



## **Faculty of Manufacturing Engineering**

# **WASTE REDUCTION IN TEXTILE MANUFACTURING COMPANY BY VALUE STREAM MAPPING**

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**WASTE REDUCTION IN TEXTILE MANUFACTURING COMPANY BY  
VALUE STREAM MAPPING IMPLEMENTATION**

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in fulfillment of the requirements for the degree of Master of Manufacturing  
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## DECLARATION

I declare that this thesis entitled “Waste Reduction in Textile Manufacturing Company by Value Stream Mapping Implementation” is the result of my own research except as cited in the references. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Signature : .....

Name : .....

Date : .....

## **APPROVAL**

I hereby declare that I have read this dissertation/report and in my opinion this dissertation/report is sufficient in terms of scope and quality as a partial fulfillment of Master of Manufacturing Engineering (Industrial Engineering).

Signature :.....

Supervisor Name :.....

Date :.....

## **DEDICATION**

To my beloved father and mother Encik Ab Rasid bin Mohamed and Puan Siti Minah binti Derahman, and my siblings, thank you for your supports for me to do my best on my Master Project. The motivation and encouragement inspired me to serve the best in my projects. To my Master Project Supervisor, Dr. Effendi bin Mohamad, thank you for guiding me to accomplish my project reports efficiently.

## **ABSTRACT**

Nowadays, manufacturing industries have become tougher and a very competitive markets ever since. Recently, many problems occur at the selected textile industry. One of the problem that occur is increasing of waste. This condition may lead to increasing of lead time. Value Stream Mapping (VSM) will provide detailed understanding of all the processes involved in production and thus will improve it. This tool can help an organization to minimize waste at all level, improve the quality, and reduce cost and time. The objectives of this project are to develop current state map (CSM) of textile manufacturing industry, to determine wastes by analysing CSM and to develop future state map (FSM). This study focuses on the production of product ball pin. This study applied Ishikawa diagram and why why analysis to determine the root cause of the waste. VSM method were used to visualize all processes and determine the waste. Before create the VSM, observation were used to know the flow of the process. After observation, data collection was done using time studies. Then the CSM is created. The result is 10439.84 minutes for value added and 20 days for non value added. After the analysis done, the FSM is develop based on the suggestion improvement. The result for the FSM the Non Value Added or lead time were decreased from 20 days to 16 days and the Value Added time were decrease from 10439.84 minutes to 10438.653 minutes. For future work, the suggestion for improvement must be implement by company to know the efficiency of value stream mapping.

## **ABSTRAK**

*Pada masa kini, industri pembuatan menjadi semakin sukar dan mendapat persaingan hebat di pasaran. Baru-baru ini, banyak masalah berlaku di industri tekstil yang dipilih. Salah satu masalah yang berlaku adalah pembaziran semakin meningkat. Value Stream Mapping (VSM) akan memberi pemahaman terperinci untuk semua proses yang terlibat dalam pengeluaran dan dengan itu akan ia ditingkatkan. Alat ini boleh membantu organisasi untuk mengurangkan pembaziran di semua peringkat, meningkatkan kualiti dan mengurangkan kos dan masa. Objektif projek ini adalah untuk membuat Current State Map (CSM) di tekstil industri, untuk menentukan pembaziran dengan menganalisis CSM dan untuk membuat Future State Map (FSM). Kajian ini memberi tumpuan kepada pembuatan produk pin bola. Kaedah yang digunakan di dalam kajian ini untuk menentukan punca pembaziran adalah gambarajah Ishikawa dan mengapa mengapa analisis. Sebelum membuat VSM, pemerhatian dilakukan untuk mengetahui aliran proses untuk membuat pin bola. Selepas pemerhatian, pengumpulan data dilakukan dengan menggunakan kajian masa. Kemudian CSM dibuat. Keputusan bagi CSM adalah 10439.84 minit adalah masa yang digunakan untuk membuat kerja, manakala 20 hari masa yang dibuang. Selepas analisis yang dilakukan, FSM telah dibuat berdasarkan cadangan membaikpulih. Keputusan untuk FSM masa yang terbuang telah berkurangan daripada 20 hari kepada 15 hari dan masa untuk membuat kerja adalah berkurangan dari 10439.84 minit kepada 10438.653 minit. Untuk kerja-kerja masa depan, cadangan untuk penambahbaikan perlu dilaksanakan oleh syarikat untuk mengetahui keberkesanan VSM.*

