DEVELOPMENT OF VALUE STREAM MAPPING FOR PALM OIL COMPANY – A CASE STUDY

MUHAMAD FITRI BIN ABDUL KADIR
B051410200

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DEVELOPMENT OF VALUE STREAM MAPPING FOR PALM OIL COMPANY – A CASE STUDY

This report is submitted in accordance with requirement of the University Teknikal Malaysia Melaka (UTeM) for Bachelor of Manufacturing Engineering (Hons.)

by

MUHAMAD FITRI BIN ABDUL KADIR
B051410200
950220-14-5615

FACULTY OF MANUFACTURING ENGINEERING
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I hereby, declared this report entitled “Development of Value Stream Mapping for Palm Oil Company – A Case Study” is the results of my own research except as cited in references.

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APPROVAL

This report is submitted to the Faculty of Manufacturing Engineering of Universiti Teknikal Malaysia Melaka as a partial fulfilment of the requirement for Bachelor of Manufacturing Engineering (Hons). The member of the supervisory committee is as follow:

…….....

(PM Ir. Dr. Puvanasvaran A/L A. Perumal)

ABSTRAK

Pada masa kini, dalam bidang pembuatan industri, persaingan semakin sengit di kalangan industri-industri. Untuk meningkatkan pengeluaran dan mempunyai kualiti produk yang baik tanpa menghasilkan apa-apa pembaziran adalah rumit. *Value Stream Mapping* (VSM) adalah salah satu kaedah pembuatan cepat yang digunakan untuk mengenalpasti semua aliran proses, maklumat dan data dari bahan mentah hingga selesai menjadi produk dengan baik. Kajian ini adalah mengenai masalah yang berlaku dalam barisan pengeluaran kerana terdapat banyak pembaziran dan sasaran syarikat untuk Produk X tidak tercapai. Ini adalah ilustrasi yang baik untuk menggambarkan *Current-State Value Stream Mapping* (CSVSM) untuk mengenal pasti dan mengira tujuh jenis pembaziran dalam proses pengeluaran. Tujuan projek ini adalah untuk mencadangkan *Future-State Value Stream Mapping* (FSVSM) di Industri X untuk menghapuskan pembaziran di sepanjang barisan pengeluaran Produk X dan mencadangkan idea penambahbaikan. Untuk melakarkan pemetaan VSM, Microsoft Visio 2013 adalah alat terbaik yang boleh digunakan. Gambar rajah *Ishikawa* telah digunakan untuk mengenal pasti punca utama masalah pembaziran. Seterusnya, tiga idea penambahbaikan dicadangkan. Sebagai idea, kaedah dan teknik perkilangan terbaik seperti 5S dan Kaizen telah dicadangkan untuk mengurangkan sisa pembaziran yang berlaku dalam proses. Projek ini juga mampu mengurangkan masa bagi setiap process dan masa permulaan proses sehingga habisnya waktu pemprosesan satu produk sebanyak 17.46% dan 12.12% masing-masing.

ABSTRACT

Nowadays, in manufacturing industries field, the competition are more intense. To increase the throughput and have a good quality of product without producing any waste is quite challenging. Value Stream Mapping (VSM) is one of lean manufacturing tools that used to visualize all the process flow and information from raw material to finished good. This project is regarding the problem that occurs in the production line are lots of waste that affects to company's target for Product X. It is a good illustration of Current-State Value Stream Mapping (CSVSM) to identify and quantify the seven types of waste in the production line. The purpose of this project is to propose Future-State Value Stream Mapping (FSVSM) at Company X to eliminate the waste along the Product X production line and recommend the improvement ideas. In order to develop the VSM, Microsoft Visio 2013 is a best tool that can be used. Ishikawa Diagram has been used to identify the root cause of the waste problems. Next, three improvement ideas are proposed. As the ideas, lean manufacturing tools and technique such as 5S and Kaizen have been proposed in order to reduce the waste occur along the process. This project able to reduce both cycle time and lead time by 17.46% and 12.12% respectively.

DEDICATION

I dedicated this to my respected supervisor, PM Ir. Dr. Puvanasvaran A/L A. Perumal for the unwavering guidance, my parents who always supported and helped me during this final year project. I also dedicated this to my fellow friends that showed supports during completion of this project.

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LIST OF ABBREVIATIONS

VSM	-	Value Stream Mapping
CSVSM	-	Current-State Value Stream Mapping
FSVSM	-	Future-State Value Stream Mapping
CT	-	Cycle Time
C/O	-	Change Over
VA	-	Value Added
NVA	-	Non-value Added

LIST OF SYMBOLS

%	-	Percentage
MPa	-	Mega Pascal
GPa	-	Giga Pascal
°C	-	Degree Celsius
s	-	Second
min	-	Minute
No.	-	Number
Tobs	-	Observation Time
PR	-	Performance Rating
Tn	-	Normal Time
Avg	-	Average
Tavg	-	Average Time
&	-	And
=	-	Equal
tan	-	Tonnes
rpm	-	Revolution per minute
MT	-	Metric Tonne
RM	-	Ringgit Malaysa
n	-	period

CHAPTER 1
INTRODUCTION

This introduction chapter provides the background of the project, background of industry, problem statement, objectives, scope and significant of the project.

