

## **Lean thinking concept application for improving quality service of public services**

**Yudi Prastyo Utomo<sup>1\*</sup>, Hernadewita Hernadewita<sup>1</sup>, Damsiar Damsiar<sup>1</sup>, Molle, Tosan Danumaya Molle<sup>1</sup>**

<sup>1</sup>*Department of Industrial Engineering, University of Mercu Buana, Jakarta, Indonesia*

*prasdi.utomo@gmail.com, hernadewita@mercubuana.ac.id, damsiar1512@gmail.com, tosandanu@gmail.com*

### **Abstract**

Depictions of the service process, usually is done through the service cycle assessment. This cycle includes a process of mapping that begins by the service of the first customer by the related service providers, until the completion of transaction processes. Even after the transaction is resolved, there is still a service that can be categorized as after sales service. Healthcare, is among the companies engaged in public pelayananan sector, particularly in public health services. To fulfill the needs of the customer / patient, company must always work to provide the health services in accordance with customer expectations. Measuring the level that patients are satisfied can be done by using several indicators such as patient satisfaction on health services access, quality health services, process health services and health service system. It could be argued that the measurement of quality of health services, and all the results or consequences of health services contained in the output has the potential to be a problem of quality in health service. The method used is by applying the concept of lean thinking, to reduce the 7 (seven) wastes that are considered to be very harmful. The achievement of the improvement process in the handling of services, is expected to accelerate and reduce wastes in the process of health service. Another technique used to identify and help search for potential problems is the use of FMEA (Failure Mode and Effect Analysis).

**Keywords :** Quality of service, lean thinking, waste, improvement, FMEA

### **1- Introduction**

Government through Law no. 22 of 1999 on the Implementation of Regional Autonomy brought a change in the implementation of governing. One of the changes is the greater authorization in governance. With that power, bureaucratic government tools can better manage and administrate public services. The main objective is to improve the quality of public services maintained by values rooted in local communities. Governmental fields that must be implemented include public works, health, education and culture, agriculture, transportation, industry and trade, investment, environment, land, cooperatives and labor (Pohan and Imbalo, 2006). The above mentioned legislative regulations should be enforced, but there are very few (not) important changes while the demands of the community as a higher subscriber, are not satisfied. The government's desire to provide quality services to the community seems to be far from anticipated; although efforts have been made (Andersen and Fagerhaug, 2006).

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\*Corresponding author

An era of legal approach in the civil service that has been used as a reference has ended. A new era emerges and is replaced by a new approach that leads to better and more effective organizational and public management.

Reality in the land shows that the existence of the public sector has grown and expanded rapidly. The quality of the service can be seen as the difference between the reality and the expectation of customers for services received. So there are two main elements in the quality of service expected services (expected services) with the services received (services seen).

First one, the service can be received or perceived in accordance with the expected service quality. On the other hand, the service can be received less than expectation in line, with a poor and unsatisfactory quality. To be able to meet the needs of users requires a method for identifying waste (wastes) or non-value added activities (not value added). Non-value added activities are those that can be directly felt by consumers / customers. By eliminating the waste it is hoped that management can optimize its service performance so as to increase customer satisfaction. Every waste event will always reduce the quality of service. Due to the highly varied service, service providers need to pay attention and collect as much information as possible to improve service quality in a sustainable manner (Gasperz, 2006).

The lean methodology, originated at Toyota Company, and also known as the Toyota Production System (TPS), is considered as a radical alternative to the traditional mass-production model. Lean is defined as a methodology that adopts the elimination of wastes, as well as the aggregation of value to all processes, whose goal is to improve the final product (Brackett, et al., 2013).

Lean can be stated as “an integrated multi-dimensional approach encompassing wide variety of management practices based on philosophy of eliminating waste through continuous improvement.” Thus, Lean is a culture, a way of thinking, a practical philosophy, and not just a tool box for quality improvement. Lean as a philosophy becomes a way of thinking, whereas practices or tools are instruments to action these thoughts (Shingo and Dillon, 1989). Lean concept as a way to improve the public sector has increased dramatically during recent years, primarily in healthcare, but increasingly in other public organizations and authorities. In Sweden, 90 percent of the hospitals use Lean concept to at least some extent (Högfelt et al., 2011). The problems in the civil service are basically seen through the process of providing public services. The problems faced by the civil service are the high differences between the services received and what the users expect. Therefore, the goal of public service improvement is to identify value-added and waste activities, and to build alternative solutions to reduce the incidence of waste.