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## LIST OF ABBREVIATIONS

SOP	-	Standard of procedure
CSM	-	Current State Map
FSM	-	Future State Map
VSM	-	Value Stream Mapping
LM	-	Lean Manufacturing
VA	-	Value Added
NVA	-	Non Value Added
NNVA-		Necessary but non-value adding
EOQ	-	Economic Order Quantity
JIT	-	Just In Time
SMED	-	Single Minute Exchange Die
FIFO	-	First In First Out
AQL	-	Acceptance Quality Limit

## LIST OF PUBLICATIONS

NO	PUBLICATION
1	Effendi Mohamad, <i>Siti Nur Fatimah Ab Rasid</i> , Teruaki Ito , Mohd Amran Md Ali, Mohd Amri Sulaiman, Mohd Ashadi Azam, Adi Saptari, , (2014), An initiative to implement lean manufacturing using value stream mapping in textile manufacturing company, 24 <sup>th</sup> Design Engineering Systems Division Annual Conference, Japan Society of Mechanical Engineers, 17 <sup>th</sup> -19 <sup>th</sup> September, University of Tokushima, Japan

## **CHAPTER 1**

### **INTRODUCTION**

#### **1.1 Background of Study**

Nowadays, manufacturing industries have become tougher and a very competitive markets ever since. Most of the companies are trying hard to make sure that their businesses can sustain in this situation. In order to sustain their businesses, the companies used several methods and approaches to keep them competitive and relevant. One of the methods is Lean Manufacturing (LM). Womack et al. (1996) state that, the LM is a philosophy that used to improve the manufacturing system by eliminating waste or non-value added activity along the process flow. Many organizations believed that by implementing LM, cost can be reduced and also optimizing the production.

Early 1990, the textiles and apparel industry was developed in Malaysia when the country has started on export-oriented industrialisation. Due to worldwide competition, manufacturers of textile in Malaysia are moving up by producing variety of product, implementing automation in manufacturing and process and looking collaboration of business with foreign companies to get new technology.



Recently, many problems occur at the selected textile industry. One of the problems that occur is increasing of waste. This condition may lead to increase the lead time. Value Stream Mapping (VSM) will provide detailed understanding of all the processes involved in production and thus will improve it. This tool can help an organization to minimize waste at all level, improve the quality, and reduce cost and time. Furthermore, to implement the lean concept in industry, top management also play important role to support for the LM success.

## **1.2 Problem Statement**

Generally, reduction of waste is a critical issue in any manufacturing company. Waste can be defined as anything that do not give any value to the product. There are seven types of waste such as transportation, defect, waiting, motion, unnecessary processing, over processing and inventory. Basically, this study was conducted in a textile manufacturing company which is producing garment accessories such as safety pin, straight pin, ball pin, snap fasteners and others. In this company, there are some of waste were detected such as transportation, defect, waiting and motion. The waste occurs because of lack of LM implementation, poor arrangement of the workplace, fail to maintain the machine, do not have standard operating procedure (SOP) and *etc.* Figure 1.1 shows a poor arrangement of workplace and Figure 1.2 shows the product waiting for the next process. The wastage can affect the process of the product in terms of lead time, delivery time, quality, system performance, system efficiency and production cost. By using VSM method, the causes of the waste can be identified and then preventive action can be taken to overcome the problems.



Figure 1.1: Poor arrangement of workplace



Figure 1.2: Product waiting for the next process

### 1.3 Objectives

- 1) To develop current state map (CSM) of textile manufacturing industry.
- 2) To determine wastes by analysing CSM.
- 3) To develop future state map (FSM).
- 4) To analyse the efficiency of VSM in reduction of waste.

#### 1.4 Scope and Limitation

The scope of this study is focusing on the production of product ball pin in a textile company. Figure 1.3 shows the product of ball pin. The processes that focus in this study are primary process, plating process, quality inspection, checking and palletizing. Indeed, the limitation of the study is only propose some improvement to the company to reduce waste and lead time.



Figure 1.3: Product of ball pin

## **1.5 Report Outline**

Chapter 1 generally discusses about the introduction which consists of background of the study, problem statements, and objectives, scope of study and report outlines.

Chapter 2 were discussed about literature review based on collected data and information. This chapter discusses about lean, VSM and the implementation techniques to be used in industries.

Next, Chapter 3 were discussed the methodology in the study. This chapter will discuss the study methodologies that will be used to collect relevant data to support the development and analysis of the study.

Chapter 4 were discussed about results and discussion based on the case study.

