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Total Quality Management: Must Read Book for All Supervisory Executives



**Authored by: K. RadhaKrishnan Kochuveetil
(2024)**

Adapted for learning purposes

Chapter 2

What is Total Quality Management

Till last century, organizations maintained high quality in products and services by providing high quality production machines, adopting Quality Management Systems (QMS) like IS 9000, ISO 14000 etc and monitoring and maintaining the desired quality through Statistical Quality Control (SQCs)

There is also management leadership and commitment to quality as required by QMS ISO

Hence Total Quality Management (TQM) had been developed to meet market expectations. TQM converge 1. Product/Services Quality and QMS 2. Management Commitment to Quality and 3. Employee Involvement. Team work and Commitment to Quality. Companies found that having all the above 3 in a company is not enough to be competitive. **It is the Convergence of all the 3, ie. the common area where all the three work hand in hand decide the Total Customer Satisfaction and hence the TQM Competitiveness of the company.** As explained later in TQM Model, the larger the

9000.

But companies found that that this is not enough to meet the ever growing competition in the corporate world and also increasing customer expectations in 21st century.

Hence 'Understanding, Involvement, and Team Work in Quality' by everyone in a company is absolutely essential to remain competitive in market, starting from entry level person to CEO, irrespective of where and at what level he works,.

Convergence area, the more the Competitive is the Company.

Topics

1. ISO definition of TQM
2. TQM Model
3. Ten Elements of TQM
4. Traditional Quality Approach Vs TQM approaches

1. ISO definition of TQM

TQM is defined as a *management approach* of an organization *centered on quality*, based on the *participation of all* its members, and aiming at *long term success* through *customer satisfaction*, and *benefit to all* members and society.

2. TQM Model

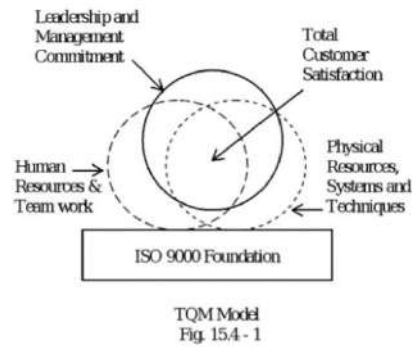


Fig 5.2-1 TQM Model

1. It has a Quality Management System (ISO 9000) as its foundation.
2. It is a top down management approach with full commitment and leadership from top management.
3. It is supported by physical resources, systems and techniques for continuous improvement at all levels. eg. good machines, tools, materials, quality assurance systems, new technologies etc.
4. Human resources and team work are considered vital and having unlimited potential with their participation to increase customer satisfaction.
5. The corporate focus is to maximize Total Customer Satisfaction. ie. the area of Convergence

As seen in the figure. The more the common area of Convergence, the more is the Total Customer Satisfaction as a result of TQM, making the company more competitive

3. Ten Elements of TQM

1. Sustained management commitment

Continued support and guidance from top management, with resources, technology and systems

2. Focus on customer requirements and expectations.

Every employees and activities of the organization is focused on meeting and exceeding customer requirements and expectations

3. Continuous Improvement

TQM aim at continuous improvement of

materials, methods, machines and people even if they are presently working well. The term **Kaizen** refer to continuous improvements even in small steps, a technique perfected by Japan to achieve global competitiveness.

4. Competitive Bench Marking

Identify other companies to benchmark, study their way of doing and improve your operations. Xerox benchmarked mail-order company L.L. Bean to improve Order filling.

5. Employee empowerment –

Educate, Motivate innovation and give workers responsibility for improvement and authority to make changes in their operational area for performance improvement

6. Team Approach

Use synergy from team work for problem solving

7. Knowledge of quality tools like SQC

Knowledge of Statistical Quality Control

quality and customer satisfaction. Extend TQM to suppliers to enhance quality

10. Quality at the Source

Follow principle of 'Do it right first time and every time'. Make the 'doer' (worker) responsible to the next 'internal customer' with authority to use resources provided to him. Do away with 'Inspector regime' as far as possible. Emphasis on 'defect prevention' rather than 'defect detection'

2. Objective	Emphasis on short term	Balance short term and long term
3. Focus	Product oriented	Process oriented
4. Management	Inconsistent objectives, not open	Consistent objectives, Open, encourage employee participation
5. Role of	Issue orders,	Coach, build

(SQC) Tools of TQM by all executives and managers for data analysis and decisions especially cause and effect analysis

8. Fact based decisions

Decisions based on Data and its analysis using **SQC** rather than opinions.

