

## **GE2022- TOTAL QUALITY MANAGEMENT**

### **UNIT-1 INTRODUCTION**

#### **INTRODUCTION – NEED FOR QUALITY**

Till 300 years ago, people used the power of their own muscles, animals or the force of wind and flowing water to do all works. With the invention of the ‘steam engine’ they got a powerful method of running their machines. This provided a tremendous boost to Industry. Goods started getting produced in larger quantities using machines. This led to the beginning of the factory system. The significant change from hand-made goods to machine-made goods, which began in Britain in 18th century, is known as the Industrial Revolution. Why it was called Revolution? Because of the large scale changes it brought about our economy, society and culture. IR soon spread to other nation like Germany, France, and Portugal. As these countries became industrialized, they needed two things:

1. Raw materials for manufacturing and
2. New markets to sell the goods they made.

They found both raw materials as well as new markets to sell their goods in the non- industrialised countries of Asia and Africa. So they started annexing to meet the needs of their new factories. Soon they became jealous of each other, and wanted their own empires to grow. They started fighting among themselves. This finally led to a great war in which several nations of the world were involved. It came to be known as World War- I (August 1914-1918). Millions of soldiers and other people were killed or wounded. Cities were destroyed and there was shortage of food and everything else. In 1939, there was another war, called World War II. It lasted for 6 years and ended in 1945 after USA dropped atomic bombs over two Japanese cities – Hiroshima and Nagasaki. After world war – II, most Japanese companies had to start literally from Scratch. Everyday brought new challenges to managers and workers alike, and everyday meant progress. They observed hard working ability and bringing new-new technologies are not enough need a culture change towards “TOTAL COMMITMENT and TOTAL IMPROVEMENT”. They also felled that human resource of Japan is highest important and precious but they need more training for continuous development. Fortunately Japan called / invited American Experts like Edward Deming, Joseph M.Juran and others in 1950s and early 1960s. In quality movement world wide the Globalization took an important role in 2000. Due to transmission to open economy, a domestic and international competition starts. Gradually TQM considered as the ultimatum for continuous improvement and sustainable growth in present day business.

However, in 21 st century, high growth of economy- the new millennium brought about increased emphasis on worldwide quality and the Internet. Japanese and other world’s business

organization started not only for quality product and services for External customer satisfaction but started satisfying them by trying to achieve the highest business excellence model – Deming Award, Malcolm Baldrige National Quality Award, CII – EXIM Award and TPM Award and others. Thanks – QUALITY

## EVOLUTION OF QUALITY

### 1920s

- ❖ Some of the first seeds of quality management were planted as the principles of scientific management swept through U.S. industry.
- ❖ Businesses clearly separated the processes of planning and carrying out the plan, and union opposition arose as workers were deprived of a voice in the conditions and functions of their work.
- ❖ The Hawthorne experiments in the late 1920s showed how worker productivity could be impacted by participation.

### 1930s

- ❖ Walter Shewhart developed the methods for statistical analysis and control of quality.

### 1950s

- ❖ W. Edwards Deming taught methods for statistical analysis and control of quality to Japanese engineers and executives.
- ❖ Joseph M. Juran taught the concepts of controlling quality and managerial breakthrough.
- ❖ Armand V. Feigenbaum's book Total Quality Control, a forerunner for the present understanding of TQM, was published.
- ❖ Philip B. Crosby's promotion of zero defects paved the way for quality improvement in many companies.

### 1968

- ❖ The Japanese named their approach to total quality companywide quality control.
- ❖ Kaoru Ishikawa's synthesis of the philosophy contributed to Japan's ascendancy as a quality leader.

### Today

- ❖ TQM is the name for the philosophy of a broad and systemic approach to managing organizational quality.
- ❖ Quality standards such as the ISO 9000 series and quality award programs such as the Deming Prize and the Malcolm Baldrige National Quality Award specify principles and processes that comprise TQM.

