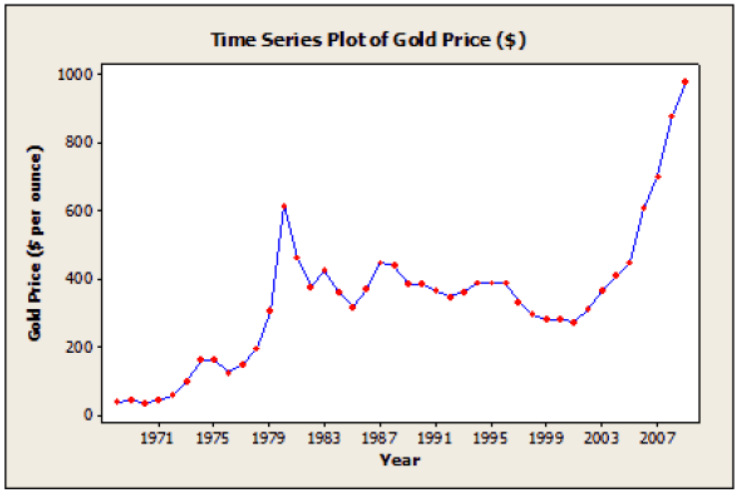

Figure 4. Time Series Plot

Lean consumption mapping

Womack et al. (2005) states that Lean Consumption Map (LCM) is a tool that is very suitable for the service industry. LCM is a diagram of all the actions customers must take to acquire given goods and services and the actions producers and service companies must perform to deliver these goods and services to customers.

Lean Consumption has five principles that every organization providing services or goods should consider, which are: solve the customer's problem completely, by insuring that everything works the first time, don't waste the consumer's time, provide exactly what the customer wants, provide value where the customer wants, provide value when the customer wants, and reduce the number of problems customers need to solve (Womack et al., 2005).

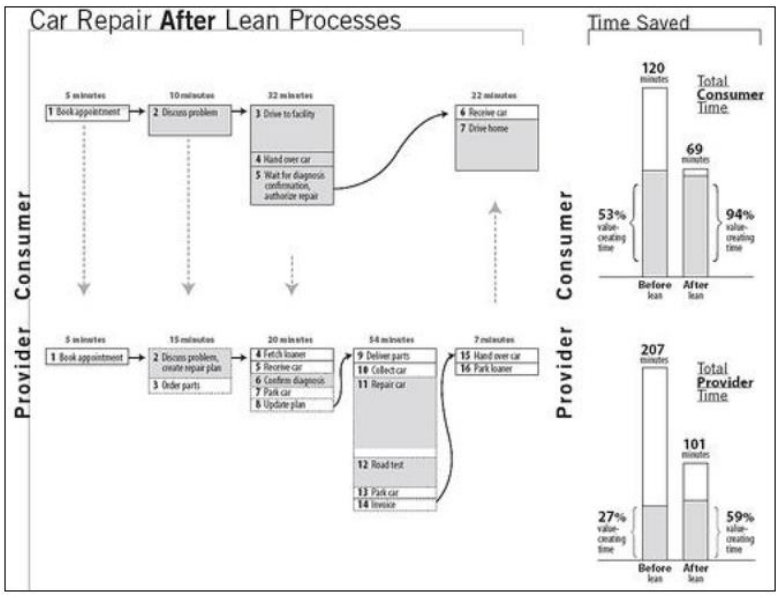

Figure 5. Lean Consumption Mapping

Failure mode and effect analysis

Failure Mode and Effects Analysis, or FMEA, is a methodology aimed at allowing organizations to anticipate failure during the design stage by identifying all of the possible failures in a design or manufacturing process. Failure Mode and Effects Analysis (FMEA) is a structured approach to discovering potential failures that may exist within the design of a product or process.

Failure modes are the ways in which a process can fail. Effects are the ways that these failures can lead to waste, defects or harmful outcomes for the customer. Failure Mode and Effects Analysis is designed to identify, prioritize and limit these failure modes. FMEA is not a substitute for good engineering. Rather, it enhances good engineering by applying the knowledge and experience of a Cross Functional Team (CFT) to review the design progress of a product or process by assessing its risk of failure.