9. Supplier/Vendor participation

Treat Suppliers of materials and parts as long term partners with high concern for

4. Traditional Quality Approach

Vs TQM approaches

Criteria	Traditional Quality Approach	TQM
1. Overall Mission	Maximize ROI	Meet or exceed customer satisfaction

manager	enforce the order	trust, remove barriers
6. Customer requirements	Unclear, not always top priority	High priority, important to identify customer needs
7. Problem solving	Blame, unsystematic, individualistic	Identify, resolve by team work

8. Improvement	Erratic	Systematic and continuous
9. Suppliers	Adversaries	Partners
10. Jobs	Narrow, specialized, individual effort	Broad, general, much team work

Chapter 3

ISO 9000 Quality Management System

As explained in TQM Model, ISO 9000 Quality Management System is the foundation of which the company build its TQM initiative. Most companies have obtained ISO 9000 certification.

Hence every executive must be familiar with ISO 9000 QMS, for the company to be become competitive. The management also expects them to be familiar. Then only the common area

ISO

ISO stands for International Organization for Standardization. This organization was formed in Geneva, Switzerland in 1946.

Objective of ISO 9000 series

Objective is the establishment of a **Quality Management System (QMS)**, which has international acceptance for the benefit of both the suppliers and the customers.

'Quality Management System' essentially means that **quality is built into the system** of various

of 3 circles explained in the TQM Model can be increased, resulting in higher Customer Satisfaction and growth for the company and the executive

Topics

1. ISO 9000 Quality Standards
2. Systems and Elements of ISO 9000
3. ISO 9000 Series of Quality Standards
4. 15 steps of ISO 9000 implementation
5. ISO 14000 Standards

1. ISO 9000 Quality Standards

management, production and procurement processes so as to ensure the required quality to the end product and it is maintained and improved on a continuous basis.

ISO 9000 QMS is different from inspection or quality control because inspection is a post process activity and quality control is only one part of ISO 9000.

In ISO 9000, the processes and systems will assure quality, because quality is built into the process itself

ISO 9000 is a tool to achieve, sustain and improve quality

Establishment of ISO 9000 is essential for to achieve higher levels of operational performances using TQM, TPM, ERP etc

2. Systems and Elements of ISO 9000

ISO 9001 comprise of 3 Systems and 20 Elements

1. System Management
2. System Methodology
3. System Maintenance

2 System Methodology

Elements are

5. Contract review – compliance as per order placed by all customers w.r.t. time, delivery, quality, performance
6. Design control – to ensure that products are produced as per the latest design which are modified from time to time to meet changing customer needs.
7. Document and data control – maintenance of all data and records for traceability of the reason
12. Inspection and testing – clearly defined inspection and testing methods and procedures
13. Control of non-confirming product – because of very high cost, certain parts are not rejected due to deviation in certain dimensions, but other parts are modified to give the desired performance – this is a non-confirming product – documentation and performance monitoring and control of such products.
14. Handling, storage, packaging and delivery – a documented system for all these activities.
15. Training – documented requirements of

1 System Management

Elements are

1. Management responsibility – clearly defined quality responsibility at all levels
2. Quality system – documented inspection procedure, calibration of measuring equipments
3. Corrective and preventive action – documented actions
4. Internal quality audit – verification of ISO compliance by the company itself

for any defect which can appear at a later date while in use.

