UNIT – I INTRODUCTION

TOTAL   **=** Made up of the whole

QUALITY   **=** Degree of excellence a product or service provides

MANAGEMENT   = Act, art or science /manner of handling, controlling, directing etc

Meaning

TQM is a structured system for satisfying internal and external customers and suppliers by integrating the business environment, continuous improvement and breakthrough with development, improvement and maintenance cycles while changing organizational culture.

THE DIMENSION OF QUALITY

Dimension	Meaning and Example
• Performance	Primary product characteristics such as the brightness of the picture
• Features	Secondary characteristics, added features, such as camera cell phone
• 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

QUALITY PLANNING

Planning in the field of quality control must be geared fundamentally for delivering satisfactory product quality to the customer at minimum cost. These objectives are realized only by carefully planning the necessary quality procedures which establish the required operational detail.

- ◆ Establishing quality goals
- ◆ Identify the customers
- ◆ Determine the customer's needs
- ◆ Develop product features which response to the customers needs
- ◆ Develop processes that are able to produce the product features
- ◆ Establish quality controls
- ◆ Transfer the plans to the operating forces

QUALITY COSTS

The cost of poor quality can add to the other costs used in decision making, such as maintenance, production, design, inspection, sales and other activities. This costs is no different than other costs. It can be programmed, budgeted, measured and analyzed to help in attaining the objectives for better quality and customer satisfaction at less cost. A reduction in these costs (quality costs) will lead to increased profit.

◆ **Prevention Cost**

Cost incurred to avoid or minimize the failures

The various elements of prevention cost are given below.

1. Marketing / Customer / User cost.

2. Product/ service / Design Development cost.

3. Purchasing cost

4. Operations costs (manufacturing or service)

5. Quality administration costs.

◆ **Appraisal costs**

Costs involved in determining the degree of conformance to the quality requirements

These are the costs incurred by the organization for inspection and testing of the product in production process itself. In its widest sense, this cost includes all the checks done by people who are not titled inspectors. For example machinists, tools setters, supervisors etc routinely inspect the production process to ensure quality and this is the appraisal cost.

1. Purchasing appraisal cost

2. Operations (manufacturing or service) appraisal costs.

3. External appraisal costs.

4. Review of test and inspection data cost.

5. Checking labour cost.

6. Setup for test or inspection.

7. Laboratory acceptance testing cost.

8. Test and inspection of purchased material cost.

9. Quality audit cost.

10. Outside endorsement.

11. Fields testing costs.

◆ **Internal failure costs**

These are the costs incurred within the manufacturing organization. Costs associated with defects found before the customer receives the product or service. Typically these costs include scrap, rework or corrective operations etc.

1. Product or service design failure cost – internal
2. Purchasing failure costs.
3. Operation (product or service) failure costs.
4. Scrap costs
5. Rework cost.
6. Factory contact engineering cost.

◆ **External failure costs**

These are the costs incurred by the manufacturer after the product has been delivered to the customer. For example, cost of products or services rejected by the customer or recalled because of some defects will fall under this category.

1. Returned goods costs.
2. Product recall costs.
3. Complaints in warranty costs.
4. Complaints out of warranty costs.
5. Product liability costs.
6. Product service cost.
7. Penalties.
8. Customer goodwill
9. Lost sales cost.

ANALYSIS TECHNIQUES FOR QUALITY COSTS

The frequently used quality costs analysis techniques are:
1. Trend Analysis
2. Pareto Analysis

1. Trend Analysis.

  ➢ Comparing the present and past cost levels is the core of trend analysis. The information from the trend analysis is useful for the long range planning.

  ➢ The data can be taken from the monthly report.

  ➢ Trend analysis can be done on cost category, indices, products, departments, work centers, etc.

  ➢ Typically the past data on quality costs are plotted on a graph and using mathematical calculations one can forecast the quality cost trend which may be in the future, based on the past data's.