Process step/ input	Potential failure mode	Potential failure effects	SEV	Potential causes	OCC	Current controls	DET	RPN	Actions recom-mended	Resp.	Actions taken	SEV	OCC	DET	RPN
1	Part not installed	Device does not work	10	Process step skipped	3	SOP 123: process routing sheet	10	300	Modify pro-gram to halt production	T. Kubiak 06-17-14	Program modified to detect missing parts	10	1	1	10
1	Wrong part installed	Device overheats	7	Parts co-mingled in bin	7	None	10	490	Place differ-ent parts in different bins	T. Kubiak 06-17-14	Parts sorted and new bins added	7	1	3	21

DET = detection
OCC = occurence
PFMEA = process failure mode and effects analysis
Resp = responsible
RPN = risk priority number
SEV = severity
SOP = standard operating procedure

Figure 6. FMEA

Effort-impact matrix

An Impact Effort Matrix is a tool that helps one decide which solution a team should pursue from a list of possible solutions. By using an Impact Effort Matrix, one is able to visually prioritize solutions based on ease of implementation. The matrix can help determine which solutions are the easiest to implement with limited time and resources (George et al., 2005).

When the ideas are placed into the matrix based on the level of effort, from low to high, and the impact of implementation, from low to high, it is easy to visualize the groupings. This allows the team to focus on an idea that will give them the biggest impact with the least amount of effort. The illustration to the left categorizes the ideas in four categories: Low-hanging Fruit, Quick Wins, Major Projects, and Not Worth Doing. A team would typically pursue the ideas in the blue quadrant or the Quick Wins.

Figure 7. Impact-Effort Matrix

Out-of-control action plan

The OCAP is a flowchart that guides employees' reactions to out-of-control situations. An OCAP consists of activators (which define out-of-control conditions); checkpoints (which are likely causes for the conditions); and terminators (which contain the action that should resolve the conditions). OCAPs are dynamic. For example, Pareto analyses of OCAPs can identify commonly used terminators and suggest methods to eliminate frequent causes of problems or to modify the OCAPs that react to common out-of-control situations. Benefits of OCAPs include the empowerment given to the operators, who are responsible for using OCAPs to troubleshoot problems. Other benefits are increased process efficiency and standardization of problem solving techniques (George et al., 2005).

Process Step	Control Item (Input or Output)	Control Methods	Responsibility	Specification Limits/ Requirement	Response Plan
Quality Lead randomly selects calls per agent	Input - system fully functional	Metric	IT	100%	1. Train the Quality Lead and Team Lead on how to escalet system downtime 2. Follow up on the service level agreement between Company A and the Systems provider
TL conducts call monitoring and saves accomplished monitoring form in the system	Output - completed call Observation form	Metric	Quality Lead	Variable - dependent on number of agents	1. Weekly tally of number of call monitored per agent per month 2. Remind Team Leads to complete monitoring within timeline 3. Expectation setting of roles and responsibilities of the Team Leads 4. Include time completion as part of performnace scorecard
TL conducts call monitoring and saves accomplished monitoring form in the system	Input - objectivity by the teamlead when conducting call monitoring	Audit	Quality Lead	20% of total calls monitored	1. Quality assoiates conducts audits of call monitored to include: a) data values with high variances; b)random sampling of team lead monitoring 2. In cases of variances in call monitoring scores between QA and TL, QA and TL to discuss and agree on final score 3. Final scores to be confirmed by Quality Team prior to agent distribution for coaching and submission to client

Research Methods

Data Analysis

This study uses qualitative research method with data obtained based on the results of observations or observations, interviews, results of shooting in the field, analysis of documents and records or reports. Qualitative research is inductive because it starts from data in the field, namely empirical data. The researcher enters the field, studies the process or findings that occur in the field, records, analyzes, interprets and reports and draw conclusions from the process (Sugiyono, 2005).

