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INTERNATIONAL JOURNAL OF RESEARCH IN
AERONAUTICAL AND MECHANICAL ENGINEERING**Quality Gurus: Philosophy and Teachings****Mr.Rajan .M .Aole***Rajiv Gandhi College of Engineering Research and Technology, Chandrapur, India.
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Abstract

This paper aims to provide good understanding regarding philosophy and teachings of Quality Gurus .Over the past few decades, writers such as Deming, Crosby, Juran, Feigenbaum, Ishikawa, Taguchi and others have developed certain propositions in the area of quality management. Their insights into quality management provide a good understanding of quality management principles. An example of one such proposition is: quality is a responsibility of the whole organization, rather than of the quality department. There are many such propositions covering different aspects of quality management practices. The following sections present the main ideas proposed by these quality gurus.

Keywords: Total Quality Management; skill; leadership; Responsibility.

1. INTRODUCTION

This paper focuses on the philosophy and teachings of quality gurus An extensive review of literature was carried out to identify the concept of TQM from Quality gurus such as Deming (1986), Juran (Juran and Gryna, 1988), Crosby (1979), Feigenbaum (1991), and Ishikawa (1985). Their propositions are the foundation for Understanding the concept of tqm. The following subsections present the approaches of quality management gurus proposed by these quality gurus towards quality and their teachings.

Deming's quality management approach

Deming does not define quality in a single phrase. He said that the quality of any product or service can only be defined by the customer. Quality is a relative term that will change in meaning depending on the customer's needs (Brown,2008). Deming approach to TQM is mainly concentrated on the creation of an organizational system that is based on cooperation and learning for facilitating the implementation of process management practices, which, in turn, leads to continuous improvement of processes, products, and services as well as to employee fulfillment, both of which are critical to customer satisfaction, and ultimately, to firm survival (Jeorge,1992). Deming (1986) stressed the responsibilities of top management to take the lead in changing processes and systems. He said that Leadership plays in ensuring the success of quality management, because it is the top management's responsibility to create and communicate a vision to move the firm toward continuous improvement. Top management is responsible for most quality problems; it should give employees

clear standards for what is considered acceptable work, and provide the methods to achieve it. These methods include an appropriate working environment. Deming (1986) also emphasized the importance of identification and measurement of customer requirements, creation of supplier partnership, use of functional teams to identify and solve quality problems, enhancement of employee skills, participation of employees, and pursuit of continuous improvement. He is cautious in defining quality and characterizes the difficulty of achieving it. "The difficulty in defining quality is to translate future needs of the user into measurable characteristics by using statistical approach, so that a product can be designed and turned out to give satisfaction at a price that the user will have to pay" (Deming, 1986, p. 169).

The 14 points put forward by Deming are listed below.

- (1) Create a constancy of purpose to improve products and services - take a longer term view, and innovate;
- (2) Adopt the new philosophy - accept the management style which promotes constant improvement;
- (3) Cease dependence on mass inspection - concentrate on improving processes;
- (4) end the practice of awarding business on the basis of price tag alone, building up relationships with fewer suppliers to understand jointly specifications of and uses for materials and other inputs;
- (5) Constantly and forever improve the system - search continually for problems in all processes. It is management's job to work on the system;
- (6) institute modern methods of training on the job - for all, to make the best use of every employee;
- (7) institute modern methods of supervision - managers to focus on quality not numbers;
- (8) drive out fear - so that people work more effectively;
- (9) break down barriers between departments - team working to tackle problems;
- (10) eliminate numerical goals for the workforce - eliminate slogans and exhortation, make reasonable requests of the workforce;
- (11) eliminate work standards and numerical quotas - focus on quality and provide support;
- (12) Remove barriers that rob workers of pride in their work - for example, defective materials, poor tools, lack of management support;
- (13) Institute a vigorous program of education and training - for continual updating and improvement;
- (14) Create a top management structure to push every day on the above 13 points. Top management commitment is where it begins and ends

Deming's seven deadly diseases(Deming, 1986, p. 169).

