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Lean Service Concept Implementation InProvisioningProcess Improvement for Wifi Station Service in PT. X

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Abstract : Significant internet penetration in Indonesia makes internet providers in Indonesia to compete, to win the Market. PT. X as one of Internet Provider in Indonesia has significantly transformed to anticipate the business dynamics. One of the main program is to focus in Small-Medium-Enteprise (SMEs) segment with Wifi Station service. Nevertheless, Wifi Station has problem that is in its long provisiong process thus causing many outstanding orders that have not been installed. as many as 69% of work orders are installed more than 14 days which means over standard time specified. This long provisioning process may cause customers to switch to competitors. Based on this problem, indicated that there is a waste process in Wifi Station provisioning. This research uses lean service concept with improvement network through Define-Measure-Analyze-Improve-Control (DMAIC). The tools used in this research are Value Stream Mapping (VSM), Process Activity Mapping (PAM), Borda Count Method (BCM), Root Cause Analyze (RCA), and risk management approach. Based on analysis, occured that high level of main waste caused by Duplication, Lack of Standardization and Delay.

Keywords –Operation Management, Lean Service,Risk Management, VSM, BCM

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I. INTRODUCTION

Wifi Station is a wifi internet service for business customers segment with Value Added Service (VAS) as customer requirement with monthly subscription scheme. This service segmentation is intended for business / corporate who require Wifi internet connectivity service with dedicated SSID access along with Cloud-based Value Added Service (VAS) to support their business. Target market of this service such as campus, trade area, hotel, shopping center, government agency, Small Medium Enterprise (SME) and resto / cafe.

Based on preliminary observations, there are major problems faced in provisioning process of wifi station. The problem is that the long provisioning process from the customer order until finally installed, thus causing a lot of outstanding orders that have not been installed.

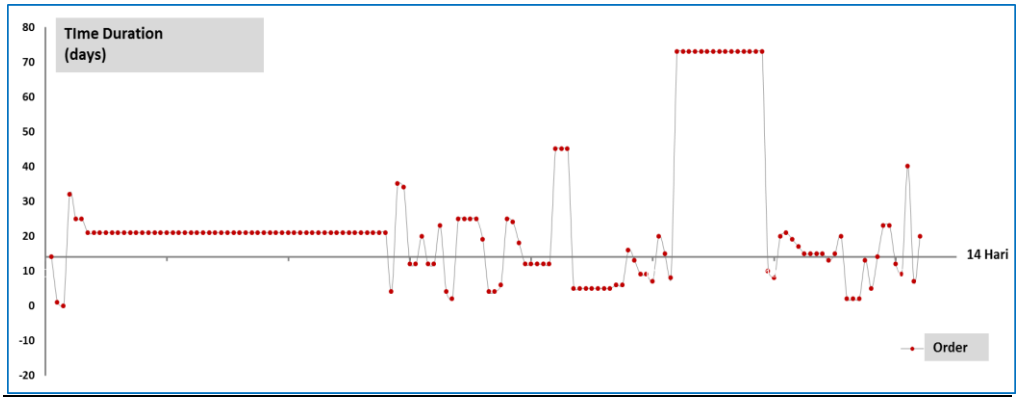

Fig 1. Time Duration of Wifi Station Provisioning Process

Fig. 1 shows the picture of the time duration of the process of ordering the wifi station starting from the registration until its installed in the customer based on data from January 2017 to February 2018. From this data, there are 144 ordersof wifi station. In the process of providing wifi station, PT. X determines the installation time of wifi service (MTI) that is 14 calendar days. Of the total 144 wifi station orders, almost 69% of those orders or 100 orders more than Mean Time to Install (MTI) which is specified more than 14 days. While the

remaining 31% or 44 orders installed less than 14 days. This long provisioning process can generate potential customers to switch to competitors.

This research used the concept of lean service to reduce the activities that are considered as waste, because this concept is used to eliminate waste and improve efficiency in the work process (Sanker, 2013). Lean Service method selected for active role, and customer in creation service. Customers participate in a process, in which the customer changes their role in the value network, which is a partner in value stream creation (Lopez, Requena & Lobera, 2015).Implementation of Lean Service concept in provisioning process of wifi station service at PT. X can be a solution to improve service efficiency and increase customers value.