8. Purchasing – system to ensure the required quality at the vendor's production processes to assure
9. Control of customer supplied product – if such situation occur.
10. Product identification and traceability – documentation for tracing the source and reasons for any defect found at a later date in the product.
11. Process control – ensure production machines are capable of giving the required quality
- employee training and training imparted.
16. Servicing – documented servicing procedures and servicing records.
17. Statistical techniques – different statistical tools used for defect/deviation analysis

3 System Maintenance (of Quality)

Elements are

18. Control of testing, measuring and inspection equipments – documentations for all
19. Inspection and test status – records of all inspection

20. Control of Quality Records – preservation of all quality records for future reference with clearly assigned responsibilities

3. ISO 9000 Series of Quality Standards

ISO 9000 series have 5 Main Documents. They are ISO 9000, 9001, 9002, 9003, 9004

1. ISO 9000

Provide guidelines for selection of ISO 9000 family of standards (ISO 9001, 9002 or 9003) as applicable to the particular business.

engaged only in **production, installation/ supply and servicing. (No product design and development is undertaken by the company)**

Most of the process based industries in petroleum, fertilizer etc where the company by itself do not carry out any product design and product development work, come under this series.

E.g. Urea produced by fertilizer companies are same in quality and composition. They do not carryout 'designing' of Urea. Hence ISO 9002is

5 ISO 9004

These standards relate to internal Quality Assurance and Quality Audit.

It deals with quality in documentation and corrective and preventive actions.

i. e. It will ensure that the company is working as per ISO 9001/9002 through systematic quality audits, documented corrective and preventive actions.

Indian Standard Equivalents of ISO 9000 series

2. ISO 9001

This document provides Quality standards as applicable to the companies and businesses engaged in **Design, Development, Production, Installation (including testing and commissioning) and Servicing.** Almost all engineering industries come under ISO 9001 series.

3 ISO 9002

This document gives Quality standards as applicable to the companies and business

applicable to them

4 ISO 9003

These standards relate to final inspection and testing system and procedures for both in-house production as well as purchased parts and materials.

i.e. It will give details as to how to inspect, test and accept each and every part, sub assemblies and finished product to ensure that they are as per design specification.

ISO 9000 to ISO 9004 series of standards are represented by and equivalent to IS 14000, 14001, 14002, 14003 and IS 14004 series of Indian Standards respectively.

4. 15 steps of ISO 9000 implementation

1. Top management commitment
 - formulate quality policy
 - set objectives of implementation
 - provide leadership and funds
2. Appoint Consultant

- to help preparation of Quality Manual and other documents.
 - provide overall guidance for implementation
 - Consultants are generally registered with one Certifying Body
3. Nominate Management Representative (MR)
- hold overall responsibility of implementation and maintenance in the organization
- determine schedule for different implementation activities
7. Element Owners
- fix responsibility for 20 elements of ISO 9000
8. Review present system
9. Prepare Documentation
- Major Documents in ISO 9000 are Quality Manual, Departmental manuals
- implementation with reference to stated Objectives by the management as detailed in Quality Manual
- take corrective and preventive action
13. Pre- assessment audit
- Done by external auditors accredited to the certifying agency together with internal auditors.
14. Registration and Certification Audit
4. Constitute Implementation team
- Implementation team members are from different functional areas and help ISO 9000 implementation in all functional areas.
5. Training and awareness
- impart company wide training and awareness program to each and every employee.
6. Time Schedule
- and Working Instruction, reporting formats, forms etc
10. Install new system
11. Internal Audit
- conduct internal audit with in 6 months by trained internal auditors with in the organization.
12. Management review
- review of internal audit NCs (Non-Conformities) and effectiveness of
- If the Pre- Assessment Audit is satisfactory, the Company has to register with the Certifying Agency for certification.
 - They will send team of external auditors to do the certification audit.
15. Award of Certification
- If certification audit is successful, ISO 9000 certificate is issued by the certifying agency

Maintenance of ISO 9000 Certification

- Internal Audit is conducted by the company usually every 6 months, but before Surveillance Audit by Certifying body Auditor
- Non Conformance Reports from Internal Audit is reviewed by the Management Team.
- Corrective and preventive actions are decided, implemented are monitored.
- Every six months, Surveillance Audit is done by the certifying body auditor.

2. The dependence on traditional inspection and quality control is very less.
3. Customers become more confident of the products and services of the company.
4. Provide competitive edge in domestic and international market.
5. Provide climate and scope for continuous quality improvement.
6. Reduce waste and increases productivity.

