TOTAL QUALITY MANAGEMENT APPROACH, A CASE STUDY IN MANUFACTURING INDUSTRY

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ABSTRACT

In this thesis, the Total Quality Management (TQM) that applied in manufacturing industry is studied theoretically through a case study in manufacturing industry. The study is about the philosophy and concept of TQM, and to analyze the implementation of TQM as well as the constraints and benefits of TQM. This thesis focuses on TQM approach in manufacturing industry in all functions at all levels of the organization. This study was mainly carried out by preparing the letter to industry, industry visit, process mapping, data collection, analysis of the data, result and discussion of the analysis, and conclusion. In this case study, Mitsumi Technology (M) Sdn. Bhd. (MSE) was examined and the results for a different year have been discussed. The study shows that the implementation of TQM in Mitsumi is based on the first defective ratio, double check, customer claim, productivity, inventory, and supplier performance. TQM in Mitsumi did not successful achieved the target even though Mitsumi had implement TQM for a long time. This is due to the improper planning of the organization, and lack of continuous training and education of the employees. Finally, it is hope that the results from the study could contribute to the researcher for future improvement.

ABSTRAK

Dalam tesis ini, *Total Quality Management* (TQM) yang diaplikasikan dalam industri pembuatan telah dikaji melalui kaedah kajian di dalam industri pembuatan. Kajian ini berkaitan dengan falsafah dan konsep TQM, dan menganalisis perlaksanaan TQM di samping keburukan dan kebaikan TQM. Tesis ini difokuskan kepada pendekatan TQM di dalam industri pembuatan dalam semua fungsi pada setiap peringkat organisasi. Kajian ini dibuat dengan terutamanya menyediakan surat kepada industri, melawat industri, proses merancang, pengumpulan data, analisis data, analisis daripada keputusan dan perbincangan, dan kesimpulan. Dalam kajian ini, Mitsumi Technology (M) Sdn. Bhd. (MSE) telah dikaji dan keputusan untuk tahun yang berbeza telah dibincangkan. Kajian ini menunjukkan perlaksanaan TQM di Mitsumi adalah berdasarkan *first defective ratio, double check, customer claim, productivity, inventory,* dan *supplier performance*. TQM di Mitsumi tidak berjaya mencapai sasaran walaupun Mitsumi telah lama melaksanakan TQM. Ini disebabkan oleh perancangan organisasi yang tidak sempurna, dan kekurangan pendedahan latihan dan pendidikan kepada pekerja. Akhirnya, keputusan daripada kajian ini diharapkan boleh memberi sumbangan kepada penyelidik untuk kemajuan yang akan datang.

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LIST OF SYMBOLS

ANSI	-	American national standard institute
ASQ	-	American society for quality
ASQC	-	American society for quality control
CEO	-	Chief executive officer
E	-	Expectations
HQ	-	Headquarters
HR	-	Human resource
IFT Coils	-	Intermediate frequency transformer coils
ISO	-	International standardization organization
KPI	-	Key performance index
LCL	-	Lower control limits
MD	-	Managing director
MPS	-	Mitsumi production system
MSE	-	Mitsumi Technology (M) Sdn. Bhd.
P	-	Performance
PDCA	-	Plan do check act
PIC	-	Person in charge
PWB	-	Printed wiring board
Q	-	Quality
QA	-	Quality assurance
QC	-	Quality control
QCC	-	Quality control circle
QFD	-	Quality function deployment
R	-	Range of sample
SPC	-	Statistical process control
SNR	-	Switching regulators
TQM	-	Total quality management

UCL	-	Upper control limits
U.S	-	United States
WI	-	Work instruction
$\overline{X}$	-	Mean of sample

CHAPTER 1

INTRODUCTION

1.1 General Introduction

Before the concepts and ideas of Total Quality Management (TQM) were formalized, much work had taken place over the centuries to reach this stage. This section charts the evolution, from inspection through the present day concepts of total quality.

1.2 History of Total Quality Management (TQM)

During the nineteenth century the modern industrial system began to emerge. In the United States, Frederick Taylor pioneered scientific management in the late nineteenth and early twentieth centuries, removing work planning from the area of workers and foremen and placing it in the hands of industrial engineers. The twentieth century introduce in a technological era that enabled the masses to benefit themselves of products previously reserved for only the wealthy. Henry Ford introduced the moving assembly line into Ford Motor Company's manufacturing environment. Assembly line production broke down complex operations that could be performed by unskilled labor. This resulted in the manufacture of highly technical products at low cost. As part of this process, an inspection operation was instituted to separate good and bad products. Quality, at this point, remained under the area of manufacturing.