1.1 Project Background

The manufacturing industry is turning out to be more aggressive and challenge with other companies to expand their proficiency and profitability. The significance of manufacturing is the production of raw materials into completed product which following of customer requests and demands. The waste can be represented by seven types of waste (muda) including overproduction, transportation, waiting, unnecessary motion, inventory, overprocessing, and rework/defects. It is a key push to build the value added works through the eliminating waste and diminishing coincidental works.

Lean Manufacturing is one of the concept to minimize or eliminates the seven types of waste. Lean manufacturing which known as a set of production techniques that were first devised by the Toyota Motor Corporation in the early 1950's. There are various tools and techniques that can eliminate these types of waste. There are 5S, Poka Yoke, Andon, Kanban, Line Balancing, Kaizen, Value Stream Mapping and more.

Value Stream Mapping (VSM) is one of a lean tools and techniques that used to break down the flow of materials and information currently which required to bring a product to customers. It is useful for identifying the target product. The developed current-

state value stream mapping will indicates the current process, postponements, and data stream required to deliver the focused product. It needs to assess how waste can be eliminated from the current-state value stream mapping. Then, by developing the future-state value stream mapping which consists of revised process which waste eliminated and improves the cycle time or lead time. The benefits of using VSM are the strength itself helps to visualize to an organization in identifying and eliminating the waste in the production line. With the VSM, it's a powerful technique to eliminate waste by identifying and analyzing on the current-state and came out with proposal of future-state mapping.

1.2 Industry Background

Company X was established in 1984 with the cost of RM20 millions. It is located about 50 km from Tanjung Malim and 30 km from Bestari Jaya. This company has a capacity of 54 metric ton/hour and the operation time is 24 hours. The staff was divided into two shift which are Shift A and Shift B. Most of the staff lives in the residences that were provided by Company X and located about half km from the company. Company X is headed by a manager Mr Ikhwan and three assistant manager engineers whose are Mr Mohamad Faizal and Mr Ahmad Syakir for production and Mr Norul Hisham for maintenance. The main activity of Company X is buying raw material which is Raw Material X from several areas which are Felda Sungai Tengi, Felda Soeharto, Felda Sungai Tengi Selatan, Felda Gedangsa as internal suppliers and others from the outside as external suppliers to process several products and by-product.

1.3 Problem Statement

Industry nowadays are encountering lots of waste in the production because they are not able to identify it. Company X, as a manufacturing industry also having the same problem as related to the wastes such as overproduction, transportation, waiting, unnecessary motion, inventory, overprocessing, and rework/defects. The raw material is material X and the product is product X. Raw material X is received from several areas which are Felda Sungai Tengi, Felda Soeharto, Felda Sungai Tengi Selatan, Felda Gedangsa and also from the outside for this industry to extract it.

Table 1.1: Palm size plantation

Project	Size area (hectar)
Soeharto	3,119.23
Gedangsa	2,732.23
Sg Tengi	2,304.42
Sg Tengi Selatan	363.00

By referring to the Table 1.1, it can see clearly that for internal suppliers are very huge (8,518.88 hectar) for this industry to process all of it. For production industry, it is very important for them to maximize its current production to achieve the demands.

Table 1.2: Company X's production

Parameters	Target	Month 2017						
		January	February	March	April	May	Jun	July
Product X (%)	100	93	92.22	87.34	84.25	85.17	86.67	88.74

By referring to the Table 1.2, it shows the tabulation of production product X in percentage over month 2017. It can see clearly that from January to July of product X does not achieved the target as 100%. The production is not a stable production rate. From the data in the table, the next step is convert them into graphically bar chart. Figure 1.1 below is a graph showing the production of Product X against month for year 2017.

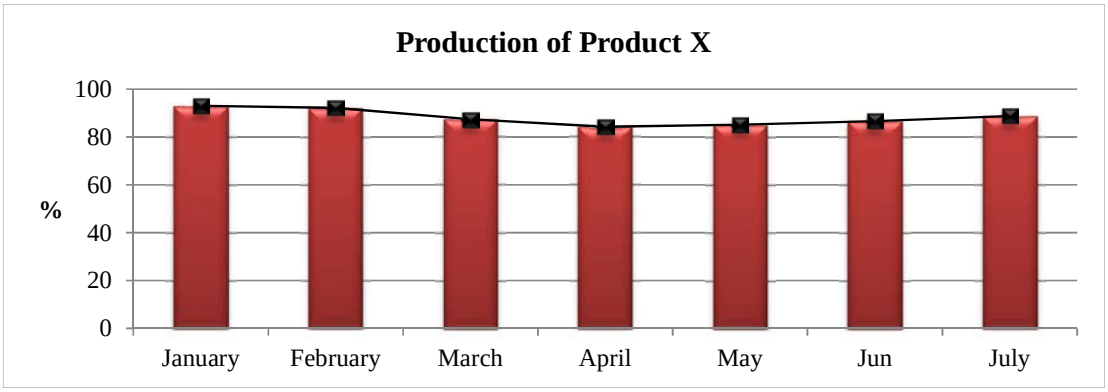

Figure 1.1: Graph production of Product X in 2017

Based on Figure 1.1, we can see clearly that the production of Product X does not achieved as their desired target from January to July and the production is fluctuted. This problem may due to the seven type of waste that might happen in the production line.

