UNIVERSITI TEKNIKAL MALAYSIA MELAKA

IMPROVEMENT OF OVERALL EQUIPMENT EFFECTIVENESS IN A HABERDASHERY MANUFACTURING COMPANY FOR PRODUCTIVITY ENHANCEMENT

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

by

SHAHRINNA BINTI MOHD SALLEH

B051210008

910210-12-5358

FACULTY OF MANUFACTURING ENGINEERING

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I hereby, declared this report entitled "Improvement of Overall Equipment Effectiveness in a Haberdashery Manufacturing Company for Productivity Enhancement" 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 UTeM as a partial fulfilment of the requirements for the degree of Bachelor of Manufacturing Engineering (Manufacturing Management) with Honours. The member of the supervisory committee is as follow:

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ABSTRAK

Kes kajian ini bertajuk "Improvement of Overall Equipment Effectiveness (OEE) in a Haberdashery Manufacturing Company to Improve Productivity Enhancement ". Kes kajian ini membincangkan tentang bagaimana OEE dapat membantu dalam usaha meningkatkan jumlah pengeluaran. Kajian ini dijalankan di syarikat pengilangan barang-barang dan alatan jahitan. Objektif kes kajian ini adalah untuk mengkaji kaedah pelaksanaan OEE di syarikat pengilangan barang-barang dan alatan jahitan, mempertingkatkan pelaksanaan OEE semasa untuk meningkatkan jumlah pengeluaran sebanyak 2% dan juga untuk mengenalpasti faedah-faedah dari pelaksanaan OEE di barisan pengeluaran. OEE dikira dan ditentukan dengan menggunakan formula tersendiri yang berkaitan dengan ketersediaan, prestasi dan kadar kualiti mesin dalam menghasilkan produk. Mesin-mesin yang dipilih dalam kes kajian ini adalah mesin pin lurus. Metodologi yang digunakan dalam kes kajian ini adalah pengenalpastian masalah, punca masalah utama, pelaksanaan penyelesaian, pengumpulan data dan penganalisisan data. Setiap peringkat mempunyai kaedah mereka tersendiri untuk mendapatkan data yang diperlukan. Jangkaan kajian ini adalah sama ada kaedah OEE akan membantu dan memudahkan peningkatan produktiviti. Melalui kes kajian ini, dapat dibuktikan bahawa melaksanakan OEE di baris pengeluaran meningkatkan jumlah pengeluaran. Dengan meningkatkan jumlah pengeluaran, produktiviti boleh kemudian diperbaiki.

ABSTRACT

This case study is entitled “Improvement of Overall Equipment Effectiveness (OEE) in a Haberdashery Manufacturing Company to Improve Productivity Enhancement”. This case study discussed about how OEE could help in increasing production output. This study was conducted at a haberdashery manufacturing company. The objectives of this case study are to study the OEE implementation methods in the haberdashery manufacturing company, to enhance the current OEE implementation to increase production output by 2% and also to identify the benefits from implementing OEE in the production line. OEE was calculated and determined by using its own particular formula which is related to availability, performance and quality rate of the machine in producing products. The machines selected in this case study are the straight pin machines. The stages of methodology used in this case study are problem identification, root causes identification, data collection, solution implementation and data analysis. Each stages had their own specific method on obtaining the essential data. The expectation of this study is whether OEE method will assist and facilitate in the improvement of productivity. Through this case study, it is proven that implementing OEE in the production line increases the production output. By increasing the production output, productivity can then be improved.

DEDICATION

To my beloved parents who are always supporting me,

Mohd Salleh Bin Adanan

Sania Binti Laimba

And

To my Supervisor,

Dr Effendi Bin Mohamad

To my families and my dearest friends,

Who provided me a loving, encouraging, caring and supportive ambience.

"There's always going to be another mountain, I'm always going and want to make it move.

There's always going to be an uphill battle, sometimes I have to lose.

Ain't about how fast I get there, ain't about what's waiting on the other side.

IT'S THE CLIMB." – Miley Cyrus, The Climb.

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In the name of Allah The Almighty, The Most Gracious and Most Graceful.

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LIST OF ABBREVIATIONS

dB	-	Decibel
KPI	-	Key Performance Indicator
LM	-	Lean Manufacturing
OEE	-	Overall Equipment Effectiveness
PM	-	Preventive Maintenance
RPM	-	Revolutions per Minute
SOP	-	Standard of Procedure
SPC	-	Statistical Process Control
TPM	-	Total Productive Maintenance
TQM	-	Total Quality Maintenance
WIP	-	Work-In-Process

CHAPTER 1

INTRODUCTION

This chapter contains the background of the case study entitled 'Implementation of Overall Equipment Effectiveness In A Haberdashery Manufacturing Company for Productivity Improvement: A Case Study'. It will then be followed by problem statement, objectives and scope of the case study.

1.1 Background of Study

Globalization and advancing technologies are having a massive impact on the manufacturing industry around the world. This event has seen the exponential improvement in new entrants in the industry itself. This development puts a factory in a very risky position since they must operate and at the same time, compete with other factories in a very responsive manner to ever changing circumstances. Some challenges faced by manufacturers include reducing the lead time, increasing the quality and productivity and providing a variety of products. In order to fulfil the challenges, a factory will face another problem which is waste. This is where lean manufacturing (LM) takes place in a factory which requires waste reducing.