It soon became apparent that the production manager's priority was meeting manufacturing deadlines; achieving product quality not a priority. Managers knew they would lose their jobs if they did not meet production demands, whereas they would only be criticism if quality was poor. Upper management eventually realized that quality was suffering as a result of this system, so a separate position of "chief inspector" was created [1].

The history of quality control is undoubtedly as old as industry itself. During the middle ages, quality was to a large extent controlled by the long periods of training required by the guilds. This training instilled pride in workers for quality of a product.

The concept of specialization of labor was introduced during the Industrial Revolution. As a result, a worker no longer made the entire product, only a portion. This change brought about a decline in workmanship. Because most products manufactured during that early period were not complicated, quality was not greatly affected. In fact, because productivity improved there was a decrease in cost, which resulted in lower customer expectations. As products become more complicated and jobs more specialized, it became necessary to inspect products after manufacture.

In 1924, W. A. Shewhart of Bell Telephone Laboratories developed a statistical chart for the control of product variables. This chart is considered to be the beginning of statistical quality control. Later in the same decade, H. F. Dodge and H. G. Roming, both of Bell Telephone Laboratories, developed the area of acceptance sampling as a substitute for 100% inspection. Recognition of the value of statistical quality control became apparent by 1942. Unfortunately, U.S managers failed to recognize its value.

In 1946, the American Society for Quality Control was formed. Recently, the name was changed to American Society for Quality (ASQ). This organization,

through its publication, conferences, and training sessions, has promoted the use of quality for all types of product and service.

In 1950, W. Edwards Deming, who learned statistical quality control from Shewhart, gave a series of lecture on statistical methods to Japanese engineers and on quality responsibility to the CEOs of the largest organizations in Japan. Joseph M. Juran made his first trip to Japan in 1954 and further emphasized management's responsibility to achieve quality. Using these concepts the Japanese set the quality standards for the rest of the world to follow.

In 1960, the first quality control circles were formed for the purpose of quality improvement. Simple statistical techniques were learned and applied by Japanese workers.

By the late 1970s and early 1980s, U.S. managers were making frequent trips to Japan to learn about the Japanese miracle. These trips were really not necessary – they could have read the writings of Deming and Juran. Nevertheless, a quality renaissance began to occur in U.S. products and services, and by the middle of 1980 the concepts of TQM were being publicized.

In the late1980s the automotive industry began to emphasize statistical process control (SPC). Suppliers and their suppliers were required to use these techniques. Other industries and the Department of Defense also implemented SPC. The Malcolm Baldrige National Quality Adward was established and become the means to measure TQM. Genechi Taguchi introduced his concepts of parameter and tolerance design and brought about a resurgence of design of experiments (DOE) as a valuable quality improvement tool.

Emphasis on quality continued in the auto industry in the 1990s when the Saturn automobile ranked first in customer satisfaction (1996). In addition, International Standardization Organization (ISO) 9000 became the worldwide model for a quality management system. It comprises a number of standards that specify

the requirements for the documentation, implementation and maintenance of a quality system. ISO 14000 was approved as the worldwide model for an environment management system.

The new millennium brought about increased emphasis on worldwide quality and the internet [2].

1.3 Objectives of the Research

1. To study the philosophy and concept of TQM.
2. To analyze the implementation of TQM in manufacturing industry.
3. To analyze the constraints and benefits of TQM in manufacturing industry.

1.4 Scope

This project focuses on Total Quality Management (TQM) approach in manufacturing industry in a specific department at all levels of the organization which include:

1. Study on TQM. (concept and philosophy)
2. Data Collection.
3. Understanding on the overall process of TQM.
4. Data Evaluation.

1.5 Problem Statement

TQM is widely use in Malaysia as a method to improve the quality in all functions at all levels of the organization. While the TQM is widely use in Malaysia but most of the companies did not fully implement the concept of TQM due to the limited knowledge about the whole TQM concept and lack of enforcement from the top management and lack of involvement from the employees. There are six basic concept of TQM that are leadership, customer satisfaction, employee involvement, continuous process improvement, supplier partnership and performance measures.

Material cannot supply on time by supplier, machine break down, operator attitude, and quality problem of the material would cause the production line stop. Thus, the product cannot delivery on time to customer. That is the reason that the company must fully implement the TQM. If TQM is fully implement, it can improves the performance of companies in several areas such as eliminating product defects, enhancing attractiveness of product design, speeding service delivery, higher productivity and reducing cost.