## **2- Research methodology**

Wastes describe the initial indication of non-value added activities. Therefore, it is necessary to identify the activities that give added value and that do not give added value (non- value added). Non value added activity is a waste which can be felt directly by consumers / customers. One method that can identify waste (waste) is lean thinking. This method is very useful in identifying the occurrence of waste (waste). Waste that appears will always reduce the quality of service. Please note that the nature of services is changing at any time as it is a non-standardized output. For that service providers should pay attention and gather information as much as possible to be able to control and improve the quality of service in a sustainable manner. With the implementation of lean is expected the company can make improvements to waste or wastage continuously in order to increase customer value. Lean thinking provides a way to perform better activities with less human effort, equipment, time and space, but closer to consumer desires and another method that can support process improvement is Sig Sigma (George, 2002).

The literature sources were analyzed against three attributes, namely: time, publication title and the region, thus catering to the aim of studying the evolution and application of Lean services. Using a chronological perspective, we observed how Lean in services evolved over time; Figure 1 shows the number of articles published annually during the period under analysis (Martíne and Moyano, 2014). Lean implementation era (2009-2014). During this phase, empirical studies started to emerge. Many authors employed case study research methods for contributing to the knowledge base of Lean services. As Lean thinking gained momentum in services, a strong committed leadership for its sustainment and applicability at an enterprise level was recognized as an important element (Vamsi and Kodali, 2014).

The purpose of using six sigma is to improve the process capability, variation reduction, process control and continuous improvement to achieve better quality. The combined two concepts are lean thinking and six sigma into lean six sigma (Cavanagh et al., 2002). Lean six sigma can be defined as a business philosophy, and a systemic approach to identify and eliminate non-value added activity through radically continuous improvement to achieve six sigma or six sigma performance (Gaspersz, 2007). The emphasis and application of lean six sigma is to improve the quality system by eliminating any waste in the process. Another success is to be able to increase the value added and give satisfaction to the customer (Carey and Eva, 2006).

The use of lean in isolated niches of quality improvement is not enough by itself. Transformation requires the use of lean as part of a comprehensive management system together with changing institutional culture and new leadership approaches to all aspects of health care delivery (Kaplan et al., 2014). For implementing the lean methodology, it is essential to know how to identify clients and processes, using clear and appropriate terminology (Proudlove et al., 2008). The application of lean as a methodology for improving quality in health services is essential, since the methodology is approached from different perspectives, according to the need of each institution Radnor et al. (2012) affirm that a wide variety of specialized management domains are introduced to transform established organizational and professional work practices, considered wasteful, evidencing an increasing impact on quality, cost, time, and satisfaction of both staff and patients. The keyword 'Six Sigma' has strong association with quality processes, management and operations. This methodology addresses procedures for eliminating or reducing errors in processes and procedures.

