

TIME WASTE IDENTIFICATION USING VALUE STREAM MAPPING IN WOOD MANUFACTURING

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Abstract. This paper aims to describe the application of Value stream mapping to identify the time in the barecore product realization process in PT.XYZ. In addition to identifying time, value stream mapping can discover some wastes that occur in the product realization process. The waste found is made as the basis for maintenance. This study was conducted with several stages. The first stage is to conduct current mapping to depict the actual conditions in the product realization process. The second phase is to analyze current value stream mapping with the data demand 40 container in September until November. It is found that there is difference in the execution time of the process, so the waste that causes it and how to solve the problem will be analysed. The future state mapping is the last step in this study, and it is found in this step that there is time reduction in the barecore product realization process. The use of value stream mapping application in this study managed to finding wastes that occur in the barecore product realization process. Waiting time are the processes by which all the divisions in the product realization process experience. Objective to find solution for eliminating waste. This study found a solution that can reduce waste. The email that will be used in the process of reporting documents. A system of electronic signature that will accelerate the process which requires ratification documents needed. Reporting is a multiplication reporting system, where the presence of this multiplication system will make the fulfillment of some process completed rapidly. The Follow-up process is one of the alternatives process of company that is always waiting for the requested process comes into its own. So with the minimum limit of the follow-up, it will accelerate the next process to be done. Future value stream mapping that is created reduces the use of time that occurs within the product realization process. It is observed, in the process of product realization with demand 40 container could reduce the time by 0.58 days.

Keyword: Value Stream Mapping (VSM), Process Mapping, Lean, Waste.

Introduction

Global competition has prompted many companies to adopt new manufacturing approaches such as lean manufacturing (LM) in order to be more competitive (Shah and Ward, 2003). Goal of lean manufacturing is to reduce waste in manpower, inventory, time to market, to become highly responsive to customer demand while producing quality products in a most efficient and economical manner (Womack & Jones, 1996). Womack, J., Jones, D. and Roos, D (1990) mentioned that lean was initially born out of the manufacturing industry. However, the concept of lean can be applied in service-based fields. Lean in the field of service bears the same principle, namely "continuous improvement" and "eliminating non-value-added activities alias waste". According to Ross & Associates Environmental Consulting 2008, the lean method has been applied in the United States, particularly in environmental agencies since 2003. They could carry out their mission in a better, faster and cheaper way, and increase effectiveness, efficiency, and transparency of government programs and services. Despite the great success of the lean concept there have been concerns raised regarding the research that informed it and questions asked about its actual competitive impact (Lewis, 2000). Lasa et al.

(2008) showed that VSM is a valuable tool for redesigning of the productive systems and found that there are some key points for the establishing teams that have to take into account for designing of suitable information systems. The primary objective of the VSM is to identify all kinds of waste in the value stream and to take actions to eliminate these (Rother & Shook, 1999). The following list summarizes the success of various organizations in implementing Value Stream Mapping, Sahoo et al. (2008) have implemented VSM tool in forging industry and improved in all aspects of production system. Singh and Sharma (2009) implemented VSM approach in an Indian manufacturing organization and witnessed 92.58 percent reduction in lead time, 2.17 percent reduction in processing time, 97.1 percent reduction in WIP and 26.08 percent reduction in manpower requirement.

PT. XYZ is one of the industry engaged in wood processing. It generates 3 refined products which are barecore, blockboard and polyester. Barecore dan polyester have achieved sales to fulfill export order. This study is focused on process barecore product realization with value stream mapping. Because due to every raw material used by the blockboard and polyester products have to go through the stage of the barecore production process first. The emerging issues related to order fulfillment, the business process that carried out is very long. So as, in pursuing the target of shipping orders, PT. XYZ requires additional time. This additional time occurs due to the existence of shortage of quantity order fulfillment. The additional time causes a high cost effect. This high cost happens because of the penalty caused by the company that exceed the time limit of shipping orders. Additional time also affect the product quality due to there are still rejection products in every production process. Conducting an analysis of value steam mapping that occur within the barecore product realization process in PT. XYZ is one way of solving the problem and to see the flaws and errors of the process undertaken at this time.

