Work Efficiency Improvement in the Bidding Process

Diana F. Kelasworoningrum[1] and Moses Laksono Singgih[2]
[1]Department of Technology Management, Institut Teknologi Sepuluh Nopember, Surabaya
[2]Department of Industrial and Systems Engineering , Institut Teknologi Sepuluh Nopember, Surabaya
e-mail: moseslsinggih@ie.its.ac.id[2]

***Abstract*—A higher of competition level requires each company to increase its competitive advantage to be a market leader. One of the options to improve the competitive advantage is to increase company performance efficiency since using this option, operational cost can be reduced. In this particular study, Lean Service concept is applied to eliminate waste that occurs throughout the value stream of bidding process in order to improve procurement performance in terms of its efficiency in PT XYZ. Lean concept implementation started from creating the Value Stream Mapping (VSM) to map current value stream along the bidding process continued with Process Activity Mapping (PAM) to classify waste that occurs throughout the value stream, Borda Count Method (BCM) to determine the critical waste and Root Cause Analysis (RCA) to find the root cause with risk analysis approach which can be used as a reference to determine priority of improvement. The goal of this study is work efficiency improvement in the bidding process by identifying its waste and its root cause since by recognizing those waste, improvement plan can be formulated. This study generates recommendations for improvement plan namely designing SOP which not only standardize its processes moreover set its time limit and improvement in the management system by increasing coordination with end user as well as upgrading procurement knowledge. Those result might be utilized by organization to increase procurement's work efficiency.**

***Keywords*—5 Whys, Lean Service, Process Activity Mapping, Value Stream Mapping.**

I. INTRODUCTION

MANY companies have to deal with lack of work efficiency particularly in service industry where ultimately will give an impact to company's operating cost. The higher the operational cost incurred, will have a significant impact on the price of products/services set by the company. Only those companies that provide cost advantage and customer convenience will survive in the marketplace. And lean can provide an antidote to both these concerns, as it not only improves organizational efficiency but also improves customer convenience and business profitability [1].

The issue of work efficiency has also been considered by procurement department of PT XYZ, a FMCG company located in East Java, Indonesia. Indication of the occurrence of waste in the bidding process which performed to procure goods and services in PT XYZ is the lead time of bidding process which having ranges from 10 to 40 working days depend on the bid complexity. It is caused by number of bid submissions as well as repetition of bidding process due to changes in the scope of work (SOW). The longer the lead time needed in the bidding process will lead waiting time from one process to another process being much longer. To overcome this issue and in order to keep promises in terms of bidding completion timeline, increasing the number of overtime, as well as number of manpower in procurement department have been taken as the final option.

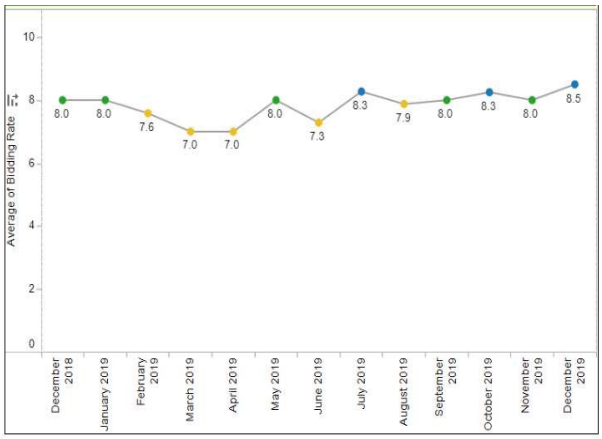

Figure 1. Graph of CSAT survey in 2019 on monthly basis.

Table 1.
Streams Mapping tools

Wastes/structure	Mapping tool: Process activity mapping	Supply chain response matrix	Production variety funnel	Quality filter mapping	Demand amplification mapping	Decision point analysis	Physical structure (a) volume (b) value
Overproduction	L	M		L	M	M	
Waiting	H	H	L		M	M	
Transport	H						L
Inappropriate processing	H		M	L		L	
Unnecessary inventory	M	H	M		H	M	L
Unnecessary motion	H	L					
Defects	L			H			
Overall structure	L	L	M	L	H	M	H

Notes: H = High correlation and usefulness
M = Medium correlation and usefulness
L = Low correlation and usefulness

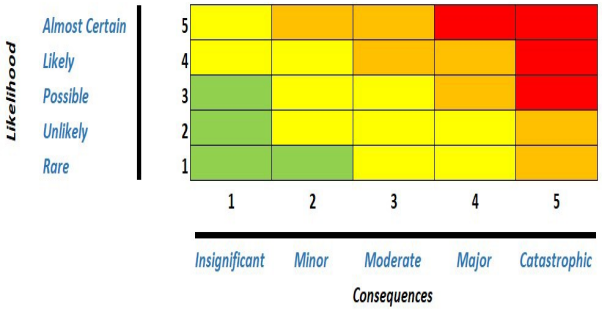

Figure 2. Risk Map.