Based on this method, this study obtained data from the results of observations and, analyzed the data from March to September 2019 from Rumah Sakit Ibu dan Anak Harapan Mulia and the service process and interviews with employees of RSIA Harapan Mulia, Tangerang District and the community as patients or customers of BPJS services. While data analysis and simulation was conducted in September 2018. This research was conducted to improve service quality thus the researcher tried to understand more deeply about the problems felt by service users and informants with the Lean Six Sigma concept, so the measure of service quality improvement is customer-oriented service, in this case from the point of view of the service user community.

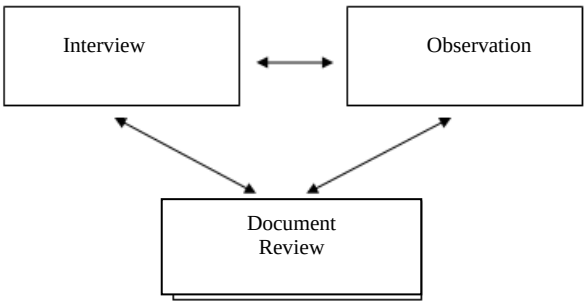

Figure 3. Triangulation Data Collection Model

The researcher tried to compare the measure of service quality at Current State with the measure of service quality at Future State beginning with the observation step in the object of the research, followed by determining the correct problem patterns to be developed into research propositions, then by applying action guide based on supporting theory thus the results will be known later whether the proposition can be applied or not so that it will be the conclusion and subsequent recommendations.

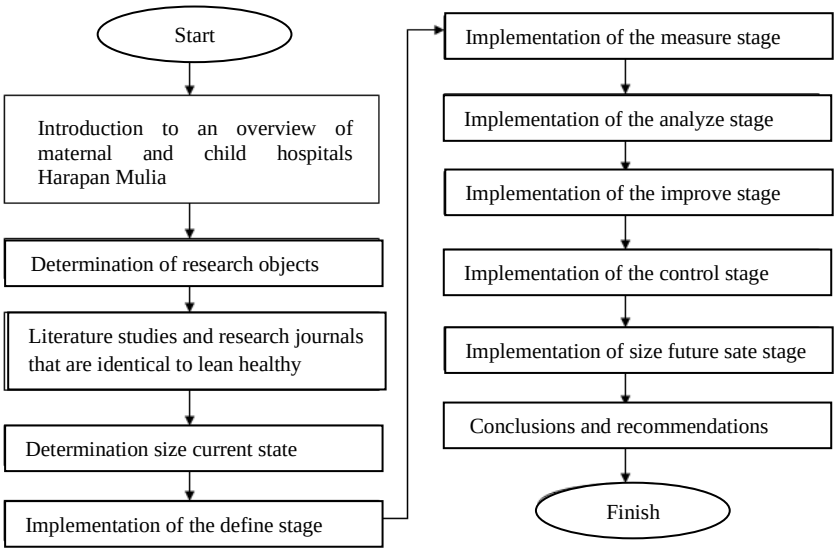

Figure 4. Research Flow

Measurement

The researcher used the DMAIC measurement method (Define, Measure, Analyze, Improve, Control). This method was combined with the Lean concept which aims to eliminate waste. Define is the step to determine the measure of success of the implementation process and the limits that will be used in this project. The measure of success chosen was the average time of service completion in each month based on the Guidelines Check-list of documents and records using Time Series Plot tools.

Measure is the stage to determine the focus of the problem by understanding the current process map (Current Process Map) based on the Interview Guidelines, Observation Guidelines, Guidelines for Documents and other Tools. By using the Lean Consumption Map (LCM) tool, the researcher will carry out mapping thus total consumer time performance and total provider time can be measured Besides the total time, researchers measured total value added time and total non-value added time both from the consumer and provider side. Consumer in this case is the community as a patient or service user and provider is a service officer in health facilities (Syukron et al., 2013).

Analyze is the stage of validation and determines the roots of the problems that directly affect the focus of the problem based on the Interview Guidelines, Observation Guidelines, Guidelines for Documents and other Tools. At the Analyze stage the researcher used FMEA tools (Failure Mode and Effect Analysis) to get the root of the problem which has a RPN (Risk Priority Number) value at high risk for the focus of the problem (Syukron et al., 2013).

