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**TOTAL QUALITY
MANAGEMENT**

M.S.-96

**Chapter Wise Reference Book
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By: Tapsi Vidyarthi B.E. (Civil), M.B.A.

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**Sample Preview
of the
Solved
Sample Question
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QUESTION PAPER

Exam Held in
February – 2021

(Solved)

TOTAL QUALITY MANAGEMENT

M.S.-96

Time: 3 Hours]

[Maximum Marks: 100

(Weightage: 70%)

Note: Attempt any five questions.

Q. 1. What is the need of Quality Management? Explain with help of examples.

Ans. Ref.: See Chapter-1, Page No. 1, 'Why Quality Management' and Page No. 6, Q. No. 1.

Q. 2. How does the Juran Trilogy reduce the cost of quality?

Ans. Ref.: See Chapter-2, Page No. 12, 'The Juran Trilogy' and Page No. 21, Q. No. 6.

Q. 3. List and explain the reasons for Total Quality Management (TQM) becoming increasingly popular in organizations all over the world.

Ans. Ref.: See Chapter-4, Page No. 27, 'TQM and Corporate Strategic Process', 'Total Quality and Customer Value Strategy'.

Q. 4. What do you understand by Quality Planning? Explain the concept of Quality Planning Road Map with the help of suitable examples.

Ans. Ref.: See Chapter-5, Page No. 35, 'Strategic Quality Management'.

Q. 5. Explain the concept of Statistical Quality Control with examples.

Ans. Statistical Quality Control (SQC) is the use of statistical methods in the monitoring and maintaining of the quality of products and services. It refers to the use of statistical methods to improve or enhance quality for its customer satisfaction. Each part of the organization has customers, some external and many internal. Identifying what the customer requirements are and setting about to meet them is the core of a total quality approach. This requires a good management system, methods including statistical quality control (SQC), and teamwork. However, this task is seldom trivial because real

world processes are affected by numerous uncontrolled factors. For instance, within every factory, conditions fluctuate with time. Variations occur in the incoming materials, in machine conditions, in the environment and in operator performance. A steel plant, for example, may purchase good quality ore from a mine, but the physical and chemical characteristics of ore coming from different locations in the mine may vary. Thus, everything isn't always "in control." Also in steel making furnace conditions may vary from heat to heat. In welding, it is not possible to form two exactly identical joints and faulty joints may occur occasionally. Many of these variations cannot be predicted with certainty, although sometimes it is possible to trace the unusual patterns of such variations to their root cause. If we have collected sufficient data from these variations, we can tell, in terms of probability, what is most likely to occur next if no action is taken. If we know what is likely to occur the next given certain conditions, we can take suitable actions to try to maintain or improve the acceptability of the output. This is the rationale of statistical quality control.

The statistical methods that can also help in improving product quality is the design of products and processes. The characteristics or quality of a product depends greatly on the choice of materials, settings of various parameters in the design of the product and the production process settings. In order to locate an optimal setting of the various parameters which gives the best product, we may consider using models governing the outcome and the various

parameters. For example, in bakery industry, the taste, tenderness and texture of a kind of bread depends on various input parameters such as the origin of the flour used, the amounts of sugar, the amount of baking power, the temperature profile and baking time, and the type of oven used, and so on. In order to improve the quality of the bread produced, the baker may use a model which relates the input parameters and the output quality of the bread. To find theoretical models quantifying the taste, tenderness and texture of the bread produced and relate these quantities to the various input parameters based on our present scientific knowledge is a formidable task.

SQC engages the following three methodologies. One method, referred to as acceptance sampling, can be used when a decision must be made to accept or reject a group of parts or items based on the quality found in a sample. A second method, referred to as statistical process control, uses graphical displays known as control charts to determine whether a process should be continued or should be adjusted to achieve the desired quality. Another method of trial

and error can be used to run experiments in the design of products and design of processes. In order to find an optimal setting of the parameters so that products of good quality will be produced. However, performing experiments by trial and error unscientifically is frequently very inefficient in the search for an optimal solution.

