Total Quality Management (TQM) can be seen as a business discipline and philosophy of management, which institutionalises planned and continuous business improvement. There is no single theoretical formalisation of total quality. However, a set of core assumptions and specific principles of management can be crystallised into a holistic framework. Many people prefer to discuss continuous improvement rather than quality, which has a product centred connotation. In the recent management parlance TQM is viewed as "excellence". Therefore, TQM assumes that quality is the outcome of all activities that take place within an organisation. This means that all functions and employees have to participate in the improvement process. This attitude indicates that all organisations need both quality system and a quality culture. Quality is a strategic issue for corporate management and is not just an operational issue alone for lower levels in the organisations.

TQM is centred round Deming's principles of quality management. Firstly, top management is the main driver of TQM. Secondly, quality improvement occurs in two places. Much has to be achieved within the existing vertical structure. Thirdly, the management innovation, which is exclusively a managerial task. Majority of quality problems are due to systems controlled by managers rather than workers. Fourthly, the rigorous and systematic techniques of issue identification and problem solving which every employee should be trained to use. They include statistical methods, measures of con-conformance and the cost of quality, cause-and-effect analysis and decision-making procedures.
Therefore, any organisation should structure its managerial styles and personnel policies in order to incorporate rank-and-file employees into quality culture, recognising and rectifying the cultural divide between managers and other employees, which were created by the traditional practices\(^2\).

In the present context, we are faced with many new challenges. The greatest of these challenges is achieving victory in a new war. This war is not a military war. It is an economic war. The major difference between the two is that a military war never ends. An economic wart requires continuous achievements of victories. To achieve victory in this war, an organization must learn to adopt to today's environment with an eye towards tomorrow. Currently, many approaches are available to meet this challenge. One such approach is Total Quality Management (TQM), which brings victories upon victories today and in the future, provided adequate preparatory work, is done before initiating TQM in the organization\(^3\).

Product and service quality are becoming national concerns to participate effectively in global economy. Total Quality Management (TQM) is concerned with the integration of all efforts in the organization towards quality and customer care. TQM represents a customer oriented and quality focused management philosophy. Quantum jumps in productivity can be achieved through total quality efforts. TQM enhances quality of work life, employee satisfaction through participation and involvement and consequently the image of the organization. It is a fundamental shift from what has gone before and is considered a thought revolution in management.

TQM has evolved and developed into its present form from quality control and quality assurance. Quality is primarily a customer issue. It arises because customers require
products and services which not only meet the performance requirements but also provide satisfaction in terms of safety, durability and pride of ownership. In an organization, the achievement of quality standard is not restricted to the shop-floor or production department. It extends to all parts of the business from market analysis, conceptual design to marketing and distribution network. TQM, therefore, has to be driven through the entire range of business activities.

By involving everyone from Chief Executive to the junior most employee in the company’s quality mission, the company will be on its way to becoming a total quality company. In TQM, it is not only the External Customer who has to be satisfied but the Internal Customer also. Each department, section and person must recognize the internal customers and outputs that meet their requirements. This concept of internal customers and their satisfaction provides the basis for establishing competitive measures, benchmarking, performance targets, better communication and in consequence the process of continuous quality improvements, this is the true aim of TQM and the only basis on which the organization can achieve world-class quality and manufacturing performance.

A Quality Culture

Total quality is an approach to improve the effectiveness and flexibility of an organization as a whole. This is possibly only when each function and each person develops an attitude for quality to prevent and eliminate errors, waste, rework etc. Teamwork, participation and communication are key words in the process of total quality. Total quality can be achieved by creating this cultural change in an organization.
Quality is not the result of gimmicks, tricks or fads; it comes from developing a culture of openness, trust, fairness, integrity and hard work. Quality, therefore, is what you make it. Quality can only be achieved by creating a quality culture and not by technical application alone. A survey conducted in which companies who have initiated TQM participated, indicated that there was a complete agreement by the responding companies on the following:

- Quality cannot be improved by high investment in technology alone.
- Quality comes from people.
- Quality is the result of attitudes and values.
- Organizational climate and culture decide the quality of products and services.

To improve total quality, a culture has to be promoted where people feel free to contribute their ideas for problem solving. Culture represents the sum total of values, behaviours and norms of management, which actually makes an organization tick. Changing the work culture is a difficult task, as it may have been around for a long time. It might have started with the founders of the organization and might exist today as rules, systems, style of management etc. TQM provides an opportunity to people to rethink about their value systems and beliefs.

Quality culture means prevention - that we must think out the process, learn how to implement if, get the concerned people trained and in essence do things right the first time. This practice is much less costly than the old of fixing things when found wanting. People respond better to being responsible for their own work.
Quality cannot be achieved by adhoc interventions for improvement over the years. Practicing total quality requires consistency and continuity. It should be recognized that quality is forever embedded into the soul of the organization.

