

# FUNDAMENTAL OF INDUSTRIAL MANAGEMENT

<b>Unit -4</b> <b>Total Quality Management</b>	<ul style="list-style-type: none"><li>• Basic concept of TQM, features of TQM</li><li>• principles of TQM</li><li>• leadership concepts</li><li>• Barriers to TQM implementation</li><li>• Concept of TPM</li><li>• Quality allied concept: KAIZEN, Poke yoke, JIT, CAPA</li></ul>
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## Introduction

Total Quality Management (TQM) is an enhancement to the traditional way of doing business. It is a proven technique to guarantee survival in world-class competition. Only by changing the actions of management will the culture and actions of an entire organization be transformed. TQM is for the most part common sense. Analysing the three words, we have

**Total** - Made up of the whole. Quality Involves everyone and all the activities performed in the company.

**Quality**- Degree of excellence a product or service provides and meeting customer requirements.

**Management**- Act, art, or manner of handling, controlling, directing, etc

Therefore, TQM is the art of managing the whole to achieve excellence. It is a process of managing quality. It is viewed as a continuous way of life and a philosophy of perpetual improvement in everything we do.

## Basics Concepts of TQM

The six concepts of Total Quality Management are:

1- Top level support for TQM: Support for total quality management must be at the highest level of management.

2- Focus on the customer/client: Customer/client requirements should be considered as the top priority, and it is important to always remember that it is the customer who defines what quality is. Keep the customer satisfied at all time.

3- Involve all the employees in the organization in the quality process: While you work is centric to the application of TQM, it is very important to make your employees understand how the quality process works, for they are the ones who will create/sustain quality, and not you.

4- Continuously improve the quality process: A very critical concept in TQM is to continuously enhance and refine your quality process.

5- Have a close relationship with your suppliers: Treat them as if they were partners to your company, this will better involve them in your quality process, and they will start appreciating and respecting your work on TQM, and they will work with you towards achieving your goals when it comes to enhancing quality.

6- Measure the performance of your quality process: Use tools to track your quality process and measure its performance to see if there is any improvement needed.

### **Evolution of Total Quality Management**

<b>Quality Management Stages</b>	<b>Areas of focus</b>	<b>Scope</b>
Inspection	Detection	1. Error detection 2. Rectification 3. Sorting, grading and reblending
Quality Control	Maintaining status	1. Quality standards 2. Product testing 3. Performance testing
Quality Assurance	Prevention	1. Quality system 2. Problem solving 3. Quality planning and policies
Total quality management	Quality as a strategy	1. Quality strategy 2. Customer, employees and suppliers 3. Involve all operations 4. Empowerment and team work

### **Features of TQM**

1. Customer Centric: – One of the fundamental feature of TQM is the focus on customers. In an organization there will be internal as well as external customers. It is important to meet the needs of the internal customer first and then move on to meeting the need of external customers.

2. On-going Process: – TQM is an ongoing process, there is a continuous effort being made to enhance quality while focusing on reducing costs. TQM is instrumental in keeping an organization competitive as well ensure customer satisfaction. TQM will always be a continuous process as there is always scope for improvement and innovation.

3. Error free: – TQM majorly stresses on error- free work for most of the time. The error free approach is expressed in various ways as right first time, improved process or zero errors.

4 All encompassing – TQM incorporates all levels of management. It cuts across departments and makes everyone an important stake holder in the TQM process.

5. Positive reinforcements: – It is necessary to ensure R&R in any organization's TQM program. Positive reinforcement maintains quality and ensures focus on continuous improvement.

7. Techniques: – TQM utilizes various techniques such as value engineering, statistical process control, etc. These techniques will help improve efficiency, quality and competitiveness of an organization.

## **Principles of TQM**

**TQM is broadly based on the following principles:**

**1. Customer Centric/focussed Approach** – Consumers are the ultimate judge to determine whether products or services are of superior quality or not. No matter how many resources are pooled in training employees, upgrading machines and computers, incorporating quality design process and standards, bringing new technology, etc.; at the end of the day, it is the customers who have the final say in judging your company. Companies must remember to implement TQM across all fronts keeping in mind the customers.

**2. Employee Involvement** – Ensuring total employee involvement in achieving goals and business objectives will lead to employee empowerment and active participation from the employees in decision making and addressing quality related problems. Employee empowerment and involvement can be increased by making the workspace more open and devoid of fear.

**3. Continual Improvement** – A major component of TQM is continual improvement. Continual improvement will lead to improved and higher quality processes. Continual improvement will ensure companies will find new ways and techniques in producing better quality products, production, be more competitive, as well as exceed customer expectations.

**Strategic Approach to Improvement** – Businesses must adopt a strategic approach towards quality improvement to achieve their goals, vision, and mission. A strategic plan is very necessary to ensure quality becomes the core aspect of all business processes.