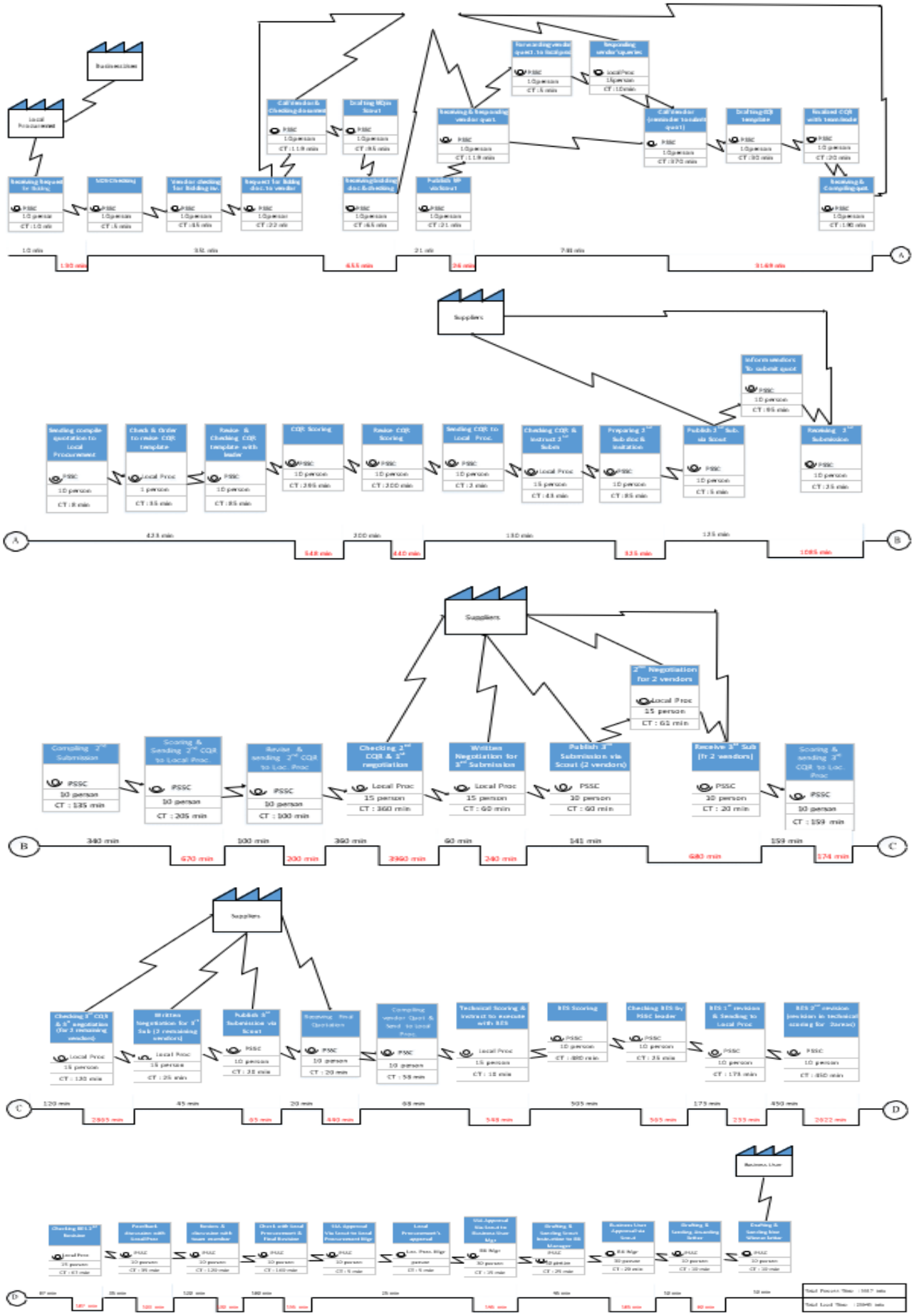

Figure 3. Current State Map.

