LEAN PRODUCTION INCREASE OVERALL EQUIPMENT EFFICIENCY IN MANUFACTURER PAPER AND PAPER PRODUCT INDUSTRY

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LAU BAN PIN

The thesis is submitted in partial fulfillment of the requirements for the award of Bachelor of Technology Management (Technology Innovation)

Faculty of Technology Management & Technopreneurship
Universiti Teknikal Malaysia Melaka

JUNE 2016

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‘I/ We, hereby declared that I/We had read through this thesis and

in my/our opinion that this thesis is adequate in terms of scope and quality which fulfill the requirements for the award of Bachelor of Technology Management (Technology Innovation)

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Lean Production Increase Overall Equipment Efficiency in Manufacture Paper and Paper Product Industry

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DEDICATION

I appreciate the dedication of my beloved families who give me educate, support and motivation to learn until degree. Other than that, I would like to thank the lecturer and friend who always guidance and support throughout the research. Without their blessing and encouragement, this research impossible to complete in short period of time.

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DECLARATION

"I admit that this report is the result of my own, except certain explanations and passages where every of it is cited with sources clearly."

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ABSTACT

The purpose of this study is to study the relationship between the lean manufacturing and overall equipment efficiency (OEE) in manufacture paper and paper product industry. This study was conducted within one year by using five lean manufacturing tools namely Single Minute Exchange of Die (SMED), standardized work (SW), takt time, value stream mapping (VSM), and Kaizen started from January 2015 until December 2015. The obtained data were compared with the past data before the implementation of Lean tools. The data was analyzed by using IBM SPSS version 22 and the results showed that the lean tools are able to reduce waste and increased OEE. This empirical study gives valuables information to paper and paper product industry to improve quality and productivity management.

Keywords: Lean Manufacturing, OEE, Kaizen, VSM, Takt time, Ishikawa Fishbone

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ABSTACT

Tujuan kajian ini adalah untuk mengkaji hubungan antara kaedah *"lean"* dan peralatan keseluruhan kecekapan (OEE) dalam industri pembuatan produk kertas dan kertas. Kajian ini dijalankan dalam tempoh satu tahun dengan menggunakan lima kaedah *"lean"* yang dinamakan sebagai pertukaran minit tunggal mati (SMED), pempiawaian kerja (SW), masa maksimum yang dibenarkan bagi menghasilkan produk bagi memenuhi permintaan (takt time), aliran nilai pemetaan (VSM) dan Kaizen bermula dari Januari 2015 hingga Disember 2015. Data yang diperolehi digunakan untuk buat perbandingan dengan data sebelum pelaksanaan *"lea*n". Data dianalisis dengan menggunakan IBM SPSS versi 22 dan keputusan menunjukkan bahawa kaedah *"lean"* dapat mengurangkan pembaziran dan meningkatkan OEE. Kajian empirikal ini memberi maklumat berharga kepada industri produk kertas dan kertas untuk peningkatan pengurusan kualiti dan produktiviti

Kata kunci:

Pembuatan Lean, SPSS versi 22.0, kertas pengilang dan industri produk kertas, kaedah Stepwise

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CHAPTER 1

INTRODUCTION

1.0 BACKGROUND OF THE STUDY

Globalization pushed manufacturer to optimize the manufacturing process that enable them to deliver high quality products in a short period of time (A. Karim, 2013).The pursuit of this optimization has increased manufacturing organizations want to improve the internal and external performance in order to achieve competitive advantage (M. A. Karim, 2008), and (Papadopoulou, 2005). However, the manufacturer wants to achieve this goal has become increasingly complex due to global competitive environment and market dynamic. Competitive pressures have been pushing companies toward cost reduction and performance improvement of operation to provide high quality product to demanding market (Souza & Carpinetti, 2014).

The lean manufacturing has been buzzword in manufacturing area (Womack et al., 1990). According to Herron & Braiden,(2007) suggested that the applying the lean manufacturing method will contribute to the successful lean manufacturing transformation. Other than that, lean manufacturing is also one of systematic approach that had been wisely acceptable and adoptable for many of the business to remain the competitive in the global market (Abdulmalek & Rajgopal, 2007).The approach of lean manufacturing focus on waste reduction and enhancement performance has been gaining importance (Gurumurthy & Kodali, 2011). The implementation lean manufacturing

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system is a practice that includes measuring current situation and designing a production system (Souza & Carpinetti, 2014). (Rother & Shook, 2003) propose a sequence of eight steps strategy to design of a future state of lean production system. The current state to future state is a continuous process that may involve many kaizen activities to eliminate or reduce waste. Hence, fundamental aspect in planning lean production improvement and implementation is deciding what type of waste should be reduced first. The benefit lean tools implementation can reduce waste and improve efficiency by eliminate the waste to product high quality product to demanding market (Schonberger, 2007) and (Womack & Jones, 1996). Therefore, fundamental aspect in planning lean production improvement and implementation is deciding what type of waste should be reduced first.