40%

30%

Non conformance cost

20%

Rework costs

10%   O   J   A   K   P   M   U   O   P
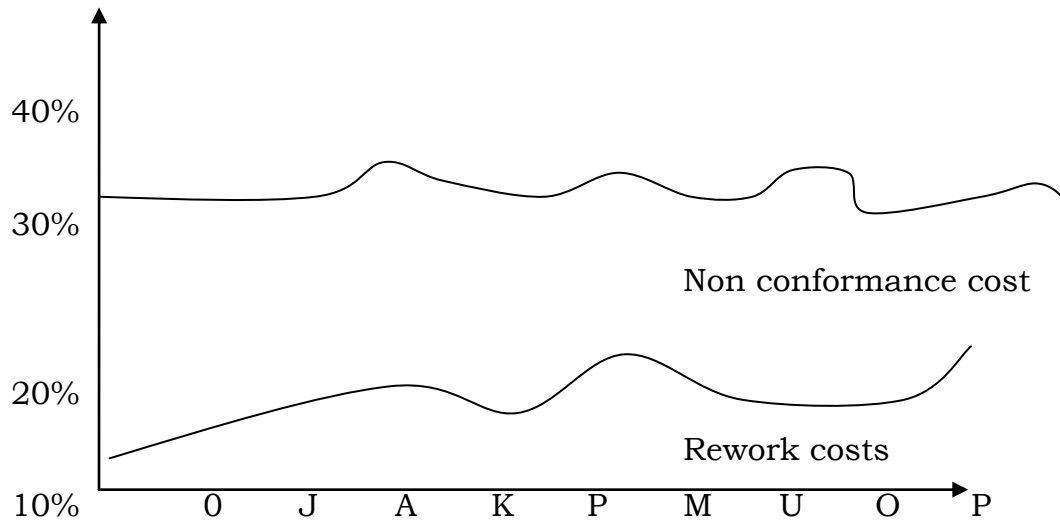
2. Pareto Analysis

➢ By this principle 80 percent of the major problems are due to 20 percent of the causes. (for example, i)few customers accounting for major sales, ii) a few type of problems accounting for major problem, iii) a few products accounting for majority of the profit)

➢ Vital causes for problems are identified; a major chunk of problems can be solved.

➢ Pareto diagram has few items that denote a substantial amount of the total.

➢ Pareto diagram can be established for quality costs by machine, defects, departments, category, etc.
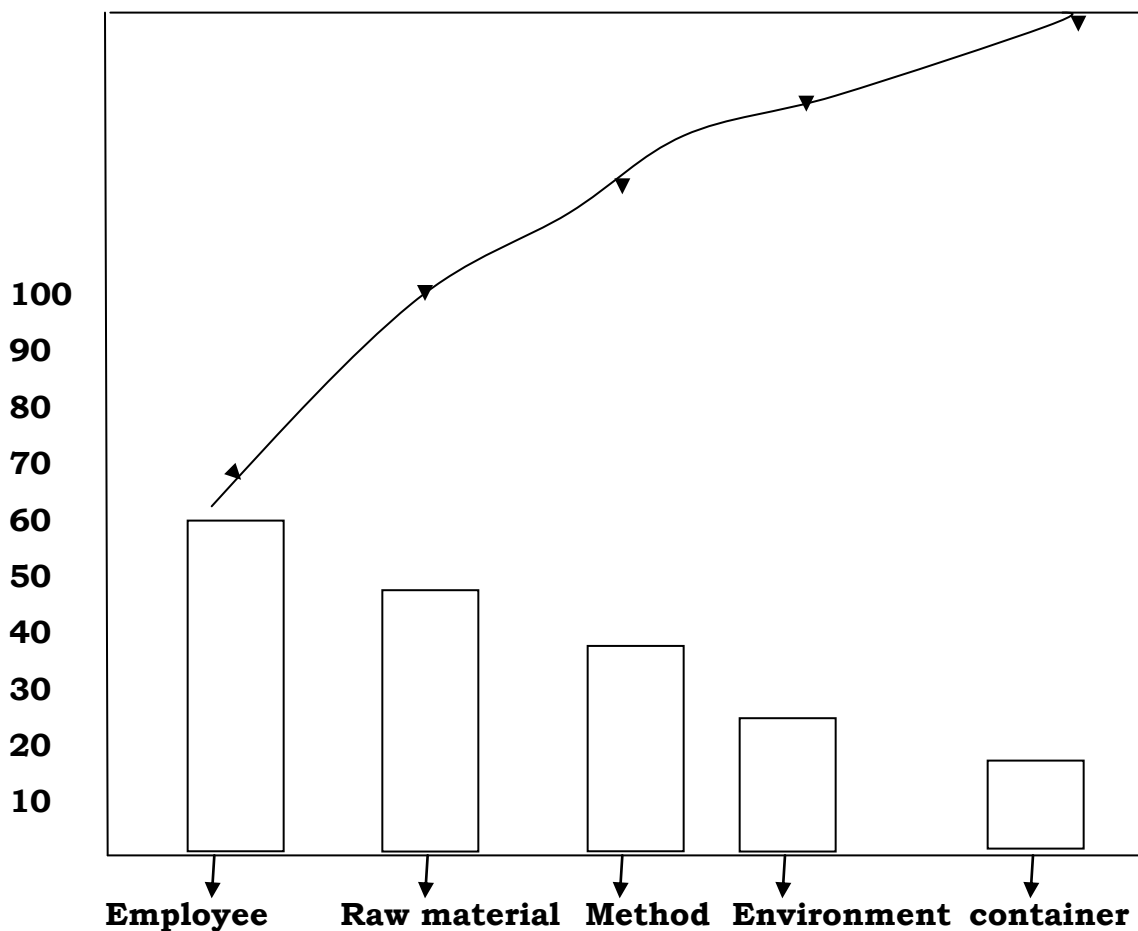
BASIC CONCEPT OF TQM

