

“An Empirical study A Study with Total Quality Management Approach to the Information system development processes.”

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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, 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.*

Keywords: *TQM (Total Quality Management), Empirical Research, Manufacturing & Service Company. Quality,*

I. INTRODUCTION

The quality idea has been around for hundreds of years. The discerning customer in shops and market places centuries ago applied ‘quality techniques’, prodding and turning fruits and vegetables testing for firmness, freshness and fitness for the purpose of consumption. If the product was not adequate the purchase would not take place. The potential customer reacted against poor quality products. Nearby in the hustle and bustle of cattle markets farmers argued and bartered over the fitness of animals for breeding, dairy farming or consumption, providing evidence for their case by inspection against criteria learned from their forefathers. Those shoppers and farmers passed on their knowledge to their children’s children. Inspection and reaction is one of the main elements while purchasing any commodity.

Inspection and protection was established as a management idea. Products were inspected and the quality image of the company protected by the removal of the poor quality products before customers applied their own inspection and reaction. Inspection and protection, however is little more than reactive management, reacting when poor quality has already entered the product.

Nowadays quality thinking has spread across the entire manufacturing and service process and extends to all management functions, making inspection of manufactured products on its own seem a rather primitive idea. Quality management has become proactive, making plans to bring about continuous quality improvement and to achieve a more desirable future. The aim is to get rid of poor quality from the product rather than get rid of the quality of the product. Quality management has progressed, establishing proactive rather than reactive management.

Objectives of The Study

- To study the Total quality management practices to business.
- Highlighted the potential and plans of the company.
- Emphasis the use of statistical models in scientific performance measures.

Plan of Study:

An attempt is made initially to analyze the performance of Modern Terry Towels before and after following Total Quality Management Practices.

Data Collection:

For the purpose of this study Modern Terry Towels Limited was selected. This study is based on internal and external data of the company. For this purpose the Quality Management guide of Modem and annual report was analyzed.

Research Methodology:

The researcher has selected Modem Terry Towels Limited financial data of the company for the last three accounting years were analyzed using the following statistical techniques:

- SQC
- AQL
- Sampling
- Distributions (hyper-geometric)

II. LITERATURE REVIEW

2.1 Academic Research in TQM

Three aspects of TQM have received more than passing attention from academic researchers. The earliest work concentrated on the question of the degree to which quality management was dependent on the culture of the workforce (Ebrahimpour, 1985; Ebrahimpour & Lee, 1988; Porker, 1991; Lee Ebrahimpour, 1985; Lewis, 1992; Oliver & Wilkinson, 1989). The research suggests that North American management will have to change its practices, and increase its commitment to quality, to obtain the benefits of TQM. Garvin (1986) studied quality management in U.S. and Japanese room air conditioner manufacturers, and found not only that attitudes and policies about quality differed, but that the two countries faced a different mix of quality problems because of their different performance with respect to quality.

Evolution: The success of Japanese competitors in North American and European markets has long been attributed to the superior quality of their products (Feigenbaum, 1984; Lee & Ebrahimpour, 1985; Mito 1982). Various initiatives have been proposed to enable Western businesses to attain these levels of quality, including quality circles, total quality control, and, most recently, total quality management (TQM).

This report is based on an extensive literature review of the area of TQM. Early approaches to quality management are reviewed first. The evolution of TQM from these approaches is then summarized. The diffusion of TQM through various parts of the economy is described, along with the problems and criticisms that were made during the process. Lastly, the aspects of TQM that have received attention in the academic literature are summarized, and areas that could benefit from further study are suggested.

Elements of Total Quality Management

Total Quality Management is a management approach that originated in the 1950's and has steadily become more popular since the early 1980's. Total Quality is a description of the culture, attitude and organization of a company that strives to provide customers with products and services that satisfy their needs. The culture requires quality in all aspects of the company's operations, with processes being done right the first time and defects and waste eradicated from operations.