Table 2.
Waste Calculation with Borda Count Method

Weight	Type of Waste					
	Delay	Duplication	Unneeded Transport of Movement	Failure Demand	Unclear Communication	Underutilized Resources
4	3	3	6	1	0	0
3	7	4	3	0	3	2
2	0	3	1	5	4	1
1	0	0	0	2	2	7
0	0	0	0	2	1	0
Score = Weight x Waste	33	30	35	16	19	15

Table 3.
Summary of Waste Occur in the Bidding Process

No	Type of waste	Risk Code	Sub Waste
1	Delay	R1	Waiting time for checking CQR/BES
		R2	Waiting time for SSA approval
		R3	Waiting time for the correct supporting documents from the vendor
		R4	Frequent checking process of CQR/BES
2	Duplication	R5	Repetition of bidding submission (due to over budget)
		R6	Repetition of bidding submission (due to changes in scope of work)
		R7	Repetition of bidding submission (due to partial submission)
		R8	Checking bidding supporting documents (NDS, VDL, SOBK, EHS, etc.)
		R9	Repetition of sending compile quotation to local procurement
3	Unneeded Transport of Movement	R10	Contact vendors who haven't sent confirmation of intent to participate in bidding process
		R11	Contact vendors to remind timeline of bidding submission

Table 4.
Proposed Improvement Plan

Type of Waste	Sub waste	Proposed Improvement Plan
Delay	Waiting time for checking CQR/BES	Designing SOP which set maximum standard time for checking and approval process
	Waiting time for SSA approval	
	Frequent checking process of CQR/BES	
Duplication	Repetition of bidding submission	Increase coordination with user in terms of budget & business strategy by conducting meeting periodically
	Repetition of sending compile quotation to localvprocurement	
	Repetition of bidding submission (inappropriate bidding process flow)	Designing SOP for bidding process flow
	Checking bidding supporting document (NDS, VDL, SOBK, EHS, etc.)	Upgrading procurement knowledge with various program e.g. sharing session with experts, training, etc.

The inefficiency in current bidding process affects to the performance of procurement team at the end user. It is reflected in the results of Customer Satisfaction Survey (CSAT) which is conducted once bidding is completed. The average yield of CSAT survey during 2019 is illustrated in the below figure where it is still less than the target set by the company which is obtaining an average score of 8 for the CSAT survey shown in Figure 1.

To address the issue as described, procurement department of PT XYZ has taken some actions in order to improve its work efficiency by standardizing procurement process and function as well as creating template of bidding documents. However, it could not be fully accepted by end user with various considerations. Therefore, new initiative has been taken by procurement department to deal with issue of its work efficiency, since improvement in this area will give many benefits to organization and ultimately give contribution in reducing operational cost. In this study, lean service concept is applied to the bidding process itself and conducted by procurement department of PT XYZ as new initiative to overcome work efficiency issue. Lean is a business philosophy which involves any use of resources including time to do work activities by doing continuous improvement, thus it only focuses on eliminating non value added activities in its product design related to manufacturing or activities relate directly to customers [3].

This research intends to identify waste and its root cause which occur throughout current bidding process, improve its processes and generate recommendations for improvement in the bidding process to increase work efficiency in ways to reducing lead time process.

II. METHOD

A. Lean Service

Lean is a systematic approach for identifying and eliminating waste through continuous improvement by 'flowing' the product at the pull of the customer in pursuit of perfection [4]. Lean focuses in the identification and elimination of activities which has no value added in the design, production (in manufacturing), services, as well as supply chain management which is directly related to customer [16]. The term lean services refers to the

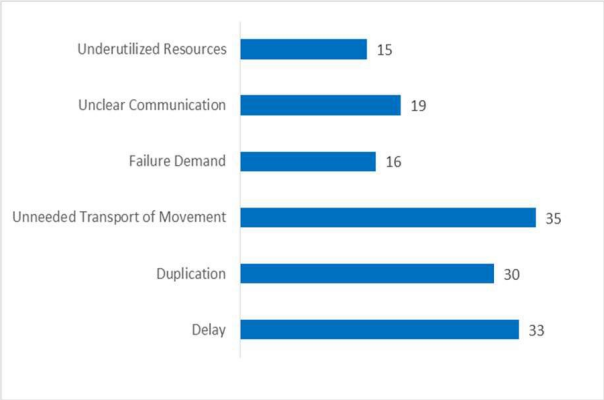

Figure 4. Rating of Critical Waste.

