

Research Study of Recent Trends Adopted In Total Quality Management

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ABSTRACT

This paper explore the recent trends in total quality management targeting at a better understanding of the current development in the industrial sector. Discussing the general figure of quality management, this paper aims to highlight the most recent and important trends at the moment. Due to the more competitive and sophisticated condition of markets, those companies which can demonstrate their ability to meet modern management that will only succeed. Concept of ISO 9000, Quality Function Development (QFD), Benchmarking, Statistical Process Control (SPC) etc. are successfully adopted by companies to survive and for long lasting in the present global market condition. The paper will touch few such trends which are generally adopted by industries in this era.

Keywords : Total Quality Management, Benchmarking, QMS, FMEA, SPC, QFD, Six Sigma.

I. INTRODUCTION

Motives and goal of any business organization is profit making or in other hands business is done only with thinking of earning profit. Profit can be earned if the customer buys the product. Customers are the king of any organization and hence can rule the organization in terms of sufficient warranty, service on demand, qualities level with economical price. If the product is having the quality as desired by the customer then only the product will bought by the customer. Quality cannot be limitedly defined to the products manufactured in the industry but also for service sectors such as transportation, hotel industries, educational institute, army force etc. In the earlier days, inspectors were held responsible for the poor quality and administrative staffs, shop floor supervisors have to face the ire of the customer directly. To match up the level of quality product to the desired level of customer many elements are responsible such as quality check, instrument, workforce vendors, management, machine, process etc. Coming up with the growth of the organization, the customer satisfaction is the responsibility of each and everyone who are involved in the organization including the top management. To achieve this goal of growth, profit making, customer satisfaction, one has to adopt Total Quality Management. TQM is the application of human resources with qualitative methods to improve

the functions and process within an organization and meet the present and future needs of customer. Different trends has been developed inside the total quality management are Quality Management System- (QMS), Environmental Management System (ISO 14000), Failure Mode and Effect Analysis (FMEA), Total Productive Maintenance (TPM) etc.

A. Historical Review

The concept of quality even date back to early history. Stone of pyramid is one such instance of quality. During early periods the product manufactured is in the simple form and hence quality was not affected. With the production of complicated products, it became necessary to inspect the products after manufacture. During the middle ages in Europe both manufacturing and inspecting job was done by craftsmen. In the period of 20th century quality was controlled through the inspection. Defects were still present but removed by inspection. In 1920 SHEWART, Edwards, DEMING, and other pioneers of quality assurance developed many techniques for improving the quality and introduction of Statistical Quality Control (SQC). In the period of 1980^{'s} remarkable change and growing awareness of quality exists in consumers, industry and government. After recognizing the importance of quality, October 1984 designated as quality month by US government. In

1994 quality practices were extended to the non-profit organization and service sector. Although initially quality is only focused on reducing error and defects in products and services. Organization began to realize that factors like voice of customers, development of strategy, performance measurement, training of employees, development of long-term relationship are the true route of quality. They recognized the importance of Quality Management. Hence with the practices of integration of qualitative methods and human resources into their management systems the notion of Total Quality Management came into exist.

B. Objectives of the Study

The overall objective of Total Quality Management is to provide the quality product or services to the customers as per their needs or satisfaction. This will results the increase in demand and hence productivity and decrease in production cost. Obviously, with increased quality and lower price, the market condition will be improved. This route will help the organization to achieve its objectives of profit and long-term growth with greater ease. In addition to this, human resources will have job security, which is one of motivational behavior in the organization.

II. METHODS AND MATERIAL

A. Tools and Techniques

BENCHMARKING : Indian companies are now becoming world class in terms of performance and size both. Quality delivery which was the property of General Electric, Ford, General motors, Xerox and AT&T had become the main principle in many corporate circles in India as well. Software companies like Infosys to Automobile companies like Mahindra are adopting best in class technologies, borrows and adopt best suitable ideas, and implement them as part of their corporate strategy. Under different methods, Pareto analysis is one of the best ways to analyze wider data. Ishikawa diagram or Cause & Effect analysis is also one of the widely used quality tool. Apart from these, organizations use flow diagrams and bar charts to capture critical factors that give rise to the success of the other organization.