## DEFINITION OF QUALITY

Quality can be quantified as

$$Q = P/E$$

Where Q=Quality

P=Performance

E=Expectations

If Q is greater than 1.0, then the customer has a good feeling about the product or service.

## DIMENSIONS OF MANUFACTURING AND SERVICE QUALITY

The various dimensions of product and service quality are:

- ❖ Performance
- ❖ Features
- ❖ Conformance
- ❖ Reliability
- ❖ Durability
- ❖ Service
- ❖ Response
- ❖ Aesthetics
- ❖ Reputation

*All these nine dimensions can be clearly explained with the example of LCD projector.*

**Performance** - Primary product characteristics, such as the brightness of the picture

**Features** - Secondary characteristics, 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.

- These dimensions are somewhat independent therefore a product can be excellent in one dimension and average or poor in another.
- Therefore quality products can be determined by using a few of the dimensions of the quality.
- 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.

## **BASIC CONCEPTS OF TQM**

1. A committed and involved management to provide long-term top-to-bottom organizational support
2. An unwavering focus on the customer, both internally and externally.
3. Effective involvement and utilization of the entire work force
4. Continuous improvement of the business and production process.
5. Treating suppliers as partners
6. Establishing performance measures for the processes

## **DEFINITION OF TQM**

### **Total Quality Management**

“TQM is the management approach of the organization ,centered on quality, based on the participation of all its members and aiming at long-term success through customer satisfaction, and benefits to all members of the organization and to society”- **ISO**

### **Meaning**

Total-Made up of the whole

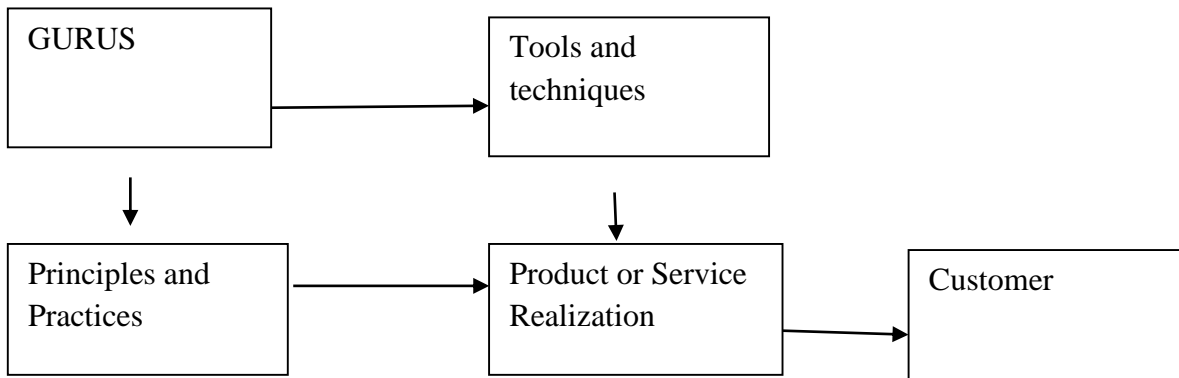
Quality- Degree of excellence a product or service provides.

Management-Act, art or manner of handling, controlling, directing.

## **TQM FRAMEWORK**

- ❖ TQM framework gives the overall structure of the organization.

❖ It consist of



### **Gurus**

- ❖ Shewhart
- ❖ Deming
- ❖ Juran
- ❖ Figenbaum
- ❖ Ishikawa
- ❖ Crosby
- ❖ Taguchi

### **Tools and Techniques**

- ❖ Benchmarking
- ❖ Information Technology
- ❖ Quality Management Systems
- ❖ Environmental Management Systems
- ❖ Quality Function Deployment
- ❖ Quality by Design
- ❖ Failure Mode and Effect Analysis
- ❖ Product and Service Liability
- ❖ Total Productive Maintenance
- ❖ Management tools
- ❖ Statistical Process Control
- ❖ Experimental Design
- ❖ Taguchi's Quality Engineering