Improve is the stage of determining proposed improvements for each root of the problem by developing potential improvements that can come from published journals, Lean reference books, Interview Guidelines and Observation Guidelines. These potential improvements are then validated with the IEM (Impact and Effort Matrix) tool. Potential improvements that get Zone I, Zone II and Zone III scores will be proposed improvements that will be validated in the repair simulation process. The simulation process will use 25 sample data which will be a reference that the proposed improvements are effective or not, and at the same time see the effect of time improvement in each process with the Lean Consumption Map (LCM) tool. Value Added and Assessment will be used to compare the value added activity against waste (waste) (Syukron et al., 2013).

Control is the stage to determine the control steps of the Improve phase thus the positive influence in the Improve phase is continuously maintained and consistently carried out by the employees in the BPJS administrative service department of RSIA Harapan Mulia. The results of the Control phase are in the form of a Change Management Plan document in which there are changes to the SOP (Standard Operational Procedure), Training to employees, determining key parameters, determining process indicators or control indicators, OCAP (Out of Control Action Plan), Checklist or Audit, and so on (Syukron et al., 2013).

Results and Discussions

The research used in this thesis was based on the DMAIC cycle with the Lean Government concept. This was chosen because the researcher had an understanding of the framework of the previous research and considered it to be very suitable when implementing the types of improvement projects. DMAIC is an extension of *Define, Measure, Analyze, Improve and Control.*

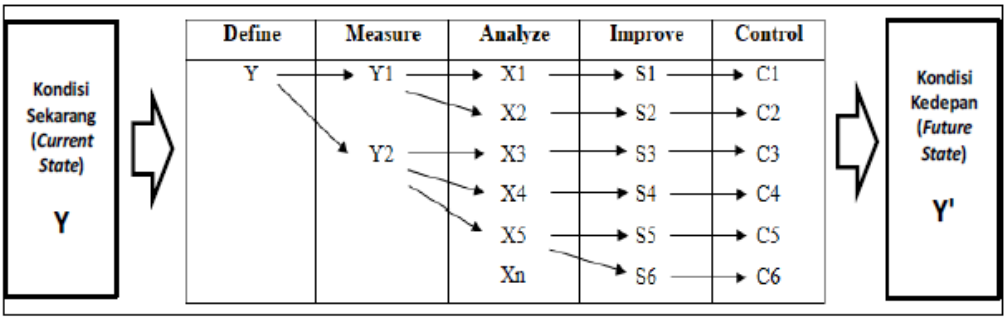

Figure 5. DMAIC Diagram

As shown in the picture above, this study describes the current condition as Y, which will be improved to Y 'or future conditions through the DMAIC process.

In this study, the completion time data from the beginning of the activity, namely BPJS patients to the first health facility to request referrals to receive drugs from the advanced health facilities were collected for six months starting from March 2019 to September 2019 as a description of the current condition. Based on these data, it is known that the completion time can reach 500 minutes.

