APPLICATION OF VALUE STREAM MAPPING IN CABLE INDUSTRY

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APPLICATION OF VALUE STREAM MAPPING (VSM) IN CABLE INDUSTRY

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

by

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APPROVAL

This report is submitted to the Faculty of Manufacturing Engineering of UTeM as a partial fulfillment of the requirements for the degree of Bachelor of Manufacturing Engineering (Manufacturing Management) (Hons.). The member of the supervisory is as follow:

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ABSTRAK

Laporan ini telah memberi tumpuan kepada penggunaan Value Stream Mapping (VSM) dalam industri pembuatan.VSM adalah cara visual yang mewakili aliran maklumat dan bahan-bahan dalam pengeluaran produk. VSM membantu pihak pengurusan untuk menggambarkan maklumat dan aliran bahan juga boleh melihat hubungan di antara maklumat dan aliran bahan. Ia membantu untuk mengenal pasti lapan sisa yang berlaku dalam proses pengeluaran. Melalui perisian Microsoft Visio 2007, dokumentasi VSM boleh menunjukkan dengan jelas dan pengurusan syarikat itu boleh mengambil manfaat daripadanya. Ulasan terdahulu menunjukkan kajian tentang teori-teori yang dapat dari jurnal dan buku menjadi satu perkara yang penting untuk membuat rujukan dan memastikan kejayaan projek ini. Oleh itu, skop projek ini adalah fokus kepada satu produk utama di syarikat pembuatan. Bagi menjalankan projek ini, beberapa kaedah dirancang untuk mencapai objektif dan lawatan kilang adalah langkah pertama untuk memerhatikan sistem pengeluaran. Beberapa data yang diperlukan seperti masa kitaran, bilangan pengendali, masa persediaan dan lain-lain maklumat yang dikumpul untuk mewujudkan VSM keadaan semasa. Selepas itu, VSM keadaan semasa menganalisis dan sisa beberapa dikenal pasti seperti masa pertukaran tinggi dan masa henti mesin. Daripada analisis, VSM masa depan telah dibangunkan. Beberapa cadangan telah dicadangkan untuk memastikan projek ini dapat memberi manfaat kepada industri dan orang ramai.

ABSTRACT

This report has focused on the application of Value Stream Mapping (VSM) in a manufacturing industry. VSM is avisual way of representing the flow of information and materials in the production of product. VSM helps management to visualize information and material flow also can see the relationship between information and material flow. It helps to identify the eight wastes that occur in production processes. Through Microsoft Visio 2007 software, the documentation of VSM can be clearly show and management of the company can take benefits from its. Literature review show about the theories that get fro journal and books be an important point to make reference and ensure this project success. Hence, the scope of this project was focus on one main product at manufacturing company. For conduct this project, some methodologies are planned due to objectives and factory visit was a first step for observing the porduction system. Some necessary data such as cycle time, number of operator, setup time and others information is collected to create current state VSM. After that, the current state VSM analyzed and several wastes been identified such as high changeover time and machine downtime. From the analysis, future state VSM has been develop. Some recommendation has been propose in order to ensure this project can give the benefit to industry and people.

DEDICATION

To my beloved mother, father and friend, thank you for the support and encouragement

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LIST OF ABBREVIATIONS, SYMBOLS AND NOMENCLATURE

VSM	-	Value Stream Mapping
CVSM	-	Current state Value Stream Mapping
FVSM	-	Future state Value Stream Mapping
PSM	-	Projek Sarjana Muda
JIT	-	Just In Time
SMED	-	Single Minute Exchange Dies
WIP	-	Work In Progress

CHAPTER 1
INTRODUCTION

1.0 Background

With the manufacturing sector more competitive, companies around the world strive to improve their efficiency. The increase in labor costs in industrialized countries, as well as reduces and control operating costs, only a few reasons companies choose to move or outsource their operations. To reduce costs and remain competitive with overseas producers, companies use a variety of different methods. The main methods known as lean manufacturing. The main principles of lean manufacturing are to reduce waste in an operation, such as long lead times, defects and waste materials (Womack and Jones 1990). In an effort to show visually where the waste occurs in the process, value stream map (VSM) is drawn. VSM is often used to evaluate the current process and create the ideal process, the state and the future. With the growing field of manufacturing and more widely spread around the world, it is important for companies to adapt to decrease the cost when the waste can be reduced or eliminate. Value Stream Mapping is a tool to enable the principles of Lean Manufacturing to be rapidly applied to improve the manufacture of a product family in a focused and prioritized way. It is a formal way of graphically depicting both the information and material flows in an end to end process as a means of identifying waste and improvement opportunities. The starting point for each map is always the definition of value from the customer's perspective. Key information such as product demand, stock levels, cycle times and scrap levels are all detailed on the map for each of the processes from raw material receipt through to finished goods. This current state value stream map is then used as a springboard for redesign to the desired

lean future state. Implementation of the future state requires the focused application of lean tools such as cell design, one piece flow, pull production, changeover reduction, kaizen events and standard operations. The objective of Value Stream Mapping is to identify and prioritize the steps needed to move to the future state design for a single product family as rapidly as possible, using a cross functional team from all the areas involved, as well as dedicated improvement facilitators.