TQM, TPM, MRP, JIT, BPR, ERP, SCM, CRM etc.

Limitations of ISO 9000

1. ISO 9000 is a top down management activity. Top management and all executives should be fully committed to the system to make it a success. Any laxity on their part will make the system ineffective.

- If the system is working OK, and there are no major Non- Conformities, company continues to remain as ISO 9000 certified.

Advantages of ISO 9000

Following are the major advantages of implementing ISO 9000 system

1. Quality is built into the system, i.e. the quality is assured if the systems are correctly followed.
7. Increases profit.
8. Bring about attitudinal change in the employees, resulting in their participation and better performance.
9. Each employee feels his importance and role in the operations of the company.
10. Encourage innovation and improvements in all areas.
11. ISO 9000 provide the foundation for implementing advanced performance improvement systems like

2. Implementation is very challenging and demanding to all resources, including money, manpower and time.

3. Change of work culture and systems will face stiff resistance in the beginning. This is mainly because of the human nature to resist changes. This needs careful handling by bringing in high awareness in each and every employee at all levels.

4. Investments are essential for upgrading inspection and testing facilities and some manufacturing facilities to meet the quality requirements.

5. Continuous maintenance and improvement of the system after Certification need constant attention and monitoring from management. Otherwise, the company will slip back to old work habits resulting in

wastage of the money and efforts for certification.

Almost all companies will have some issues related to environment, health and safety. Hence most companies need ISO 14000 Certification also, which all executives must be familiar

5. Six Sigma

1. Process Variability

- In any production process any two parts cannot be made exactly identical
 - This variation in process is called process variations
-
- These variations generally follow normal distribution curve
 - The distribution will have a mean and standard deviation

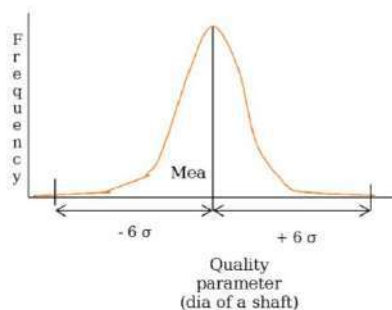


Fig 2.10-1 Six Sigma

2. Six Sigma Philosophy

- Statistical terms define Six Sigma as less than 3.4 defects per million opportunities in any process, products or services
- In Operations Management, Six Sigma has much wider meaning.

It is a program to achieve

- zero defect
- improved customer satisfaction

at

- lower cost and
- lesser time

- The emphasis of Six Sigma program is 'defect prevention' rather than 'defect detection'

- Six sigma methodology is a rigorous approach known as DMAIC (define, measure, analyze, improve and control).

- Six sigma practitioners follow DMAIC approach to root out the causes of defect, starting with identifying the problem and ending with implementation of long lasting solution,

3. Six Sigma Methodology

- **D** Define a problem or improvement opportunity.
- **M** Measure process performance.
- **A** Analyze the process to determine the root causes of poor performance; determine whether the process can be improved or should be redesigned.
- **I** Improve the process by attacking root causes.
- **C** Control the improved process to hold the gains.
 - Develop a change control and maintenance program
 - Coordinate and control the Roadmap

6. Key players in Six Sigma Program

- Top management – formulate and communicate overall Six Sigma Program and lead the program.
- Champion – Six Sigma Leader, who identify and rank potential projects, help select and evaluate candidates, manage program resources, serve as advocate for the program

4. DMAIC Approach

5. Road Map to Six Sigma

- Provide strong leadership and commitment
- Appoint Six Sigma leader – 'Champion'
- Select Cross functional team
- Train them to become Black Belts and Green Belts
- Define performance matrices
- Select projects that are likely to achieve the objective
- Address data collection issues for DMAIC approach
- Carryout DMAIC
 - Master Black Belts – They are specialists in Six Sigma Program having extensive training in statistics and use of quality tools. They train Black belts
 - Black Belts – they are project team leaders responsible for implementation of process improvement project after getting trained in six sigma program and demonstrated mastery in the program.
 - Green belts – are project team members.