To be successful implementing TQM, an organization must concentrate on the eight key elements: Ethics

1. Integrity
2. Trust
3. Training
4. Teamwork
5. Leadership
6. Recognition
7. Communication

This paper is meant to describe the eight elements comprising TQM.

Key Elements

TQM has been coined to describe a philosophy that makes quality the driving force behind leadership, design, planning, and improvement initiatives. For this, TQM requires the help of those eight key elements. These elements can be divided into four groups according to their function. The groups are:

- I. Foundation - It includes: Ethics, Integrity and Trust.
- II. Building Bricks - It includes: Training, Teamwork and Leadership.
- III. Binding Mortar - It includes: Communication.
- IV. Roof - It includes: Recognition.

Implementation Process of Total Quality Management

The implementation program of TQM is of nine stages:

- Stage 1: understanding the organization system.
- Stage 2: developing a strategic plan for the TQM effort.
- Stage 3: Planning Assumptions.
- Stage 4: specifying strategic objectives.
- Stage 5: specifying tactical objectives.
- Stage 6: implementation planning.
- Step 7: project management.

Step 8: measurement & evaluation.

Step 9: evaluation, accountability, follow through, ensuring effective implementation.

Requirements for successful implementation of TQM

TQM is an approach to doing business that attempts to maximize the competitiveness of an organization through the continual improvement of the quality of its products, services, people, processes and environment. It is a customer oriented management system, which seeks to meet or exceed customer expectations by providing defect free goods or services the first time, on time, all the time. Although the ultimate goal is to satisfy external customers without meeting the requirements of the internal customers as well. Therefore, it seeks to meet or exceed the expectations of both internal and external customers.

In TQM, the search of improvement is a never ending process. Thus, when the initial goals are met, newer and higher goals are set. Seeking to achieve incremental improvements continuously is the core stone of TQM. The continuous search for improvement requires the full participation and involvement of all stakeholders of the organization, including managers, employees, suppliers and customers. Particularly significant is the buy-in by employees, without whose support the TQM effort would be fruitless. Partnerships must also be forged with suppliers. In TQM, collaboration through team efforts among workers and departments is encouraged, and quality improvement becomes everyone's responsibility. In organization where the TQM culture is well established, the manager's role changes from being an administrator and controller to that of coach and facilitator.

The best principles of TQM are applicable in any organization, whether manufacturing or service, public or private. Properly designed and implemented, TQM can help private firms to attain competitiveness both in domestic and international markets, and it can enable nations to achieve their economic growth objectives. In view of the fact that TQM introduction involves a major change in organization culture and structure, its implementation process should be adapted to the specific situation based on the objective assessment of the external and internal environment in which a firm operated. Even though the implementation process should be tailored to each organization's specific situation, however there are certain necessary conditions for the successful implementation of TQM. These basic requirements are as mentioned below:

III. TOP MANAGEMENT SUPPORT & COMMITMENT

The degree of support and commitment by top management is critical for TQM success. Top management must show unwavering support to quality and excellence, and must promote the effort aggressively in order to ensure support among middle managers and workers.

A true test of management commitment lies in the amount of resources that are willing to allocate to the TQM implementation effort. Top management's willingness and commitment to accept such change can inspire the entire organization to embrace the TQM process.

Long Term Orientation & Persistence:

TQM is a long term oriented process, which demands persistence and patience. It is not a quick fix and it often takes a long time before its impact can be known. Unwavering management support and its persistent guidance are needed in order to steer the organization towards successful implementation.

Customer Orientation:

The customers' needs and expectations must be carefully and continuously assessed and understood, and every effort must be made not just to meet those expectations but also to exceed them. This applies both to internal and external customers.

Employee Involvement:

TQM success is unthinkable without the full and active involvement of all employees. Workers should be encouraged to utilize their latent innovativeness and creativity should be empowered to make their own decisions in matters related to specific work.

Training:

Through, continuous training is a must if the TQM efforts are to succeed. The training offered should include group dynamics, problem solving and task skills training.