Figure 5. Mapping the Risk.

application of lean manufacturing ideas to service industries. In relation to lean manufacturing, lean service focuses on the elimination of waste and the improvement of efficiency in work processes [2]. 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 [5].

Waste determination in service may be complex considering that the operation are intangible. In addition, new wastes can be formulated, apart from traditional ones. Type of waste in service industry are categorized into 8 types[5]:

a. Overproduction: Completion of more work than needed prior to its being demanded by customer.
b. Delay: Delays in terms of employees or customers waiting for information or service delivery.
c. Unneeded Transport of Movement: Needless, non-adding value movement of resources (people or items).
d. 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.
e. Excessive Variation, Lack of Standardization: Lack of standardization in the offer or processes, procedures, formats, including expired or outdated with no standard time defined.
f. 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.
g. Underutilized resources: Waste of resources, especially human potential, not leveraging employee's talent and potential, under-using their skills, creative abilities and knowledge.
h. Manager's Resistance to Change: "Saying no" attitude from the management, not encouraging all employees to get involved in the continuous improvement process.

B. Value Stream Mapping

Reducing waste and improving material flow are two of the primary goals of lean. In order to reduce or eliminate waste, understanding of current process is needed and a value stream map (VSM) is an effective way to highlight waste and its causes. A well-constructed VSM illustrates flow and the barriers to smooth flow, thing that cause longer lead times and higher inventories. A VSM consists of three main components namely material flow, information flow, and timeline [6]. In this study, VSM will be designed to map the current state and future state. Current state map represents how the company organizes and progresses work today. It defines the project's baseline and forces the team to get acquainted with the process and to investigate and question how and why it is performed in a certain way [7]. While future state map focuses the direction of a new design for value stream and its intended performance at a specific point in a lean transformation. Future states can describe how the value stream should operate over wide range of timelines [8].

C. Process Activity Mapping

In order to create improvements in the supply chain it is suggested that at least an outline understanding of the particular wastes to be reduced must be gained before any mapping activity takes place. There are seven stream mapping tools which were already well-known as tools to map the value stream according to the waste that has been identified shown in see Table 1 [9].

Process activity mapping has its origins in industrial engineering which comprises a group of techniques that can be used to eliminate waste from the workplace, inconsistencies and irrationalities, and provide high-quality goods and services easily, quickly and inexpensively [9]. In process activity mapping, all activities in process are categorized in 5 terms of variety of activity types (operation, transport, inspection, delay, and storage). Operation and inspection are types of value-added activities, while transport and storage are activities which are necessary but non value-added. The delay is an activity that should be avoided thus it is non-value-added activities.

D. Borda Count Method (Bcm)

Borda count method is a voting method used to make decision in selecting the winner either single or multiple winner. The Borda count considers the entire ranking of individual preferences when making the choice. Each alternative is given a count based on its ranking in individual's preferences. For n alternatives, the most frequently used way to assign counts to alternatives is n-1 points for each ballot on which it is ranked first, n-2 for second, etc., down to 0 for last place. The alternative with

the highest total count wins. Variations of the Borda count method may assign different weights to different ranks. The Borda count method chooses a Borda winner which does not always coincide with the Condorcet winner [10].

E. Root Cause Analysis (Rca)

Root cause analysis is the process used to reach the primary cause or causes of a problem. Root cause is the core reason or reasons that the problem exists. Aiming performance improvement measures at root causes is more effective than merely treating the symptoms of a problem. Root Cause Analysis (RCA) is effectively performed on the issue. RCA is performed systematically, with conclusions and causes backed up by documented evidence [11].

The 5 Whys is one of other quality tools may be of great use in assisting a root cause investigator. One if simple concept that should be used during any root cause analysis is asking "why" five times. Repeatedly asking why prevents focusing on obvious symptoms while ignoring the true root cause [12]. 5 Whys identifies the contributors of an adverse event or near miss and clarifies the underlying causes. It is a simple approach that works by peeling away the onion skin of subtle causal factors to uncover opportunities for mitigation and prevention of future events [13]. Using the 5 whys method can lead from the obvious proximate cause to the ultimate cause [12].

F. Risk Analysis

Risk analysis is the stage to identify and evaluate the controls that exist on that moment, determine the consequences and likelihood as well as cause of risk level. Risk can be analyzed using assessments of the likelihood of occurrence and the consequences if it occurs. When likelihood and consequences have been identified, then evaluation with prioritizing the most significant risks must be performed first [14]. Risk analysis assessment is performed by multiplying its likelihood and its consequences and mapping it to the Risk Map shown in Figure 2.