Q. 6. Give the rationale and constitution of Quality Circles.

Ans. Ref.: See Chapter-8, Page No. 68, 'Quality Circles: Rationale and brief history'.

Q. 7. Describe the concept of 5 S and explain its role in the quality of the workplace.

Ans. Ref.: See Chapter-9, Page No. 80, '5 'S' Concept' and Page No. 81, 'Details of 5 'S'.

Q. 8. Why is Safety and Health Management required in industries? Discuss.

Ans. Ref.: See Chapter-15, Page No. 128, 'Introduction', 'Need for Safety and Health Industries' and Page No. 129, 'The approach Towards Safety', 'Safety Management'.

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TOTAL QUALITY MANAGEMENT

VOLUME – 1

PHILOSOPHY AND BASIC CONCEPTS

Introduction: Basic Concepts and Approach

- M. Murugkar

1

INTRODUCTION

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

CHAPTER AT A GLANCE

WHY QUALITY MANAGEMENT?

Quality management is a recent phenomenon. Advanced Civilizations that supported the arts and crafts allowed clients to choose goods meeting higher quality standards than normal goods. In societies where art and craft (and craftsmanship) were valued, one of the responsibilities of a master craftsman (and similarly for artists) was to lead their studio, train and supervise the work of their craftsmen and apprentices. The master craftsman set standards, reviewed the work of others and ordered re-work and revision as necessary. One of the limitations of the craft approach was that relatively few goods could be produced; on the other hand an advantage was that each item produced could be individually shaped to suit the client. This craft based approach to quality and the practices used were major inputs when quality management was created as a management science.

Important factors which caused quality management are:

(i) Question of survival in an intense competitive environment

- Initially monopoly situation in the market.
- One seller, many buyers.
- Higher dissatisfaction among customers.
- In present times, economic barriers have been lifted, and competition has increased among the sellers.
- Many sellers in the market and higher customer satisfaction level.

(ii) Increasing customer consciousness

- Stricter rules and regulations.
- More awareness among customers.
- Changing buyer behaviour.

(iii) Need for earning profit instead of making profit

- Various cost cutting ways adopted by the organisation.
- Old practice of keeping cost price fixed, adding profit and then determine the selling price, has been removed.

(iv) Organisational issues pointing to the need to focus on TQM

- Leader of an organisation has lot of impact on the working of the organisation.
- With the introduction of information technology in the organisation all the processes have been speeded up.
- It has also increased the awareness level among the employees.

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UNDERSTANDING SOME BASIC CONCEPTS

Concept of Quality

(a) Definition of Quality: The totality of features and characteristics of a product or service that bear on its ability to satisfy stated or implied needs. The quality of something can be determined by comparing a set of inherent characteristics with a set of requirements.

If those inherent characteristics meet all requirements, high or excellent quality is achieved. If those characteristics do not meet all requirements, a low or poor level of quality is achieved.

Quality is, therefore, a question of degree. As a result, the central quality question is: How well does this set of inherent characteristics comply with this set of requirements?

In short, the quality of something depends on a set of inherent characteristics and a set of requirements and how well the former complies with the latter.

According to this definition, quality is a relative concept. By linking quality to requirements, ISO 9000 argues that the quality of something cannot be established in a vacuum. Quality is always relative to a set of requirements.

(b) Definition of Product: A product is the output of a process. Products can be tangible or intangible. ISO 9000 lists four generic product categories: services, software, hardware, and processed materials. Many products combine several of these categories. For example, an automobile (a product) combines hardware (e.g. tires), software (e.g. engine control algorithms), and processed materials (e.g. lubricants).

Service is always the result of an interaction between a service supplier and a customer and can take many forms. Service can be provided to support an organisation's own products (e.g. warranty service or the serving of meals). Conversely, service can be provided for a product supplied by a customer (e.g. a repair service or a delivery service). Service can also involve the provision of an intangible thing to a customer (e.g. entertainment, transportation, or advice). While software is intangible, and includes things like approaches and procedures, hardware and processed materials are tangible and are often referred to as goods.