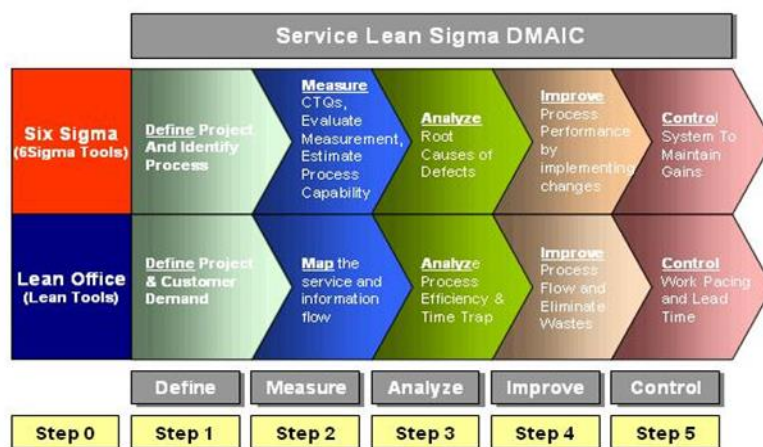


Fig. 1 Service lean six sigma

### 3- Data processing

One trait for a company that produces a service is that it cannot be piled up or stacked like other items. From some definitions of services above can be concluded that the service is something that can be produced or perceived where in this service can use tangible and intangible objects as media to define it (Pohan and Imbalo, 2006). Various indicators are necessary to determine the level of utilization and quality of hospital services. For that we need meaningful information, and created values or parameters used as the value of the appeal between the facts with the desired standard. Some indicators used to assess hospital services, and most often used are Bed Occupancy Rate (BOR), namely the percentage of bed usage, Average Length of Stay (AV LOS), the average length of patient care, Bed Turn Over (BTO), namely the frequency of bed usage, Turn Over Interval (TOI), i.e. average days, unused beds, Net Death Rate (NDR), i.e. death after treatment 48 hours for every 1000 patients out.

Inpatient division is a division which occupies the highest percentage of income compared to others (see figure 2). In order to not decrease income, everything related to inpatient division will always be done continuous process improvement (continuous process improvement). Patients who had been in inpatients turned out to have a worsening level of satisfaction compared with patients in outpatient.

From the survey results showed that the number of inpatients who feel dissatisfied and quite satisfied with hospital services is approaching 56%, and the satisfied and very satisfied is 44%. While the number of outpatients who feel dissatisfied and quite satisfied is approaching 24%, and who are satisfied and very satisfied is 76%. This indicates that the patient at the hospital has problems that need to be addressed.

<b>Structure</b>		<b>Process</b>		<b>Output</b>
Human Resources	→	Anamnesis	→	The level of compliance increases
Supplies	→	Medical Examination	→	Cure rate increases
Equipment	→	Infiltration of Drugs	→	Death rate decreased
Material	→	Health Counseling	→	Decreased morbidity
Facilities	→	Referring Patients	→	The level of disability decreases
Wisdom	→		→	Patient satisfaction increases
Standard				

**Fig. 2** Measurement mind set quality of health services

#### **4- Analysis**

Based on health standard, BOR is in the range (60-85) %. Many of the health care providers have low BOR indications and are under the standard of the health department. This indicates that there is a great loss to investment in bed / bedding facilities. With BOR indications as indicated above means the BOR indicator has given a bad signal on the management of hospital resources. Based on the service flow formed in the business process, the inpatient service process can be divided into 4 main processes namely Acceptance Process, Treatment Process, Repatriation Process or Patient Transfer, Collection Process and data processing of patient. The depiction of the four service process groups can be divided into activity types. Activities in the health service process can be grouped into service activity process types such as value-added activities, non-value added activities and necessary but non value added activities (see table 1).

**Table 1.** Type of health services process

Code	Activity Type	VA	NV	NN	
			A	VA	
B. Process of Patient Treatment in Inpatient Room					
B1	Preparing the bed			√	
B2	Transfer to treatment	√			
B3	Transfer of patient report		√		
B4	Moving data reports patient administration		√		
B5	Scheduling physician			√	
B6	Inspection by doctors	√			
B7	Doctor's instruction recording			√	
B8	Recording of consultation sheets and filling chart form			√	
B9	Scheduling operations and tests laboratory			√	
B10	The process of preparing the document		√		
B11	Delivery of state report			√	
B12	Monitoring of patient condition	√			
B13	Giving drugs, injections	√			
B14	Food menu process	√			

Based on the overall activity on the service process, the finding show that less than 42% are the value adding activities, 18.5% are necessary but non-value adding activities, and 40.74% are non-value adding activities. The non-value adding activity recorded has a large percentage; but it is known that this activity is wasteful. For that we need a way for nonvalue adding activity can be reduced.

Waste identification is the most important step in lean thinking. Based on the observations on the patient service system it can be identified waste (wastes) that occurs in the service process of inpatients. 7 (seven) wastes found are: defect that the number of patients less satisfied or even dissatisfied with service, unnecessary inventory (inventory may be an unfinished process, unused equipment, or unfinished / completed information), inappropriate processing, incomplete additional process handling, excessive transportation, movement of physical flow and excessive information flow, waiting (the delay that occurred because waiting for service process), unnecessary motion (defined as the movement of medical officers and nurses who are not productive: move, search and walk), not utilizing employees abilities (a kind of waste of human resources). Table 2 is the waste sequence that occurs in the service process from highest to lowest.

