

PRODUCTIVITY IMPROVEMENT BY USING LEAN  
SIX SIGMA APPROACH  
(A CASE STUDY AT FURNITURE COMPANY)

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## APPROVAL

'I hereby acknowledge that I have read this thesis and in my opinion this work  
sufficient in terms of scope and quality for the award of Bachelor of  
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This research report is submitted to  
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## DECLARATION OF ORIGINAL WORK

“I hereby declare that the work of this research is mine except for the quotations  
summaries that have been duly acknowledged”

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## **DEDICATION**

This research is dedicated to my lovely family and fellow friends that accompanying me along the difficult pathway in my university life, thanks for your help and support. Also thanks to my PSM Supervisor, Ir. Budiono Hardjono for guide me for this project.

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## **ABSTRACT**

With the importance of being competitive in today's market, manufacturing company was focusing their efforts to maximize their productivity. High productivity is an important part for ensuring the product produced meet or exceed customer requirements and maximize their profits. This research is conducted through a real life industry case addresses the current weakness of low productivity and proposed new approach to improve it. The main purpose of this paper is to identify the factors that cause the productivity in this company low and then analyze all the potential causes of the factor. Based on the analysis each cause, there are some improvement were suggested by using the Lean Six Sigma. Lean Six Sigma was selected in this project for the since it is a method-oriented approach for the optimization of production of goods through the removal of waste and application flow for quality improvement. This paper will try to capture some of the key concepts in Lean Six Sigma initiatives and how industries are utilizing it to lower production costs while maintaining high quality and speed.

Keywords: Lean Six Sigma, Productivity, Quality Improvement

## **ABSTRAK**

Demi kepentingan menjadi berdaya saing di pasaran hari ini, syarikat pembuatan telah menumpukan usaha mereka untuk meningkatkan produktiviti syarikat. Produktiviti yang tinggi adalah satu aspek penting bagi memastikan produk yang dihasilkan memenuhi atau melebihi permintaan pelanggan dan memaksimumkan keuntungan mereka. Kajian ini dijalankan melalui kehidupan kes industri sebenar untuk menangani produktiviti yang rendah dan mencadangkan pendekatan baru untuk memperbaikinya. Tujuan utama kertas ini adalah untuk mengenal pasti faktor-faktor yang menyebabkan produktiviti di syarikat ini rendah dan kemudian menganalisis semua potensi sebab daripada faktor tersebut. Berdasarkan analisis setiap sebab, terdapat beberapa penambahbaikan telah dicadangkan dengan menggunakan Lean Six Sigma. Lean Six Sigma telah dipilih dalam projek ini untuk kerana ia merupakan satu pendekatan yang berorientasikan kaedah untuk mengoptimumkan pengeluaran barangan melalui penyingkiran bahan buangan dan aliran operasi bagi peningkatan kualiti. Kertas ini akan cuba untuk menangkap beberapa konsep utama dalam Lean Six Sigma inisiatif dan bagaimana industri menggunakannya untuk mengurangkan kos pengeluaran di samping mengekalkan kualiti dan kelajuan yang tinggi.

**Keywords:** Lean Six Sigma, Produktiviti, Peningkatan Kualiti



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## LIST OF ABBREVIATIONS

TPS	=	Toyota Production System
DMAIC	=	Define, Measure, Analyze, Improve, and Control
KPI	=	Key Performance Indicator
VSM	=	Value Stream Mapping
TQM	=	Total Quality Management
MC	=	Moisture Content
SPC	=	Statistical Process Control



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## **CHAPTER 1**

### **INTRODUCTION**

#### **1.1 Background**

In recent years, most manufacturing companies have focused on the manufacture of higher value added products with low production costs. Therefore, elimination of waste and improve the quality has become the important success criterion for company to increase the productivity.

According to Parham (n.d), productivity is a measure of the rate at which outputs of goods and services are produced per unit of input (labour, capital, raw materials, etc). It is calculated as the ratio of the amount of outputs produced to some measure of the amount of inputs used. Productivity measures the efficiency of the production system. Higher productivity means producing more from a given amount of input or producing a given amount with minimum level of inputs.