Benchmarking Process



Figure 1. Benchmarking Process

The process of benchmarking is not a simple one. The process may require greater degree of systematic process review and constant control apart from the following:

- a) Flexible planning
- b) Detailed analysis
- c) Qualitative implementation
- d) Constant review
- e) Progressive change management.

There are three main types of benchmarking that have emerged in Indian organization:

1. Performance or operational benchmarking
2. Process or functional benchmarking
3. Strategic Benchmarking

INFORMATION TECHNOLOGY : Information technology has pervaded itself into all areas of the organization. So quality control is not an exception and like any other tools used to achieve the desired goals, information technology also has been used as a tool in the TQM. The most important application of IT in manufacturing field is for statistical analysis which is one of the most powerful methods of quality control. Apart from the manufacturing sector, the IT was used to control the process with numerically controlled (NC) machines. Mechatronics, Flexible manufacturing system, Nano technology, Micro mechanical system is the other area of the Information Technology applications.

B. Environmental Management System-Ems (ISO 14000) :

The ISO 14000 is the set of standards that are designed and developed to assure that the activities in organization are environmentally responsible. The implementation of the ISO 14000 standards which are given by International Organization for Standards (IOS) will more than benefit the organization financially and will assure with government policies and regulations. The main goals of ISO 14000 standards was "sustainable development", a cleaner, safer, healthier world for all of us. It include the guidelines for waste disposal, use of natural resources, pollution control and environment responsibility.

The new series of ISO 14000 standards are designed to cover:

1. Environmental Auditing
2. Environmental Performance Evaluation
3. Environmental Management System
4. Life cycle assessment
5. Environmental labeling.
6. Environmental aspects in product standards

QUALITY FUNCTION DEPLOYMENT (QFD) : Quality function deployment was invented by Dr. Mizuno, professor of emeritus of the Tokyo Institute of Technology. It is a planning tool which can be used to fulfill the customer satisfaction. Quality function deployment is a proper approach for product design, engineering and production and provides in-depth evaluation of a product. It has become a standard practice for most of the leading business firm, who also expect their supplier to require it. It focuses on customer expectation, often referred to as voice of customer. Quality function deployment is used to convert customer need in terms of specific requirements, into the way and act in terms of engineering characteristics which can be deployed through part development, process planning, product planning and service sectors.

QFD Process:

- Phase 1: Customer requirements planning matrix.
- Phase 2: Parts deployment planning matrix.
- Phase 3: Process plan and quality control charts.
- Phase 4: Production planning / operating instructions.

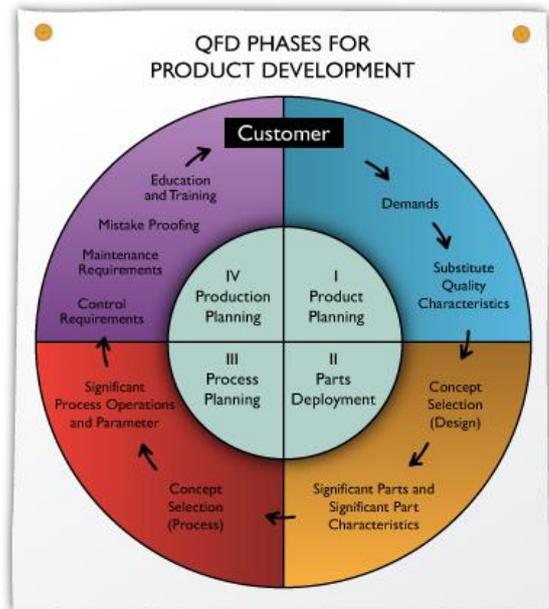


Figure 2. QFD Process or Phases

QUALITY MANAGEMENT SYSTEM : The systematic approach to quality integrate the plans, activities, events, and responsibilities of different body and provide a mechanism to ensure that the organization goals are achieved through the Co-ordination of the objectives of individual bodies. When the European country moved towards the European free trade agreement, the Quality Management System (QMS) came into exist which went into effect at the end of 1992. The International Organization for Standardization (IOS) was founded in 1945 for standardization to standardize quality requirement for European countries. ISO later adopted ISO prefix in naming the standard ISO meaning same or equal. The organization which is certified under ISO 9000 standards are assumed to have quality equal to their counterparts elsewhere having ISO 9000 certification.