1. **A committed and involved management to provide ling term, top to bottom organizational support**.

    It is useless to embark on a quality journey without the top management's commitment to quality. Top management must participate in the quality programme. They must also participate on quality improvement teams and also act as coaches to other teams

2. **An un – wavering focus on the customer both internally and externally**.

    The employees of the organization in the first place. Mangers must listen to the suggestions and recommendations made by the employees to improve quality.

    This aspect of listening to the voice of customers leads to the emphasis of design quality and defect prevention.

3. **Effective involvement and utilization of the entire workforce.**

    TQM is everyone's responsibility in an organization. All workers in and organization must be oriented towards TQM and all personnel must be trained in TQM, statistical process control and other appropriate quality improvement skills.

4. **Continuous improvement of the business and production process.**

    Continuous improvement refers to constant refinement and improvement of products, services and organizational systems to yield improved value to consumers.

    Areas such as on-time delivery, scrap reduction, supplier management, customer satisfaction, etc. are good quality projects to begin continuous improvement.

5. **Treating suppliers as partner**

> The traditional relationship between the buyer and the supplier has been adversarial in nature. Each tried to extract the maximum out of each other. There was lack of trust on each other.
>
> To ensure good relationship with suppliers, frequent change of suppliers should be avoided and suppliers should be few in number so that true partnering can occur.

6. **Establishing performance measures for the process.**

> Performance measure is an integral part of the quality process. If an organization cannot measure its progress, it is useless for it to go on a quality journey. Performance measures such as percentage of non conformance, absenteeism, customer satisfaction, etc., should be determined for each functional area.

HISTORICAL REVIEW

➤ The concept of specification of labour was introduced during the industrial revolution

➤ As a result a worker no longer made the entire product, only a portion. This change brought about a decline in workmanship

➤ Because productivity increased there was a decrease in cost, which result in lower customer expectations

➤ As products become more complicated and jobs more specialized, it became necessary to inspect product after manufacturing

➤ In 1942 W.A. Shewhart of Bell Telephone Laboratories developed a statistical chart for the control of product variables. This is beginning of SQC

- In some decade H.F. Dodge and H.G. Romig both of Bell telephone laboratories developed the area of acceptance sampling as a substitute for 100% inspection. It is recognized by 1942

- In 1946 the American society for Quality Control was formed. Now it is American Society for Quality

- In 1950 W. Edwards Deming who learned SQC from shewhart, gave a series of lectures on statistical methods to Japanese Engineers

- Un 1954 Joseph M. Juran made his first trip to Japan and further he emphasized management's responsibility to achieve quality

  By this concept the Japanese set the quality standard for the rest of the world

  In 1960 the first quality circles were formed for quality improvement by Japanese workers

- By 19770's and 80's U.S. managers were making frequent trips to Japan to learn about the Japanese miracle

- In 1980's the automotive industry began to emphasizes statistical process control (SQC)

- Emphasis on quality continued in the auto industry in the year 1990's. when the Saturn automobile ranked first in customer satisfaction in 1996

- ISO 9000 became the world wide model for quality system

PRINCIPLES OF TQM

1. Customer focus
2. Leadership
3. Involvement of people
4. Continuous improvement/ long-term
5. Systematic improvement/ approach
6. Problem prevention
7. Quality as everyone's job
8. Mutually beneficial

LEADERSHIP DEFINED:

Leadership is interpersonal influence exercised in a situation and directed through communication process, towards the attainment of a specialized goal or goals. Thus leadership is a process of influencing the activities of an individual or a group for goal achievement in a given situation.