1.2 Problem Statement

With the modern manufacturers trying to strive for lean in order to reduce inventory, production lead time, direct labor, indirect labor, space requirements, quality costs and material costs. Common waste found in the factory cannot be identified because not use the tool that can show the entire process for the product in the factory. Among the methods available to detect the waste to show the actual course of a process in the factory from customer request to return to customer back covering all aspects such as suppliers, the process of going in the factory and shipped. Value stream mapping (VSM) is the method to visual the representing flow information and material in the production of product that included the delivery time. This method can be used as monitor to review the production line processes from the beginning to the shipping process.

1.3 Objective

The objective of this project is to identify the where is the waste based on the value stream mapping method.

The objective of the study is:

a) Create a Current State Value Stream Mapping (CVSM) for current production line.

b) Analyze current state mapping to identify the wastes and bottleneck that occur in production processes
c) Propose future state value stream mapping (FVSM) for improvement.

1.4 Scope

This research was created in three parts, identify the current state at the production and analyze the current state map to determine the existence of wastes for non value added value added activities along the production flow of the company Then, the research focus on creating the future state map as the way to overcome the problems found in the current state map.

1.5 Project Outline

This section shows the organization of chapter that need to be complete during PSM 1 and PSM 2. PSM 1 only cover on the theory of research, while for psm 2 will proceed the research practically. Table show the organization of the chapter for both PSM 1 and PSM 2.

1.5.1 Introduction

Introduction of the project conducted which is background, problem statement, objective, scope and project outlines.

1.5.2 Literature Review

Literature review contains the view for various resources on lean and value stream mapping though paper research, case studies, journal and books. By understand the basic

concept and method of value stream mapping, it may enhance the progress of this project.

1.5.3 Methodology

Methodology contain the procedure to conduct the research during PSM. This chapter included the planing of the research, flowchart, and the souurces of data. Methodology can be devided by into 2 parts which are general methodology and specific methodology for value stream mapping.

1.5.4 Data Analysis

Data analysis has been collected in the production processes. The current state map is shown in this chapter.

1.5.5 Result

The result is stressing the significance and implementation of the finding of the project. The suggestion for future state value stream mapping show in this chapter. This part shows the expected result achieve the objective or not.

1.5.6 Discussion and Conclusion

Discussion and conclusion of the whole study and recommendation for future research.

CHAPTER 2

LITERATURE REVIEW

In this chapter, some background and basic knowledge of value stream mapping will be reviewed. Besides that, this chapter will be describing topics that related to value stream mapping analysis and measurement methods. Some of previous research and studies were included in this chapter to support the development of ideas of value stream mapping concept and design.

2.1 Lean Production

Womack et al. (1990) created the term lean production. In their definition, lean is a thought process and a philosophy, not a tool, used to look at a business whether it is manufacturing, service or any other activity with a supplier and a customer relation with the goal of eliminating non-value added tasks (Womack et al., 1990). They define lean as a way to create new work rather than simply destroying jobs in the name of efficiency. Although the basic philosophies of Ohno (1988) and apply to all work, the standard tools of lean manufacturing are much less effective when taken away from the shop floor and applied to office processes without any modification. Marchwinski and

Shook (2004) notify the lean production is a system for organizing and managing product development, operations, suppliers, and customer relations that requires reducing the 8 wastes to make products with fewer defects to achieve customer demand, compared with the previous system of mass production.

2.2 Leans Principles

There are five overriding principles to Lean. The figure 2.1 shows the step of lean thinking principles.

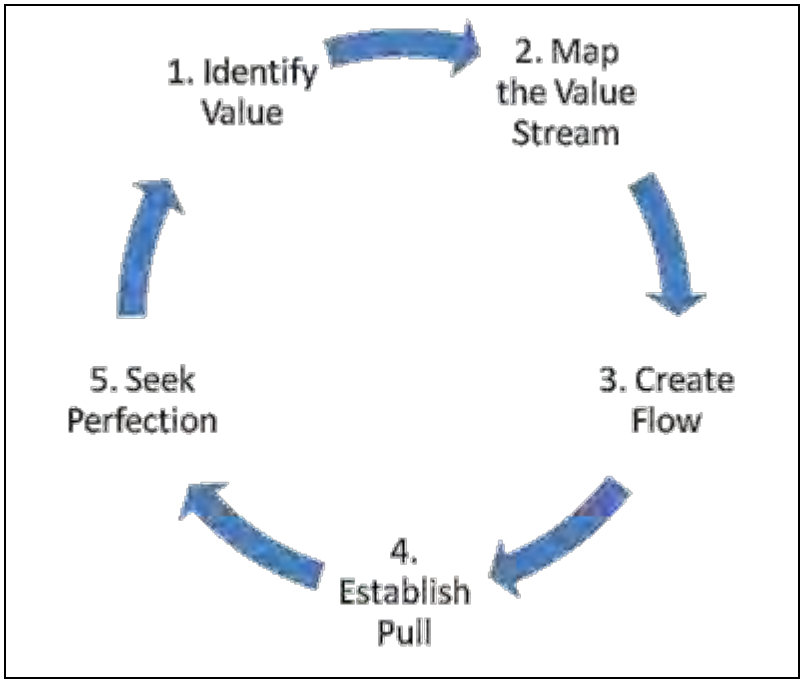

Figure 2.1: Step of Leans Thinking Principles (Womack & Jones, 1996).