**Integrated System** – Businesses comprise of various departments with different functionality purposes. These functionalities are interconnected with various horizontal processes TQM focuses on. Everyone in the company should have a thorough understanding of the quality policies, standards, objectives, and important processes. It is very important to promote a quality work culture as it helps to achieve excellence and surpass customer expectations. An integrated system ensures continual improvement and helps companies achieve a competitive edge.

**Decision Making** – Data from the performance measurement of processes indicates the current health of the company. For efficient TQM, companies must collect and analyze data to improve quality, decision making accuracy, and forecasts. The decision making must be statistically and situational based in order to avoid any room for emotional based decisions.

**Communications** – Communication plays a crucial role in TQM as it helps to motivate employees and improve their morale during routine daily operations. Employees need to be involved as much as

possible in the day to day operations and decision making process to really give them a sense of empowerment. This creates the environment of success and unity and helps drive the results the TQM process can achieve.

**It requires immense efforts, time, courage, and patience to successfully implement TQM. Businesses successfully implementing TQM can witness improved quality across all major processes and departments, higher customer retention, higher revenue due to improved sales, and global brand recognition.**

### **Definition of leadership**

**Alan Keith: "Leadership is ultimately about creating a way for people to contribute to making something extraordinary happen."**

**Leadership has been described as the “process of social influence in which one person can enlist the aid and support of others in the accomplishment of a common task”.[Chemers MM 2002]**

- Top management must realize importance of quality
- Quality is responsibility of everybody, but ultimate responsibility is CEO
- Involvement and commitment to CQI
- Quality excellence becomes part of business strategy
- Lead in the implementation process

### **Characteristics of Successful Leaders**

#### **1. Give attention to external and internal customers**

2. Empower, not control subordinates. Provide resources, training, and work environment to help them do their jobs
3. Emphasize improvement rather than maintenance
4. Emphasize prevention
5. Encourage collaboration rather than competition
6. Train and coach, not direct and supervise
7. Learn from problems – opportunity for improvement
8. Continually try to improve communications
9. Continually demonstrate commitment to quality

10. Choose suppliers on the basis of quality, not price
11. Establish organisational systems that supports quality Efforts

### **Barriers to TQM Implementation**

Understanding the factors that are likely to impede the implementation of the TQM allows managers to develop more effective strategies for improving the chances of successfully deploy TQM and thereby to achieve excellence in the business. In the literature there are a multitude of studies that address very different ways for the identification of the factors that hinder the successful implementation of TQM. We will emphasize some barriers which prevents the application of the system of quality management. Following are the barriers that hinder the implementation and development of a programme of TQM:

- Poor planning
- Lack of management commitment
- The strength of the labour
- Lack of appropriate training
- Complacency team
- Use of an invalid program (outside of shelf-life/moral)
- The inability to change the organizational philosophy (culture)
- Insufficiency of resources
- The lack of improvement of the quality of the measurement.
- Practice management and development of human resources insufficient and inadequate
- Lack of quality planning
- The lack of leadership in the development of a quality culture
- Inadequate resources for TQM
- Lack of customer orientation.

Main barriers were found to be the lack of benchmarking and employee resistance to change. Organizations must understand that benchmarking is a tool used to identify strengths and weaknesses in comparison with the best companies in their industry. Employee resistance can be overcome by appropriate training and involving them in the planning and implementation phases of TQM. It was also found that insufficient resources were an obstacle to the implementation of TQM.

### **TPM (Total Productive Maintenance)**

TPM (Total Productive Maintenance) is a holistic approach to equipment maintenance that strives to achieve perfect production:

1. No Breakdowns
2. No Small Stops or Slow Running
3. No Defects
4. In addition it values a safe working environment:
5. No Accidents

TPM emphasizes proactive and preventative maintenance to maximize the operational efficiency of equipment. It blurs the distinction between the roles of production and maintenance by placing a strong emphasis on empowering operators to help maintain their equipment.

The implementation of a TPM program creates a shared responsibility for equipment that encourages greater involvement by plant floor workers. In the right environment this can be very effective in improving productivity (increasing up time, reducing cycle times, and eliminating defects).

### **KAIZEN (continuous improvement)**

**Kai** means Change and **Zen** means good. Kaizen is an approach to creating continuous improvement based on the idea that small, ongoing positive changes can reap major improvements. Typically, it is based on cooperation and commitment and stands in contrast to approaches that use radical changes or top-down edicts to achieve transformation. It was developed in the manufacturing sector to lower defects, eliminate waste, boost productivity, encourage worker purpose and accountability, and promote innovation.

It is a system that involves every employee from the upper management to the cleaning crew. Everyone in an organisation is encouraged to come up with small improvement suggestion on a regular basis.

### **Ten principles of Kaizen**

Because executing Kaizen requires enabling the right mindset throughout the company, 10 principles that address the Kaizen mindset are commonly referenced as core to the philosophy. They are:

1. Let go of assumptions
2. Be proactive about solving problems.
3. Don't accept the status quo.
4. Let go of perfectionism and take an attitude of iterative, adaptive change.