**Defining Quality**

The genesis of various methods and meaning of quality can be found as early as in 1924 when Walter A Shewhart proposed the control chart for the analysis of inspection data. This concept led to an enlargement of the concept of inspection from emphasis and detection and correction of defectives to control of quality using analysis and prevention of problems. Quality has received much attention recently and will continue to be an important business parameter. The meaning and process of quality have changed from time to time depending upon the prevailing circumstances and market conditions. Right from the beginning of the concept till today when it has takes the form of TQM, quality attracted differing views from professionals.

The dictionary meanings of quality are as follows;

- A distinguished attribute
- Degree of excellence
- Degree of goodness or worth
- A superior or high rank or skill
- That which may be relied upon – reliability
- Trustworthiness
- Achievement in a consistent manner
- Having always the same from

Quality can have several meanings making it differently understandable to different people. But, in a business environment, quality has to be understood adequately in a
practical sense. Quality can therefore have product-based definition, customer (user) based definition, value based definition and so on.

**Quality Characteristics**

1. **Goodness:** In general when we use the word quality, what we mean is simply goodness.

2. **Performance:** The performance covers a wide range of magnitude on parameters. When a product performs well, it is considered to be of a good quality. Similarly in a service situation, if recipient of service expresses fulfilment, it is said to be a good quality service.

3. **Features:** In each product or service, there are a number of characteristics that satisfy the user or customer. In case of a TV remote control is a feature, not essential to performance of a T.V., but it conveys an idea of quality and may well become a selling point. Similarly in an automobile, flexible seats, power windows etc., are features conveying better quality but not necessarily an essential part of the product performance.

4. **Grade:** A grade is an indicator of a category or rank related to features or characteristics that cover different sets of needs for products or services intended for the same functional use. A grade reflects a planned or recognized difference in requirements. A high grade can be of a poor quality or vice-versa.

5. **Consistency:** It indicates the performance of a product trustworthy. A customer or user can expect similar performance from each product he uses. Let us take the example of a packet of razor blades. A user can expect a
given number of shaves from each razor blade, provided other parameters remain same. Or, one can go to any restaurant run by an organization as a chain of restaurants. A customer could expect the same type of food from any location, uniformly.

Evolution of TQM

Total Quality Management is an evolutionary concept. Its nature, philosophy and titles have changed with time. TQM has not appeared overnight and that is why it is not a fad. The organization wishing to fulfil most, if not all, of the market conditions, will exploit TQM to their advantage by making it a necessary pre-requisite for achieving competitiveness and a means to drive the business rather than just a loose input.

It is unfortunate that some people consider TQM to be a misnomer. They fail to visualise the evolutionary process by which considerable growth and reliance on the role of quality has taken place. Its evolution could be traced back to the areas of inspection, control, assurance and management. Each of these stages reflects a change in the market conditions and customer requirements. The entire evolution of quality can be classified into four phases:

**Inspection Phase**

All efforts were directed to carry out inspection and measurement to segregate the good output from the one, which does not conform to laid down criterion or specification. It was done as post-production activity to ensure that the bad production does not go to customers. During this phase quality was regarded as inspection only. This reflected a
Fig: 1.1. Different Phases of TQM
business culture prevalent at that time which was based on output optimisation and profits at any cost.

**Quality Control Phase**

Quality Control focused on product defects detection through post-production inspection. It was concerned with the adherence to standards and sorting out rejects. Quality continued to be regarded as an ‘end-of-line’ function where attention was given more to the end product that the processes themselves. Variation was studied through a decision making process based on acceptable or unacceptable standards. Quality Control Phase made use of techniques (including statistical) to achieve, maintain and improve quality standards of products and services.

**Quality Assurance Phase**

Quality Assurance (QA) recognizes that inspection is not the answer and that the entire manufacturing process must be committed to meeting the quality needs of the customer, Quality Assurance contains all those planned and systematic actions required to provide adequate confidence that a product or service will satisfy given requirements for quality.

QA focuses on procedure compliance and product conformity to specifications through production and operations management. Often using statistical process control (SPC) as a tracking tool. Quality Assurance also means that there is a set of documentation (a system), which demonstrates the existing standards of quality and reliability. The system for the implementation, controlling and auditing in QA is often open to third party approval either by customers or government or any other agencies.
Total Quality Management Phase

If QA philosophy is expanded beyond manufacturing operations into other areas of organizational life, it is termed as Total Quality Control (TQC); TQC has been described as a management framework to ensure continuing excellence. Concerns with direct cost reduction and a pre-occupation with efficiency are ousted in favour of the pursuit of quality through the elimination of waste and non-value added procedures. TQM extends outside the factory gate to tie-in the suppliers, distributors and customers in the chain of quality. But problems have arisen in the adoption, as TQM is supposed to be a company-wide movement but actually, is largely limited to the manufacturing function.