### **People and Relationships**

- ❖ Leadership

- ❖ Customer Satisfaction
- ❖ Employee Involvement
- ❖ Supplier Partnership

### **Approach**

- ❖ Continuous Process Improvement

### **Measure**

- ❖ Performance measures

## **CONTRIBUTION OF DEMING**

Deming has given 14 points

### **Create and Publish the Aims and Purposes of the Organization**

- Management must create and publish the aims and purposes of the organization to investors, customers, suppliers, employees, the community and a quality philosophy.
- Organization should develop a long term view of business and set goals according to that.
- In order to achieve these goals resources must be allocated to research, training and continuing education.
- Innovation must be promoted to ensure that the product or service does not become obsolete.

### **Learn the New Philosophy:**

- Top management and everyone in the organization must learn the new philosophy.
- Organization must concentrate on defect prevention rather than defect detection.
- Organizations must give importance to never ending improvement and refuse to accept nonconformance.
- Customer satisfaction is the number one priority because dissatisfied customers will not continue to purchase nonconforming products or services.
- Everyone in the organization including the union must be involved in the quality journey and change his or her attitude about quality.

### **Understand the Purpose of Inspection:**

- Management must understand that the purpose of inspection is to improve the process and reduce its cost.
- For the most part of the organization, mass inspection is costly and unreliable.
- Where ever the inspection is required it should be applied and replaced by never ending improvement process.

- It should be clearly understood that mass inspection is for managing failure and defect prevention is for managing success.

#### **Stop Awarding Business Based on Price Alone:**

- The organization must stop awarding business based on the low bid because price has no meaning without quality.
- The goal is to have single suppliers for each item and to develop a long term relationship of trust and loyalty, thereby providing improved products and services.
- They must follow the materials throughout the life cycle in order to examine how customer expectations are affected and provide feedback to the supplier regarding the quality.

#### **Improve Constantly and Forever the System:**

- Management must take more responsibility in actively finding and correcting problems, so that quality and productivity are continually and permanently improved and costs are reduced.
- The focus is on preventing problems before they happen.
- Responsibilities are assigned to the teams to remove the causes of the problems and continually improve the process.

#### **Institute Training:**

- Each employee must be oriented to the organizations philosophy of never ending improvements.
- Management must allocate resources to train their employees to perform their jobs in the better manner.

#### **Teach and Institute Leadership:**

- Improving Supervision in the organization is the management's responsibility.
- Management must appoint supervisors with training, so that the new philosophy can be implemented.
- Supervisors should create a positive and supportive work environment instead of focusing on negative and fault finding atmosphere.
- All communication must be clear from top management to supervisors to operators.

#### **Drive out Fear, Create trust and Create a Climate for Innovation:**

- Management must encourage open, effective communication and team work.
- Fear is caused because of lack of job security, possible physical harm, performance appraisals, and ignorance of organization goals, poor supervision and not knowing the job.
- Driving out fear will lead to success, for this management must concentrate on workers with adequate training, good supervision, and proper tools to do the job as well removing physical dangers.

- When people are treated with dignity fear can be eliminated and they will work for the general well being of the organization.

**Optimize the efforts of teams, groups and staff areas:**

- Management must optimize the efforts of teams, groups and staff areas to achieve the aims and purposes of the organization.
- Internally the barriers exist among levels of management, among departments, within departments and among shifts.
- Externally it exists between the organization and its customers and suppliers.
- The barriers exist because of poor communication, ignorance of organization mission and it can be overcome by multifunctional team.

**Eliminate Exhortations for the Workforce:**

- Exhortations that ask for increased productivity without providing specific improvement methods can handicap an organization.
- They do not produce better product or service because the workers are limited by the system.
- Improvements in the process cannot be made unless the tools and methods are available.