Literature Review

The ultimate goal of lean manufacturing is to reduce waste in manpower, inventory, time to market, to become highly responsive to customer demand while producing quality products in a most efficient and economical manner (Womack & Jones, 1996). According to Schwiebert, E. and Schwiebert, P. (2008), lean in the office is streamlining and eliminating waste from administrative processes and adding value. Lean is focused on doing the right things, at the right place, and at the right time, throughout every step from product development to order fulfillment (George, 2002). Liker and Wu (2000) defined it as a philosophy of manufacturing that focusses on delivering the highest quality product on time and at the lowest cost. It as the systematic removal of waste by all members of the organization from all areas of the value stream (Jones and Womack, 2000). It is well known that seven types of waste generally occur (Sullivan, McDonald & Van Aken, 2002). Lasa et al. (2008) showed that VSM is a valuable tool for redesigning of the productive systems and found that there are some key points for the establishing teams that have to take into account for designing of suitable information systems. Identifies According to (Gill, P.S. 2012), Value Stream Mapping can be divided into six steps:

1. Identification of service family.
2. Creating a current value stream from the organization and customer point of view.
3. Making an ideal future state mapping.
4. Improvement actions to close the gap between current and future conditions.
5. Conducting improvement actions.
6. Making a new current state mappping.

Seth and Gupta (2005) describes VSM as the complete process of mapping the raw material and information flows of all the processes in a value stream that starts from suppliers to production process and distribution to the end customer. VSM is a pencil and paper visualization tool that shows flow of material and information as a product makes its way through the value stream (Rother and Shook,

1999). A value stream can be defined as a sequence of activities required to design and manufacture/provide a product or service (Erlach, 2010). Process mapping is a technique that captures knowledge contained within an organization (Parry et al., 2010). Process mapping is a powerful tool for improving efficiency; it could show control breakdowns, bottlenecks, unproductive utilization of resources, redundant steps; non-value added activities and root causes of problems (Keller and Jacka, 1999 Savory and Olson, 2001, and Paradiso, 2003). Once the current state map has been analyzed the future state map can then be produced to show how the company could operate more effectively (Pavnaskar et al., 2003). Lasa et al., 2008, Based on guidelines aforementioned, the study has developed the future state map. The future state of map has constructed with incorporation of various.

Methodology

The methods that used in this study through three steps. The first step is looking for the problem in there. The second step is analyze and complete the problem and the last is how to apply the solution. First step, in internal company there are some problems that occurred, that is the additional time, cost and quality high. Additional time can be happened due to addition time in the process to achieve target's order. While high cost can be happened due to penalty that caused by additional time. Additional time also affects toward the quality of production in the production process where there is still a reject goods. Based on the problem, it needs evaluation of business process within the realization process of barecore's product. Business processes in the realization of the products are included customer orders, release orders, production and warehouse. For seeing the problem that happens will be mapping in the stage of product realization. It is also doing to look at the overall process that occurs in the division, which is involved in the product realization process barecore.

The second step is the improvement of the problem that occurred. By doing stages of the process improvement. Making the analysis of value stream mapping. This includes mapping the business process that occurred right now in the process of realization barecore's product, identify waste that contained in the business process. Doing streamlining process which is part of step process in Business Improvement and Mapping process to make the product realization and process barecore be ideal. Followed by integrating the results of the field observations, historical data collection, study literature and doing-depth interviews with the management of the company in October-December 2015. The final results of this study is to provide recommendations to the existing problems. Recommendations will help the company to reduce the problem in the realization product process barecore. The third stage is the implementation that can be done by the company where this implementation as the recommendations of this study. It would be reduced the problems that occurred in the company.

Data Analysis

Barecore is processed wood core made from core pieces through the process of gluing and pressing. Core pieces themselves are a form of small timbers in the form of sticks made of wood beams that are cut with a smooth surface on each side. In accordance with its function, barecore product is included into semi-finished products which will be processed into the other products by the consumers. Barecore product processing process is much easier than other processed wood products. Therefore, the sales price is much cheaper, but the quantity demand for Barecore is far more for export market. So from the Barecore broduction, the profit of PT. XYZ is much faster. Barecore product has 2 levels of quality. The quality which is included into grade A is a product that will meet the export demand. While Grade B is the product that will be used as raw material in the production of Block Board and Polyester or for local sale. For a product with a grade A quality, there should be no fibers to the surface and must not be any knots in the product. The system used in the sale of the product Barecore, to

know order fulfillment carried per container. In one container, if counted per cubic contained 52 cubic Barecore or if seen from 1510 counts per sheet contained sheet.