TQM is a fundamental shift from what has gone before. Quality management is that aspect of the overall management function that determines and implements the quality policy and as such is the responsibility of the top management. Since quality management is a managerial responsibility, it has to be linked to the destiny of business. It is not therefore a question of achieving standards but one of survival and being strong all the time. TQM therefore is an organizational concern and is driven by the culture of the organization. In TQM, customer orientation achieved through continuous quality improvement becomes a valid 'taken for granted' atmosphere shared by every one, unquestioned and habitually enacted. The Chart 1.1 indicates the perception and improvement of business considerations across the different phases of quality.

TQM AS DEFINED IN DIFFERENT PERSPECTIVES:

TQM has become buzzword meaning many things to many people. Therefore, it becomes necessary to infuse clarity and focus in understanding Total Quality Management.
## CHART 1.1

**IMPROVEMENT OF BUSINESS CONSIDERATIONS UNDER DIFFERENT PHASES OF QUALITY**

<table>
<thead>
<tr>
<th>Governing Consideration</th>
<th>Inspection Phase</th>
<th>Quality Control Phase</th>
<th>Quality Assurance Phase</th>
<th>Total Quality Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scope</td>
<td>Products</td>
<td>Products</td>
<td>Products, Sta onal Materials All Processes</td>
<td>Products, Materials</td>
</tr>
<tr>
<td>Area of Action</td>
<td>End of Line</td>
<td>End of Line</td>
<td>On-line</td>
<td>Before Start</td>
</tr>
<tr>
<td>Function</td>
<td>Inspection</td>
<td>Inspection</td>
<td>Inspection</td>
<td>Plan, Control Improve and Audit</td>
</tr>
<tr>
<td>Status</td>
<td>Operator</td>
<td>Supervisory</td>
<td>Management</td>
<td>Top &amp; Senior General Management</td>
</tr>
<tr>
<td>Reporting</td>
<td>Producing Supervisor</td>
<td>Works Manager</td>
<td>General Manager</td>
<td>Chief Executive</td>
</tr>
</tbody>
</table>

Source: National Centre for Quality Management, Mumbai.
• "Total Quality Management is a combination of socio-technical process towards doing the right things (externally), every thing right (internally), first time and all the time with economic viability considered at each stage of each process" ------ *Zaire and Simintiras* \(^8\)

• TQM is a management system, not a series of programs. It is a system that puts customer satisfaction before profit. It is a system that comprises a set of integrated philosophies, tools and processes used to accomplish business objectives by creating delighted customers and happy employees" ------ *Price and Chen* \(^9\)

• Total quality control is an effective system for integrating the quality development, quality maintenance, and quality improvement efforts of the various groups in an organization so as to enable production and service at the most economical levels which allow full customer satisfaction" ------ *Armand V. Feigenbaum* \(^10\)

TQM is hot topic in business and academic circles. Business managers are frequently trying to figure out how to do it, while academicians are trying to determine what it actually is. None of them completely agrees upon either the definition of TQM or how to put the concept into practice. This disagreement should be accepted; firstly, because TQM is an evolving concept that is changing as the new concept, methods and systems are developed. Secondly, different organizations, everywhere, are in different stages of transforming to TQM. Thirdly, different organizations may require different forms of TQM.
THE FIVE PRINCIPLES OF TQM

The main principles of TQM are clearly described in figure 1.2. These principles provide a concise understanding of TQM as it stands today. Advocates of TQM claim that these five principles are very important because they have to support each other in order to enable the organization to be creative, competitive and profitable.

SIGNIFICANCE OF TQM

TQM has emerged as one of the most integrative mechanisms or organization development and improvement. It represents a complete way of managing an organization with a focus on quality and customer. The unrelenting increase in the intensity of commercial competition world-wide demands that organizations must continuously strive to improve the efficiency of their operations. Quality, therefore, has become a corporate strategy of doing business. It is no longer an option, it is a positive requirement. Among many other benefits, TQM results in:

- Committed customers
- Increased productivity
- Reduced costs
- Better profits
- Improved company image
- Employee motivation
- Team spirit and increased participation
- Improvements in attitudes and value system
- Dedicated management
- Positive organizational culture

Today many organizations recognize that they have to change the way they manage their business, because their traditional customer base is being eroded. They realize that they have to become competitive and have to follow the leaders in the business, which seek total quality in every sense.
Fig. 1.2. Principles of TQM.
Defining TQM

An understanding of TQM is more important than any formal definitions. TQM encompasses a wide range of concepts and processes and therefore several people have tried to define TQM in several ways. That is why it is necessary to understand the evolutionary process of TQM through various phases of its development. It is widely accepted that quality is also a behavioural question and that the major task involved is the changing of people’s attitudes in understanding the importance of quality. Dr. Mohamed Zairi has tried to define TQM in his book on Total Quality Management for Engineers as follows:

"Managing quality is the job of each and every member of an organization, not solely of its managers. In this sense, managers as well as shop floor workers must shape the environment which is most propitious for such an achievement and he given incentives to ensure that it becomes, in the routine tasks of everyday life a reality".