The purpose of this research are a)Identify waste in the service provisioning service of wifi station; b) Determine critical waste; c) Determine the root cause of critical waste; d) Determine the priority of the root source of critical waste cause; e)Provide recommendations for service improvement; f)Planning for provisioning process improvement using Future Value Stream Mapping (FVSM).

II. MATERIAL AND METHODS

Most of lean methodologies refer to manufacturing industry, where a tangible product exists. Within service environments, although there is engagement with the principles of lean, many of the techniques used in manufacturing context are not immediately applicable. In this research will be used the concept of Lean Service approach, which aims to find the root cause of waste so that it can be formulated recommendation for improvement. Lean Service is a methodology used in order to achieve an effective and more efficient process by identifying and eliminating waste or non value adding activities, resulting in increased corporate productivity, lower operational costs, increased profits business and can provide satisfactory service.

Waste determination in service may be complex considering that the operations are intangible. In addition, new wastes can be formulated, apart from the traditional ones. Thus, one of the major challenges in service organizations is developing the ability to recognize waste, through the analysis of the customer experience. Waste in service is described as bellow (Lopez, Requena&Lobera, 2015).

- *Overproduction*: Completion of more work than needed or prior to its being demanded by customer.
- *Delay*: Delays in terms of employees or customers waiting for information or service delivery.
- *Unneeded Transport or Movement*: Needless, non-adding-value movement of resources (people or items), physical (from office to office) or virtual (methods, approaches, paths or tools for performing the same work).
- *Over-Quality, Duplication*: Activities or processes that do not add value as perceived by customers. They do not answer to a real need, adding more value to the service than the one customers are willing to pay for. Design or build a work that presents oversized performance if compared with real demand.
- *Excessive Variation, Lack of Standardization*: Lack of standardization in the offer or processes, procedures, formats, including expired or outdated with no standard time defined.
- *Failure Demand, Lack of Customer's Focus*: Any aspect of a service that fails to conform to customer's expectations or needs, which results in miscommunication and/or opportunity lost.
- *Underutilized resources*: Waste of resources, especially human potential, not leveraging employee's talent and potential, under-using their skills, creative abilities and knowledge.
- *Manager's Resistance to Change*: "Saying no" attitude from the management, not encouraging all employees to get involved in the continuous improvement process.

All types of waste often occur unnoticed, because it has been considered as something that is normal and common, when in fact very harmful, especially often cause additional cost that should be avoided. To compare lean service with lean manufacturing analogy is summarized in table 1.

Table 1. Waste Service Using Manufacturing Analogy

No	Service	Manufacturing Analogy	Example	Root Cause
1	Over Production	Over Production	Processing items before being required	Poor planning
2	**Delay/ Waiting**	**Waiting**	Pending requests Delayed information provisions	Poor coordination
3	Unneeded Transport or Movement	Motion	Looking for data and information	Poor office housekeeping
		Transport	Excessive e-mail attachments	Outdated work habits
4	**Over-Quality,**	**Over**	Repeated details on forms	Excessive

	Duplication	**Processing**		bureaucracy
5	**Excessive Variation, Lack of Standardization**	Inventory	Fluctuating lead times	Demand fluctuations
6	Failure Demand, Lack of Customer's Focus	Defects	Poor attention to the customer	Lack of motivation
7	Underutilized resources		Error, incomplete work in service transaction	Manager's resistance to change
8	Manager's resistance to change	Manager's resistance to change	Rejected suggestions Belief of "Saying no" attitude	Belief of "Saying no" attitude is safer

(Lopez, Requena&Lobera, 2015)

To achieve the purposes of this research, some supporting tools are used, they are :

2.1 Value Stream Mapping (VSM)

VSM is a visual method that describes the process in terms of the physical flow of material and create the values of the customer. This includes diagrams of information flows to manage, control or influence the flow of physical materials. The purpose of the VSM is to help identify the source of waste.

2.2 Process Activity Mapping

It is an approach that can be used in production floor activity. This tool can classify the steps of each activity that is operations, transportation, inspection, delay and storage and then grouped and divided to identify activity value-adding activity, and non-value-adding activity. This tool serves to facilitate view flow process and identification of waste occurrence.

