UNIVERSITI TEKNIKAL MALAYSIA MELAKA

PRODUCTIVITY IMPROVEMENT: A CASE STUDY ON IMPLEMENTATION OF QUALITY AT COMMUNICATION MANUFACTURING COMPANY

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

by

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FACULTY OF MANUFACTURING ENGINEERING

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I hereby, declared this report entitled "PRODUCTIVITY IMPROVEMENT: A CASE STUDY ON IMPLEMENTATION OF QUALITY AT COMMUNICATION MANUFACTURING COMPANY" 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 fulfillment of the requirements for the degree of Bachelor of Manufacturing Engineering (Robotic and Automation) with Honours. The members of the supervisory committee are as follow:

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ABSTRACT

This case study focuses on the implementation of quality to the productivity improvement at Multitone Electronics Sdn. Bhd. (MESB) for incoming inspection of Window R750R Display Silver. The objectives of this case study are to study and to measure the implementation of Acceptance Quality Level (AQL) to the company productivity. The study of related literature review was carried out thorough the journals, books and websites. In order to indicate the planning process for this study, the Gantt chart and methodology flow chart were created. To analyze the data, some of the Statistical Quality Control (SQC) tools were used such as histogram, flow chart and cause and effect diagram. The major cause of rejection of Window R750R Display Silver was analyzed. From the analysis, the suggestion for improvement was suggested and the relationship between quality, productivity and cost were also determined.

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ABSTRAK

Kajian kes ini memfokuskan mengenai pelaksanan kualiti untuk memperbaiki produktiviti pada proses 'incoming inspection' untuk "Window R750R Display Silver" di Multitone Electronics Sdn. Bhd. Objektif kajian kes ini adalah untuk melaksanakan pengukuran dan kajian secara ilmiah berkaitan "Acceptance Quality Level (AQL)" terhadap produktiviti syarikat. Kajian secara ilmiah dilaksanakan melalui pembacaan jurnal – jurnal, buku – buku dan laman web. Carta Gantt dan metodologi carta aliran dibuat untuk menunjukkan plan perancangan kajian kes ini. Untuk menganalisa data, beberapa komponen kawalan kualiti secara statistik (SQC) seperti histogram, carta aliran dan rajah sebab dan akibat digunakan. Masalah utama yang menyebabkan "Window R750R Display Silver" tidak boleh diterima pakai dikaji. Daripada analisa yang dibuat, cadangan untuk memperbaiki masalah tersebut dicadangkan dan hubungan antara kualiti, produktiviti dan kos ditentukan.

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DEDICATION

This thesis is dedicated to my parents and family members who provide the most supportive atmosphere instead of loving and caring.

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LIST OF ABBREVIATIONS, SYMBOLS, SPECIALIZED NOMENCLATURE

AQL	-	Acceptance Quality Level
E	-	Expectation from customer
MESB	-	Multitone Electronics Sdn. Bhd.
P	-	Performance of the manufacturer
Q	-	Quality
Global	-	Global Sourcing HK
QC	-	Quality Control
QA	-	Quality Assurance
SPC	-	Statistical Process Control
pcs	-	pieces
OC Curve	-	Operating Characteristic Curve

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CHAPTER 1
INTRODUCTION

1.1 Introduction

Generally, this chapter will describe the background of the case study, the objectives, the scope of case study, the challenged that been faced, significance of this study, research methodology and organization of the report.

1.2 Overview of the study

In facing the competitive global business environment of 21st century, the manufacturers must respond effectively to the various demands from the customers. In order to increase customer loyalty and competitiveness, the manufacturers must produce products that meet customer requirements and deliver them at the right time. Hence, the objectives of the manufacturers should be related to the concept of quality.

Quality plays an essential factor in order to qualify the manufacturers to enter the market place since it is tremendously emphasized in nowadays business. The quality tools and techniques help the manufacturers to have long term dividends through productivity improvement.

Quality philosophies that been developed by the quality gurus years ago, have been used widely by the manufacturers as a quality guidelines to meet customer satisfactions.