Another way of defining TQM is in its concern to integrate various aspects of the organizations activities and produce a total mass driven by the same commitment, beliefs and with similar objectives in mind 13:

"The agreed company wide and plant wide operating work structure, documented in effective, integrated technical and managerial procedures, for guiding the coordinated actions of the people, the machines and information of the company in the best and most practical ways to assure customer quality satisfaction and economical costs of quality".

15
A few more definitions:

"TQM is an approach for continuously improving the quality of goods and services delivered through the participation of all levels and functions of the organizations"\textsuperscript{14}.

"TQM is an integrated organizational approach in delighting customers (both external and internal) by meeting their expectations on a continuous basis through everyone involved with the organization's working on continuous improvement in all products/processes along with proper problem solving methodology"\textsuperscript{15}.

British Standard BS 7850 Part 1: 1992 on Total Quality Management Guide to Management Principles defines TQM as "Management philosophy and company practices that aim to harness the human and material resources of an organization in the most effective way to achieve the objectives of the organization".

When all the mystique, clichés and gimmicks are stripped away, this is what we are trying to accomplish through TQM; "Involve all aspects of business enterprise or the organization in satisfying customer requirements all the time through a system of planning, control and continuous improvement"\textsuperscript{16}.

**ACTION PLAN FOR A TQM PROGRAM**

TQM cannot be implemented directly. It is a rigorous and time-consuming process covering a number of background preparations. Figure 1.3 shows the program in a schematic form\textsuperscript{17}.
You should secure
You need to assess
Then you develop
Then you create
Finally you review

Management understanding and Commitment

Staff attitude  Customers' needs  Cost of Quality

Objectives  Targets  Bench Marks
Responsibilities  Time Table  Programme

Team Working  Training  Measurement
Management Systems  Team briefings  Project teams

Progress against plan in attitudes, costs Performance and defects

Fig. 1.3: Action Plan for a TQM Program
5. ORGANIZATIONAL STRUCTURE FOR TQM

In order to be successful in quality improvement effort, it is essential to set up an organizational structure at the outset for the introduction of TQM. The structure of the organization can be evaluated by the management with the help of an outside consultant to determine whether a different organizational structure is required for the quality effort. Figure 1.4 shows the general framework of organizational structure for implementing TQM.

TQM Promotion Committee

The promotion committee is, actually, the top management of the company, which establishes and approves TQM policies and programs. The promotion committee also gives the approval to start the program and offers basic guidelines to make the TQM program operate effectively. Once the promotion committee approves the program, mission statement should be established so that guidelines can be set for the rest of the organization.

Quality Steering Committee

The first line managers constitute the quality steering committee. Members of all the major departments are represented in the committee. The committee determines policy, establishes direction, provides support and by example demonstrates commitment to quality improvement. The committee is responsible for supervising the entire quality improvement process.
Fig. 1.4: Framework of Organization Structure
Quality Improvement Teams [QIT]

QITs are groups of people who are responsible for making actual improvements in processes. Further, once the process requiring improvement is identified, an improvement team meets to identify probable causes of deficiencies and recommend changes in the process to improve performance. These teams are to have representatives of all departments affected by the process being studied.

Facilitator Team or Corrective Action Team

The facilitator team carries out the following duties:

1. Works as an active member of the steering committee
2. Serves as quality improvements coordinator,
3. Trains members, leaders, management,
4. Co-ordinates QITs, Maintains progress records,
5. Prepares new training material,
6. Spreads some good words about the program,
7. Links all people in the organization.
8. Follows up on completed projects,
9. Attends meetings and conferences.

6. THE TOOLS AND TECHNIQUES OF TQM.

We cannot ask people to fight battles without tools and techniques. Arms and ammunitions are equally important to fight the battle apart from skills of using the tools. Quality is nothing but a war on error and waste. Companies should reach the tools and techniques of TQM to all employees.