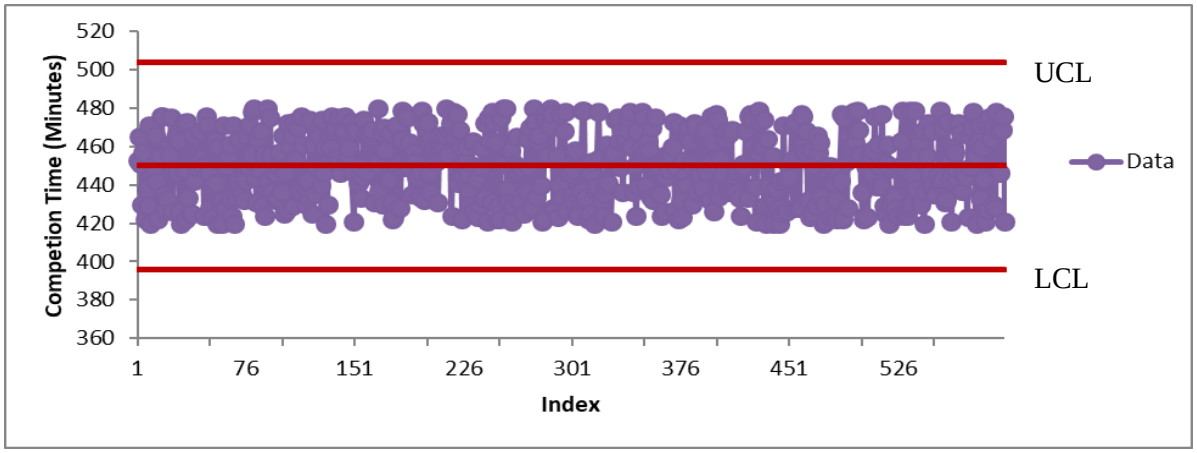

Figure 6. Time Series Plot Before Lean

Based on the above data, the researcher determined the target of improvement for services of 120 minutes referring to the time considered reasonable by the patient or service user. The researcher assumed that patients or service users should not be as long as it is in the data collected.

To explore the problem and achieve the improvement targets above, the researcher determined the focus of the problem by understanding the current process map based on the Interview Guidelines, Observation Guidelines, Guidelines for Documents and other Tools. By using the Lean Consumption Map (LCM) tool, the researcher will carry out mapping thus the total consumer time performance and total provider time can be measured (total service provider time)).

The first step was to do a mapping of service flow or Flow Chart of BPJS participants. The flow started with the patient going to the first health facility to ask for a referral to the next health facility. Patients or service users must queue up and register first in the administration of registration of the first health facility. The service clerk will check the completeness of the data and participant eligibility. If the patient was eligible, the patient would be entitled to service. The patient was then examined by a doctor of practice and will receive a referral letter according to the purpose of the facility.

The patient then continued the process flow to the next health facility by bringing a reference letter from the first facility and other files. Patients must register again when they were in advanced health facilities. First the patient must queue and filled in the registration form. Then the patient will be called. Meanwhile, the registration administration officer will check the files again. After the files were checked again and the patient was eligible, the officer issued a letter of elegibility from the participant. The flow of this process is illustrated in the picture below.

The next step after mapping with the Flow Chart was to map the Lean Consumption Mapping. This aimed to identify and assess activities with value added and non-value added activities. Analysis of Lean Consumption Mapping is useful to find out waste in every activity both from the service user and service provider thus later improvements can be made to activities that lack value added.

Based on the results of mapping the Lean Consumption Mapping, it can be seen that from the service user side the total time needed to complete the process was 351 minutes with a total value added of 90 minutes or 25.6% while the total non-value added is 261 minutes or 74.4%. While from the service provider side the total time needed to complete the process was 481 minutes with a total value added of 78 minutes or 16.2% while the total non-value added is 403 minutes or 83.8%. In addition to the fact that high non-value added activities were found, it was also found that many activities were repeated so as to cause waste of time. Moreover, the length of the service process has been dominated by waiting or queuing by service users.

Table 2. Value Added Assessment Before *Lean*

Item	Customer (Consumption Time)	Provider (Provision Time)
Total Time	351	481
Value Added	90	78
Non-Value Added	261	403
% Value Added	25.6%	16.2%
% Non-Value Added	74.4%	83.8%
Value to waste Ratio	34.5%	19.4%

To solve this problem, the researcher used the next tool, PFMEA table. PFMEA aims to find the root cause of a work process. In addition, PFMEA can also be used to predict a process failure so that proposed improvements can be made.

The first step in the analysis using PFMEA, was looking for a process with a high Risk Priority Number (RPN) value with a general standard> 100, is considered a high RPN and needs improvement. Next, see the value of Severity if a high severity value can be considered as a process improvement. Based on the results of the PFMEA analysis, it can be seen that there were several high RPN values. Some processes with the highest RPN value were, the process of queuing from the service user side as much as 320 points and the medical service process from the service provider side was 294. In addition, the process with high RPN and need for improvement is the process of filling out forms from users of services and referral processes, checking documents, checking participant eligibility letters, sending documents and prescriptions to pharmacies, and compounding drugs from the service provider side. > 100. Meanwhile, to analyze the value of the severity of the process was not done because it was already included in the process with a high RPN value.