2.3 Borda Count Method (BCM)

The Borda Count Method invented by Jean Charles De Borda, is a direct technique for ranking calculations of selectedalternatives (Nash, Zhang, &Strawderman, 2011). Respondents/voters fill preferential options, according to theirrank from first to last. If there is n option, then the first rank is n, then the second rank is n-1, the third option is n-2 and soon. The result of that value can determine the rank of all the options, which get the highest value, is waste with the firstrank. Borda Count Method can be used to determine the priority of which waste will be completed first using thequestionnaire to the relevant sections.

2.4 Root Cause Analysis (RCA)

Root Cause Analysis is a structured evaluation method to identify the root cause of the problem. In addition, the use ofRCA in performance improvement analysis by Latino and Kenneth (2006) in prestige (2007) canfacilitate theidentification of factors affecting performance. Root cause is part of several factors (events, conditions, organizationalfactors) that contribute, or cause possible causes and followed by unexpected results. There are various undesired outcome methods. Jing (2008)describes five popular methods for identifying root causes of unexpected undesired outcomes from simple to complex

- Is/Is not comperative analysis
- 5 Why Methods
- Fishbone diagram
- Cause and Effect matrix
- Root Couse Tree

2.5 Risk Analysis

Risk analysis is the stage of identifying and evaluating existing controls at that time, determining the consequences and possibilities and causes of risk levels (Anityasari and Wessiani, 2011). Risks can be analyzed by appraising theprobability of occurrence and consequences if they occur. When likelihood and consequences havebeen identified,evaluations are made and prioritize the most significant risks to be corrected first. Here are the assessment steps :

1. Assess the risk into the likelihood criterion (L) and consequence (C).
2. Calculate Risk Rating with the following formula (R = L x C)

The purpose of risk analysis is to classify these risks into extreme, high, moderate and low categories. Where thehighest risk will be priority to be managed first.

2.6 DMAIC (Define-Measure–Analyze-Improve-Control)

DMAIC is a methodology for improvement with 5 stages (Brue, 2002). In DMAIC, there are five stages or basic steps in implementing this strategy: Define-Measure-Analyze-Improve-Control, where the stages are repetitive stages or form a cycle aimed at improving quality. The DMAIC cycle is illustrated in Figure 2.

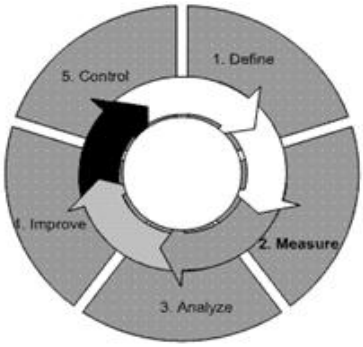

Fig 2. DMAIC Cycle

III. Analysis Result

The collected observation data becomes the basis for creating Stream Value Mapping (SVSM). SVSM shows the flow of physical work and logic processes in the provisioning process of wifi station listed in Figure 3. In SVSM seen several processes that contribute considerable time, causing the total process time and lead time to be long. The process is then potentially eliminated to reduce waste throughout the process and improve the efficiency of the provisioning process of wifi station.

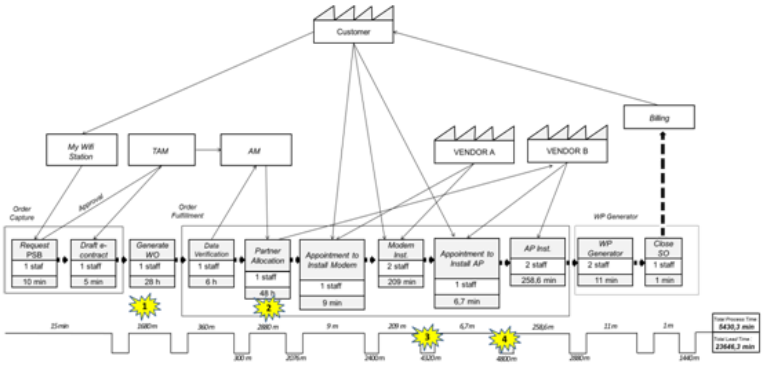

Fig 3. Current State Mapping

Process Activity

Mapping (PAM) is based on the analysis of the symptomps provisioning process and the interview results of those who know the process from upstream to downstream. All activities are then defined into 3 categories: a)Value Added (VA) activities; b)Non-value added (NVA) activities; c) Activities that do not add value but are required in the process or Necessary but Non-Value Added (NNVA).