2.2.1 Identify Value

The starting point is to recognize that only a small fraction of the total time and effort in any organization actually adds value for the end customer. By clearly defining Value for a specific product or service from the end customer‟s perspective, all the non value

activities. Define value precisely from the perspective of the end customer, in terms of a specific product, with specific capabilities, offered at a specific price and time. As Taiichi Ohno (1988), one of the creators of the Toyota Production system put it, all industrial thinking must begin by differentiating value for the customer, from muda – the Japanese term for waste.

2.2.2 Map the Value Stream

The Value Stream is the entire set of activities across all parts of the organization involved in jointly delivering the product or service. This represents the end-to-end process that delivers the value to the customer. Once you understand what your customer wants the next step is to identify how you are delivering that to them. Identifying the value stream almost always exposes enormous amounts of waste in the form of unnecessary steps, backtracking, and scrap, as the throughput travels from department to department and from company to company (Womack & Jones, 1996).

2.2.3 Create Flow by Eliminating Waste

Making steps flow means working on each design, order, and product continuously from beginning to end so that there is no waiting, downtime, or waste, within or between the steps. Eliminating this waste ensures that your product or service “flows” to the customer without any interruption, detour or waiting. (Womack & Jones, 1996)

2.2.4 Establish Pull

This is about understanding the customer demand on service and then creating process to respond to this. Only produce what the customer wants when the customer wants it. Letting the customer pull the product or service from the value stream eliminates the following types of waste. Designs that is obsolete before the product is completed, finished goods, inventories, elaborate inventory or information tracking systems, and no one wants (Womack & Jones, 1996).

2.2.5 Pursue Perfection

Creating flow and pull starts with radically reorganizing individual process steps, but the gains become truly significant as the entire steps link together. As this happens more and more layers of waste become visible and the process continues towards the theoretical end point of perfection, where every asset and every action adds value for the end customer with the ultimate goal of achieving Zero defects. Create a culture of continuous improvement. It is more about culture and attitudes than management Lean-tools (Womack & Jones, 1996).

2.3 Lean Manufacturing Tools and Techniques

Lean manufacturing is based on continuous finding and removal of the wastes. Value is defined from the customer‟s point of view. The tools in lean manufacturing aim to identify and remove wastes from the system continuously. Below is the several of lean tool and technique.

2.3.1 Just- In-Time (JIT)

Since it is a management idea that attempts to eliminate sources of manufacturing waste by producing the right part at the right time in the right place. This addresses waste such as work-in-process material, defects and poor scheduling of parts delivered (Nahmias, 1997). Inventory and material flow systems are typically classified as either push (traditional) or pull (just-in-time) systems. Just-in-time is a tool that enables the internal process of a company to adapt to sudden changes in the demand pattern by producing the right product at the right time, and in the right quantities (Monden, 1998). Moreover, just-in-time is a critical tool to manage the external activities of a company such as purchasing and distribution. Customer demand, which is the generator of the order sends the first signal to production. As a result, the product gets pulled out of the assembly

process. The final assembly line goes to the preceding process and pulls or withdraws the necessary parts in the necessary quantity at the necessary time (Monden, 1998). The process goes on as each process pulls tile needed parts from the preceding process further up stream. A kanban is used to manage these shipments. Kanban is an information system that is used to control tile number of parts to be produced in every process (Monden, 1998). The most common types of kanbans are the withdrawal kanban, which specifies the quantity that the succeeding process should pull from the preceding process, and the production kanban, which specifies the quantity to be produced by the preceding process (Monden, 1998).

2.3.2 Continuous Improvement

Continuous improvement is another fundamental principle of lean manufacturing. Kaizen which is the Japanese word for a continuous endeavor for perfection has become popular in the west as a paramount concept behind good management. Kaizen is a systematic approach to gradual, orderly, continuous improvement. In manufacturing settings improvements can take place in many forms such as reduction of inventory, and reduction of defective parts. One of the most effective tools of continuous improvement is 5S, which is the basis for an effective lean company. 5S is a first, modular step toward serious waste reduction. 5S consists of the Japanese words Seiri (Sort). Seiton (Straighten). Seiso (Sweep and Clean). Seiketsu (Systemize). and Shitsuke (Standardize). The underlying concept behind 5S is to look for waste and then to try to eliminate it. Waste could be in the form of scrap, defects, excess raw material. Unneeded items, old broken tools, and obsolete jigs and fixtures (Monden, 1998).

2.3.3 Standardization of Work

A very important principle of waste elimination is the standardization of worker actions. Standardized work basically ensures that each job is organized and is carried out in the most effective manner. No matter who is doing the job the same level of quality should be achieved. At Toyota every worker follows the same processing steps all the time.