In this study, the result of risk analysis will be taken into consideration by the organization to determine which issues will be resolved as priorities.

III. RESULT AND DISCUSSION

Nowadays, Lean principle has been applied in several enterprises as a means of providing products and services that creates value for customers with minimum amount of waste and maximum degree of quality. Yet, it can be more difficult to bring the concept of Lean into the office environment than manufacturing area due to lack understanding, lack of cooperation between departments and also lack of directive from the top[4]. The proposed procedure for implementing lean in this study consists of 5 steps.

A. Step 1. Drawing the current-state map

In order to figure out the waste and its root cause, understanding of current process flow becomes an important thing to do. The detail current bidding process flow is depicted in Figure 3.

By mapping out all activities in the bidding process into the value stream mapping, we will have information of total lead time and total process time. According to this study, total lead time to complete 1 bidding is 20,645 min ≈ 43 working days while total process time is 5,017 min ≈ 11 working days.

B. Step 2. Performing Process Activity Mapping (PAM)

The next step is classify all activities in the bidding process into 3 types namely Value added (VA), Non Value Added (NVA) and Necessary but Non Value Added (NNVA) with Process Activity Mapping. From this particular analysis we found there are 33 activities with total time 2,390 min are categorized as value added activities (44.6%), 30 activities with total time 1,160 min are categorized as necessary but non value added activities (40.5%) and 11 activities with total time 1,467 min are classified as non-value added activities (14,9%). Since it still shows the presence of NNVA and NVA, we can assume that waste still occurs in the bidding process. From service perspective, we can determine the efficiency by using value added ratio with formula [15]:

$$Value\ Added\ Ratio = \frac{Value\ Added\ Time}{Total\ Lead\ Time} \times 100\%$$
$$Value\ Added\ Ratio = \frac{2{,}390}{20{,}645} \times 100\% = 11{,}58\% \quad (1)$$

For most of the services, if its value added ratio is greater than 20% then it can be considered sufficient [7]. In this case study, we found out the value added ratio is less than 20% which means this process is not efficient enough.

C. Step 3. Waste identification and determining the critical ones

Based on the observation and brainstorming with the parties involved in the bidding process, we identified 6 types of waste occurring in the bidding process. Those waste are 1) Delay which is caused by long waiting time for checking process, completion document and approval process; 2) Duplication for some activities i.e. frequent checking process and sending document as well as repetition in the bidding submission; 3) Unneeded transport or movement in terms of contact vendors for several purposes ; 4) Failure demand where some processes have been done in an inappropriate way; 5) Unclear communication where it causes revision in scoring process; and 6) Underutilized resources that causes corrective action has to be performed for several issues. Determination of critical waste have been conducted with Borda Count Method which is illustrated in Table 2 and Figure 4.

In this study we only select 3 out of 6 waste to be followed up with the corrective action. As for the three waste in sequence are 1) Unneeded transport of movement; 2) Delay; and 3) Duplication.

D.Step 4. Determining the root cause

Once critical waste has been identified, it should be followed up with root cause analysis where in this study we used 5 Whys method. For waste of unneeded transport of movement consists of 2 sub waste namely contacting vendors who haven't sent confirmation of intent to participate in the bidding process as well as to remind vendor regarding bidding submission deadline. The root cause of those issues is vendors are accustomed to communicating by phone for their activities rather than email and often forgetting the bidding submission deadline. While for waste of delay consists of 3 sub waste that are waiting time for checking Competitive Quotation Report (CQR) or Bidding Evaluation Summary (BES), waiting time for SSA approval as well as waiting time for correct supporting document from the vendors. The root cause of those particular issues is no standard time has been set as maximum time limit for checking and approval process and vendor has sent incorrect/incomplete supporting document. The last waste is duplication that consists of 4 sub waste i.e. frequent checking process of CQR/BES, repetition of bidding submission, checking bidding supporting documents, and repetition of sending compile quotation to local procurement. The root cause for those issues are change in user's business strategy, the ultimate user as the budget owner plots the budget without considering the market price, technical scoring was received late from user, and not all procurements have sufficient knowledge regarding the requested documents.

E. Step 5. Designing recommendation for improvement plan

After obtaining the root cause with 5 Whys method then followed up with risk analysis by mapping the likelihood and the consequences of sub waste which is illustrated in Table 3 into the Risk map that is depicted in Figure 5.