**Table 2.** The waste sequence that occurs in the service process from highest to lowest

Code	Activity Type	NV NN		
		VA	A	VA
<b>A. Inpatient Acceptance Process</b>				
A1	Patient registration process	√		
A2	Factual data collection	√		
A3	Delivery of patient to nurse	√		
<b>C. Repatriation or Patient Displacement Process</b>				
	Document referral			
C1	arrangement			√
C2	Mail handling	√		
C3	The process of calculating the cost of the bill		√	
	The process of completing the letters			
C4	Askes patient requirements			√
	Making receipts as evidence			
C5	payment of service charge	√		
C6	Payment process	√		
C7	Process of billing adjustment			√
<b>D. The process of collecting and processing patient data Inpatient</b>				
	The process of sending patient data			√
D1	The process of sending patient data			√
D2	administrative data			√
	The process of sending patient data			√
D3	patient data			√

From the emergence of waste above will be determined critical waste. The three selected wastes are waste defect, inappropriate processing waste, and waiting waste. Efforts to minimize waste are done on the 3 largest wastes. Based on the identification of critical wastes, then failure mode and effect analysis-FMEA is used to determine the priority for improvement of waste generation (Evans and Lindsay, 2007). For defect waste, the repair work will be related to the change of facility / system of data collection and processing, room including cleanliness and comfort, Turn over nurse.

For waiting waste, the repairs done will be related to the preparation of hospital treatment and equipment, repair of holidays / lids for the appropriate process waste, the improvements done will be related to changes in facility / system of data collection and processing, improvement of nurse discipline. Proposed improvements to reduce these three wastes are: (Hines and Taylor, 2000).

- 1) The reassignment of officers in the administration on Saturdays and Sundays.
- 2) Building computer-based information technology.
- 3) Provide a structured form of customer needs, complaints and satisfaction.
- 4) Improving hygiene by providing training to the person in charge of cleanliness.
- 5) Improve work efficiency and motivation of nurses.

**Table 3.** Ranking of waste weighting results

Waste	Bobot	Waste	Bobot
<i>Defect</i>	6.4	<i>Unnecessary Inventory</i>	3
<i>Inappropriat processing</i>	5.6	<i>Not Utilizing Employee Ability</i>	2.4
<i>Waiting Excessive Transportation</i>	5.6 3.2	<i>Unnecessary Motion</i>	1.8

From several suggestions above improvement then will be made a combination into several alternative improvements. To implement an alternative will require certain costs and other alternatives will require other costs Selection of alternative improvements based on value management approach. Each alternative will be assessed with certain criteria. Thus each alternative has a performance. The criteria used to assess are divided into two broad categories, namely service system and quality / service quality. Value is obtained by comparing the performance of each alternative with the cost used to run the alternative (Supriyanto, 2007).

**Table 4.** Value of each Alternative

Alternative	Performance	Cost	Value
Kondisi awal	123.23	494148044	1.000
1,2,3,4,5	138.20	499451144	1.110
1,3,4,5	125.29	489551144	1.026
1,2,3,5	139.69	499375544	1.122
1,2,3,4	137.03	504731144	1.089
1,4,5	124.20	488943644	1.019
1,3,5	123.65	489475544	1.013
1,3,4	123.65	494831144	1.002
1,2,5	138.73	498768044	1.115
1,2,4	135.73	504123644	1.080
1,2,3	138.13	504655544	1.098
1.2	137.27	504048044	1.092
1.3	125.67	494755544	1.019
1.4	123.03	494223644	0.998
1.5	125.81	488868044	1.032

To make it easier to get results then the initial design that became a comparison for other alternatives. The chosen alternative is an alternative with an alternative performance that has the greatest value. Table 4 shows the value of each alternative. From the calculation between performance and cost that yield value for each alternative known there are 12 alternative which have better value mean value bigger than with initial condition. The selected values can be taken from the combination of the highest alternatives. The choice of alternative will be based on the advantages and advantages that the chosen alternative can provide.