LEADERSHIP CONCEPT

Leadership requires in order to become successful as a leader , he needs an intimate and insightful understanding of human nature – the basic needs, wants and abilities people, a leader needs to know and understand the following;

1. People need both security and independence at the same time.
2. People are sensitive and do respond to external rewards or punishments. They are also strongly self-motivated.
3. Peoples sometime value a kind word of praise more than any monetary reward.
4. They trust their gut reaction more than statistical data.
5. A leader should simplify the task

ROLE OF SENIOR MANGEMENT

> Senior management must practice the philosophy of Management By Wandering Around (MBWA). They should get out of the office and visit customers, departments, and plants within the organization and suppliers

> Encourage subordinates to write only important messages that need to be part of the permanent record.

> Senior management role is no longer to make the final decision, but to make sure the teams decision is aligned with the quality statement of the organization

> Problem solving and decision making to the lowest appropriate level by delegating authority and responsibility.

> Senior managers must stay informed on the topic of quality improvement by reading books and articles attending seminars and talking to other TQM leaders.

> The needed resources must be provided to train employees in the TQM tools and techniques, the technical requirements of the job and safety.

> Must be visibly and actively engaged in the quality effort by serving on teams, coaching teams and teaching seminars.

> They should lead by demonstrating, communicating, and re-in forcing the quality statements.

> They should spend about one third of their time on quality

> Senior managers are listening to internal and external customers and supplies through visits, focus groups and surveys.

> To create awareness of the importance of TQM and provide TQM results in an ongoing manner.

> Senior managers should be able to drive fear out of the organization, break down barriers, remove system roadblocks, anticipating and minimize resistance to change and in general change the culture.

QUALITY CIRCLE

Meaning

Quality council is composed of the chief executive officer, the senior managers of the functional areas, such as design, marketing, finance, production and quality and a coordinator or consultant. Individual selected for the coordinated position should be bright young person with execution potential.

Objectives of quality council:

- To raise the quality consciousness in the organization through seminars, study tours and using forms of promotion.
- To ensure effective functioning of the organization on the quality statement and plan.
- To encourage basic and applied research and development in the field of quality and dissemination of its results to the organization.
- To raise the level of training of personnel engaged in quality activities including the assessors and trainees.
- To facilitate upgradation of testing and calibration facilities and laboratories as well as to encourage the overall quality of the organization.

DUTIES OF QUALITY COUNCIL

- ❑ Develop with input from all personnel; the core values Vision statement, Mission statement, and Quality policy statement.
- ❑ Develop the strategic long term with goals and the annual quality improvement program with objectives
- ❑ Determine and continually monitor the cost of poor quality.

- ❑ Create the total education and training plan.
- ❑ Determine the programme measures for the organization.
- ❑ Continually determine those projects that improve the process. (internal and external customers)
- ❑ Establish or revise the recognition and reward system to account for the new way of doing business.

QUALITY STATEMENT

In addition to the core values and concepts, the quality statement includes the Vision statement, Mission statement and Quality policy statement. Once developed they are occasionally revised and updated. They are part of the strategic planning process, which included goals and objectives.

VISION STATEMENT

The vision statement is a clear declaration of what an organization aspires to be in the future (in long term). Its purpose is to provide a platform for the managers for thinking strategically. A vision statement is usually an ideal condition, that might never be reached but that will inspire the people to achieve.

Example: "THE HAPPIEST PLACE ON EARTH"   - Disney Theme park.

MISSION STATEMENT

The mission statement answers the following questions. Who we are, who are the customers, what we do and how we do it. This statement is usually one paragraph or less. It is easy to understand and describe the functions of the organization. It provides a clear statement of purpose for employees, customers and supplies.

EXAMPLE: BEN & JERRY'S ICE CREAM – MISSION STATEMENT

PRODUCT MISSION: TO make, distribute and sell the finest quality natural ice cream and related products in a wide variety of innovative flavors made from Vermont dairy products.

