

UNIT-4 Total Quality Management

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

While there are significant differences among the theorists and their approaches to implementation, they share basic concepts that are the foundation of TQM.

Continuous Improvement of Quality:

Fundamental to all TQM systems is improving the quality of the products and services provided by an organization. Such quality improvement results in greater productivity and enhances the ability of an organization to remain vital, employ people, and serve customers. A focus on continuous quality improvement helps an organization do things right.

Central Focus on the Customer:

Also central to all TQM is a focus on the customer, the internal and external recipients of an organization's products. Their needs and desires define quality for the producer whose job it is to meet or exceed the customer's needs and expectations. A focus on customers helps an organization to do the right things.

Systematic Improvement of Operations:

All work occurs in processes that begin and end somewhere. These work processes account for 80- 85 percent of the quality of work and productivity of employees. Management is responsible for systems within an organization; therefore, managers, not employees, must shoulder blame when something goes wrong with the system.

Open Work Environments:

Continuous quality improvement requires an atmosphere for innovation where suggestions for improvement are solicited and respected and where supervisors and managers are open to disagreement, conflict, and challenge. Activities for the improvement of work processes, especially when teams are involved, help to break down barriers that occur between departments or between supervisors and those supervised.

Long- Term Thinking:

TQM is also characterized by long- term thinking which helps mold the future by understanding the consequences of current actions. Such thinking requires decision making that is based on data, both hard and soft, and related to real problems, not symptoms. It requires time. It shies away from quick fixes arrived at by discussion and intuition. Long- term thinking works best in organizations where managers plan to stay, and thus have a stake in the consequences of their decisions.

Development of Human Resources:

Organizations that follow TQM principles are organized to help people do their jobs; they are seriously committed to employee learning and development. Such development begins with a thorough orientation to the organization, including its mission, values, and information about where the job fits into the organization. It involves educating people to perform to the quality standards of a specific job before requiring them to work independently.

Management Responsibility for TQM Leadership:

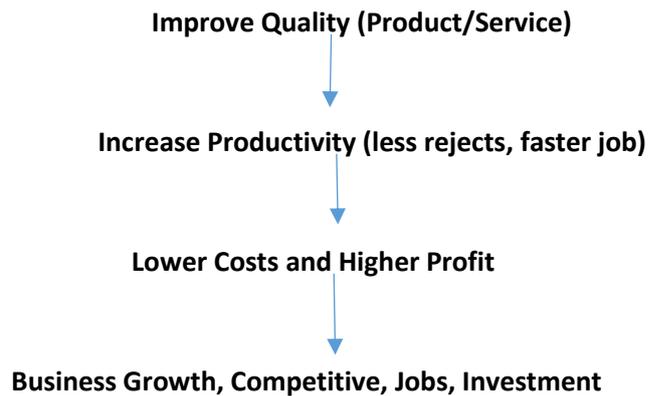
Managers need to lead the transformation of the organization to the new culture of continuous quality improvement. They must accept personal responsibility for continuous quality improvement and be dedicated to empowering others in the organization to accept personal responsibility for it, too. This approach taps the collective genius of the organization to identify and solve problems. The leader’s focus is on policy, structure, and systems to sustain continuous quality improvement. Within this context, quality is the first among equals of the organization’s functions. Quality is at the top of the agenda for every meeting, every communication. The leader’s goal is to help people, things, and machines do a better job; the leader’s role is that of facilitator, catalyst, and coach.

As previously stated, TQM requires a cultural change. The TQM state for typical quality elements. This change is substantial and will not be accomplished in a short period of time. Small organizations will be able to make the transformation much faster than large organizations.

Evolution of Total Quality Management

Quality Management Stages	Areas of focus	Scope
Inspection	Detection	1. Error detection 2. Rectification 3. Sorting, grading and reblending
Quality Control	Maintaining status quo	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

Effect of TQM (Quality Improvement)



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.

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.

Leadership concept



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

Implementation Process

- Must begin from top management
- Cannot be delegated (lack of involvement cited as principle reason for failure)
- Top/senior management must be educated on TQM philosophy and concepts
- Visits to TQM companies, read books, attend seminars
- Need a roadmap/framework for implementation – consider timing (any crisis)
- Formation of Quality Council – policies, strategies, programmes.

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).

The Eight Pillars of TPM

The eight pillars of TPM are mostly focused on proactive and preventative techniques for improving equipment reliability.

Pillar	What Is It?	How Does It Help?
Autonomous Maintenance	Places responsibility for routine maintenance, such as cleaning, lubricating, and inspection, in the hands of operators.	Gives operators greater “ownership” of their equipment. Increases operators’ knowledge of their equipment. Ensures equipment is well-cleaned and lubricated. Identifies emergent issues before they become failures. Frees maintenance personnel for higher-level tasks.
Planned Maintenance	Schedules maintenance tasks based on predicted and/or measured failure rates.	Significantly reduces instances of unplanned stop time. Enables most maintenance to be planned for times when equipment is not scheduled for production.