Teamwork:

While individual effort is recognized in TQM, the emphasis is on teamwork. Co-operation among the departments and employees is a necessary ingredient for TQM success. Hence, employees must be well trained in group dynamics and in becoming effective team players. The objective must be to develop a sense of

interdependence and a sense of shared purpose. Teams must be empowered to introduce incremental improvements, which will have a significant impact on the organization as a whole.

Reward & Recognition System:

A good TQM system will have built-in mechanism for motivating and recognizing individual employees as well as teams. Top management must reward both superior effort and superior results. The reward system must be relevant, meaningful and consistent with the TQM philosophy. For example, it should be designed in a manner that fosters co-operation and teamwork, and discourages destructive competition among workers and departments. Well designed reward systems help to sustain the change process for a long time. For such reward systems to have a lasting effect, however, they must be integrated with the overall organizational effectiveness and training programmes.

Statistical Process Control (SPC)

Is an effective method of monitoring a process through the use of control charts. By collecting data from samples at various points within the process, variations in the process that may affect the quality of the end product or service can be detected and corrected, thus reducing waste and as well as the likelihood that problems will be passed on to the customer. With its emphasis on early detection and prevention of problems, SPC has a distinct advantage over quality methods, such as inspection, that apply resources to detecting and correcting problems in the end product or service.

In addition to reducing waste, SPC can lead to a reduction in the time required to produce the product or service from end to end. This is partially due to a diminished likelihood that the final product will have to be reworked, but it may also result from using SPC data to identify bottlenecks, wait times, and other sources of delays within the process. Process cycle time reductions coupled with improvements in yield have made SPC a valuable tool from both a cost reduction and a customer satisfaction standpoint.

Shewhart created the basis for the control chart and the concept of a state of statistical control by carefully designed experiments. While Dr. Shewhart drew from pure mathematical statistical theories, he understood that data from physical processes seldom produces a “normal distribution curve” (a Gaussian distribution, also commonly referred to as a “bell curve”). He discovered that observed variation in manufacturing data did not always behave the same way as data in nature (for example, Brownian motion of particles). Dr. Shewhart concluded that while every process displays variation, some processes display controlled variation that is natural to the process (common causes of variation), while others display uncontrolled variation that is not present in the process causal system at all times (special causes of variation). The following description relates to manufacturing rather than to the service industry, although the principles of SPC can be successfully applied to either. For a description and example of how SPC applies to a service environment, refer to Roberts (2005).

In mass-manufacturing, the quality of the finished article was traditionally achieved through 100% inspection of the product; accepting or rejecting each article based on how well it met its design specifications. In contrast, **Statistical Process Control** uses statistical tools to observe the performance of the production process in order to predict significant deviations that may later result in rejected product.

Two kinds of variations occur in all manufacturing processes: both these process variations cause subsequent variations in the final product. The first are known as natural or common causes of variation and may be variations in temperature, specifications of raw materials or electrical current etc. These variations are small, and are generally near to the average value. The pattern of variation will be similar to those found in nature, and the distribution forms the bell-shaped *normal distribution curve*. The second kind are known as special causes, and happen less frequently than the first.