Dr. Kaoru Ishikawa said that by using seven tools of quality control can solve 95% of the day-to-day problems. The tools developed by him are explained in Chart 1.2.
## CHART 1.2
### SOME OF THE IMPORTANT TOOLS AND TECHNIQUES OF TQM

<table>
<thead>
<tr>
<th>Tools</th>
<th>Purpose</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cause and Effect diagram</td>
<td>To examine the effects or problems and to find out possible causes</td>
<td>An effective tool for analysis</td>
</tr>
<tr>
<td>Check Sheet</td>
<td>To arrange and present data in such a way that they can be understood and used easily</td>
<td>To identify the causes of failure and look for the ways of removing them.</td>
</tr>
<tr>
<td>Control chart</td>
<td>To detect and eliminate special causes and ensure that the process is stable</td>
<td>Facilitates to follow the principle of management by exception</td>
</tr>
<tr>
<td>Pareto diagram</td>
<td>To identify the vital few from the trivial many.</td>
<td>Facilitates to follow the principle of management by exception.</td>
</tr>
<tr>
<td>Scattered diagram</td>
<td>To show the relationship between cause and effect</td>
<td>When used with other techniques such as cause and effect analysis, pareto analysis, solutions to problems become scientific.</td>
</tr>
<tr>
<td>Bench marking</td>
<td>To identify and fill gaps in performance, by putting in place the best practice.</td>
<td>Helps organizations to move away from being introspective towards being externally focused and close to their markets.</td>
</tr>
<tr>
<td>5s Concept</td>
<td>To achieve zero break down [the 5s concept takes its name from the initials of five Japanese words that start with S - Seiri-Straighten up, Seiton-put things in order, Seiso-clean up, Seiketsu-personal cleanliness and Shitsuke-discipline]</td>
<td>Facilitates to do more work with less effort and least disturbance.</td>
</tr>
<tr>
<td>Quality function deployment</td>
<td>A technique or discipline for optimising the process of developing and producing new products on the basis of customer needs.</td>
<td>Encourages organizations to focus on the process itself rather than just on the product or service.</td>
</tr>
<tr>
<td>Departmental cost of quality</td>
<td>To provide a financial measure of the quality performance of an organization.</td>
<td>It provides a Benchmark for future performance.</td>
</tr>
<tr>
<td>Failure mode and effect analysis.</td>
<td>To assist in the fool proofing of a design or a process.</td>
<td>Facilitates to assess possible failures and which areas to investigate first. A major advantage is that it does this at an early stage in both products and processes.</td>
</tr>
<tr>
<td>Flow Charts</td>
<td>To generate a picture of how work gets done by linking together all the steps taken in a process.</td>
<td>Leads to process simplification.</td>
</tr>
<tr>
<td>Quality policy deployment</td>
<td>To delight the customer through the manufacturing and servicing process by implementing the quality goals of the organization.</td>
<td>It shows the employee what the overall goals of the organization are and where he or she fits in, so that everybody works in the same direction towards clearly defined goals.</td>
</tr>
<tr>
<td>Six Sigma approach</td>
<td>The six Sigma approach allows for no more then 3.4 defects per million parts in manufactured goods or 3.4. mistakes per million activities in a service operation.</td>
<td>Helps to set a quality standard and provides mechanism for striving to reach the goal. In effect, the Six Sigma process means changing the way people do things so as to minimize the potential for defects.</td>
</tr>
</tbody>
</table>

Companies should graduate the problems stators to problem – solvers by educating them to use tools and techniques of TQM effectively in the work place.

7. MODELS OF TQM

The Oakland Model 21, which is presented TQM in a pyramid form with five different components:

➢ Management Commitment: The role of leading and introducing change has to stem from the senior management. The success achieved in TQM directly depends upon their commitment. The entire company management has to be committed to it and not just few individual.

➢ Customer – Supplier Chains: This concept is at the heart of Oakland model. It is guided by the improvement in processes and management of these processes.

➢ Systems: The system for quality management needs to be documented to ensure procedure compliance.

➢ SPC Tools: One of the important requirements of TQM is to continuously upgrade the process capability and continuously measure and control performance. This is achieved by applying statistical process control tools and techniques.

➢ Team work: This component means that a culture based on teamwork, participation and involvement should be encouraged and implemented throughout the organization.

An Integrated TQM Model 22

The integrated model has been proposed by the author earlier in one of his papers published in the productivity Journal of National Productivity Council. It takes ten components to be implemented in an integrated way to achieve total quality. They are called components as all of them are necessarily required to become a total quality
company, it is like a produce – unless all components are assembled the product will not
be ready. Importance of each component is unique in reaching the final stage of a
product.

Quality Policy and its Communication
A sound quality policy is a fundamental requirement if an organization is to start
implementing TQM. The TQM foundation consists of strategic quality management,
executive leadership and a continual focus on the customer. Therefore, the first thing is a
clear vision of where the organization is going. This must be clearly stated, documented
and communicated in the form of Quality Policy to every member of the organization in a
language he or she understands. This has to be followed by defining clearly the key
objectives and quality goals that must be achieved if the company is to realize its vision.
The Quality Policy helps in creating an understanding of mission and vision i.e., oneness
in the organization.