According to risk analysis, waste that will become our main focus to be followed up with improvement plan is waste with category extreme and high risk. The recommendation of improvement plan which proposed by the authors in this study is illustrated in Table 4.

IV. CONCLUSION

This paper has demonstrated that lean concept is able to be implemented in the service industry as an effective way to increase organizational competiveness and customer satisfaction. However, due to the different nature between manufacturing and service industry, applying lean to service industry is quite challenging and it must be often reinterpreted and redefined in proper way. The introduction of lean concept in any service activity must begin with a deep understanding of service inherent aspect and close knowledge of customer value. In this particular study, we can see that implementation of lean concept in the bidding process can improve procurement's work efficiency because by using this concept we are able to recognize activities which have contributed to be waste and its root cause, thereby we are able to design appropriate improvement plans.

ACKNOWLEDGEMENT

We sincerely thank to PT XYZ who has given us opportunity to conduct research on their bidding process flow. We also express our sincere thanks to all parties for their support, assistance, input and feedback which is very useful in order to complete this study.

REFERENCE

[1] Sarkar, Debashis, "Lean for Service Organizations and Offices: a holistic approach for achieving operational excellence and improvements", Milwaukee, WI, Quality Press, 2007.
[2] WiseGEEK, "What are Lean Services?", WiseGEEK.,[Online]. Available: https://www.wisegeek.com/what-are-lean-services.htm, [Accessed: 28-12-2019].
[3] Gasperz, V., "Lean Six Sigma for Manufacturing and Service Industries: Waste elimination and Continuous Cost Reduction", revision ed., Bogor, Vinchristo Publication, 2011.
[4] Chen, J. C., & Cox, R. A., "Value Stream Management for Lean Office—A Case Study. American Journal of Industrial and Business Management", 02(02), 2012, 17–29.
[5] Andrés-López, E., González-Requena, I., & Sanz-Lobera, A., "Lean Service: Reassessment of Lean Manufacturing for Service Activities", in Procedia Engineering The Manufacturing Engineering Society International Conference, MESIC, 132, 2015, pp. 23–30.
[6] King, P.L., & King, J. S., "Value Stream Mapping Process Industries: Creating a Roadmap for Len Transformation", 1st ed., New York, CRC Press, 2015.
[7] Bonaccorsi, A., Carmignani, G., & Zammori, F., "Service Value Stream Management (SVSM): Developing Lean Thinking in the Service Industry. Journal of Service Science and Management", 04(04), 2011, 428–439.
[8] Keyte, B., & Locher, D. A. (n.d.), "The Complete Lean Enterprise Value Stream Mapping for Office and Services",2nd ed., Florida, CRC Press, 2016.
[9] Hines, Peter and Rich, Nick, "The Seven Value Stream Mapping Tools", in International Journal of Operations and Production Management Vol.17 No.1, MCB University Press, 1997, pp. 46-64.
[10] Cheng, K. and Deek, F., "Voting Methods and Information Exchange in Group Systems", in Proceedings of the 12th Americas Conference on Information Systems, 2006.
[11] Qualitymag, "Getting to the Root Cause", Qualitymag, [Online]. Available: https://www.qualitymag.com/articles/92778-getting-to-the-root-cause, [Accessed: 28-12-2019].
[12] Barsalou , M. A., "Root Cause Analysis: A Step-By-Step Guide to Using the Right Tool at the Right Time", Florida, CRC Press, 2015.
[13] Kudla, A. U., & Brook, O. R., "Quality and Efficiency Improvement Tools for Every Radiologist", in The Association of University Radiologist, Vol. 25, Elsevier, 2018, p.p 757–766.
[14] Anityasari, M. and Wessiani, N.A., "Analisa Kelayakan Usaha Dilengkapi dengan Kajian Manajemen Resiko", 1st ed., Surabaya, Guna Widya, 2011.
[15] Ririyani, Vika & Singgih, Moses L., "Peningkatan Efisiensi di PT Varia Usaha Beton dengan menerapkan Lean Manufacturing", in Proceeding of the 23rd National Conference of Management Technology, Surabaya, 2015.
[16] Fanani, Zaenal & Singgih, Moses L., "Implementasi Lean Manufacturing untuk Peningkatan Produktivitas (studi kasus pada PT. Ekamas Fortuna Malang)", in Proceeding of the 13rd National Conference of Management Technology, Surabaya, 2011.