Therefore, the purpose of this paper is to study the effectiveness of lean manufacturing technique in reducing waste and to increase OEE in manufacture paper and paper product industry. This study starts with exploring the manufacturing improvement tools for waste to improve operational performance. Then identify factors of waste effected the operational performance and finally measure the manufacturing effectiveness and efficiency (OEE) after implemented the lean manufacturing tools.

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1.1 PROBLEM STATEMENT

Industry sale and work opportunity are bringing high impact to economic. According to Department of Statistics Malaysia (2012), the report on the annual survey of manufacturing industries show the wood products, furniture paper product and printing are RM 48.4 billion in gross output and the total employment is 326, 274 employees and state in the third highest employment in Malaysia. From the studies, the manufacture paper and paper product industry are playing the important part in bring income to Malaysia. They also carry the high employment in market.

Occurrences of waste in production line cause the poor operation performance. Low operation performance will be affecting to production quality. Unsatisfied production will affect to mass production. Low productions cause the demand in low purchasing. Low demand for products will eventually affect to company profit. Low company profits will consequence in unable to sustain in market. Failure companies cause the increase of unemployment and lack of work opportunity. These issues bring significant change to our economic. This statistics data can be continuous improve once the company have launch lean manufacturing.

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1.2 RESEARCH QUESTIONS

From the previous section, this research was discussed about the occurrence waste affecting the manufacture production line because of poor productions quality. Therefore, apply lean to reduce waste are critical important to solve the problem. In here, lean manufacturing is replenishment method to provide the opportunities in improving the operation performance

So that, this research making several research questions to support this research as follow:

- What are the manufacturing improvement tools for waste to improve operational performance?
- What is the potential factor of waste to improve performance?
- What is the effectiveness of lean manufacturing to improve operational performance?

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1.3 RESEARCH OBJECTIVE

The researcher required to answer the research question by supported data from manufacture paper and paper product. The purpose of research objective is to help the manufacture paper and paper product to determine the effectiveness of lean manufacturing.

Therefore, the researcher making several research objectives to support this research as follow:

- To explore the manufacturing improvement tools for waste to improve operational performance
- To investigate the potential factors of waste to improve performance
- To determine the effectiveness of lean manufacturing to improve operational performance

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1.4 SCOPE, LIMITATION, KEY ASSUMPTION OF THE STUDY

In Malaysia, there are more than 38 of manufacture paper and paper product industries have giving support in gross output. From the research in Malaysian pulp and paper manufacturer association (MPPMA), they announce that 18 of manufacture paper and paper product were paper mill industry. Therefore, this research was carried out on XYZ manufacturer paper and paper products industry. The research model was design to investigate the lean manufacturing techniques is experiment. These experiments collect data from real time for support the research. The result of this research will be used for the further validation.

The limitation of this research will be only made in Melaka. Different place of industry were bring hard to get commitment. Due to longitude place of industry the research will be costly. It became obvious that transportation were major problems to cause this research hard to make data analysis.

The key assumption of the research is the industry practice of lean manufacturing method to improve the production process. The research study can assume as very practical and useful technique to reduce waste for the industry

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1.5 IMPORTANT OF THE RESEARCH

The most important in the research is based on the finding the existence of waste and solution on implement the lean manufacturing method. This research is also to explore the most effective lean manufacturing method to reduce waste in manufacture paper and paper product. In fact, well understanding in the implementation of lean manufacturing method very important for organization to improve the business performance and sustain competitive advantage. This research done considered important to be the references for parties such as:

- To explore the advantage while applied lean manufacturing in the organization. The result in this research will be such as improve the value added process, maximize performance, financial saving, and reduction in processing time
- To investigate the potential factors of waste affect the manufacturing. The result in this research will be such as to categories of the waste.
- To determine the effectiveness of lean manufacturing to improve operational performance. The Lean manufacturing is unstopped improvement to organization. The result will be such as the improvement efficiency and effectiveness measure by overall equipment efficiency

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1.6 SUMMARY

This chapter describes the introduction and background of lean manufacturing. The research is to determine the effective lean manufacturing method to reduce non-value added and waste. Lean manufacturing approach is to maximize the resource utilization through eliminate the production process waste. Applied lean manufacturing to the organization will be improve sustainability and reduce process time. This chapter concludes with the important of research. The next chapter will describe the implementation of lean manufacturing approaches and its advantage for the manufacturing paper and paper industry.

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CHAPTER 2

LITERATURE REVIEW

2.0 INTRODUCTION

In this chapter, researcher will discuss about the function and theory of lean manufacturing method. The theory and function of each lean technique will explain in detail to provide the clear understanding. The literature reviews collected is to explain and support the term and concept lean manufacturing technique such as books and academic journals. In here, researcher also will discuss the challenge of applying lean manufacturing system. In the end of this chapter, researcher will come out the theoretical framework.

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