(c) Dimensions of Quality: Even Quality have its few dimensions. These dimensions are independent of each other. Hence a product can be excellent in one dimension, average in another, and poor in still

another dimension. Quality has nine dimensions in total:

- (i) Performance:** Primary product characteristics.
- (ii) Features:** Secondary characteristics.
- (iii) Conformance:** Meeting specifications or industry standards.
- (iv) Reliability:** Consistency of performance over time.
- (v) Durability:** Useful life.
- (vi) Service:** Resolution of problems and complaints, ease of repair.
- (vii) Response:** Human-to-human interface.
- (viii) Aesthetics:** Sensory characteristics.
- (ix) Reputation:** Past performance and intangibles.

(d) Facets of Quality: An organisation applying this broader definition would then have to consider the following four facets of quality due to:

- Defining marketplace requirements and opportunities.
- Designing the product to meet marketplace requirements.
- Consistently conforming to product design.
- Providing product support throughout the product's life cycle.

An effective ISO 9001 quality management system must address all four facets of quality.

Concept of a Process and its Networking

The process approach is a management strategy. When managers use a process approach, it means that they manage the processes that make up their organisation, the interaction between these processes, and the inputs and outputs that glue these processes together?

But, what's a process, and what are inputs and outputs? Briefly put, a process uses inputs to generate outputs. Or, more precisely, a process is an integrated set of activities that uses resources to transform inputs into outputs. A system exists whenever several processes are interconnected using such input-output relationships. Processes are interconnected because the output from one process becomes the input for another process. In effect, processes are "glued" together by means of such input output relationships. And because the output of one process becomes the input of another process, inputs and outputs are really the same thing.

A quality management system is a network of processes, and a process is made up of people, work,

activities, tasks, records, documents, forms, resources, rules, regulations, reports, materials, supplies, tools, equipment, and so on - all the things that are needed to transform inputs into outputs. In general, a quality system includes all the things that are used to regulate, control, and improve the quality of products and services.

Stakeholders and their Expectations

Following are the types of stakeholders on which organisations depend on support from a wide range of other organisations and individuals. Some are merely different terms for the same thing. These can be placed into five categories:

1. Shareholders including investors, owners, partners, directors, people owning shares or stock, banks and anyone having a financial stake in the business
2. Customers including clients, purchasers, consumers and end users. (ISO 9000 also includes beneficiary but this term can apply to any stakeholder. Purchasers also include wholesalers, distributors and retailers).
3. Employees including temporary and permanent staff and managers. Some texts regard management as a separate stakeholder group but all managers are employees unless they happen to be owners who also manage the organisation.
4. Suppliers including manufactures, service providers, consultants and contract labour.
5. Society including people in the local community, the global community and the various organisations set-up to govern police and regulate the population and its inter-relationships.

Quality Control and Quality Assurance

Quality Control is a set of activities intended to ensure that quality requirements are actually being met. Quality control is one part of quality management.

Quality Assurance is the guarantee to maintain a certain level of quality according to target goals. Quality assurance is guided by a framework document that formalises the quality assurance measures. The standard ISO gives the following definition:

The series of pre-established and systematic activities laid out in the quality system framework that are performed when needed to prove that an entity will meet quality expectations.

The goal of quality assurance is to reassure a client about the quality of a company's product or service.

The framework is presented in a **quality assurance manual** that summarizes the company's quality policy.

Standardisation

(a) The Concept and its Evolution

Standards and standardisation play a key role for the development and functions of production systems. Standards hold a core function in production systems. This function of standardisation within production system is unproblematic. The term standardisation is not value free but is associated with a particular form and function of standardisation focusing primarily on its function to regulate time and motion as an extremely static process standard of work.