**a. Eliminate Numerical Quotas for the Workforce:**

- Quotas and work standards focus on quantity rather than quality.
- Instead of quotas, management must concentrate on methods of improvement.
- They encourage poor workmanship in order to meet their quotas.

**b. Eliminate Management by Objective:**

- Instead of management by objective, management must learn the capabilities of the processes and how to improve them.
- Management by numerical goal is an attempt to manage without knowledge of what to do.

**Remove Barriers that Rob People of Pride of Workmanship:**

- Loss of pride in workmanship exists throughout the organization because
  - ✓ Workers do not know how to relate to organizations mission
  - ✓ They are being blamed for system problems.
  - ✓ Poor designs lead to the production of junk.
  - ✓ Inadequate training is provided.
  - ✓ Punitive supervision exists.
  - ✓ Inadequate or ineffective equipment is provided for performing the required work.

**Encourage Education and Self Improvement for Everyone:**

- When an organization needs is people who are improving with education, a long term commitment to continuously train and educate people must be made by management.

**Take Action to Accomplish the Transformation:**



- Management has to accept the primary responsibility for the never ending improvement of the process.
- A cultural change is required from the previous “business as usual” attitude.
- Management must be committed, involved and accessible if the organization is to succeed in implementing the new philosophy.

### **CROSBY'S CONTRIBUTIONS**

Philip Crosby, author of **Quality is Free**. Crosby emphasized meeting customer requirements by focusing on prevention rather than correction.

#### **His "Absolutes" are:**

- (1) Quality is defined as conformance to requirements, not *goodness*;
- (2) The system for achieving quality is prevention, not appraisal;
- (3) The performance standard is zero defects, not *that's close enough*; and
- (4) The measure of quality is the price of non-conformance, not indexes.

#### **14 Principles**

1. Management commitment, that is, top level management must be convinced and committed and communicated to the entire company.
2. Quality improvement team composed of department heads to oversee improvements.
3. Quality measurement is established for every activity.
4. Cost of quality is estimated to identify areas of improvement.
5. Quality awareness is raised among all employees.
6. Corrective action is taken.
7. Zero defects are planned for.
8. Supervisor training in quality implementation.
9. Zero defects day is scheduled.
10. Goal setting for individuals.
11. Error causes are removed by having employees informed management of problems.
12. Recognition is given, but it is non-financial, to those who meet quality goals.
13. Quality councils meet regularly.
14. Do it all over again (i.e., repeat steps one through thirteen).

### **CONTRIBUTION OF JURAN**

#### **Juran's Trilogy**

- ❖ Quality Planning
- ❖ Quality Control
- ❖ Quality Improvement

### **Quality Planning:**

- The planning component begins with external customers.
- Once the quality goals are established, marketing determines the external customers and all organizational personnel (managers, members of multifunctional teams or work groups) determine the internal customer.
- Once the customers are determined, their needs are discovered.
- Customer needs has to be stated in their own words, however real needs may differ from stated needs.
- Internal customers may not wish to voice real needs out of fear of the consequences.
- The customer needs which are stated in their view point should be translated to requirements that are understandable to the organization and its suppliers.
- The next step is to develop the product/service features that respond to customer needs, meet the needs of organization and its suppliers.
- The fourth step is to develop the processes able to produce the product or service features.
- Transferring plans to operations is the final step of the planning process.

### **Quality Control:**

- Control is used by operating forces to help meet the product, process and service requirements.

### **Steps:**

- ✓ Determine items/subjects to be controlled and their units of measure.
- ✓ Set goals for control and determine what sensors need to be put in place to measure the product, process or service.
- ✓ Measure actual performance.
- ✓ Compare actual performance to goals.
- ✓ Act on the difference.