Table 3. Proposed Improvement

No.	Proposed Improvements	Code
1	Queue separator between referral applicant and patient check	S1
2	Making and adding information boards for procedure information	S2
3	Creating a queue screen	S3
4	Utilize frontman security to assist registration administration services	S4
5	creation of health facility registration information portal portal that contains information on self-sufficiency, referral health facilities, and poly/doctor information	S5
6	making system barcodes on referral letters and forms since the first health facility	S6
7	Expansion of storage area for medical record data	S7
8	Making standard operating procedure for medical services (pathway)	S8
9	Making E-Recive information system	S9

Based on the PFMEA analysis, a corrective action proposal was made. These proposals, among others, aimed to create a non-repetitive process that did not provide added value, namely the creation of an information portal system connected between the first health facility and advanced health facilities in the hope that the registration and checking of forms and BPJS participation would be done once at the time of the patient registering in the first health facility so as to reduce the risk of errors and speed up the queue. Another important proposal was the making of the Standard Operating Procedure and Pathway. This was done to create a work process that was not varied and standardized thus the completion time obtained was relatively the same. For example, in the process of providing medical services by doctors, doctors often provide services more than what is needed by patients that the completion time is longer and costs are higher. Another example is, when the process of sending files and recipes to the

pharmacy, often files and recipes are only stacked and waiting to be transferred to the next process. This causes a longer queue in the drug collection section. Therefore it is necessary to regulate a standardized work guideline that regulates the implementation procedures. That is why a standard work system is needed. Table 3is a complete list of proposed improvements.

The proposed improvements above were then mapped on the Impact-Effort Matrix diagram to find out how much effort is being made to make improvements and the results or influences obtained. These proposals were separated according to each zone. Zone I is a priority for improvement proposals with minimal effort and maximum results. Next, the proposals were respectively in Zone II and Zone III to be carried out next. In Zone IV, it was expected that there were no proposals because of large business considerations while the results are minimal.

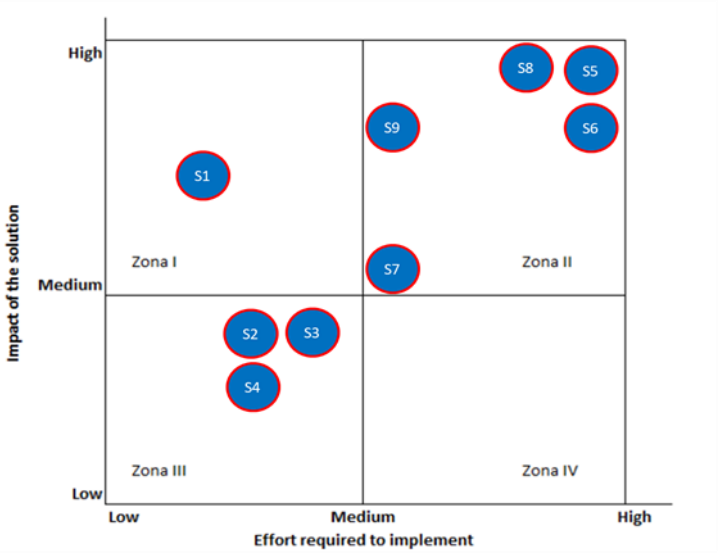

Figure 7. Effort-Impact Matrix

After repairs, the mapping of the Lean Consumption Mapping was carried out again. The results of the Lean Consumption Mapping after repairs showed that the total time needed was reduce both from the service provider side, from 481 minutes to 153 minutes or there was an improvement of 68.2% and from the service users, from 351 minutes to 122 minutes or 65.2%. The value of added value also increased from 16.2% to 39.9% from the service provider side and from 25.6% to 43.4% from the service user side. In addition to total time, several repetitive processes are omitted. This of course cuts down a lot of processing time. The process is faster and information becomes accurate so errors will also be minimal.