Lastly, Chapter 5 were discussed a conclusion and recommendation for this study.

## CHAPTER 2

### LITERATURE REVIEW

#### 2.1 Lean Manufacturing (LM)

The LM begins when the westerner realized the potential of Japanese car in producing a car with mass production of high quality product at a lower cost. The term of LM has been introduced by Womack (1990), it described the TPS (Toyota Production System) and term it as Lean Production or Lean Manufacturing (Kumar and Kumar, 2012). LM can defined as systematic approach to identify waste and then continuous improvement will be done to eliminate (Choudhary et al., 2012). According to Chitturi et al. (2007), LM means identifying non value added activities throughout the supply chain to eliminate the waste. In other opinion, the concept of LM is the need to provide more value to customers and reduce waste for the organization. Focus of lean thinking is creating a perfect process of value creation in product development and operation (Lumms et al., 2006).

Generally, there are three types of operation that should be undertaken which is non value added (NVA), value added (VA) and necessary but non-value added (NNVA) (Hines and Rich, 1997). NVA is a waste and involves unnecessary actions which should be reduce. An example of the non-value adding are waiting time, doubling work and others. NNVA is an operation that may be wasteful, but it is under current operating procedure such as walking to pick up the part, transfer a tool from the one hand to the

other hand and etc. VA is an operation that involves in the raw material process or semi-finished products using manual labor.

## 2.2 LM Principle

Five principles are proposed in order to achieve the LM. These five LM principles will ensure that the organization produces the most effective means of value for customer. Other than that, these principles will help company to identify and eliminate the non value adding and wasteful activities. According to Womack et al. (1996), five principles of LM are specify value, value stream, create flow, customer pull and pursue perfection. The Figure 2.1 below shows the principles of LM.



Figure 2.1: Principle of LM (Womack *et al.*, 1996)

### 2.2.1 Identify Value

The critical starting point for LM principle is identifying value which entirely referred to customer perspectives. The significance value is the information of product that a customer willing to pay for and only are defined by the customer (Womack et al.,

1996). The producer exists because of the value comes from customer point of view and was created by producer (Womack et al., 1996). Usually producer tends to make what they already make and the customer can only settle for what they offered. The situation shows that the producer does not see what customer really want and when customer no longer accept what has been offered, the producer then will lower their price as a technique to persuade customers to purchase back. It is really important to identify the value or what customer view because the indicator on what activities that add value and activities does not add value.

### **2.2.2 Map the Value Stream**

The second step in LM principle is to identify and map the value stream. Mapping a value stream means compress of both VA and NVA from product overview starting at the raw material and finish in the hands of the customer (Duggan, 2002). A value stream map is a tool used to chart the materials and information flow from the raw material stage, through the factory floor, to the finished product. It will provide from starting to delivery process that add value and does not add value to customer perspective. The purpose of the map is to determine and eliminate waste in the process by providing a systematic approach to plan how and when they implement and changes can be made that make it satisfied to customer demand (Tapping et al., 2002).

### **2.2.3 Create Flow**

The third step in LM principle is creating flow by eliminating the waste. According to Womack et al. (1996) flow can be referred as successful of tasks along the value stream. The process start from raw material into customer hand without breakdown, scrap, rework or backflow. In other word, products need to move

continuously from a process to another process without stopping or having to wait in the manufacturing plant. It can be done by putting an effort to eliminate waste or obstacle along process flow and thus resulting in minimizing the non value added and maximizing the value added activities.

#### **2.2.4 Establish Pull**

The fourth step in LM principle is to establish pull. The idea of letting the customer pull the product for you as they need rather than pushing products onto the customer is the pull theory (Womack *et al*, 1996). Production only response to the customer demand by producing only what customer need and when they need it. Its mean that nothing is made until it is requested and then once requested, make it as fast as possible. In order to establish pull, it is important to properly design, schedule and fullfill the customer's requirement.

#### **2.2.5 Seeking Perfection**

The final step in LM principle is seeking perfection or continuous improvement. The concept behind perfection is there is no endless opportunity to improve by reducing costs, scrap, mistakes, space and etc. Perfection are an aspiration goal and can be only attained by definition. However, there is always room for more continuous improvement during the process of pursuing perfection in the system.

### **2.3 Value Stream Mapping (VSM)**

According to Pan *et al.*, (2010), VSM is one of the methods of visually mapping a product's production flow. This method maps the flow of material and information from the receiving of raw material, all manufacturing process until finished goods. Based