5. Look for solutions as you find mistakes.
6. Create an environment in which everyone feels empowered to contribute.
7. Don't accept the obvious issue; instead, ask "why" five times to get to the root cause.
8. Cull information and opinions from multiple people.
9. Use creativity to find low-cost, small improvements.
10. Never stop improving.

## **POKE YOKE**

Poka-yoke is a Japanese term that means "mistake-proofing" or "inadvertent error prevention". The key word in the second translation, often omitted, is "inadvertent". A poka-yoke is any mechanism in any process that helps an equipment operator avoid mistakes (poka). Its purpose is to eliminate product defects by preventing, correcting, or drawing attention to human errors as they occur.

Poka-yoke can be implemented at any step of a manufacturing process where something can go wrong or an error can be made. For example, a fixture that holds pieces for processing might be modified to only allow pieces to be held in the correct orientation, or a digital counter might track the number of spot welds on each piece to ensure that the worker executes the correct number of welds.

Shigeo Shingo recognized three types of poka-yoke for detecting and preventing errors in a mass production system.

1. The contact method identifies product defects by testing the product's shape, size, color, or other physical attributes.
2. The fixed-value (or constant number) method alerts the operator if a certain number of movements are not made.
3. The motion-step (or sequence) method determines whether the prescribed steps of the process have been followed.

Either the operator is alerted when a mistake is about to be made, or the poka-yoke device actually prevents the mistake from being made. In Shingo's lexicon, the former implementation would be called a warning poka-yoke, while the latter would be referred to as a control poka-yoke.

Shingo argued that errors are inevitable in any manufacturing process, but that if appropriate poka-yokes are implemented, then mistakes can be caught quickly and prevented from resulting in defects. By eliminating defects at the source, the cost of mistakes within a company is reduced.

### **Benefits of poka-yoke implementation**

1. Less time spent on training workers;

2. Elimination of many operations related to quality control;
3. Unburdening of operators from repetitive operations;
4. Promotion of the work improvement-oriented approach and actions;
5. A reduced number of rejects;
6. Immediate action when a problem occurs;
7. 100% built-in quality control.

### **JIT (Just In Time)**

The exact reasons for adoption of JIT in Japan are unclear. During Japan's post-World War II rebuilding of industry: 1) Japan's lack of cash made it difficult for industry to finance the big-batch, large inventory production methods common elsewhere. 2) Japan lacked space to build big factories loaded with inventory. 3) The Japanese islands were (and are) lacking in natural resources with which to build products. 4) Japan had high unemployment, which meant that labor efficiency methods were not an obvious pathway to industrial success. Thus the Japanese "leaned out" their processes. "They built smaller factories ... in which the only materials housed in the factory were those on which work was currently being done. In this way, inventory levels were kept low, investment in in-process inventories was at a minimum, and the investment in purchased natural resources was quickly turned around so that additional materials were purchased."

The just-in-time inventory system is a management strategy that aligns raw-material orders from suppliers directly with production schedules. Companies use this inventory strategy to increase efficiency and decrease waste by receiving goods only as they need them for the production process, which reduces inventory costs. This method requires producers to forecast demand accurately.

#### **Just-in-Time Inventory System Advantages**

JIT inventory controls have several advantages over traditional models. Production runs remain short, which means manufacturers can move from one product to another easily. This method reduces costs by minimizing warehouse needs. Companies also spend less money on raw materials because they buy just enough resources to make just the ordered products and no more.

#### **System Disadvantages**

The disadvantages of JIT inventories involve disruptions in the supply chain. If a raw materials supplier has a breakdown and cannot deliver the goods on time, one supplier can shut down the entire production process. A sudden order for goods that surpasses expectations may delay delivery of finished products to clients.



## **CAPA (Corrective action preventive action)**

Corrective and preventive action (CAPA, also called corrective action/preventive action or simply corrective action) consists of improvements to an organization's processes taken to eliminate causes of non-conformities or other undesirable situations. It is usually a set of actions that laws or regulations require an organization to take in manufacturing, documentation, procedures, or systems to rectify and eliminate recurring non-performance. Non-conformance is identified after systematic evaluation and analysis of the root cause of the non-conformance. Non-conformance may be a market complaint or customer complaint or a failure of a machinery or a quality management system, or misinterpretation of written instructions to carry out a work. The corrective and preventive action is designed by a team that includes quality assurance personnel and personnel involved in the actual observation point of non-conformance. It must be systematically implemented and observed for its ability to eliminate further recurrence of such non-conformance.

Corrective actions are implemented in response to customer complaints, unacceptable levels of product non-conformance, issues identified during an internal audit, as well as adverse or unstable trends in product and process monitoring. Preventive actions are implemented in response to the identification of potential sources of non-conformity. To ensure that corrective and preventive actions are effective, the systematic investigation of the root causes of failure is pivotal. CAPA is part of the overall quality management system (QMS).