Based on the analysis of the deficiencies and advantages of the three alternatives that have been done then the alternative improvements selected is an alternative improvement 3 by applying proposals 1,2,3,5 i.e. open the administration on the weekend, build a computerized information system, providing a structured form of service needs, complaints and customer satisfaction as well as nurse efficiency and more optimize the performance and motivation of nurses.

## 5- Conclusions and suggestions

The conclusion that can be taken is that there is an indication that the level of satisfaction / perception of public service is lower than expected by the customer / patient. This can be seen from the waste (waste) that most often occurs in the service process of defeat waste, waiting waste and inappropriate processing waste.

An immediate improvement is an alternative repair 3, which opens the weekend administration section, builds a computerized information system, provides a structured form of needs, complaints and customer satisfaction as well as performs nurse efficiency and further optimizes the performance and motivation of the nurse.

## References

- Andersen, B., & Fagerhaug, T. (2006). "Root Cause Analysis: Simplified Tools Techniques". American Society for Quality. Milwaukee : Quality Press.
- Brackett, T., Comer, L., & Whichello, R. (2013). Do lean practices lead to more time at the bedside? *Journal for Healthcare Quality*, 35 (2), 7-14. <http://dx.doi.org/10.1111/j.1945-1474.2011.00169.x>. PMID:22093157.
- Carey, B., Eva, Z. (2006). *Lean Six Sigma Getting Result by Improving Quality and Speed*.
- Cavanagh R.R., Peter S.P., Robert P.N. (2002). *The Six Sigma Way*, Penerbit Andi, Jogjakarta
- Evans, J. R., & Lindsay, W. M. (2007). *Pengantar Six Sigma; An Introduction to Six Sigma and Process Improvement*. Jakarta: Penerbit Salemba Empat.
- Gaspersz, V. (2007). "Lean Six Sigma for Manufacturing and Service Industries". Jakarta : PT Gramedia Pustaka Utama
- Gasperz, V. (2006). *Lean Six-Sigma for Manufacturing and Service*. Jakarta : PT Gramedia Pustaka Utama, Jakarta.
- George, M. L. (2002). *Lean Six Sigma: Combining Six Sigma Quality With Lean Speed*, New York : McGraw-Hill.
- Hines, P., & Taylor, D., (2000). "Going Lean". *Proceeding of Lean Enterprise Research Centre Cardiff Business School*, UK.
- Högfelt, D., Sjögren, T., Weimarsson, H. (2011). *Lean Healthcare: Jakten på nya nyckeltal i den svenska sjukvården*.
- Kaplan, G. S., Patterson, S. H., Ching, J. M., & Blackmore, C. C. (2014). Why Lean doesn't work for everyone. *BMJ Quality & Safety* , 23 (12), 970-973. <http://dx.doi.org/10.1136/bmjqs-2014-003248>. PMID:25056985.
- Martíne, P.J. & Moyano, J. (2014). "Lean management, supply chain management and sustainability: a literature review", *Journal of Cleaner Production*, Vol. 85, pp. 134-150
- Pohan, S., & Imballo. (2006). *Jaminan Mutu Layanan Kesehatan*. Jakarta : Penerbit Buku Kedokteran EGC, Jakarta.
- Proudlove, N., Moxham, C., & Boaden, R. (2008). Lessons for lean in healthcare from using six sigma in the NHS. *Public Money & Management*, 28 (1), 27-34. <http://dx.doi.org/10.1111/j.1467-9302.2008.00615.x>.



Radnor, Z. J., Holweg, M., & Waring, J. (2012). Lean in healthcare: The unfilled promise? *Social Science & Medicine*, 74 (3), 364-371. <http://dx.doi.org/10.1016/j.socscimed.2011.02.011>. PMID: 21414703.

Shingo, S., & Dillon, A.P. (1989). *Study of Toyota Production System From The Industrial Engineering Viewpoint*, Productivity Press, New York, NY.

Supriyanto, H. (2007). *Prosiding Seminar Nasional "Evaluasi dan Perbaikan Proses Produksi dengan Pendekatan Lean Six Sigma"*, Surabaya

Vamsi, N., & Kodali, R. (2014), "A literature review of empirical research methodology in Lean manufacturing", *International Journal of Operations and Production Management*, Vol. 34 No. 8, pp. 1080-1122.