According to Khan (2007), productivity and quality are directly related. The quality management can also improve productivity – the number of units produced from available recourses. This means that when companies yielding high quality products in this way they are saving cost of poor quality. The company has little chances of rework, scrap, and defective products. By efficient use of resources in term of better quality products the company can increase their productivity.

Schneider (2009) said that quality is one of the most important properties of a product. By providing the optimal quality, the wastes and the lead times can be reduced and thus improve the productivity. Quality is a critical success factor to achieve the high productivity in the company. As the competition increases and consumer demand of high quality of product or services at reasonable price. A better understanding of the quality is the needs to every company in order to maintain their competitiveness. There is a increasing of focus on quality throughout the world. Effective quality management decreases production costs because the sooner an error is found and corrected, the less costly it will be.

According to Melissa (2002), quality improvement is necessary for providing a systematic approach to continuous quality improvement. Continuous improvement requires the use of cost of quality as a management tool to help gauge the effectiveness of the quality improvement process. Next, the use of statistical method is vital in identifying, understanding and continually improves process capability.

The improvement of the productivity is able to accomplish by using the Lean Six Sigma approach. Lean Six Sigma is a process improvement methodology that combines tools and methods of both Lean and Six Sigma, as the name implies. Ronald (2010) describes Lean six sigma as a well structured theory based methodology to improve performances, customer satisfaction, and bottom line results, while Lean focuses on speed and flow, Six Sigma focuses on quality (defects and process variation).

The first principle of Lean Six Sigma is delight customers with speed and quality. The second principle is improved process flow and speed. Lean Six Sigma emphasizes that speed is directly tied to excence. Speed is not the same thing as schedule. Schedule is about when something is supposed to get done, speed is about how fast it gets done. Speed has a bad reputation; it is often equated with hasty, undisciplined work. But Lean Six Sigma is looking for opportunities to streamline the core processes.

This research was completed at Company X which is a furniture company in Muar, Johor. Company X look for ways to improve their production and

management processes in order to remain competitive in the market. Company X plan to change the way the product was produced and reduces the non-value added activities in order to satisfy the client's needs and also maximize their profit.

## **1.2 Problem Statement**

Pursuing to achieve a high productivity and quality becomes one of the basic strategic and operative intentions of modern company. The productivity and the quality in Company X are poor. The current situation is that customer satisfaction for the company is low. Customers are complaint about the late delivery, wrong design, poor product quality, and other else.

Productivity issues occurred in Company X reduces the rate of return and by increased scrap and rework cost for the materials, labour and overhead associated with production. In this study we are concerned on improve the production's productivity by improve the quality and reduce the non-value added activities.

## **1.3 Research Questions**

1. What are the factors that cause the productivity problem in this company?
2. What are the root causes for the main factor which cause the productivity in the company low?
3. How to solve the productivity problem in this company?

## **1.4 Objective**

The objectives of the study as follows:

1. To identify the factors those cause the productivity problem in the company.
2. To analyze the root causes for the main factor which cause the productivity in this company low.
3. To develop the solution for the productivity problem of the company.

## **1.5 Scope, Limitation and Key Assumptions of the project**

This research mainly focuses on the improvement of the production's productivity in the company. The scope of the study focuses on quality issues since it as the main factor to cause the productivity in this company low. Besides that, one particular product, which is Laminated Board Without Profile with 20mmx900mmx1500mm (Grade A) was focused on the study of quality issue. This study includes identification of the defects problem of the product, quality analysis for the product, root cause of the defect problem, process capability of the product and suggestion for improvement will be made. Minitab 14 software was used to conduct the analysis.

There are limitations been identified in this research which include this research is focus to production site of laminated board in Company X. This mean that the investigation of the problems and implementation of Lean Six Sigma to improve the productivity are only focus to the production site, thus other departments are not being to discuss in detail.

The key assumptions of this research include do not have any restructure programs within the organization, no new technology and machines was adapted in this research periods since all of this changes will influence the research results.