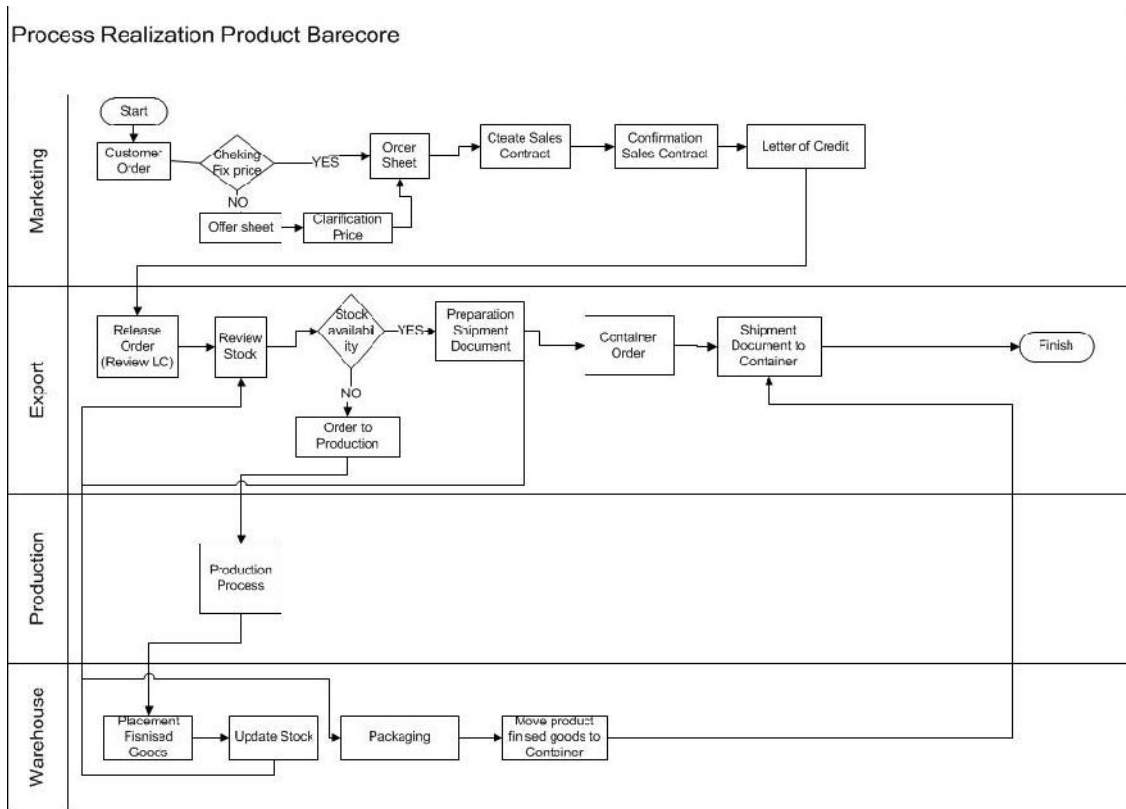


Figure 4.8 Realization Product Barecore General with Flow Chart

The object of this study is the product realization process barecore in PT. XYZ. In the process of realization, there are 4 division involved, Marketing, Export, Production and Warehouse. The picture above is the whole process begins when the order until delivery process. The following is the graphic showing orders given by the company.