Table 4. Value Added Assessment After Lean

Item	Customer (Consumption Time)	Provider (Provision Time)
Total Time	122	153
Value Added	53	61
Non-Value Added	69	92
% Value Added	43.4%	39.9%
% Non-Value Added	56.6%	60.1%
Value to waste Ratio	76.8%	66.3%

Based on the simulation presented in the Time Series image, the plot after the repair shows that there is a decrease in service completion time.

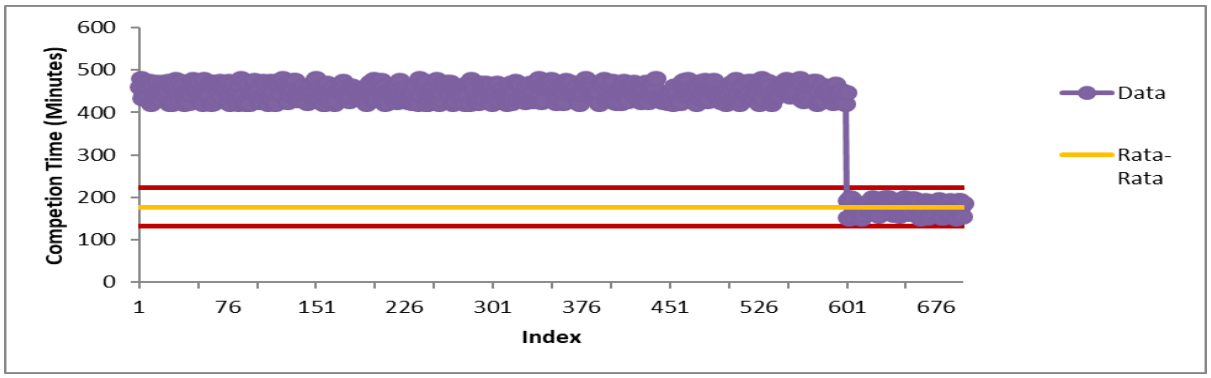

Figure 8. Time Series Plot After Repairment

The final step is the making of Out-of-Control Plan (OCAP). Making Out-of-Control Plan (OCAP) aims to analyze a failure and how to overcome it thus the process continues according to the control. Out-of-Control Plan (OCAP) is a guideline for employees to respond to actions well if there is a situation out of control. Control steps are carried out on the service provider side.

Lean Six Sigma is a powerful method for analyzing a performance process. In a previous Lean Hospital study at the Akron Children's Hospital in the United States, the application of Lean Hospital reduced patient waiting times by 90% in the Radiology department thereby increasing the number of patients and benefits for the organization (Lighter, 2014). Meanwhile, the implementation of the Lean Government in Indonesia in one of the tax service processes in one of the city government institutions investigated to improve the service process so that service time fell from 56 days to 20 days (Sunaryanto et al., 2019). In the case of this health service process, the Lean Six Sigma method is proven to reduce the completion time of a service, from the service provider side, at 68.2%, making the performance of service providers effective and efficient, and reducing non-added value work.

The results of the analysis using DMAIC with the aim of eliminating waste focusing to parse the activities in a process to find the core activities of the process. With the establishment of core activities, other activities that do not provide added value should be minimized. Based on the Flow Chart of the Health Service Process in the Era of Universal Health Coverage of BPJS Kesehatan (see appendix), core activities can be mapped like Figure 9.

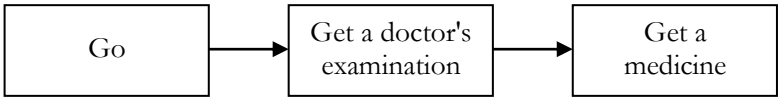

Figure 9. *Core Activities* pf Health Services

In general, the key to the health care process is that the patient gets a doctor's examination and then gets a prescription and gets the medicine. In the process of conventional health care services users, patients are required to pay for services and medicines provided by service providers in this case health facilities. With the existence of a system of universal health coverage by BPJS Kesehatan, the different thing is that the patient is free of charge and the referral system. The absence of medical expenses is certainly a benefit for service users but the referral system makes the service process flow make service users who need referrals take longer. The same is the case with the service process in the conventional era, masalah yang dihadapi pengguna layanan yakni, lamanya proses antrian yang diperparah oleh proses yang berulang-ulang di era cakupan kesehatan semesta ini. Sementara dari sisi pemberi layanan, proses pemberian layanan administrasi dan medis perlu distandardisasikan sehingga proses menjadi efisien dan hanya memberi pelayanan sesuai kebutuhan pasien baik pelayanan administrasi maupun pelayanan medis.