Teamwork and Participation
The total quality process involves participation of all functions of an organization and all
the people of each function 23. The complexity of the present day processes operated in
the industry and services places them beyond the control of any one individual. The only
way to tackle such processes is through the use of team working.

For effectiveness, teamwork and participation should be structured and institutional
within the organization. The known and tested methods of doing these are 24:

> Quality Improvement Teams (QIT) or Cross Functional Management Teams
> Quality Circles
> Suggestion Schemes
Problem Solving Tools and Techniques

Teamwork and participation, which is an important component of TQM, will be affective only when quality circles and quality improvement teams use various tools and techniques to identify, analyse and solve problems. The use of tools and techniques will also develop lateral thinking in the people to bring out the real creative potential in them. An attitude of problem solving i.e. ‘There is always scope for improvement’ should pervade the entire organization. Problems, therefore, have to be allowed to surface so that they can be solved.

Standardization

Standardization is a management tool for encouraging and securing optimum utilization of resources and maximum efficiency of operations through formal establishment of the most suitable, pre determined solution and answers to recurring problems and needs. Company standards may be technical specifications in design, procurement, production and control or administrative specifications in supervision and management. They may deal with products, processes, methods, materials, parts, inspections, tests, procedures or other types of requirements.

Design and Implementation of Quality System

The quality system represents an assembly of organization structure, responsibilities, procedures, processes and resources for implementing quality management. It is, therefore, necessary for each organization to develop and use a well-documented quality system. The ISO 9000 series brought out by International Organization for Standardization (ISO) sets out the methods by which a management system, incorporating
all the activities associated with quality, can be implemented in an organization to ensure the specified performance requirements and needs of the customers\textsuperscript{26}.

**Quality Costs and Measurements**

People used to have a stereotyped belief that high quality means high cost. It has now been demonstrated that quality improvement programmes really bring down the cost. It is estimated that manufacturing companies spend about 10 to 25 per cent of sales revenue as cost due to poor quality or not doing things right, offering a tremendous potential for saving. Once the cost parameters are laid down then measurements can be exercised through benchmarking leading to continuous improvement.

**Process Control**

The emphasis is quality improvement is on prevention and not on correcting and reworking at postproduction stage\textsuperscript{27}. Control of processes becomes important so that the processes do not produce defectives or rejects. The main objective of process control is to immediately give a feedback to initiate necessary action. Continuous quality improvement is achieved using statistical process control.

**Customer-Supplier Integration**

Customer-Supplier Integration refers to identifying the mutual needs, expectations and responsibilities and fulfilling them to the utmost satisfaction of all concerned. Only when the total quality process ensures this integration, ‘zero defects’ objective can be achieved. The organization has to extend its quality improvement efforts to its suppliers. ‘The next process is customer’ has to be understood and ingrained in the organization culture.
Education and Training

Prof. K. Ishikawa, one of the world's foremost authorities on quality management considered that 'TQM begins with education and training must be started in all the organizations for improvement in skills, knowledge and attitudes on quality. It is, therefore, necessary to initiate training programmes for everyone from top to bottom in the organization on TQM based on needs analysis on continuous basis.

Quality Audit and Review

Quality audit and management review forms an important component and systematic examination conducted to compare the given aspects of quality performance with the standards or specifications, those people who have no direct responsibility for performance under review carry it out. There are generally three kinds of audit and review, which are performed:

- Product oriented
- Process oriented
- System oriented

Each organization should develop and institutionalise and internal quality auditing system for addressing the customer requirements and complaints and internal quality problems. For assessing the effective implementation of TQM activities in an organization, models have been developed by different countries that are interested in introducing the TQM culture.

Following are some of the important models:

- The Deming Cycle
- The Juran Model
The Malcolm Baldrige Award Model
The European Foundation for Quality Management Award Model

THE DEMING CYCLE

The Deming Cycle was developed to link the production of a product with consumer needs and focusing the resources of all departments (research, design, production, marketing) in a co-operative effort to meet those needs (Figure 1.5). The Deming Cycle proceeds as follows:

- Conduct consumer research and use it in planning the product [plan]
- Produce the product [do]
- Check the product to make sure it was produced in accordance with the Plan [act]
- Market the product [act]
- Analyze how the product is received in the market place in terms of quality, cost and other criteria [analyse].