Table 2. PAM Identification

No	Activity	Activity	Channel	Average (Hour)	Category
1	Request PSB	Operation	AplikasiMy*Wifi*Station	0,17	VA
2	Validation	Operation	By Phone	0,17	NVA
3	Deal e-contract	Operation	AplikasiMy*Wifi*Station	0,08	VA
4	Generate Work Order	Operation	By system : Tenoss	28,00	VA

The determination of critical waste is determined using the Bourda Count Method (BCM) to determine the 8 critical waste types. Lean's main focus is to eliminate waste in the process, one of the key challenges in

service is how to recognize waste through customer experience analysis (Lopez, Requena & Lobera, 2015). Determination of critical waste is done by distributing questionnaires involving 6 korespenden directly involved in the provision of wifi station process. The selection of correspondents in determining this critical waste takes into consideration the associated role roles in the four wifi station provisioning processes: order capture, order fulfillment, web page generators and billing.

Table 3. Rank of Waste

Waste	Rank	Ratings
Overproduction	1	8
Delay/ Waiting	2	7
Unneeded transport or movement	3	6
Over-quality/ Duplication	4	5
Excessive Variation/ Lack of Standardization	5	4
Failure Demand/ Lack of Customer's Focus	6	3
Underutilizes Resources	7	2
Manager's Resistance to Change	8	1

The selected correspondents are then given a list of types of waste then given the waste ratings of the eight types of waste in accordance with Table 3. Then the results of the questionnaire are recorded as Figure 4.

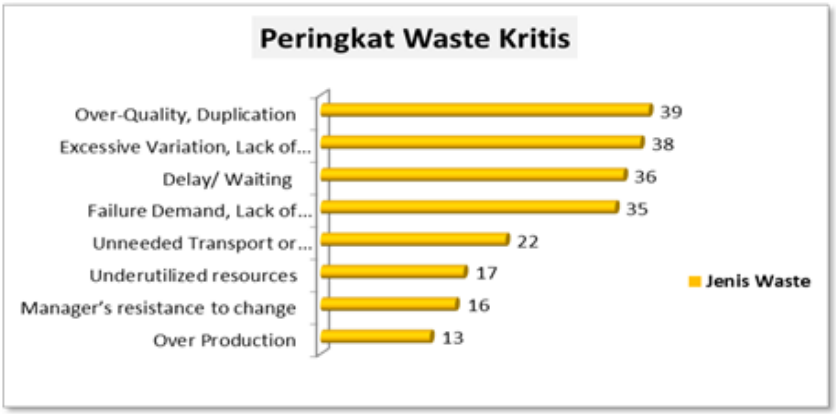

Fig 4. Critical Waste Rating

The highest rank of waste critical is Over Quality / Duplication, Excessive Variation / Lack of Standardization and Delay / Waiting.The three critical wastes are then analyzed by identifying the activities of VSM and PAM along with activities that include non-value added activities in Table 4.

Table 4. The Classification of NVA Activities in PAM

Waste Type	Activity
Over Quality , Duplication	Data Validation by TAM (Tele Account Marketing)
	Vendor A appointments with customer for AP Installation
Excessive variation, lack of Stadardization	There is no standard time between processes
Delay, Waiting	Partner Allocation for AP Instalation
	Customer waits for validation by Account Manager
	Technicians wait for modem allocation

Once found the root cause of the waste will then be determinedthe root cause of critical waste that will be prioritized based on the multiplication of the frequency value to emerge (likelihood) and also the consequences of the root cause of waste.