In this study, the researcher sought to minimize, substitute and even eliminate activities other than core activities in the health service process in the Era of Universal Health Coverage of BPJS Kesehatan. Activities that need to be eliminated are repetitive activities such as filling out forms, data entry, checking BPJS participant eligibility. Other activities that do not add value are also eliminated, such as queuing, waiting for the previous process. Activities that have uncertainties such as medical SOPs (Standard Operating Procedure), and ignorance of service schedules are also minimized.

The BPJS Kesehatan tiered referral system that starts from patients requesting referrals in Health Department I has seen the ineffectiveness of the service process. Based on observations, the queues between patients were examined and the patients requesting referrals became one counter making the queue was long. This should be overcome by separating the queue between the patient requesting referral and the patient being examined. The next problem was when the patient arrived at the advanced facility. Patient service users had to queue again and the clerk must enter data and checked the document again. To overcome this problem, the advanced health facilities should work together with health facilities I, which when referring to patients no longer need to queue up and do document checks. This can be done by making an information system portal which contains patient data thus the registration process in the advanced facilities the patients do not need to be re-checked their documents and data entry. In addition to reducing the length of the queue, the portal can eliminate repetitive work. Furthermore, the portal can be connected to a poly queuing system or a doctor's practice containing relevant information such as, queues and doctor's schedule so that patients can calculate when they have to come so they don't queue too long. In return for this cooperation, a further health facility will provide a fee for the patient referred to his health facility.

Furthermore, the medical treatment process of patients also needs to be considered. Often the absence of Clinical Pathways makes different doctors often make different treatments with patients who have the same medical diagnosis. Doctors often provide excessive service or even inadequate to diagnose patients. If excessive medical service is used then of course it would be a detrimental to the service provider both financially and when the service is completed. Conversely, if the service is inadequate, patients will also be harmed. This requires the existence of a standardization of the process of medical services by service providers so that the medical treatment process becomes relied on by applying the Clinical Pathway guidelines.

The last process that needs improvement is the pharmacy service process. In this process after the patient gets a doctor's examination, then the doctor writes a prescription for the medicine. The prescription will be delivered by the nurse to the pharmacy, then the pharmacy mixes the medicine and gives it to the patient. In practice, the prescription that has been given by the doctor is not immediately taken to the pharmacy but is still stacked and when the stack is a lot then they will be transfered to the pharmacy. This makes patients often queue long. Improvements to this process are made through the E-Recipe portal where doctors directly write recipes on a portal that is connected to the pharmacy thus pharmacists can immediately mix the drugs as soon as the examination is complete without waiting for the recipe to be delivered. This process can reduce the patient queue when taking the drug.

By minimizing activities that lack value-added and are only trying to provide core activities, the process will run effectively with customer-oriented objectives. Waste will be reduced and the turnaround time will be faster. The process is getting better, the service users will be satisfied that more service users will use the service. With customer satisfaction the business runs and grows that service providers, health facilities, will profit.

Conclusion

The Lean Six Sigma concept is one of the improvement methods that are often used in the manufacturing sector and can also be applied to other sectors such as the service sector. Lean Six Sigma is able to be applied with LCM tools on improving the BPJS tiered referral patient service process at RSIA Harapan Mulia by reducing the total time of service completion both from the

service user 351 minutes to 122 minutes or 65.2% and from the service provider side from 481 to 153 minutes or 68.2%. Activities with Added value also increased from 25.6% to 43.4% from the service user side and from 16.2% to 39.9% from the service provider side. While non-added value is reduced both from the service user side from 74.4% to 56.6% and service provider side from 83.8% to 60.1%.

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