QUALITY BY DESIGN : Quality by design is a concept which was first given by quality guru Joseph M. JURAN in his publication JURAN on Quality by Design. The problem associated in sequential approach is prevented by Quality by Design. It may be defined as the simultaneous approach to design and development of a product by a team of specialist to ensure ease of productivity and customer satisfaction. Quality of design is also called parallel engineering. In this tools production, and business as well as suppliers and customers brainstorm together to develop product that considers all fact of its functionality as well as its costs. This results in better quality products being produced in shorter duration of time at less cost.

FAILURE MODE AND EFFECT ANALYSIS (FMEA):

Failure mode and effect analysis is all activities which is intended to recognize and evaluate the potential failure of a product or process and its effect before the product or service being produced and used, identify the action that could eliminate the chances of potential failures. FMEA is also known as Failure mode, effect, and critically analysis (FMECA). Failure mode analysis is the process of analyzing the operation which is carried out to the product to check out what are the most likely modes where failure would occur. Failure effect analysis is the study of the potential failure to ascertain the likely impact on the performance of the whole product. It is a “before-an-event” action requiring a team effort to easily and inexpensively effect changes in design and production.

There are several types of FMEA, which are in trends.

They are:

1. Design FMEA
2. Concept FMEA
3. Maintenance FMEA
4. Process FMEA
5. Service FMEA
6. Environmental FMEA
7. System FMEA

STATISTICAL PROCESS CONTROL (SPC):

SPC has seven tools and techniques that have been following by the organization worldwide for controlling the quality. They are:

1. Process Flow Diagram: Flow-chart also known as flow diagram that shows the different activities that are involved in a process, the process that can be for a product or a service as it flows.
2. Check Sheets: It is one of the types of data collection in which results may be interpreted directly without additional processing. It is also called as datasheet or tally sheets.
3. Histograms: This is a graphical representation of the check sheet. They are a set of vertical rectangles representing width as a class width and height representing the number of items.
4. Pareto Diagram: It is similar to the histogram containing vertical rectangles, but data classification in descending order of their numerical value of their frequency of occurrence from left to right.

5. Cause and Effect Diagram: It is a simple graphical method for presenting a chain of causes and effects and for sorting out causes and organizing relationship between variables. This is also called fishbone diagram because of its structure.

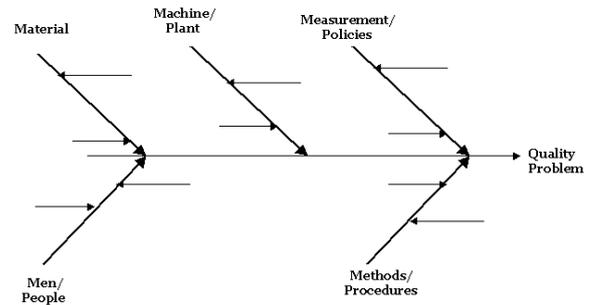


Figure 3. A Typical Cause and Effect Diagram

6. Scatter Diagram: Scatter Diagrams are graphical component of regression analysis. Graph pairs of the numerical data with one variable on each axis which provide relationships between variables.