Deming's seven deadly diseases summarize the factors that he believes can inhibit the transformation that the fourteen points can bring about. The seven deadly diseases are:

1. Lack of constancy of purpose to plan products and services that have a market sufficient to keep the company in business and provide jobs
2. Emphasis on short-term profit; short-term thinking that is driven by a fear of unfriendly takeover attempts and pressure from bankers and shareholders to produce dividends
3. Personal review systems for managers and management by objectives without providing methods or resources to accomplish objectives; includes performance evaluations, merit rating, and annual appraisals
4. Job-hopping by managers
5. Using only visible data and information in decision making with little or no consideration given to what is not known or cannot be known
6. Excessive medical costs
7. Excessive costs of liability driven up by lawyers who work on contingency fees

Crosby's quality management approach

Crosby defines quality as a means "conformance to requirements" (Crosby, 1979). Quality must be defined in measurable and clearly stated terms to help the organization take action based on achievable targets, rather than experience, or opinions. To Crosby, quality is either present or not present. There is no such thing as differing levels of quality (Donaldson, 2004); Management must measure quality by continually tracking the cost of doing things wrong. Crosby refers to this as the "price of nonconformance." To aid managers in tracking the cost of doing things wrong, he developed the following formula. (George, 1992)

Cost of Quality (COQ) = Price of conformance (POC) + Price of Nonconformance (PONC).

POC = The cost of getting things done right the first time. POC is important as such that it provides management the information about the wasted cost.

The requirements of a product need to be defined and specified clearly so that they are properly understood. He emphasized that higher quality reduces costs and raises profits. Quality is measured by the quality cost. His categories of quality costs are similar to those of Juran - prevention, appraisal and failure. This requires an emphasis on prevention rather than after-the-fact inspection.

Crosby also presents the quality management maturity grid which contains five stages which are uncertainty, awakening, enlightenment, wisdom, and certainty. These stages can be used to assess progress in management understanding and attitude, the status of quality in the organization, problem handling, cost of quality as a percentage of sales, quality improvement actions.

Crosby Provides 14 steps to quality improvement the 14 steps are listed below. (George, 1992)

- (1) Management commitment - to make clear where management stands on quality;
- (2) Quality improvement team - to set up a high-level, cross-functional team to run the quality improvement program;
- (3) Quality measurement - to provide a display/report of current and potential non-conformance problems in an objective manner;
- (4) The cost of quality - to define the ingredients of the cost of quality and explain its use as a management tool;
- (5) Quality awareness - to provide a method of raising the personal concern for quality felt by all employees;
- (6) Corrective action - to provide a systematic method for resolving problems identified;
- (7) Zero defects (zd) action - preparatory activities for zd program launching;
- (8) Employee education - define the type and extent of supervisor training;
- (9) Zd day - popularize zd philosophy and raise quality consciousness;
- (10) Goal setting - goals and commitments are set by employees for themselves and their groups;
- (11) Error-cause removal - develop a method for employees to communicate with the management regarding error-cause removal;
- (12) Recognition of good work in the quality process - to appreciate employees with superior performance.
- (13) Quality councils - brings together the professional quality staff for a planned communication on a regular basis;
- (14) Do it over again - emphasize that quality improvement never ends and is a constant effort.

Crosby (1984) claims "mistakes are caused by two factors: lack of knowledge and lack of attention". Education and training can eliminate the first cause, and a Personal commitment to excellence (zero defects) and attention to detail will cure the second.

Juran's quality management approach

Juran defines quality as "fitness for use." He stresses a balance between product features and products free from *deficiencies*. As used by Juran, the word "product" refers to the *output* of any process, and that includes goods as well as services (Juran & Gryna, 1988).

Juran considers quality management as three basic processes (Juran trilogy): quality planning, quality control, and quality improvement (Juran and Gryna, 1993).

In his view, the approach to managing for quality consists of :

- (1) The sporadic problem is detected and acted upon by the process of quality control;
- (2) The chronic problem requires a different process, namely, quality improvement;
- (3) Such chronic problems are traceable to an inadequate quality planning Process.