Table 5. the total value of the likelihood value and the consequences value of the root cause of waste

Waste	**Risk Code**	**Root Cause**	**Likelihood (L)**	**Consequence (C)**	**Risk Rating R = (LXC)**
Duplication	R1	Data Validation by TAM (Tele Account Marketing)	5	1	5
Duplication	R2	Vendor A and Vendor Bappointments with customer for AP Installation	5	3	15
Lack of Standardization	R3	There is no standard time between processes	5	3	15
Delay	R4	Partner Allocation for AP Instalation	5	5	25
Delay	R5	Customer waits for validation by Account Manager	4	2	8
Delay	R6	Technicians wait for modem allocation	3	4	12

Table 6. Mapping the Root Causes of Critical Waste

Likelihood	Nilai					
Almost Certain	5	R1		R2, R3		R4
Likely	4		R5			
Moderate	3				R6	
Unlikely	2					
Rare	1					
	Nilai	1	2	3	4	5
		Ignificant	*Minor*	*Moderate*	*Mayor*	*Catastrophic*
		Consequences				

The total value of the calculations in Table 5 is the mapping of the traffic light graph as shown in Table 6. From these results it was found that the root causes with codes R2, R3, R4 and R6 fall into the extreme category so that the root causes of waste with the code will be the main focus of the improvement recommendations.

IV. RECOMMENDATION FOR IMPROVEMENT

Result of root cause of critical waste with the approach of risk analysis define 4 root cause of critical waste which enter extreme category with code R2, R3, R4 and R6 according to table 7.

Table 7. Extreme Categories of Critical Waste

Waste	**Waste Code**	**Root Cause of Critical Waste**
Duplication	R2	There is no one deployment partner policy for Wifi Station Process
Lack of Standardization	R3	There is no standard time between processes
Delay	R4	There is no data that clearly states AP availability
Delay	R6	There is no data that clearly states the availability of ALU modems

4.1 Recommendation of improvement for the root cause of critical waste R2

The root cause of waste with R2 code is that there is no single deployment partner policy in provisioning Wifi Station work. The recommendation for improvement is establishment of a policy of singlepartner for Wifi deploymentas the basis for the addition of Scope of Work (SoW)through the amendment process of agreement with Vendor. Based on the research, there was a reduction of lead time in the provisioning process. Leadtime is currently 8 days, while on recommendation improvement to 3 days which means there is a reduction of 64%. This process improvement recommendation becomes the basis for making Future Value State Mapping idea.

4.2 Recommendation of improvement for the root cause of critical waste R3

The root cause of critical waste R3 is the absence of standard time between processes. Therefore, the improvement recommendation is proposed to createthe standard time between processes. Standard time recommendation between processes is shown in table 8 with standard time calculation formula = normal time + allowence. With the allowance of 10%, there is a standard time between processes as shown in Table 8.

Table 8. Standar Time Calculation

No	Between Process	Hour		
		Normal Time	Allowence (10%)	Standard Time
1	Order *Capture* - Order *Fulfillment*	22,3	2,23	24,53
2	Order *Fulfillment* - WP Generator	25,9	2,59	28,49
3	WP Generator - *Billing*	24	0	24

4.3 Recommendation of improvement for the root cause of critical waste R4 & R6

Recommendation of improvement on Root causes of critical waste R4 and R6 that is by making monitoring system availability of AP and modem. The calculations are used using the aquilano formula in the operation management with the average daily demand parameters, lead time of arrival of goods, and inventory according to the following formula.

$$q = \bar{d}(T + L) + Z\sigma_{T+L} - I$$

$$\sigma_{T+L} = \sqrt{(T + L)\sigma_d^2}$$

Notes; $q = order\ quantity$; $\bar{d} =$ Avarege demand per days; $(T + L) =$ lead time; $Z =$ error; $\sigma_{T+L} =$ standard deviation; $I =$ Inventory

Recommendation R4, calculation as follows:

$\sigma_{T+L} = \sqrt{2\ x\ 2^2} = \sqrt{8} = 2.82$

$$P = 99\% \rightarrow Z = 2.33$$

$$q = (4x2) + (2.33\ x\ 2.82) - 10 = 4{,}507$$

Recommendation R6, calculation as follows:

$$\bar{d} = \frac{4}{7} = 0{,}571$$

$$\sigma_{T+L} = \sqrt{7\ x\ 2^2} = 5{,}291$$

$$P = 95\% \rightarrow Z = 1{,}64$$

$$q = (0{,}571x7) + (1.64\ x\ 5.291) = 12{,}674$$

4.4 Designing Recommendation for Improvement with Future Value Stream Mapping (FVSM)

Based on the results of brainstorming and recommendation for improvement based on the root cause of critical waste is prepared idea Value Values Stream Mapping as Figure 5.