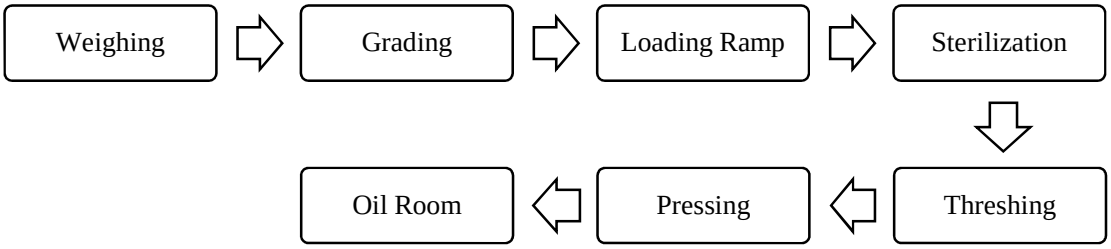

Figure 1.2: Process flow of Product X

According to the Figure 1.2, there are basic process flow of Product X which is from the raw material X. The process starts from Weighing station until Oil Room station where the production of Product X and also removal of water in it. The Product X is categorized as a continuous production line. It flows from the raw materials until the finished goods. Therefore, there are many factors that may affect to its cycle time and lead time of the production system such as delay, machine breakdown, inventory, waiting and others which leads to waste. In this production system, if there is one process that cannot be complete, it will affect the whole performances of the process.

The main problem in the industry are they cannot visualize the seven types of waste that occurs in production line. It is may due to the production is takes longer time to process. The raw material X should be processed on time because it needs the freshness of raw material to maximize the output Product X. By executing the lean tools and techniques in the production stream, it is able to identify wastes that effect on increasing cost, time and toward satisfy the customer demand. VSM is powerful tools to visualize all the seven type of waste that happen in the production line and better understanding. Thus, the aim for the project is to develop the current-state VSM to visualize the waste on each of workstation and time taken to complete task. Next, the aim is to eliminate or minimize the wastes in the production line to increase the production. VSM is often used to prove current-state manufacturing process for creating better future-state process. It is important for company to improve their business and satisfies the customer demands.

It can be concluded that, VSM is one of the great technique that can be used to eliminate the seven type of waste. By mapping the current-state, it can come out of the future-state VSM by revising the current-state VSM with the solution to eliminate seven type of waste on production of Product X.

1.4 Objectives

The main objectives using VSM is to eliminate seven type of waste on the production line. Thus, this project is aim to achieve the following objectives in order to increase the productivity:

(a) To visualize the current process flow for overall production.

(b) To construct the current-state value stream mapping for case study company.

(c) To propose the future-state value stream mapping with the solution to eliminate the waste.

1.5 Scopes of the Project

This project focused one of the high demand product which is Product X in Company X. This product has been selected to be observed and analyzed of the current performance. This study is conducted by using the specific tools which is Value Stream Mapping (VSM) from the first workstation process until the Product X production finished. This project is aim for development of value stream mapping for Product X. It is one of tools to improve the production and performance of the company. This project is to determine and minimize the waste in production line by analyzing the current-state value stream mapping. Then, to improve the productivity rate via proposing the future value stream mapping with the solution to eliminate the seven type of waste. The VSM is developed using Microsoft Visio 2013 for current-state and future-state. This study will

also include identifying the Lean Manufacturing practices that can be implemented by the industry.

1.6 Significant of the Project

This project is important to industry which it gives lot of benefits. One of it is the industry able to identify all the waste in production line. All the waste can eliminated and the productivity could be increase. Furthermore, it can also reduce both cycle time and lead time of the process which may gives lots of benefits to the industry. Lastly, it also creates the role of responsibility and motivates all the workers and organization which focus to make a cultural improvement of doing their works.

1.7 Project Outlines

The organization of this project is as following, Chapter 1 is begin with project background, company background, problem statement, objectives, scope of the project, and significant of this project for development the value stream mapping for palm oil company – a case study in Company X addressed. Chapters 2 are literature review that comprises previous study or research about the lean manufacturing and VSM in various company of manufacturing industry. Chapter 3 is a methodology that describes all the process and steps taken for mapping the Current Value Stream Mapping, identifying and eliminating waste and also drawing a Future-State Value Stream Mapping that used will be stated in the research. Chapter 4 is analyzing the information data and process from methodology that used in the project to come out result and data of the project. In Chapter 5, conclusion and recommendation about this project are examined.