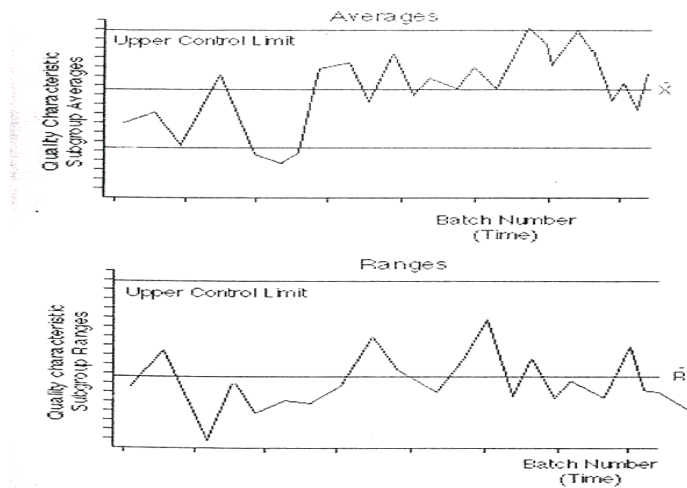
For example, a breakfast cereal packaging line may be designed to fill each cereal box with 500 grams of product, but some boxes will have slightly more than 500 grams, and some will have slightly less, in accordance with a distribution of net weights. If the production process, its inputs, or its environment changes (for example, the machines doing the manufacture begin to wear) this distribution can change. For example, as its cams and pulleys wear out, the cereal filling machine may start putting more cereal into each box than specified. If this change is allowed to continue unchecked, more and more product will be produced that fall outside the tolerances of the manufacturer or consumer, resulting in waste. While in this case, the waste is in the form of “free” product for the consumer, typically waste consists of rework or scrap.

By observing at the right time what happened in the process that led to a change, the quality engineer or any member of the team responsible for the production line can troubleshoot the root cause of the variation that has crept in to the process and correct the problem.

SPC indicates when an action should be taken in a process, but it also indicates when NO action should be taken. An example is a person who would like to maintain a constant body weight and takes weight measurements weekly. A person who does not understand SPC concepts might start dieting every time his or her

weight increased, or eat more every time his or her weight decreased. This type of action could be harmful and possibly generate even more variation in body weight. SPC would account for normal weight variation and better indicate when the person is in fact gaining or losing weight.

Control Charts



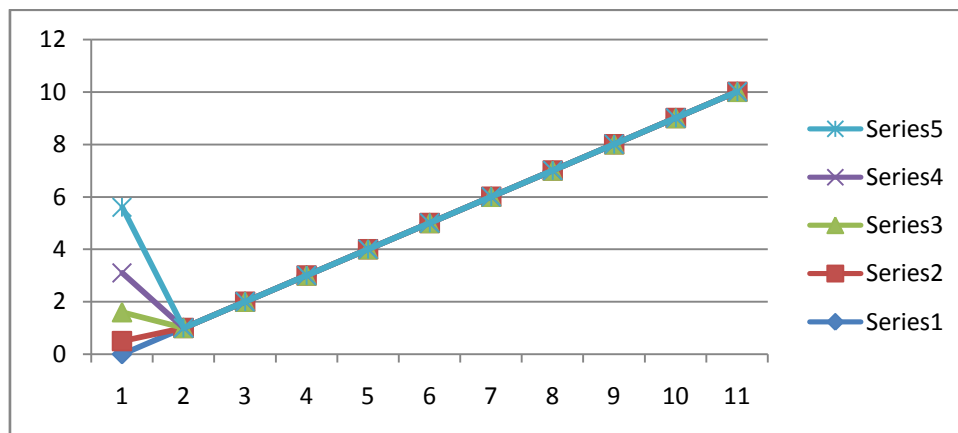
Control charts are a method of Statistical Process Control, SPC. (Control system for production processes). They enable the control of distribution of variation rather than attempting to control each individual variation. Upper and lower control and tolerance limits are calculated for a process and sampled measures are regularly plotted about a central line between the two sets of limits. The plotted line corresponds to the stability/trend of the process. Action can be taken based on trend rather than on individual variation. This prevents over-correction/compensation for random variation, which would lead to many rejects.