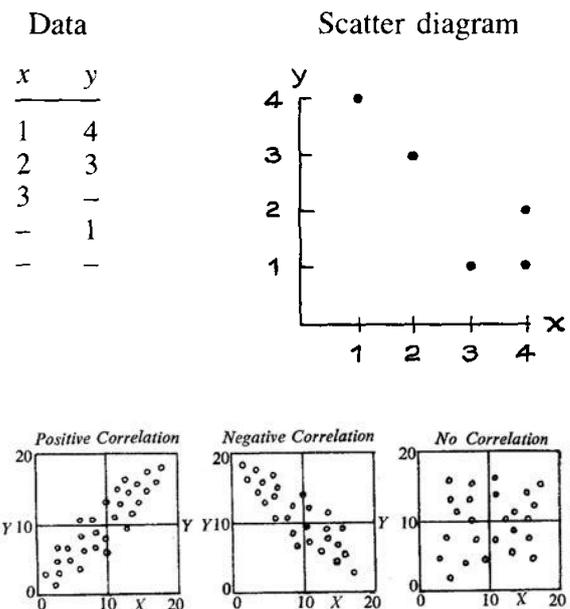


Figure 4 : Scatter Diagram

SIX SIGMA (σ): Standard deviation is denoted by Sigma which is one of the methods of measure of dispersion of a process from its measure of central tendency. Six Sigma is simply a TQM process that utilizes process capability analysis as a way of measuring progress. In the real σ gives the idea about shape of the curve. If the value of the σ will be large, spread of the process will be larger. Likewise smaller the value of σ , more peaked will be the curve.

There are several companies who are engaged in Six Sigma one way or other. The companies like Amazon, Caterpillar, Boeing, Ford Motor Company, Wipro, Dell, General Electric, Motorola and so on claim to have successfully implemented Six Sigma in some form or another.

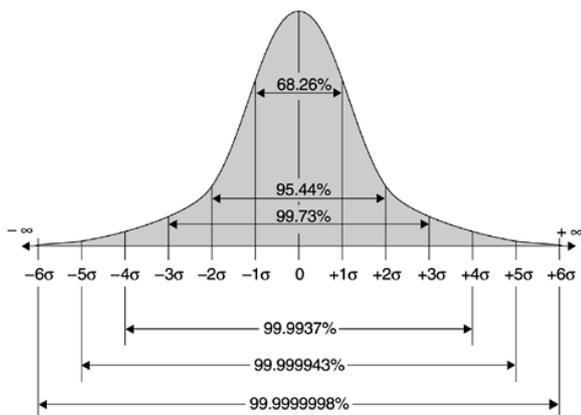


Figure 5 : Influence of σ on shape of normal curve

The above fig shows a process that is normally distributed centered at μ and LSL and USL established at $\pm 6\sigma$. Under this situation 99.9999998% of the product will be within the specification limits (SL) i.e., 0.004 parts per millions will be nonconformance or 4.0 pieces per billion. For this situation the process capability index C_p is 4.0.

Principle of Lean: Lean Six Sigma is a modern managerial concept combining Lean and Six Sigma that results in the elimination of seven kinds of waste. “Lean” is a methodology designed to improve business by preserving quality and value with less work and “Six Sigma” is a system designed to improve the quality of process outputs by identifying and removing the cause of defects. Lean is popular for its methodical approach to streamlining both manufacturing and service processes by eliminating waste while continuing to deliver value to customers.

III. RESULTS AND DISCUSSION

1. Scope of the TQM

TQM is the philosophy of embracing and improving all activities which help to meet and exceed customer satisfaction. It requires a high level of commitment for its implementation. TQM emphasize to continually improve product and services by the principles which already discussed above. TQM has broad scope in all organization such as military force, business firm, manufacturing industry, service sector and so on which

integrates fundamental management techniques, existing improvement efforts and technical tools under a disciplined approach as per customer needs. In the Indian market, most of the organization such as Mahindra & Mahindra LTD., TATA steels, Indian Railways, Indian Arm Force, TVS Motor Company etc. has adopted TQM approach for their quality product and services.

2. Obstacles to Total Quality Management Implementation

TQM cannot be implemented so easily in Indian Market. There will be obstacles to its successful implementation. They are:

1. Improper planning in an organization
2. Inability to change over to new culture
3. Lack of management commitment
4. Presence of ineffective measurement techniques &
5. Lack of access to data and results
6. Incompatible organizational structure
7. Failing to improve continuously
8. Inadequate use of empowerment and teamwork

IV. CONCLUSION

The paper discussed what trends generally is happening in the area of Total Quality Management highlighting the importance and role of each trends in continuous quality or process improvement. Interestingly, it was analyzed how all trends play a role to achieve the customer satisfaction by quality product and services with the integration of qualitative methods and human resources. For the survival, economic growth and to be in the business for a longer time and to earn profit, all the organization should adopt the above effective tools and techniques.

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