1.6 Methodology

The methodology of this project can be seen in Figure 1.1 while the Gantt chart of the project schedule is shown in Figure 1.2.

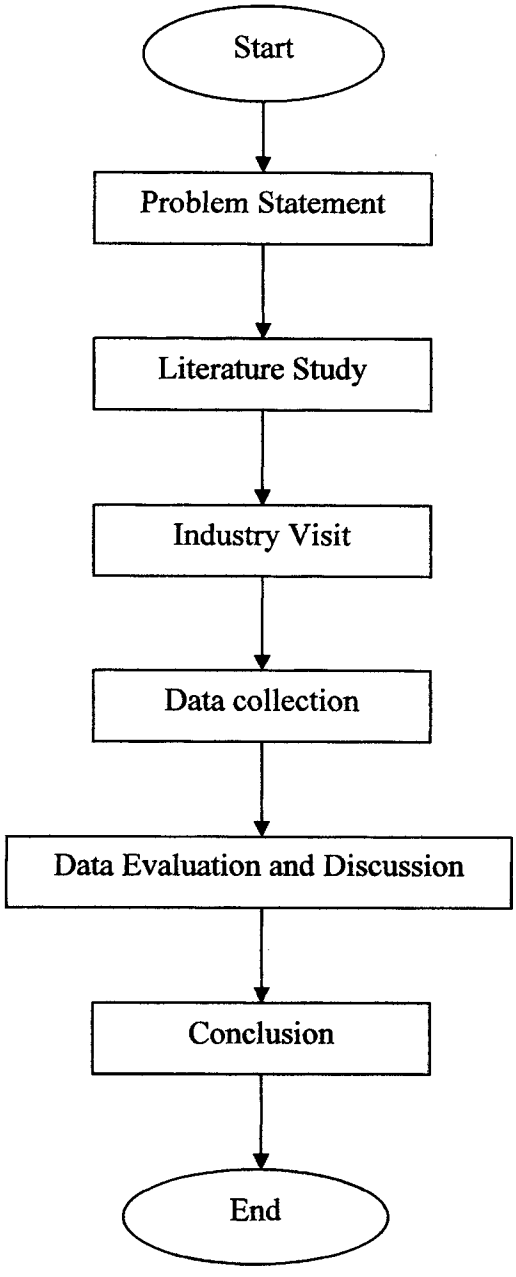

Figure 1.1: Flow chart of project methodology

Gantt Chart/ Project Schedule for semester II 2006/07 (Thesis I)

	Project Activities	Week															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	Set a meeting time																
2	Objective and scope																
3	Project background																
4	Flow chart																
5	Submit log book																
6	Problem statement																
7	Prepare a letter to industry																
8	Chapter 1: Introduction																
9	Chapter 2: Literature Review																
10	First visit to the company																
11	Chapter 3: Methodology																
12	Draft I																
13	Submit draft I																
14	Presentation preparation																
15	Presentation																

Gantt Chart/ Project Schedule for semester I 2007/08 (Thesis II)

	Project Activities	Week															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	Research in a company	—	—	—	—	—	—										
2	Chapter 4: Result and Discussion							—	—								
3	Chapter 5: Conclusion and Recommendation									—	—	—	—	—			
4	Abstract													—			
5	Draft II		—	—	—	—	—	—	—	—	—	—	—				
6	Submit draft II														—		
7	Presentation preparation															—	
8	Presentation																—

Figure 1.2: Gantt chart of the project schedule

1.7 Organization of the Thesis / Thesis Organization

Chapter 1 is about the introduction of the whole project. It consist a general introduction that is necessary to understand the early day of manufacturing before the Total Quality Management (TQM) appear. The thesis includes the history of Total Quality Management (TQM) from the early day until 21st century. The objective, scope, problem statement and methodology of the project in brief are also included in this chapter.

Chapter 2 is based on literature study that related to this project. It consists of definition of quality, definition of TQM, benefits and constraints of TQM, concept of TQM and philosophy of TQM. The concept of TQM explains about leadership, customer satisfaction, employee involvement, continuous process improvement, supplier partnership, and performance measures. Armand Feigenbaum, Walter Shewhart, W Edwards Deming, Joseph M. Juran, and Philip Q. Crosby are the philosopher that will briefly explain in this chapter.