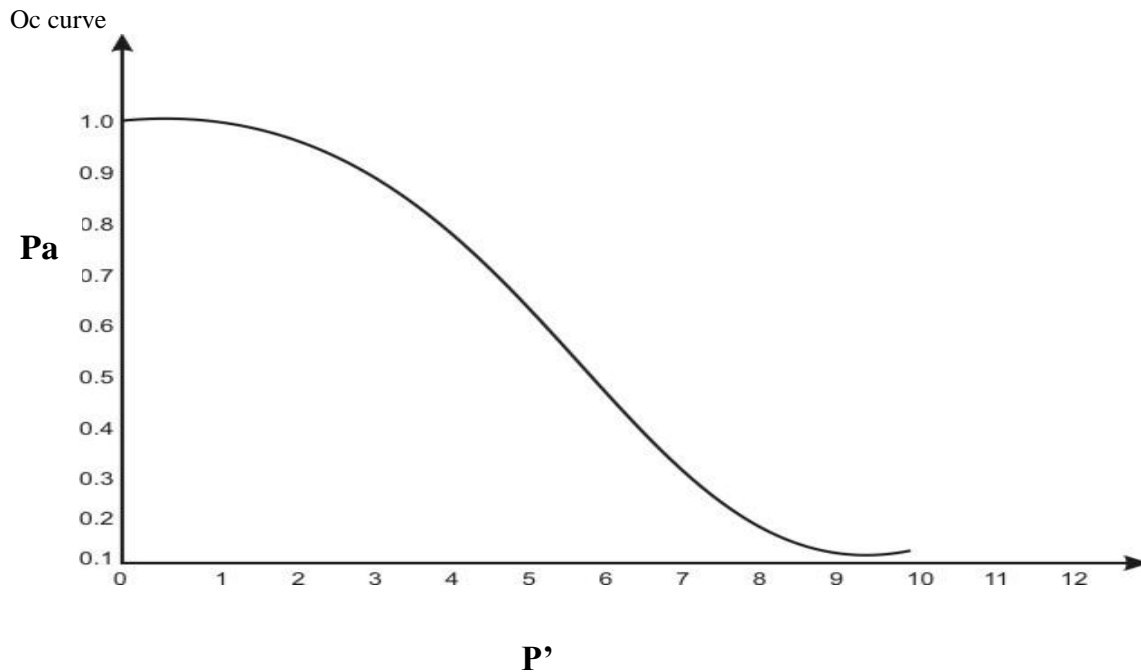
Establishing Control Limits

Even though one could arbitrarily determine when to declare a process out of control (that is, outside the UCL-LCL range), it is common practice to apply statistical principles to do so. *Elementary Concepts* discusses the concept of the *sampling distribution*, and the characteristics of the *normal distribution*. The method for constructing the upper and lower control limits is a straightforward application of the principles described there.

Curves for sampling plan: Modern Terry Towels Ltd.

AQL %	INSPECTION LEVEL	LOT BATCH	SAMPLE SIZE	ACCEPTANCE NUMBER
0.065	II	10,000	200	0
0.9	II	10,000	200	3
1.1	II	10,000	200	5
1.5	II	10,000	200	7
2.5	II	10,000	200	10





P'	Pa
0	1
0.01	0.92
0.02	0.67
0.03	0.42
0.04	0.24

(1000, 100, 2) single sampling plan

In Acceptance sampling if defective product increase then acceptance level (probability of product) is decrease due to product defective customer are not ready to accept the product.

VI. CONCLUSIONS

TQM is a management philosophy that seeks to integrate all organizational functions (marketing, finance, design, engineering, and production, customer service, etc.) to focus on meeting customer needs and organizational objectives.

TQM views an organization as a collection of processes. It maintains that organizations must strive to continuously improve these processes by incorporating the knowledge and experiences of workers. The simple objective of TQM is “Do the right things, right the first time, every time”. TQM is infinitely variable and adaptable. Although originally applied to manufacturing operations, and for a number of years only used in that area, TQM is now becoming recognized as a generic management tool, just as applicable in service and public sector organizations. There are a number of evolutionary strands, with different sectors creating their own versions from the common ancestor. TQM is the foundation for activities. The success of any Six Sigma implementation project depends a lot on the level of support that is provided by the top management to Six Sigma teams handling the implementations. Support and commitment is required in the form of time, effort and resources, which are vital for the success of any quality improvement initiative undertaken by an organization. The leadership cannot afford to have a laid-back attitude while Six Sigma implementation projects are being implemented in the organization.

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