7. Typical six sigma programs are to

- reduce defects,
- reduce cost,
- reduce product or process variability,
- reduce time,
- increase productivity
- and improve customer satisfaction.

Motorola was the first company to pioneer in Six sigma in 1980s.

8. Advantages of Six sigma

4. Attain capability to expand in national and international market.
5. Develop excellent quality culture in the organization, reflecting quality in all spheres of activities.
6. Develop internal strength through its employees and systems to overcome bad times and competition.

6. Zero Defect Quality (ZDQ) System

1, Concept

- “Zero defects” is referred to as a philosophy, a mind set or a movement.
- It's not a program, nor does it have distinct steps to follow or rules to abide by.
- It is adaptable to any situation, business, profession or industry.
- Zero defects is NOT about being perfect.

1. Companies achieve high competitiveness in cost, quality and customer satisfaction.

2. Result in high employee motivation, innovation and participation to be competitive.

3. Facilitate continuous product, quality and cost improvement as per customer needs.

9. Challenges to Six Sigma

1. The perception of ‘Sick Sigma’ – that it is not workable
2. Resistance to change of work culture
3. Design constraints to shift to DFSS (Design for Six Sigma)
4. Lack of training especially at managerial level
5. Hasty implementation before organisational readiness
6. Inaptitude for statistical analysis due to poor mathematical capability

- Zero defects is about changing your perspective.
- It does this by demanding that you:
 - Recognize the high cost of quality issues;
 - Continuously think of the places where flaws may be introduced; and
 - Work proactively to address the flaws in your systems and processes, which allow defects to occur.

Chapter 6.
Kaizen & Bench Marking

After implementing TQM, companies found that, it is not the end to be more competitive. Continuous small improvements by every person in what they do is essential to be more competitive. Hence the technique of Kaizen was developed by Japanese companies, and being adopted all over the world.

Similarly the technique of Bench Marking was developed to understand, where your company stand in various parameter compared to the

1. Kaizen

What is Kaizen?

Kaizen : Literal meaning in Japanese is Kai = 'to Change' and Zen – 'Good' or 'Better' , Kaizen = 'to change for better' or 'improvements to reduce cost'

.Kaizen strategy:- Means continuous effort for small improvements involving everyone in the organization – managers and workers alike

Once a product design and process is implemented it is left to the line managers, supervisors and workmen to maintain the process till the next improved process is implemented.

competetors and take appropriate actions to fill the gap.

Executives in all companies must understand Kaizen and Bench Marking and practice them in the area where they work, irrespective of position and department

Topics

- 1. Kaizen**
- 2. Bench Marking**

Understanding Innovation, Maintenance and Kaizen

Traditional organizations have only innovation & Maintenance

1. Innovation & Process Improvement (PI) Function

Traditionally top management put their attention to 'Innovation', 'Product Design' and 'Process Improvements'. (refer figure 6.1-1) It requires large investments in terms of manpower, technology and production facility.

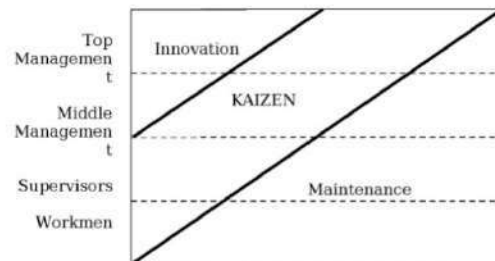


Figure 6.1-1 Innovation, Maintenance & Kaizen

The objective of the maintenance function is to maintain current technological, managerial, and operating standards.

Under the maintenance function, the management must first establish policies, rules, directives and standard operating procedures (SOPs) and then work towards ensuring that everybody follows SOP. The latter is achieved through a combination of discipline and human resource development measures.

If SOP is followed by all (mostly by middle

management, supervisors and workmen) to maintain the process It will prevent the deterioration of the process till the next process improvement (PI) is implemented as shown by line 2 (fig 6.1-2)

If SOP is not followed, the process will deteriorate as shown by line 1 in Fig 6.1-2. The Process improvement (PI) will start from a deteriorated level, which will not give the expected result.