QUALITY POLICY STATEMENT

QPS serve as a guide for everyone in the organization. This statement clarifies the employees about how the products and services must be provided to the customers. The CEO of the company writes quality policy statement after a careful study and analysis of the feedback from the workforce. Finally the quality council must approve the statement.

EXAMPLE:

Meet the requirements of the customers (both internal and external)

Go ahead competition

Complete utilization of the entire workforce.

STRATEGIC PLANNING

Organizations are finding that strategic quality plans and business plans are inseparable. The strategic planning is three to ten years and short term planning is one year or less. It consists of goals and planning.

SEVEN STEPS TO STRATEGIC PLANNING.

1. **Identification of customer needs.**
2. **Determination of customer positioning**
3. **Predict the future.**
4. **Gap analysis.**
5. **Closing the gap.**
6. **Aligning the plan to the mission and vision.**
7. **Implementation of the plan.**

1. **Identification of customer needs.**
   - This steps provides a focus on customer satisfaction.
   - There needs and wants have to be identified and satisfied.
   - The profile of the customers are identified. Questions like who are our customers? Will they change in future? What will they want in future?.

2. **Determination of customer positioning**
   - The planners determine where the organization wants to be in relation to the customers.
   - Expand the customer base products or services.
   - Products with poor quality performance should be removed or eliminated and replaced by better ones.
   - The organization needs to concentrate its efforts on areas of excellence

3. **Predict the future**
   - Predict the future conditions that will affect their product or service
   - Using effective tools for analyzing and predicting future
   - Some products or services have become absolute because it failed to foresee the changing technologies.
   - The mangers in the organization anticipate a change in the first place, and then they can make necessary arrangements by making investments on resources and be prepared to take on the future.
   - The rate of change is continuously increasing.

4. Gap Analysis

- The planners to identify the gaps between the current state and future state.

- The present position of the organization in the market in relation to competition, profits, customer satisfaction employee satisfaction, etc. to the intended position.

- If any there is gap identified future strategies must be formulated taking this gap in to consideration.

5. Closing the Gap

- After gap analysis plans must be formulated to reduce or close the strategic gap.

- To close the gap by establishing goals and responsibilities.

- All stakeholders should be included in the development of the plan.

6. Alignment

- It must be aligned with the mission, vision, and core values and concepts of the organization.

7. Implementation

a. Resources must be allocated to collecting data, designing changes and overcoming resistance to change.

b. To monitoring activities to ensure that progress is being made.

c. Monitoring by the steering committee and periodical assessments are required for an effective and speedy implementation.

THE DEMING PHILOSOPHY

In 1950 he taught SPC concepts and the importance of quality to the leading CEO's of Japanese industry. He developed **the following fourteen points as a theory for management for improvement of quality** productivity and competitive position.

1. **Create and publish the aims and purposes of the organization**
   - ✓ Organization must develop a long term view at least 10 yrs
   - ✓ Plan to stay in business by setting long range goals
   - ✓ Resources must be allocated for research, training and continuing education to achieve the goals
   - ✓ Innovation in promoted to ensure that the product or services does not become absolute
   - ✓ Organizational philosophy is developed to send the message that everyone is part of the organization

2. **Learn the new philosophy**
   - ✓ Organization must seek never-ending improvement and refuse to accept non-conformance.
   - ✓ Customer satisfaction is the number one priority
   - ✓ The organization must concentrate on defect prevention rather that defect detection.
   - ✓ Everyone should involved in the quality journey and change his or her attitude about quality
   - ✓ Supplier must help to improve quality
   - ✓ Share the information relative to customer expectations

3. Understand the purpose of inspection

- ✓ Mass inspection is costly and un reliable it is replace by statistical techniques
- ✓ It is required for self and supplier
- ✓ Mass inspection is managing for failure and defect prevention is managing for success.

4. Stop awarding business based on price alone

- ✓ Awarding business based on the low bid, because price has no meaning without quality
- ✓ To examine how customer expectations are affected and provide feedback to the supplier regarding the quality

5. Improve constantly and forever the system

- ✓ Management must have take more responsibility for problems by actively finding and correcting problems
- ✓ So that quality and productivity are continually and permanently improved and costs are reduced.
- ✓ The focus is preventing problems before they happen.
- ✓ Responsibility is assigned to teams to remove the causes of problems and continually improve the process.

6. Institute training

- ✓ Employee must be oriented
- ✓ Management must allocate resources to train employee to perform their jobs
- ✓ Everyone should be trained in statistical methods and monitor the need for further training.