Like Deming, Juran believes most quality problems are due to management, not employees. He also states that the distinction between chronic and sporadic problems is essential because there are two different approaches to handling the problems. Chronic problems require the principle of "breakthrough", while sporadic problems require the principle of "control" (Juran and Gryna, 1970). He further elaborates the sequence of activities required for "breakthrough" and "control". These are respectively as follows:

"breakthrough" activities (quality improvement) (Juran and Gryna, 1970) include:

- (1) Breakthrough in attitudes - convincing those responsible that a change in quality level is desirable and feasible;
- (2) Discovery of the vital few projects - determining which quality problem areas are important;
- (3) Organizing for breakthrough in knowledge - defining the organizational mechanism for obtaining the knowledge for achieving a breakthrough;
- (4) Creation of a steering arm - defining and staffing a mechanism for directing the investigation for quality improvement;
- (5) Creation of a diagnostic arm - defining and staffing a mechanism for executing the technical investigation;
- (6) Diagnosis - collecting and analyzing the facts required and recommending the action needed;
- (7) breakthrough in cultural pattern - determining the effect of a proposed change on the people involved and finding ways to overcome resistance to change;
- (8) Breakthrough in performance - obtaining agreement to take action;
- (9) Transition to the new level - implement the change.

"Control" activities (Juran and Gryna, 1993) include:

- (1) Choosing the control subject: i.e., choosing what we intend to regulate;
- (2) Choosing a unit of measure;
- (3) Setting a goal for the control subject;
- (4) Creating a sensor which can measure the control subject in terms of the unit of measure;
- (5) Measuring actual performance;
- (6) Interpreting the difference between actual performance and the goal;
- (7) Taking action (if any) on the difference. "Planning" activities (Juran and Gryna, 1993) include:
 - (1) Establish the quality goal;
 - (2) Identify customers;
 - (3) discover customer needs;
 - (4) develop product features;
 - (5) develop process features;
 - (6) Establish process controls and transfer to operations.

Feigenbaum's quality management approach

Feigenbaum defines quality as the "total composite product and service characteristics of marketing, engineering, manufacture and maintenance through which the product and service in use will meet the expectations of the customer" (Feigenbaum, 1986). He states that total quality management covers the full scope of the product and service "life cycle" from product conception through production and customer service. The quality chain, he argues, starts with the identification of all customers' requirements and ends only when the product or service is delivered to the customer who remains satisfied. Thus, all functional activities, such as

Marketing, design, engineering, purchasing, manufacturing, inspection, shipping, accounting, installation, and service, etc., are involved in and influence the attainment of quality. Effective total quality control requires, therefore, a high degree of functional integration. Furthermore, it guides the coordinated actions of people, machines and information to achieve quality goals. He stresses a system approach to quality. The total quality control consists, he claims, of four main

Stages. They are described as follows.

- (1) Setting quality standards;
- (2) Appraising conformance to these standards;
- (3) Acting when standards are not met;
- (4) Planning for improvement in these standards.

The emphasis is on the prevention of poor quality rather than detecting it after the event. He argues that quality is an integral part of the day-to-day work of the line, staff and operatives of an organization. It cannot be effectively separated from other activities undertaken by employees and any attempt to do so more would than likely result in substandard quality. He, like most other gurus, considers effective staff training and education to be an essential component of TQM. He states that education and training should address the three vital areas of quality attitudes, quality knowledge, and quality skills.

Ishikawa's quality management approach

Ishikawa defines quality as the “development, design, production and service of a product that is most economical, most useful, and always satisfactory to the consumer” (Greg., W,2004). He argues that quality control extends beyond the product and encompasses after-sales service, the quality of management, the quality of individuals and the company itself. He advocates employee participation as the key to the successful implementation of TQM. Quality circles, he believes, are an important vehicle to achieve this. In his work, like all other gurus, he emphasizes the importance of education. He states that quality begins and ends with education. He has been associated with the development and advocacy of universal education in the seven QC tools (ishikawa, 1985). These tools are listed below:

- (1) Process flow chart;
- (2) Check sheet;
- (3) Histogram;
- (4) Pareto chart;
- (5) Cause - effect diagram (ishikawa diagram);
- (6) Scatter diagram;
- (7) Control chart.