## **1.6 Importance of the Project**

This research is mainly to investigate how to improve the productivity by implementing Lean Six Sigma. The customer satisfaction can be achieved if the productivity is improved and it may also increase the sales growth and their profit as well.

## **1.7 Summary**

This chapter contains an introduction to Company X, Lean Manufacturing and Six Sigma, objective and the scope of study, and includes the background of the problem statement. In the whole of this chapter, it summarized the progress of the whole project describing and how the project to be complete.

## **CHAPTER 2**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter will focus on the study and research of the published materials such as case study, thesis, journal and some online database. Some related quality topic such as Lean Six Sigma methodology, quality improvement process, quality tools and etc.

The purpose of this literary review is to gain insight into Lean Six Sigma and how it can be applied within a manufacturing environment in order to improve the productivity and quality of work. With global competition, it is important for manufacturers to remain competitive in their respective markets and to understand the principles of Lean Six Sigma and the steps to implement them in order to ensure that they are on the leading edge of manufacturing.

#### **2.2 Manufacturing System**

The basic foundations of a manufacturing system are input, output and transformation of process. A measurement system constructed for loop back the non-compliance part to maintain high quality of product. Action will taken in measurement system includes detect assignable cause, identify root cause of problem, implement corrective action, and verify follow up.

Following figure present a simple manufacturing system.

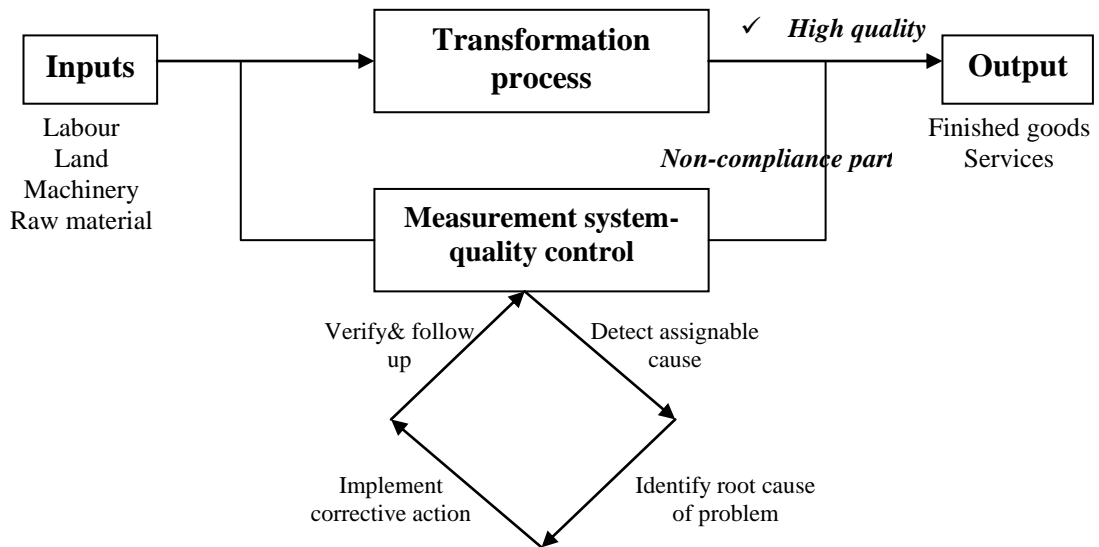


Figure 2.1: Simple manufacturing system (Stevenson, 2009).

### 2.2.1 What is Transformation Process?

A process is a transformation of a set of inputs, which can include materials, actions, methods and operations into desired outputs, in the form of products, information, services or results. It is an integrated set of responsibilities between engineering design, production and warehouse managers, and logistics team. Each plays its part in producing quality products and delivering it to customers (Oakland, 1999). How well of an organization success is determined by undertaking of the transformation process. The output of the process is transferred to customers. Thus, to produce an output which meets the customer requirements, it is necessary to define, monitor and control the inputs of the process (Ei-Tayeb *et al.*, 2006).