7. Teach and institute leadership
- ✓ Improving supervision is management's responsibility
- ✓ Training in statistical methods
- ✓ Supervisors not focusing on negative fault findings,
- ✓ He create positive supportive
- ✓ Communication must be clear from the top management to supervisor and to operators

8. Drive out fear, create trust and create a climate for innovation.
- ✓ By providing workers with adequate training, good supervision and proper tools to do the job as well as removing physical dangerous.
- ✓ When people are treated with dignity fear can be eliminated and people will work for the general good of the organization.
- ✓ This climate will provide ideas for innovations and improvement.

9. Optimize the efforts of teams, groups, and staff areas.
- ✓ Barriers internally like levels of management among department within department etc.
- ✓ Barriers externally like with customers and suppliers
- ✓ The barriers exist because of poor communication, ignorance of the organization mission, completion, fear and personal grudges.
- ✓ To overcome these attitudes need to be changed communication channel opened, project teams organized, training for teamwork.

10. Eliminate exhortations for the work force

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

11.a) Eliminate numerical quotas for the work force

- ✓ Instead of quotas, management must learn and institute methods for improvements.
- ✓ Quotas and work standards focus on quality rather that quality.
- ✓ Quotas should be replaced with statistical method of process control.

b.) Eliminate management by objectives

- ✓ Management must learn the capabilities of the processes and how to improve them
- ✓ Management by numerical is an attempt to manage without knowledge of what to do

12. Remove barriers that rob people of pride of workmanship

Loss of pride in workmanship exists throughout organization because

- ✓ Workers do not know how to relate the organization mission
- ✓ They are being blamed for system problems
- ✓ Poor designs lead to the production of "Junk"
- ✓ In adequate training is provided
- ✓ In adequate or in-efficient equipment is provided for Performing the required work.

13. Encourage Education and self-improvement for everyone

- ✓ What an organization need is people who are improving with education
- ✓ A long term commitment to continuously train and educate people must be made by management
- ✓ Everyone should be retained as the organization requirements change to meet the changing environment

14. Take action to accomplish the transformation

- ✓ Management has to accept the primary responsibility for the never ending improvement of the process.
- ✓ Management must be committed, involved and accessible if the organization is to succeed in implementing the new philosophy.

BARRIERS / OBSTACLES IN IMPLEMENTATION OF TQM

➢ Lack of management commitment

The management commitment should be clearly communicated both verbally and in action to the organization.

If the workers feel that the management is doing only the talking about no action is initiated on TQM then they too will lack necessary commitment and motivation to implement TQM principles.

➢ Inability to change organizational culture

The past culture should be unlearned and the new culture should be learnt. This gives rise to enormous resistance to change from the employees.

It is very difficult for an organization to make a culture change.

➢ **Improper planning**

When planning for TQM all the constitutes should be involved in the development of the implementation plan and any modification that occur as the plan evolves. Rapid planning will ensure that the TQM fails.

Planning should be done on the customer front, employee's front and the supplier front.

➢ **Lack of continuous training and education**

Training and education is an ongoing process for everyone in the organization. The training needs of the employees must be determined and a plan should be developed to satisfy those needs.

Training and education are most effective when senior management conducts the training programme based on the principles of TQM

➢ **Incompatible organizational structures and isolated individuals and department**

Lack of co ordination and difference of opinion among departments and individuals in an organization will create implementation problems.

The use of multifunctional teams can help to break this barrier.

Restructuring of the organization may be needed to make the organization more responsive to the needs of the customers.

➢ **Ineffective measurement techniques and lack of access to data and results**

In order to improve the process, one has to measure the present position. Mechanisms to measure the present position should be available in the organization.

Once the measurement is done the data should be made available to the necessary mangers to make decisions.

Any clogging of data to the managers will become a barrier to TQM implementation.

➢ **Playing inadequate attention to internal and external customers**

Organizations have to understand the changing needs and expectations of the customers both internal and external.

Effective feedback mechanisms that provide data for decision making are necessary for this understanding.

One way to overcome this is to give the right people in the organization, a direct access to the customers.

➢ **Inadequate use of empowerment and teamwork**

Individuals should be empowered to make decisions and take responsibility to make decisions that affect the efficiency of the process of production.

Teams should be formed and need to have proper training. The team's recommendations should be adopted whenever possible.

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