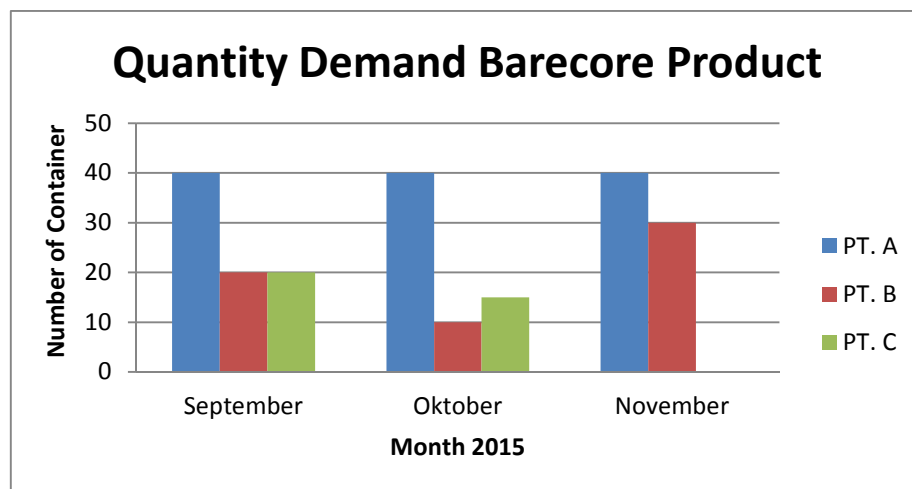


Figure 4.9 Quantity Demand Barecore Product

The flow of information in the value stream mapping picture complete, the final step in making the value stream mapping is to equip lead time. The data that is used to do value stream mapping analysis is demand 40 container that happened from September to November.

Table 4.3 Total Poces Time for Demand 40 Container

40 Demand(Container)			
	Total process (VA AND NVA)	Value Added (Day)	Non-Value Added (Day)
Marketing			
Customer Order (day)	0,14	0,08	0,06
Cheking Fix Price (day)	0,24	0,12	0,12
Order Sheet (day)	0,14	0,07	0,07
Create Sales Contract (day)	0,14	0,07	0,07
Confirmation Sales Contarct (day)	1	0,07	0,93
Letter Of Credit (day)	2	2	0
Total Time Marketing Process (day)	3,67	2,42	1,25
Export			
Release order (day)	0,07	0,04	0,04
Review Stock (day)	0,14	0,14	0
Stock availability (day)	0,29	0,07	0,21
Preparation Shipment document (day)	2	0,04	1,96
Container Order (day)	1	0,07	0,93
Shipment document container (day)	0,07	0,07	0
Total Time Export Process (Day)	3,57	0,43	3,14
Production			
Production product (Day)	12	12	0
Day X 2 Shift	24	24	0
Warehouse			
Placemnt finished Goods (day)	0,57	0,57	0
Update Stock (day)	0,07	0,04	0,04
Packaging (day)	0,43	0,43	0

Move Product finished Goods (day)	0,57	0,57	0
Total Time Warehouse	1,64	1,61	0,04

For filling Current value stream mapping with general value, using total time needed by one division to finish all the process. Here is the figure 4.15 current value stream mapping in realization product barecore general.