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Productivity and quality always relate to each other. According to Daming (Gitlow, 2005), improving in quality will lead to the increase in productivity. Stressing the quality can lead a lot of advantages to all that involved in the field such as manufacturer, customers, vendors and investors. In order to balance the quality – productivity relationship, it all depends on the ability of the manufacturers itself.

According to Sower (2006), acceptance sampling is an approach to sampling a lot in order to determine whether the lot should be rejected or accepted. Compared to 100 percent inspection, the sampling plan is more practical to be used since the 100 percent inspection always lead to waste in cost and time. Acceptance Quality Level (AQL) is use as a standard guideline for the manufacturer to maintain their performance to achieve 100 percent zero defect.

This case study is mainly focused on improving the productivity in terms of quality. In order to complete this study, the quality philosophy and other related quality tools that can be implemented to the study are used to identify the problem of rejection faced by the company and overcome the problem based on the findings. Further explanation of the study will be conducted in Chapter 2 (Literature Review), Chapter 3 (Methodology), Chapter 4 (Company Profile), Chapter 5 (Result and Discussion) and Chapter 6 (Conclusion).

1.3 Problem Statement

Multitone Electronics Sdn. Bhd. (MESB); which produced pager as the main business; faced a lot of rejection problems from the supplier side. In MESB, the suppliers; either local or overseas; have to pass the Quality Assurance department before the parts supplied can be use by the production. One of the main reject parts in this company is Window R750R Display Silver which is currently used in pager RPR750 series' assembly process. Based on Quality

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Assurance department, the cause of rejection for the Window R750R Display Silver are scratches, stain mark, white dot/stain, adhesive glue, poor coating, black dot, dirty, broken, case front problem, blurry display and paint mark.

1.4 Objectives of the study

The objectives that need to be achieved in this study are:

1.4.1 To obtain thorough understanding of quality implementation to the productivity improvement.

1.4.2 To study the present quality system in the selected company.

1.4.3 To measure the implementation of Acceptance Quality Level (AQL) in the selected company.

1.4.4 To measure the impact of Acceptance Quality Level (AQL) practices to the productivity improvement at the selected company.

1.5 Scope of the study

1.5.1 The study is mainly focused on the quality field that is related to the productivity improvement.

1.5.2 The study is only focused on incoming quality inspection at the Quality Assurance department for Window R750R Display Silver.

1.5.3 The study is carried out using Acceptance Quality Level (AQL) inspection.

1.5.4 The study is only focused on 6 months from September 2008 to March 2009.

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1.6 Challenges faced

There are several challenges that have to be faced in completing the study. Firstly, the data is prohibited to be taken directly from company due to company policy. Thus, only limited data can be used at the analyzing stage in Chapter 5 (Result and Discussion).

The next challenge is the difficulty to find information about the companies that implement the Acceptance Quality Level (AQL). It is because most of the companies nowadays use Six Sigma or other alternative and advanced quality tools to maintain their quality.

1.7 Significance of this study

This study will be significant to the company since improving the supplier quality will affect the productivity of the production hence increase the company's profitability. Moreover, this study is also beneficial to the company since they can monitor the supplier performance based on the findings. This study will also serve as future reference for students and the researchers in the quality field.

1.8 Research methodology

Oxford University Press defined methodology as a set of methods and principles used to perform a particular activity. The purpose of research methodology is to identify and select the appropriate methods to be used in this study. The planning process of the study is present in term of flow chart and Gantt chart. Further explanation of the methodology will be discussed in Chapter 3, Methodology.

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1.9 Organization of the report

This report is arranged in order to convey a better understanding for the whole process of the case study and it is divided into six chapters.

Chapter 1 gives an introduction to the case study including the objectives and the scopes of study, problem statement, research methodology, and challenges faced.

Chapter 2 presents the literature review on concept of productivity, quality, the correlation between quality and productivity, concept of AQL, and some quality tools that incorporate with study.

Chapter 3 presents the methodology of the study. This is where the detail explanations of methodology will be conducted for both PSM 1 and PSM 2.

Chapter 4 presents the company profile and background including the general information, organization chart and the company services and products.

Chapter 5 presents the data analysis for this case study. In this chapter, the collected data from the case study company were analyzed for both before and after implementing AQL. From the data, the main rejection problem can be identified. The relationship between the quality, productivity and cost also been derived.