### **Quality Improvement:**

- Aim is to attain the levels of performance that are significantly higher than current levels.
- Process improvements begin with the establishment of quality council.
- Two duties of quality council
  - ✓ Identify the improvement projects
  - ✓ Establish the project teams with a project owner.
- Quality council needs to provide the teams with resources to determine the causes, create solutions and establish controls to hold the gains.
- In the figure juran provides a distinction between sporadic waste and chronic waste
  - ✓ Sporadic waste can be identified and corrected through quality control.

✓ Chronic waste requires an improvement process.

- As solution is found through the improvement process, lessons learned are brought back to the quality planning process, so that new goals may be established for organization.



### Improvement Strategies:

- Repair
- Refinement
- Renovation
- Reinvention

### Repair:

- This strategy is simple; if anything is broken it must be fixed so that it functions as designed.
- If a customer receives a damaged product, a quick fix is required.
- The second level is to identify and eliminate the root causes of the problem and effects a permanent solution.
- Repair strategy does not make the process better than the original design.

### Refinement:

- Improvements to processes, products and services are accomplished on an incremental basis.
- Refinement improves efficiency and effectiveness.
- The change may be so gradual that there is no appearance of change.
- The primary benefit of gradual change is that it produces little resistance from employees.

### Renovation:

- This strategy results in major or breakthrough improvements.
- Innovation and technological advancements are key factors in this approach.
- Eg: Rechargeable batteries

### Reinvention:

- Renovation is the most demanding improvement strategy.
- It is preceded by the feeling that the current approach will never satisfy customer requirements.

- A new product, service, process or activity is developed using teams based on a complete understanding of the customer requirements and expectations.

**Types of Problems:**

- ✓ Compliance
- ✓ Unstructured
- ✓ Efficiency
- ✓ Process design
- ✓ Product design

**BARRIERS TO TQM**

❖ **Lack of Management Commitment**

- There must be a substantial management commitment of management time and organizational resources.
- The purpose must be clearly and continuously communicated to all personnel
- Management must consistently apply the principles of TQM

❖ **Inability to change organizational Culture**

- **Basic Concepts**
  - People change when they want to and to meet their own needs.
  - Never expect anyone to engage in behavior that serves the organizational values unless adequate reason (why) has been given.
  - For change to be accepted, people must be moved from a state of fear to trust.
- Speeches, Slogans, Campaigns are effective only for a short period of time.
- Organization that spend more time on change, only have chances of success.

❖ **Improper Planning**

- All constituents of the organization must be involved in the development of the implementation plan and any modification that occurs as the plan evolves.
- The most important thing is two way communications of ideas by all personnel during the development of the plan and its implementation.
- Customer satisfaction should be the goal rather than the financial or sales goals.

❖ **Lack of continuous training and education**

- Training and education is an ongoing process for everyone in the organization.
- Training and education are most effective when senior management conducts the training on the principles of TQM.

❖ **Incompatible Organizational Structure and Isolated Individuals and Departments.**

- Differences between departments and individuals can create implementation problems.
- The use of multifunctional team will help to break down long-standing barriers.

- Restructuring the organization to meet organization needs is important.
- Individuals who do not embrace the new philosophy can be required to leave the organization.

❖ **Ineffective Measurement Techniques and Lack of Access to Data and Results.**

- Key characteristics of the organization should be measured so that the effective decisions can be made.
- Access to data and quick retrieval is necessary for effective processes.

❖ **Paying Inadequate Attention to Internal and External Customers**

- Organizations need to understand the changing needs and expectations of their customers.
- Effective feedback mechanisms that provide data for decision making are necessary for this understanding.
- When an organization fails to empower individuals and teams, it cannot hold them responsible for producing results.

❖ **Inadequate Use of Empowerment and Teamwork**

- Teams need to have the proper training and at least in the beginning a facilitator.
- Individuals should be empowered to make decisions that affect the efficiency of their process or the satisfaction of their customers.

❖ **Failure to Continually Improve**

- A lack of continuous improvement of the processes, product or service will even leave the leader of the pack in the dust.