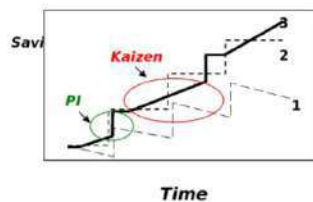


Fig 6.1-2 Kaizen

3. Kaizen

make continuous and incremental improvements to make it better and better

4. Kaizen emphasis is on continuous, small, every day improvements without spending money, resulting in continuous improvements and cost saving – line 3 in figure 6.1-2.
5. Implementation of next Process Improvement (PI) can start from a higher level of operational performance.

1. Kaizen signifies small, incremental and continuous improvements (Line 3 in Fig 6.1-2) as a result of coordinated continuous efforts by all workmen, supervisors and managers using common sense
2. Kaizen is a 'process oriented thinking' to reduce cost instead of 'result oriented thinking' at higher cost.
3. Kaizen never allow the process performance to deteriorate, but

6. The next investment for Process Improvement (PI) can be delayed because Kaizen has already achieved higher performance level without investment. PI can wait till a time when technology itself is to be changed

Kaizen Implementation

Kaizen activities can be conducted in 3 Stages with several steps.

Stage 1 – Establish and improve Process Standard

Step 1 – Establish ‘Process Standard’

- Review the current work standards to check the current performance.
- Estimate how and how much performance can still be improved.
- Allow each worker to re-engineer the process himself with the help of team mates or a Kaizen support group.
- Change worker's operations to make his job less tiring, more comfortable, more safer and more productive

and/or changing the machine layout to eliminate waste

Stage 3 – Improve Procedures

- Third stage is to improve ‘Procedures’ to make the process more efficient and eliminate waste.

All the 3 stages can be combined in a broad improvement plan

Kaizen is controlled

different work areas to identify problems and suggestions are invited.

- Suggestions will be discussed by ‘Authoritative Committee’ and given approval for implementation.
- The process improvement is measured and process is accepted as a standard, which can further be improved.
- The suggestions are rewarded according to global gain.

2. Bench Marking

Step 2, 3 etc – ‘Continuously improve Process Standard’

- Once step 1 is established as a ‘Process Standard’, upgrade the standard for himself and supported by Kaizen group to achieve a small improvements in each step to higher and higher standards

Stage 2 – Improve Equipments

- Second stage is to improve ‘Equipment’ itself, like installing foolproof devices

- Empowering employees to make changes in the process does not mean that it is not controlled.

- Everybody irrespective of rank and position is encouraged to make suggestions for small improvements in their work area through a ‘Kaizen Submitting System’.

- In addition to individual initiatives, Kaizen committees are formed in

Definition

It is a continuous process of measuring products, services and practices of the company against the toughest competitor or renowned industry leader.

It serves as a standard for comparison

It is a means of self evaluation and subsequent improvement

3 Basic Questions in BM

- where we are ?

- why we are here Vs competitor/ industry ?
- what can be improved and how ?

Types of Bench Marking

1. Internal Bench marking

- plant related – between functional areas with in one plant, and between different plants in a multi plant company
- branch related – pertain to different branches of a company

4. Find the 'competitive gap' – ie. The difference between your company & BM partner
5. Project future performance of BM partner, your company and also the industry if required (because it will take some time for implementation and BM partner and industry may move forward by that time – eg, 0.05 % rejection will come down to 0.03 % of BM partner by the time you implement the plan).

Customer complaint	10%	2%
Customer retention rate	80%	90%
Employee retention rate	80%	85%
Information retrieval time	10 mts to 1 day	10 seconds
Customer response time	30 mts	10 mts

2. External Bench marking

- Market/product related
- Generic processes – best business practices in the industry

Steps of Bench marking

1. Identify bench mark subject areas
2. Identify BM partner – ie. Company of reference
3. Determine the methods of data collection and actual data collection
6. Analyse and communicate findings
7. Set functional goals.
8. Develop action plan
9. Implement and monitor results
10. Re calibrate the bench mark
11. Continue BM exercise where ever competitive gap exists.

Examples of BM targets

Criteria	Your company	BM Company
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Medical cost per employee	Rs y	Rs 0.2y
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