Finally, Chapter 6 presents the conclusion of the case study, the limitations of the case study and suggestions for further work.

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CHAPTER 2
LITERATURE REVIEW

2.1 Introduction

Generally, this chapter will describe the study of literature reviews that are related to the case study's field. This chapter includes the study on productivity and quality, quality philosophies and the relationship between quality and productivity. Besides that, this chapter also includes the study on quality tools, AQL Inspection, comparison of AQL and 100% inspection and the case study that related to the field.

2.2 Productivity

In Oxford Advanced Learner's Dictionary, productivity is defined as the rate at which a worker, a company or a country produces goods, and the amount produced, compared with how much time, work and money is needed to produce them while Pavlina (2005) defined the productivity as value divided by time, where the value is depending on the person itself.

In productivity's principal, it mainly focused on doing something more efficiently. One must work efficiently and operate in a manner that best utilizes the available resources in order to be productive (Donna, 2003).

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2.3 Quality

The American Society for Quality Control defined quality in two meanings: firstly, the characteristics of a products or service that have ability to meet requirements and secondly, a product or service that have zero deficiencies (Summers, 2003).

On the other hand, Barry Boehm defined quality as set of attributes which are portability, reliability, efficiency, human engineering, understandability, modifiability and testability (Glass, 1998).

Besides, Juran said that quality is "fitness for use". It is similar to the Crosby definition who states that quality as "conformance to requirements" because both definitions put quality to customer (Jabnoun, 1999).

Other quality expert, Dr. W. Edwards Demings defined quality in two types. Quality of conformances is the extent to which company and suppliers to fulfil the design specifications in order to meet the customer satisfactions. Quality of performance is measuring how the products perform through the research and analysis (Pyzdek, 1989).

Quality can also be quantified in term of mathematic:

$$Q = P/E \text{ (Besterfield, 2001)}$$

where Q is the quality of the product or service, P is performance of the manufacturer and E is expectation from the customer. From the equation, if Q is greater than 1.0, it means that the customer satisfied with the products or service (Besterfield, 2001).

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It is the processes to make sure the program will meet the needs for which it was undertaken. These processes include quality planning, quality assurance and quality control (P.McMahon et al., 2002).

Quality can be further divided into three major categories which is (Arnold, 1995):

- Quality of design is related to the manufacturing's requirements.
- Quality of conformance to design monitors the products and all the processes to ensure it meet the specifications.
- Quality of performance which is the result of design quality and quality of conformance.

There are eight dimensions from Garvin's eight dimension of quality (Jabnoun, 1999):

- Performance
- Features
- Reliability
- Conformance
- Durability
- Serviceability
- Aesthetics
- Perceived quality (image)

Implementing properly quality programs in the company will reduced the manufacturing cost, increased the production, produced safer product and increased quality reputation. Hence it gives the company the advantages in greater market, higher profitability and reducing the liability (Arnold, 1995).

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2.4 Quality Philosophies

Quality has been develops and implements by many individuals and organization throughout the world. Many managers see the quality as a way to increase the productivity hence meet the customer satisfactions. They quickly become familiar with the quality gurus – Edwards Deming and Philip Crosby; who carries the quality philosophies for over 30 years. These leading professional gave a lot of influences to worldwide with their accomplishment and became legendary in the quality field.

2.4.1 Dr. W. Edwards Deming

Edwards Deming (1900 – 1993) defined quality in two different types – quality of conformance and quality of performance (Pyzdek, 1989). According to Deming, quality must be defined in term of customer satisfaction. Quality improvement will be the catalyst to the company in order to meet the satisfactions.

Deming claims that 94% of quality problems are generated by managements. The manager should take responsibilities to assure the removal of all barriers in order to improve the quality. He also advocated the management to using single sourcing since the incoming and outgoing inspection is too late and ineffective.

2.4.1.1 Deming's 14 Points (Besterfield,2001)

In order to manage the quality improvement in the company, Deming had developed 14 steps that aimed at management.

1. Creating and publishing the aims and purposes of the organization.
2. Learning the new philosophy.
3. Understanding the purpose of inspection.

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