		Reduces inventory through better control of wear-prone and failure-prone parts.
Quality Maintenance	Design error detection and prevention into production processes. Apply Root Cause Analysis to eliminate recurring sources of quality defects.	Specifically targets quality issues with improvement projects focused on removing root sources of defects. Reduces number of defects. Reduces cost by catching defects early (it is expensive and unreliable to find defects through inspection).
Focused Improvement	Have small groups of employees work together proactively to achieve regular, incremental improvements in equipment operation.	Recurring problems are identified and resolved by cross-functional teams. Combines the collective talents of a company to create an engine for continuous improvement.
Early Equipment Management/ Development Management	Directs practical knowledge and understanding of manufacturing equipment gained through TPM towards improving the design of new equipment.	New equipment reaches planned performance levels much faster due to fewer startup issues. Maintenance is simpler and more robust due to practical review and employee involvement prior to installation.
Training and Education	Fill in knowledge gaps necessary to achieve TPM goals. Applies to operators, maintenance personnel and managers.	Operators develop skills to routinely maintain equipment and identify emerging problems. Maintenance personnel learn techniques for proactive and preventative maintenance. Managers are trained on TPM principles as well as on employee coaching and development.
Safety, Health, Environment	Maintain a safe and healthy working environment.	Eliminates potential health and safety risks, resulting in a safer workplace. Specifically targets the goal of an accident-free workplace.
TPM in Administration	Apply TPM techniques to administrative functions.	Extends TPM benefits beyond the plant floor by addressing waste in administrative functions. Supports production through improved administrative operations (e.g. order processing, procurement, and scheduling).

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)



Just-In-Time (JIT) Manufacturing

Producing Necessary Quantities at the Necessary Time

JIT manufacturing means producing the necessary items in necessary quantities at the necessary time.

Benefits of JIT

- Reduced operating costs
- Greater performance
- Higher quality
- Improved delivery
- Increased flexibility and innovativeness
- Shortened lead time
- Reduced inventory
- Better balance between different processes
- Problem clarification

Case Study: Hewlett Packard

- Manufacturing time for the assembly of 31 circuit boards reduced from 15 days to 11.3 hours
- The value of inventory fell from \$670,000 to \$20,000



1000ventures.com

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.

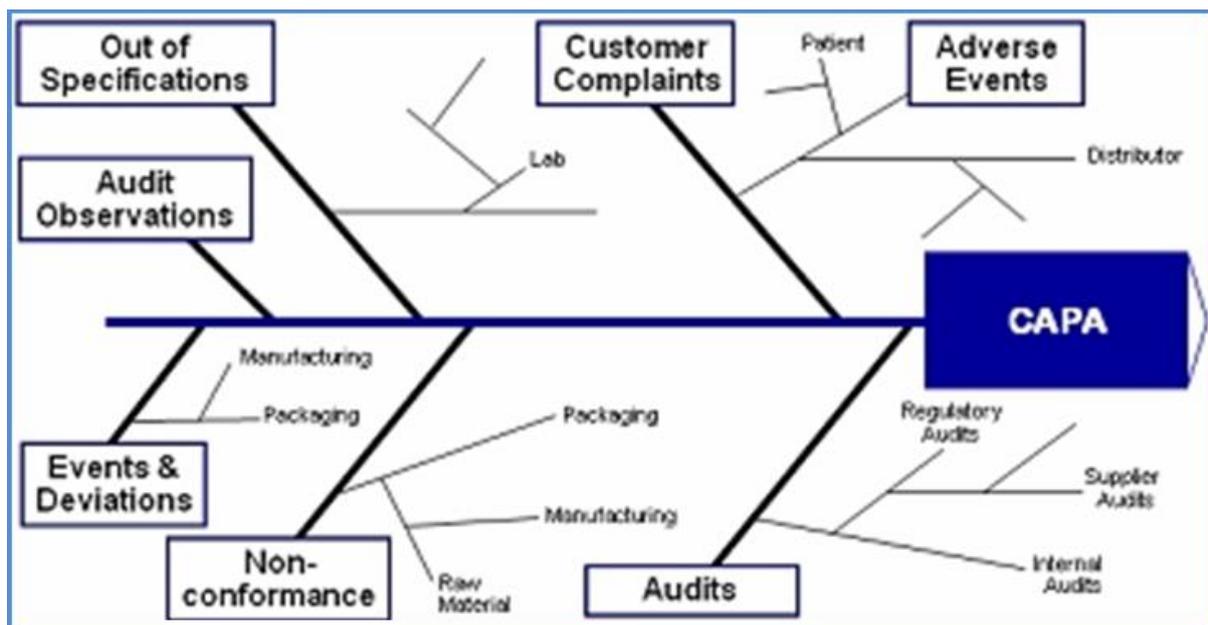
System Disadvantages

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-conformation.

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).



Deming's 14 Points for Management

1. Create constancy of purpose towards improvement of product and service with aim to be competitive, stay in business and provide jobs.
2. Adopt a new philosophy – new economic age, learn responsibilities and take on leadership for future change.
3. Cease dependence on inspection to achieve quality. Eliminate the

need for inspection on a mass basis by building quality into product in the first place.

4. End the practice of awarding business on the basis of price, instead, minimize total costs.

5. Improve constantly and forever the system of production and service, to improve quality and productivity, thus decreasing costs.

6. Institute training on the job

7. Institute leadership, supervision to help do a better job.

8. Drive out fear, everyone can work effectively for company.

9. Breakdown barriers between departments. Work as teams to foresee production problems.

10. Eliminate slogans, exhortations, and targets for workforce.

11. Eliminate numerical quotas on the workforce.

12. Remove barriers that rob people pride of workmanship.

13. Institute a vigorous program of education and self-improvement.

14. Put everybody to work to accomplish the transformation.