THE JURAN MODEL

The Juran Model mentioned in Figure 1.6 summarizes the three primary managerial functions. Juran’s views on these functions are explained in the following sections;

Quality Planning

Quality planning involves developing the products, systems, and process needed to meet or exceed customer expectations. The following steps are required;

- Determine who the customers are.
- Identify the needs of customers.
- Develop products with features that respond to customer needs.
- Develop systems and processes that allow the organization to produce these features.
- Deploy the plans to operational levels.
Fig. 1.5. The Deming's Quality Cycle
Fig. 1.6: The Juran’s Trilogy
Quality Control

The control of quality involves the following process;

➤ Assessing actual quality performance
➤ Comparing performance with goals
➤ Acting on differences between performance and goals.

Quality Improvement

The improvement of quality should be on going and continual:

- Develop the infrastructure necessary to make annual quality improvements.
- Identify specific areas in need of improvement and implement improvement Projects.
- Establish a project team with responsibility for completing each improvement Project.
- Assist teams to diagnose problems, to determine root causes, to develop solutions, and to establish controls that ultimately facilitate to reach the target.

MALCOLM BALDRIGE MODEL

The Baldrige award program 'was designed as a value system, an education/communication tool, a vehicle for cooperation and a device to help to evaluate quality standards. In "The 1992 Malcolm Baldrige National Quality Award Criteria," a description of the criteria notes that they are directed towards dual results-oriented goals; To project key requirements for delivering ever-improving value to customers while at the same time maximizing the overall productivity and effectiveness of the delivering organization. The quality model proposed by the Baldrige Award is explained in Figure 1.7.
Fig.1.7: The Baldrige Award Model
The Malcolm Baldrige National Quality Award Examination Criteria evaluates the seven critical steps in attaining global quality standards, dividing them into four categories; driver, systems, results and achievements. The driver comprises the first parameter; senior executive leadership. Systems comprise the next four parameters; information and analysis, strategic quality planning, human resources, and management of process quality. Results refer to the sixth parameter-quality and operational results and achievement to the seventh; Customer Satisfaction. A brief explanation of each category is described below.

1. Leadership
The leadership category examines senior executives personal leadership and involvement in creating and sustaining a customer focus and visible quality values. Also examined is how the quality values are integrated into the company's management system, including how the company addresses its public responsibilities and corporate citizenship.

1.1. Senior executive leadership.
Describes the senior executives' leadership, personal involvement, and visibility in developing and maintaining a customer focus and an environment for quality excellence.

1.2. Management for quality.
Addresses how the company's customer focus and quality values are integrated into day-to-day leadership, management, and supervision of all company units.
1.3 Public responsibility.

Presents how the company includes its responsibilities to the public for health, safety, environmental protection, and ethical business practices in its quality policies and improvement activities, and how it provides leadership in external groups.

2. Information and analysis.

The information and analysis category examines the scope, validity, analysis, management, and use of data and information to drive quality excellence and improve competitive performance. Also examined is the adequacy of the company’s data, information, and analysis system to support improvement of the company’s customer focus, products, services, and internal operations.

2.1 Scope and management of quality and performance data and information

Describes the company’s base of data and information used for planning, day-to-day management, and evaluation of quality. Describes also how data and information reliability, timeliness, and access are assured.

2.2 Competitive comparisons and benchmarks

Specifies the company’s approach to selecting data and information for competitive comparisons and world-class benchmarks to support quality and performance planning, evaluation, and improvement.

2.3 Analysis and uses of company-level data

Highlights how quality- and performance related data and information are analysed and used to support the company’s overall operational and planning objectives.
3. Strategic Quality Planning.

The strategic quality-planning category examines the company's planning process and how all-key quality requirements are integrated into overall business planning. Also examined are the company's short-and long-term plans and how quality and performance requirements are deployed to all work units.

3.1. Strategic Quality and company performance planning process

Addresses the company's strategic planning process for the short term [1 to 2 years] and long term [3 years or more] for quality and customer satisfaction leadership. Include how this process integrates quality and company performance requirements and how plans are deployed.

3.2. Quality and performance plans.

Summarizes the company's quality and performance plans and goals for the short term [1 to 2 years] and the long term [3 years or more]


The human resource development and management category examines the key elements of how the company develops and realizes the full potential of the workforce to pursue the company's quality and performance objectives. Also examined are the company's efforts to build and maintain an environment for quality excellence conductive to full participation, personal and organizational growth.
4.1 Human Resource Management.
Evaluates how the company’s overall human resource development and management plans and practices support its quality and company performance plans and address all categories and types of employees.

4.2 Employee Involvement.
Specifies the means available for all employees to contribute effectively to meet the company’s quality and performance objectives; summarize trends in involvement.

4.3 Employee Education and Training.
Describes how the company determines what quality and how the company utilizes the knowledge and skills acquired; summarizes the types of quality and related education and training received by employees in all categories.

4.4 Employee’s Performance and Recognition.
Examines how the company’s employee performance, recognition, promotion, compensation, reward, and feedback contribute to the achievement of company’s quality and performance objectives.