Ishikawa's concept of total quality control contains six fundamental principles:

- (1) Quality first - not short-term profits first;
- (2) Customer orientation - not producer orientation;
- (3) The next step is your customer - breaking down the barrier of sectionalism;
- (4) Using facts and data to make presentations - utilization of statistical methods;
- (5) respect for humanity as a management philosophy, full participatory management;
- (6) Cross - functional management.

Taguchi's quality management approach

Taguchi emphasizes an engineering approach to quality. Taguchi defines quality as the “loss imparted to the society from the time a product is shipped”. Examples of loss include: failure to reach ideal performance, failure to meet the customer's requirements, breakdowns, and harmful side-effects caused by products (taguchi, 1986). Thus, the smaller the loss, the more desirable the product. The key elements of taguchis quality concepts are briefly stated below.

- (1) Quality improvement should concentrate on reducing the variation of the product's key performance characteristics with regard to their target values;
- (2) The loss suffered by a customer due to a product's performance variation is often approximately proportional to the square of the deviation of the performance characteristics from its target value;
- (3) The final quality and cost of manufactured products are determined to a large extent by the engineering design of the product and the manufacturing process;
- (4) A product's or process's performance variation can be reduced by exploiting the non-linear effects of the product or process parameters on the performance characteristics;

(5) Statistically planned experiments can be used to identify the settings of product/process parameters that reduce performance variation.

Dr. Shigeo shingo.

Dr. Shingo Shigeo was perhaps the greatest contributor to modern manufacturing practices. While his name has little recognition in the western hemisphere, his teachings and principles have formed the backbone of efficient engineering practices. In applying his experience and expertise in the field of industrial engineering, Dr. Shigeo was able to provide a better way of life for both the operators and the corporations. His policies have gained reputation through results in manufacturing among the companies that have implemented these teachings. In view of his contributions, Utah State University founded the Shingo prize for excellence in manufacturing in 1988. This prize promotes world-class manufacturing and recognizes companies that achieve superior customer satisfaction and business results, and has been compared as a Noble Prize for manufacturing. The famous equation is the essence of Zero Quality Control Concepts formulated by the Japanese quality guru, Dr. Shigeo Shingo is (Vardeman, 2001)

$$\begin{aligned} &\textbf{Poka-Yoke Techniques to Correct Defects} \\ &+ \\ &\textbf{Source Inspection to Prevent Defects} \\ &= \\ &\textbf{Zero Quality Control} \end{aligned}$$

Dr. Shigeo was one of the greatest influences on Japanese quality control and his contributions to quality improvement revolutionized the Japanese industrial sector and consequently influenced the industries in the west. In comparison to other quality gurus famous in the western hemisphere, Dr. Shigeo's name is generally less familiar. However, the impacts of his principles form the backbone of modern manufacturing fundamentals.

Dr. Shingo Shigeo's teachings can be classified into the three concepts listed as follows:

1. Just In Time (JIT).
2. Single Minute Exchange of Dies (SMED).
3. Zero Quality Control.

Using his key teachings, many modern day manufacturing companies have realized substantial profits. The impacts of his teachings are discussed in detail below

Conclusions

After the approaches to TQM of the five quality gurus have been reviewed, it has become evident that each has his own distinctive approach. Nevertheless, the principles and practices of TQM proposed by these quality gurus do provide the author with a better understanding of the concept of TQM. Their insights offer a solid foundation for conducting this study. Although their approaches to TQM are not totally the same, they do share some common points which are summarized as follows:

- (1) It is management's responsibility to provide commitment, leadership, empowerment, encouragement, and the appropriate support to technical and human processes
- (2) The strategy, policy, and firm-wide evaluation activities are emphasized.
- (3) Employee education and training is very important
- (4) Employees should be recognized and rewarded for their quality improvement efforts.
- (5) It is very important to control the processes and improve quality system and product design.
- (6) The emphasis is on prevention of product defects, not inspection after the event.

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