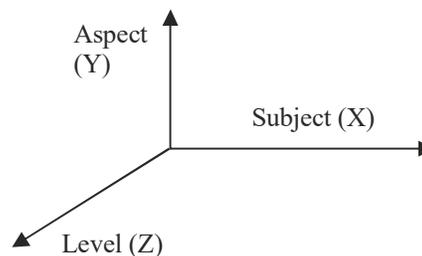
(b) Definitions of Terms

- **Standardisation:** Activity of establishing, with regard to actual or potential problems, provisions for common and repeated use, aimed at the achievement of the optimum degree of order in a given context.
- **Standard:** A standard is a document. It is a set of rules that control how people develop and manage materials, products, services, technologies, processes, and systems. ISO's standards are agreements. ISO refers to them as agreements because its members must agree on content and give formal approval before they are published. ISO standards are developed by technical committees. Members of these committees come from many countries. Therefore, ISO standards tend to have very broad support.

(c) Standardisation Space:

Standardization constitutes of three areas:

- **Subject:** It is shown on the X-axis and concerns the product or process.
- **Aspect:** It is shown on the Y-axis and standards are different for every aspect of a subject.
- **Level:** It is shown on the Z-axis and concerns the level of standardisation.



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(d) Aims of Standardisation

- Want to elevate their company's quality requirements.
- Want to comply with the standards set by their suppliers or clients.
- Improve their performance in terms of production and service.
- Improve customer satisfaction.

(a) Benefits of Standardisation: The benefits of acquiring ISO certification go beyond the satisfaction of doing a good deed. Adhering to the standard may result in better conformance to environmental regulations, greater marketability, better use of resources, higher quality goods and services, increased levels of safety, improved image and increased profits.

The environmental awareness and the documentation that are required by the ISO standards assist a company in conforming to environmental regulations. This means that a company, by diligently adhering to the standard, is less likely to violate environmental regulations and is always ready for inspection by a regulatory agency. In addition, the certification and documentation may aid a company in acquiring capital, in defending itself during environmental litigation and in receiving insurance or permits.

A wider market for a company's goods and services may result from certification. Many corporations and governments will be looking for suppliers that are ISO certified in order to maintain their own certification and environment-friendly image. Although the European Union claims that ISO certification is not required doing business in Europe, which was the message received by many non-European firms and lead to the amazing success of that standard. If ISO is similarly successful, the companies who are already ISO certified will have an advantage in global markets. Also, producers of consumer goods may find that many consumers not only try to purchase goods from environment-friendly companies, but will spend a little more if they feel they are helping the environment. In order to reap this benefit, a company must make their environmental efforts known through advertising and labeling.

The process analyses that go along with ISO certification may result in streamlining processes and more efficient use of resources and raw materials and subsequently reduce a company's costs. Finding ways

to capture emissions or recycle the products may, in the long run, reduce the amount of raw materials and utilities used. Reducing the amount of potentially dangerous substances in an end product may result in less use of dangerous chemicals in a plant. This leads to a safer internal environment for employees and the possibility of reduced insurance premiums. Improved employee morale may result when employees feel that the workplace is safer and they are contributing to the environmental effort.

**TOTAL QUALITY MANAGEMENT:
AN OVERVIEW**

General

TQM provides the overall concept that fosters continuous improvement in an organisation. The TQM philosophy stresses a systematic, integrated, consistent, organisation-wide perspective involving everyone and everything. It focuses primarily on total satisfaction for both the internal and external customers, within a management environment that seeks continuous improvement of all systems and processes. TQM emphasises use of all people, usually in multifunctional teams, to bring about improvement from within the organisation. It stresses optimal life cycle costs and uses measurement within a disciplined methodology in achieving improvements. The key aspects of TQM are the prevention of defects and emphasis on quality in design. TQM is a necessity. It is a journey. It will never end. It makes Japanese industry a miracle. It is the way to survive and succeed. TQM is the totally integrated effort for gaining competitive advantage by continuously improving every face of an organisation's activities.

Leadership

The success of any organisation depends on the performance of the workers at the bottom of the pyramid. All managers, ideally starting with the CEO, must act as the organisation's leaders for quality. Their task is to create clear values and high expectations for performance excellence, and then build these into the company's processes. Senior management should serve as role models to inspire and motivate the workforce and encourage involvement, learning, innovation and creativity.

Participatory Approach

In this approach, three areas are given importance: process, job and person.

- First, quality depends upon the various processes of the company.