The chapter 3 is mainly about the methodology of the whole thesis. This chapter describes the methods used to run the project include how the data is collected, evaluated, and analyzed. Chapter 4 presents the result of the data collection and the discussion of the results. Finally, the conclusion and recommendation are discussed in the Chapter 5.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Chapter 2 introduces the fundamental concepts that are necessary to understand and use total quality management in an organization. These concepts include a definition of quality and total quality management. This chapter also discusses the benefits and constraints of total quality management. It also explains the basic concept that needed to establish a quality company. The next part presents the style of management and philosophy developed by Armand Feigenbaum, Walter Shewhart, W Edwards Deming, Joseph M. Juran, and Philip Q. Crosby.

2.2 Definition of Quality

When the expression "quality" is used, we usually think terms of an excellent product or service that fulfills or exceeds our expectations. These expectations are based on the intended use and the selling price. For example, a customer expects a different performance from a plain steel washer that from a chrome-plated steel washer because they are a different grade. When a product surpasses our expectations we consider that quality. Thus, it is somewhat of an intangible based on perception. Quality can be quantified as equation (2.1) follows:

$$Q = \frac{P}{E} \tag{2.1}$$

Where Q = quality

P = performance

E = expectations

If Q is greater than 1.0, then the customer has a good feeling about the product and service. Of course, the determination of P and E will most likely be based on perception with the organization determining performance and the customer determining expectations [2].

A more definitive definition of quality is given in ISO 9000: 2000. It is defined as the degree to which a set of inherent characteristic fulfills requirements. Degree means that quality can be used with adjectives such as poor, good, and excellent. Inherent is defined as existing in something, especially as a permanent characteristic. Characteristics can be quantitative or qualitative. Requirement is a need or expectation that is stated; generally implied by the organization, its customers, and other interested parties; or obligatory.

Quality starts with market research – to establish the true requirements for the product or service and the true needs of the customers. However, for an organization to be really effective, quality must span all functions, all people, all departments and all activities and be a common language for improvement. The cooperation of everyone at every interface is necessary to achieve a total quality organization, in the same way that the Japanese achieve this with company wide quality control.

Quality has nine different dimensions. Table 2.1 shows these nine dimensions of quality with their meanings and explanations [2].

These dimensions are somewhat independent; therefore, a product can be excellent in one dimension and average or poor in another. Very few, if any,

products excel in all nine dimensions. For example, the Japanese were cited for high-quality cars in the 1970s based only on the dimensions of reliability, conformance, and aesthetics. Therefore, quality products can be determined by using a few of the dimensions of quality.

Table 2.1: The dimension of quality

Dimension	Meaning and Example
Performance	Primary product characteristic, such as the brightness of the picture
Features	Secondary characteristic, added features, such as remote control
Conformance	Meeting specifications or industry standards, workmanship
Reliability	Consistency of performance over time, average time for the unit to fail
Durability	Useful life, includes repair
Service	Resolution of problems and complaints, ease of repair
Response	Human-to- human interface, such as the courtesy of the dealer
Aesthetics	Sensory characteristics, such as exterior finish
Reputation	Past performance and other intangibles, such as being ranked first

Marketing has the responsibility of identifying the relative importance of each dimension of quality. These dimensions are then translated into the requirements for the development of a new product or the improvement of an existing one [2].

2.3 Definition of Total Quality Management (TQM)

TQM can be defined in many ways; difference source can result in difference definition. Below is some of the definition that selected from several journals:

..."TQM has been defined as ". . . a set of organizational strategies, practices, and tools for organizational performance improvement" (Lawler et al., 1995, p. 45) and TQM advocates argue that it cannot be successful without employee involvement (Deming, 1986). "One of the most important principles of TQM concerns employee involvement, or as it is often called, empowerment" (Lawler, 1994, p. 68) [3]."...

..."view of TQM as "a business level strategy . . . [with] . . . components of process and content." Establishing that TQM is a business level strategy is important because it is at the business level where competitive advantage occurs. In the case of TQM, for example, it can include improving product quality to help increase sales and revenues (Reed et al., 1996), or reduce risk (Kroll et al., 1999). For TQM, that can include things like the use of teams to iron out inefficiencies in manufacturing processes. Competitive advantage is the outcome of a strategy that generates increased value for a firm, relative to its competition, and sustainability is present if the increased value remains when competitors stop trying to imitate the advantage (Barney, 1991) [4]."...

..."TQM is a management philosophy embracing all activities through which the needs and expectations of the customer and the community and the objectives of the organization are satisfied in the most efficient and cost effective way by maximizing the potential of all employees in a continuing drive for improvement (BS.4778: Part 2, 1991) [5]."...

2.4 Benefits of TQM

Reed et al. (1996) saw TQM content as having four main components: market advantage, reliability, design efficiency, and process efficiency. The first two allow firms to generate profits by increasing revenues, and the latter two increase profits by cutting costs.