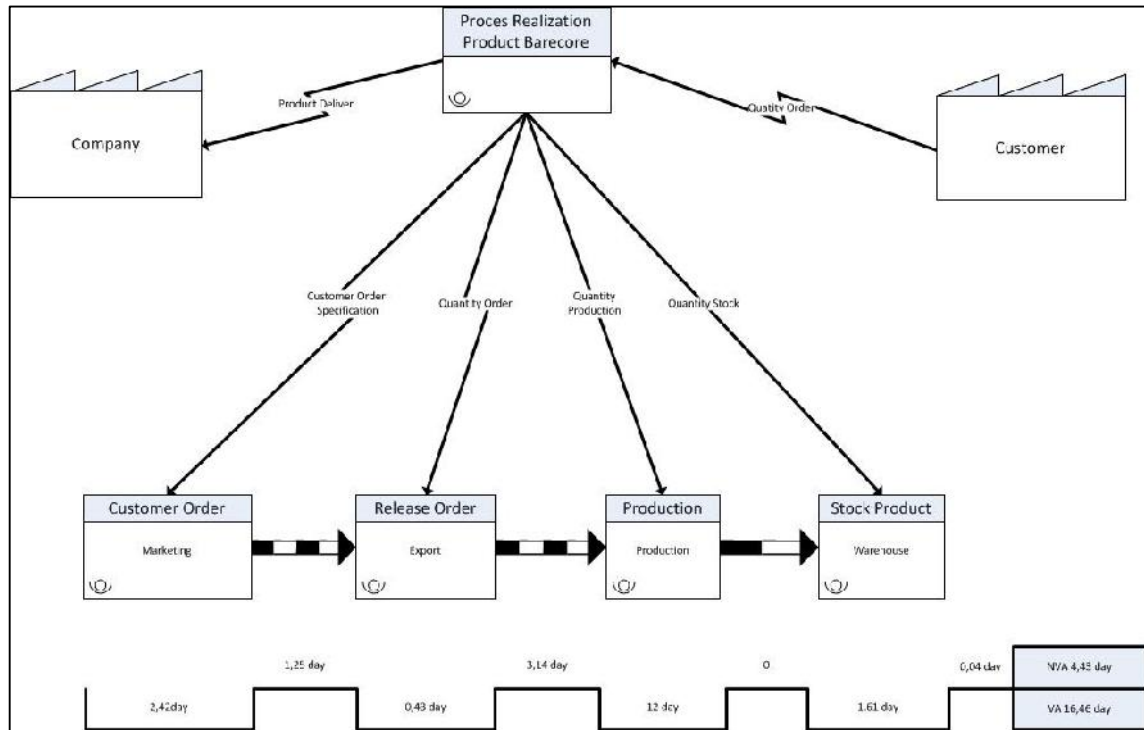


Figure 4.15 Current Value Stream Mapping in Realization Product Barecore General

Based on the figure 4.15 above the total amount that is used in one time handling order process is 20,9 day, where the total value added is 16,46 day and the total of non-value added is 4,43 day. The next step is making the value satram mapping analysis. This analysis will focus on reducing the time of non-value added in every process. In omitting non-value added, it will focus on waste waiting in every division process. Marketing, waiting time occurs in the customer order, check fix price, order sheet, create sales contract and confirmation sales contract process. Export, waiting time happens order release, stock availability, preparation shipment document, and container order process. Warehouse, on update stock process.

After doing the identification waste waiting from the process in every division, continue with reducing the time of non-value added. This reducing is done with several alternative solutions. Email, with the reporting process that uses email will reduce the time as much as 15 minutes. This 15 minutes is obtained from the confirmation the management party. Electronic signature, electronic signatures will facilitate the process of reducing the time required to conduct the ratification document. Reporting double system, Not only one person can be responsible for doing reporting process. It can be seen from working hour available. This reporting system is one of the alternatives that can be applied with email system. Follow Up is used to ensure the certainty of a decision, where the company will only waiting and do nothing in this process.

Creating future value stream mapping was done by reducing non-value added time which contained in the process with the implementation of an alternative solution. Here is the table that is used to differentiate time of current and future non-value added.

Table 4.4 Future Non-Value Added

Demand 40 (Container)		Alternative Solution					
Marketing	Current NVA (Day)	Email 15 Minutes	Electronic 30 Minutes	Reporting 10 minutes	Follow up 30 minutes	Total alternative solution (day)	Future NVA (Day)
Customer Order	0,06	15		10		0,06	0
Checking Fix Price	0,12			10		0,02	0,1
Order Sheet	0,07				30	0,07	0
Create Sales Contract	0,07		30			0,07	0
Confirmation Sales Contract	0,93				30	0,07	0,85
Letter Of Credit	0					0	0
Total Time Marketing Process (Day)	1,25					0,3	0,95
Export							
Release order	0,04	15				0,04	0
Review Stock	0					0	0
Stock availability	0,21				30	0,07	0,14
Preparation Shipment document	1,96	15	30			0,11	1,86
Container Order	0,93				30	0,07	0,86

Shipment document container	0					0	0
Total Time Export Process	3,14					0,29	2,86
Production							
Production product (Day)	0					0	0
Day X 2 Shift	0					0	0
Warehouse							
Placement finished Goods	0					0	0
Update Stock	0,04	15				0,04	0
Packaging	0					0	0
Move Product finished Goods	0					0	0
Total Time Warehouse Process (day)	0,04					0,04	0

To see the difference between current and future time of Non-value added, it can be seen on the table 4.5 below that will describe the summary clearly:

Table 4.5 Summary Time Current and Future Non-Value Added and Value Added in General

Demand 40 container	CURRENT		FUTURE		Reduce NVA
	NVA	VA	NVA	VA	
Marketing (Day)	1,25	2,42	0,95	2,42	0,3
Export (Day)	3,14	0,43	2,86	0,43	0,28
Production (Day)	0	12	0	12	0
Warehouse (Day)	0,04	1,61	0,04	1,61	0

The time used is the total time used by each division in the finishing order. From table 4.5 for the marketing division, time of non-value added could be reduced during 0.3 day. And for the process of export division, it was reduced to 0.28 day. Here is a future value stream mapping in realization product barecore general.