Overall Equipment Effectiveness (OEE) is a tool used in manufacturing industry to measure the success of Total Productive Maintenance (TPM). It is a complicated measure of performance, related to the equipment. The key starting points for employees to understand that there are equipment losses and waste is the OEE data. After that, the factory could establish improvement programs to eliminate the losses and waste. OEE could be used to identify potential areas of advancement and supporting the lean initiatives. Thus, generally, OEE typically advances from a base measure for efficiency as the basic purpose, into being a tool to improve effectiveness for analysing data through the identification and elimination of waste. On the contrary, a process or any activity that does not increase up any value to a product is identified as waste. OEE can be the starting point to assist management, engineers and production to determine problems regarding productivity and help to identify its root causes.

1.2 Problem Statement

Straight pins are one of the core-manufactured products made in ABC Sdn. Bhd. The daily output production of straight pins should reach the daily target with more output and less scraps or waste. Production should run with less machine downtime caused by the machine condition itself or machine settings by the operators and technicians. Production should also increase the company's profit gain instead of increasing the company's profit loss. Nonetheless in reality, daily productions for straight pins are disturbed by few faults which then will lead to waste.

Among the wastes involved are motion and the waste of material itself. Motion waste exists when spillage problems occurred where pins move off track from the pin rail and fall on floors. Operators have to do extra work such as sweeping the fallen pins in order to keep each workstation clear, organized and safe to work in. The sweeping action is a motion that does not add nor increase any value to the output product.

Hence, it is a waste. On the other hand, the waste of material can be clearly seen as the pins spillage will directly be thrown away because it is considered as scrap. Anyhow, most of the spillage pins are still considered as good product.

Thus, implementation of LM tools and techniques is proposed regarding to this matter in order to improve the production output. The tools and techniques will help to minimize the faults that have been occurring frequently. The downtime for each faulty machine could last up until one day shift which is 970 minutes and the maintenance time could also last up to 970 minutes as well. The implementation progress then will be monitored using the OEE where production output, scraps and machine downtime could be observed easily.

1.3 Objectives

There are three objectives in this case study. They are:

a) To study the implementation methods of OEE in the haberdashery manufacturing company.
b) Enhance the current implementation up to 2% increase in production output.
c) To identify the benefits of implementing OEE in production line.

1.4 Scope of Study

The scope of this case study is to identify problems and increase productivity in the straight pins production line in ABC Sdn. Bhd. by defining the current state of OEE

implementation and analyzing the data. Afterwards, an applicable, convenient and relevant solution is suggested and proposed for the future production using lean tools and techniques.

1.5 Significance of This Study

The OEE popularized the performance, availability and quality of the machines that can be used optimally in order in increase production. ABC Sdn. Bhd. has targeted to increase production at the same time, advancing the quality of the product and OEE method is the best way to implement it. This method is implemented at the straight pin machines that always experienced downtime. The advantage of using this method includes the improvement of the machine's availability, performance and quality of the production.

CHAPTER 2

LITERATURE REVIEW

Overall, this chapter is about identifying and understanding the concept of Lean Manufacturing (LM) including its definition, principle, Overall Equipment Effectiveness (OEE), waste and its types, and Total Productive Maintenance (TPM).

2.1 Lean Manufacturing (LM)

Abdul Wahab et al. (2013) believed that LM is one of the popular and ideal methods in the elimination of waste in manufacturing and service industry. That is why many firms grabbed the chance to practice LM for quality and productivity enhancing. Nonetheless, previous research proved that there are various sets of tools and techniques that have been adopted according to their understanding of LM, which produced different leanness measures in order to measure lean practices.

According to Abdul Wahab et al. (2013) again, lean indicated to LM or lean production because it uses everything in limitation. Examples are, half of spaces in manufacturing, half of the tools invested and, half mankind power in the factory half of the engineering hours to develop a new product in half the time (Womack and

Jones, 1996). Based on Bayou and Korvin (2008), manufacturing leanness is one of the strategies to gain less input for a better output. In this statement, the input specifies the physical magnitude of the assets used and their expenditure. Whereas, the output specifies about the quantity and quality produced including the corresponding customer services.

It can be concluded that it is the essential aspect of leanness that the productive usage of resources is minimized as the aim of LM is to cut down and lessen waste and non-value added activities. Essentially, it means maximizing customer value and at the same time, minimizing waste. It is agreed by Karlsson and Ahlstrom (1996) that conclusively, the utmost objective and target of establishing LM in an operation is to raise productivity, enhance quality, decrease lead times, and reduce expenses.

2.1.1 Lean Principle

According to Perumal (2012), LM, Toyota Production System, lean production and others are acknowledged as the variety synonyms of lean operating principles that began in the manufacturing industries. People in the industry have been contemplating these lean principles for a long period of years and relished its astounding core improvement by implementing them.

Lean manufacturer requires a step on focusing how to create a product flow through value adding process without interruption, and a culture which everyone is striving continuously to improve (Womack and Jones, 1996). There are five key principles that guide lean thinking.

The five key principles are:

a) Identify value.

It is defined entirely by the customers. Products must meet the customer's requirements in area of time and price.

b) Map the value stream.

Determined as a sequence of process from raw materials until it reaches the customer. It can help identifying steps required to make a product.

c) Create flow.

Begins from production process of raw materials, and then to the assembly process until the end process which is packaging. Flow is characterized by time, cost and value.

d) Establish pull.

Pull can be defined as the starting of product's production when it is actually needed by customers.

e) Seek perfection.

The systematic elimination of waste will reduce cost and help to fulfil customer's desires to the maximum value at the lowest price.