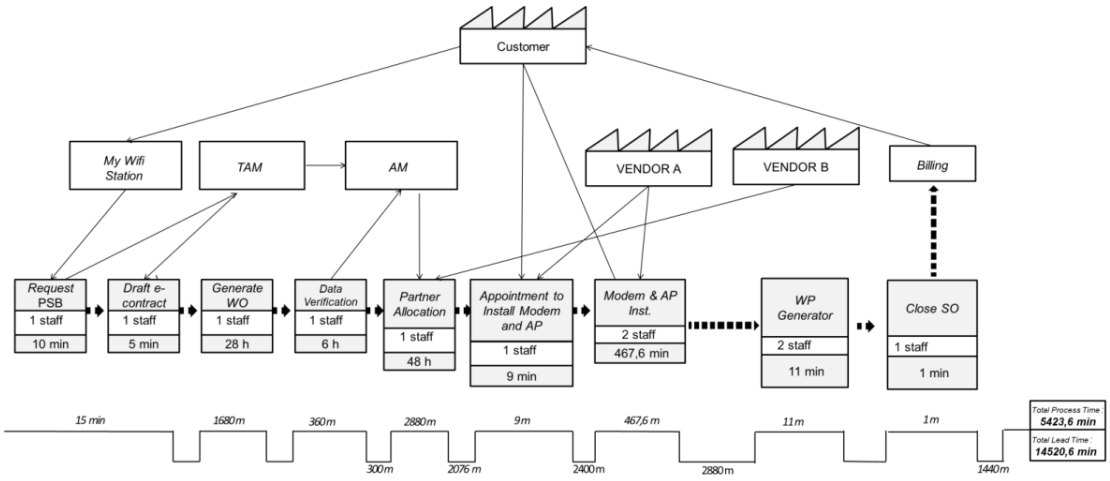

Fig 5. Future Value Stream Mapping

The result of future value stream mapping changes process time from 5430.3 minutes to 5423.6 minutes. Lead time changed from 23646.3 minutes to 14520.6 minutes. This means it can accelerate the total installation process by 39% from a total of 16 days to 10 days so it can meet Mean Time to Install (MTI) for less than 14 days specified. The changes in lead time and process time due to process changes by eliminating activities that include duplication and delay / waiting. By eliminating the duplication process is expected to increase customer satisfaction and speed up the provisioning process wifi station.

V. CONCLUSION

Based on research that has been done on the provisioning process of wifi station can be defined some conclusions as follows:

1. The type of waste that is identified in the service provisioning process of the wifi station service is duplication, lack of standardization and delay.
2. Waste critical identified 3 (three) highest rank of critical waste that is Over Quality / Duplication, Excessive Variation / Lack of Standardization, and Delay / Waiting.
3. The root cause of critical waste :Duplication : a) Data Validation by TAM; b) Partner A makes appointment with customer for AP installation; Lack of stadardization : there is no standard time between processes of activity; Type of waste delay / waiting : a) Partners Allocation for AP Instalation; b) customers waiting for validation by AM; b)Technicians await modem allocation.
4. The Priority of root cause of critical waste obtained by using risk analysis approach method with extreme risk is as: a) There is no one deployment partner policy provisioning Wifi Station work; b) There is no standard inter-process time; c) There is no data that clearly states AP availability; d) There is no data that clearly states the availability of ALU modems;.
5. The result of mapping of future value stream mapping changes process time from 5430.3 minutes to 5423.6 minutes. Lead time changed from 23646.3 minutes to 14520.6 minutes. This can accelerate the total installation process by 39% from a total of 16 days to 10 days. The changes in lead time and process time due to process changes by eliminating activities that include duplication and delay / waiting.

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