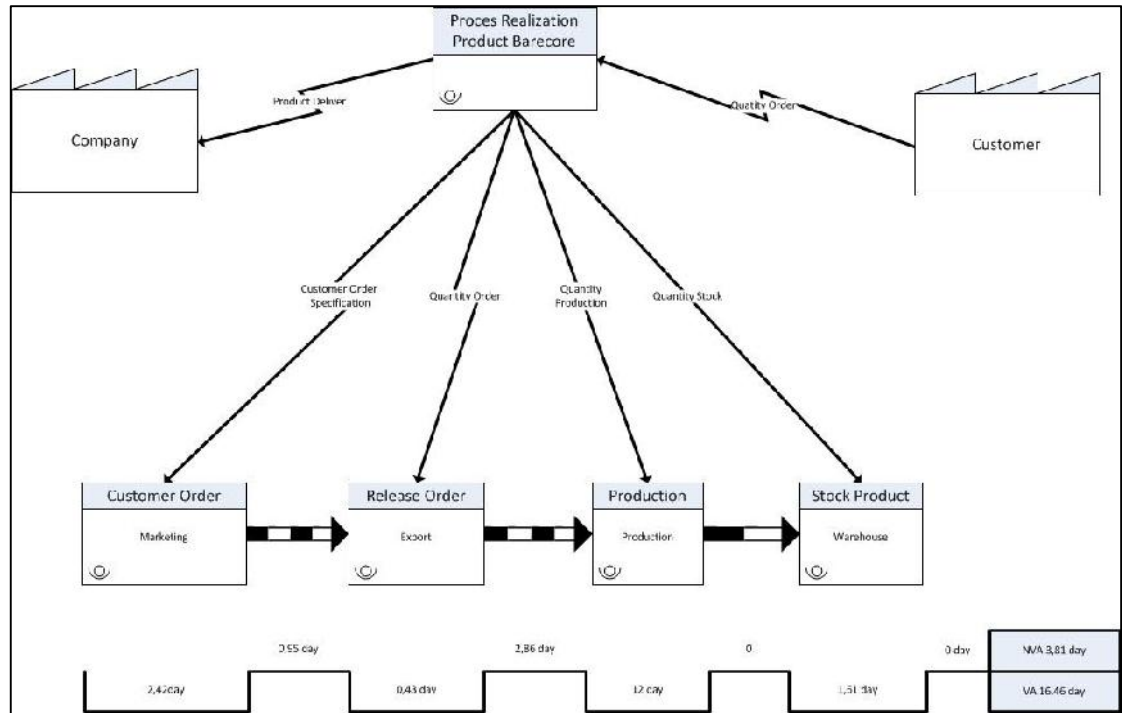


Figure 4.20 Future Value Stream Mapping in Realization Product Barecore General

Conclusion and Recommendation

Conclusion

- This study shows that value stream mapping helps in reducing the non-value added time that exist within each division process. By using the data to make the fulfillment of demand 40 container, companies can reduce non-value added time as much as 0.58 day.
- Alternative solution that was done to reducing waste is the email that will be used in the process of reporting documents. A system of electronic signature that will accelerate the process which requires ratification documents needed. Reporting is a multiplication reporting system, where the presence of this multiplication system will make the fulfillment of some process completed rapidly. The Follow-up process is one of the alternatives process of company that is always waiting for the requested process comes into its own. So with the minimum limit of the follow-up, it will accelerate the next process to be done.

Recommendation

- To eliminate waste time of waiting that cause non-added value, company can implement an alternative solution that has been given. So the company will be able to reduce non-value added time that occurred within the company.
- Conducting the evaluation system of the existing systems periodically, where's the finding in this study reinforcing that the company is lacking in doing the evaluation. With the periodically evaluation, the company can further improve the productivity of every process that was done.

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