4.5. Employee Well being and Morale.
Describes how the company maintains a work environment conductive to the well-being and growth of all employees, summarize trends and levels in key indicators of well-being and morale.

This category examines the key elements of process management, including the operational performance and quality assessment. The category also examines how all work units, including research and development units and suppliers, contribute to overall quality and operational performance requirements.

5.1. Design and introduction of quality products and service.

Addresses how new and/or improved products and services are designed and introduced and how process are designed to meet key product and service quality requirements and company performance requirements.

5.2. Process management-product and service production and delivery processes.

Describes how the company’s product and service, production and delivery processes are managed so that current quality requirements are met and quality and performance are continuously improved.

5.3 Processes management-business processes and support services.

Specifies how the company’s business processes and support services are managed so that current requirements are met and quality and performance are continuously improved.

5.4 Supplier quality.

Describes how the quality of materials, components, and services furnished by other businesses is assured and continuously improved.
5.5 Quality Assessment

Addresses how the company assesses the quality and performance of its systems, processes, and practices and the quality of its products and services.

6. Quality and operational results.

The category examines the company's quality levels and improvement trends in quality, company's operational performance, and supplier quality. Also examined are current quality and performance levels relative to those of competitors.

6.1 Product and service quality results.

Describes the level of the quality of products and services with reference to factors that predict customer satisfaction and quality in customer use. Also examines the level of the quality of products and services in comparison to competitors in the key markets, industry averages, and world leaders.

6.2 Company Operational Results.

Addresses the level of the quality of operational performance with reference to productivity, efficiency, and financial parameters. Also examines the level of the quality of products and services in comparison to competitors in the key markets, industry averages, and world leaders.

6.3 Business Process and Support Service Results

Specifies the level of the quality of the company's business and support services with reference to productivity, cycle time, and costs. Also examines the level of the quality of products and services in comparison to competitors in the key markets, industry averages, and world leaders.
6.4 Supplier quality results.

Examines the trends in quality of the company's business and support services with reference to productivity, cycle time, and costs. Also examines the level of the quality of products and services in comparison to competitors in the key markets, industry averages, and world leaders.

7. Customer focus and satisfaction.

This category examines the company's relationships with customers and its knowledge of customer requirements and of the key quality factors that determine marketplace competitiveness. Also examined are the company's methods to determine customer satisfaction, the current trends and levels of satisfaction, and these results relative to competitors.

7.1 Customer relationship management

Describes how the company provides effective management of its relationships with its customers and uses information gained from customers to improve customer relationship management strategies and practices.

7.2 Commitment to customers.

Addresses the company's explicit and implicit commitments to customers regarding its products and services.

7.3 Customer satisfaction determination.

Examines the company's methods for determining customer satisfaction and customer satisfaction relative to competitors; describes how these methods are evaluated and improved.
7.4. Customer satisfaction results.
Evaluates the levels of customer satisfaction for the company’s products and services, also examines the level of customer dissatisfaction for the company’s products and services.

7.5. Customer satisfaction comparison.
Describes the levels of customer satisfaction for the company’s products and services to those of competitors, trends in gaining or losing customers, or customers accounts to competitors, trends in gaining or losing market share to competitors.

7.6. Future requirement and expectations of customers
Describes how the company determines future requirements and expectations of customers.

THE REQUIREMENTS FOR A TQM PROGRAMME
There are 3 main elements of a TQM programme:
1. The commitment by the Management (at all levels) to implement one.
2. An appropriate management system, to provide a management framework for the programme.
3. The appropriate measurement tools and techniques to measure quality (system, process and product.

The Role of ISO 9000 (in a TQM programme)
The ISO 9000 series is the international standard, which defines the criteria for a quality management system. This standard was introduced in 1987. It therefore makes sense to
use the ISO 9000 criteria as the management system criteria in a TQM programme. This is particularly so because many enterprises implement an ISO 9000 system to obtain certification for commercial reasons. There are, therefore, a number of enterprises who have taken the first step towards TQM and can build on it.

This is the general standard for quality systems (excluding nuclear safety related items) and is designed to cover the design and manufacture of all types of manufactured products. It is also divided into three separate parts each of which defines a different level of quality system. The level of quality system applied is dependent on the type of product and the extent of the supplier’s involvement and of course, the level of quality system has some effect on the cost of implementation. Considering the scope of each part can see the major differences between the three parts.

We will see that ISO 9000 is written primarily for contractual purposes (i.e. the second party situation) rather than for the 3rd party assessment situation. For 3rd party assessment, therefore, the ‘interpretation’ must be well defined.

- Production, Installation and Servicing
- Scope and field of application

This International Standard specifies quality system requirements for use where a contract between two parties requires the demonstration of a supplier’s capability to design and supply a product. The requirements specified in this International standard are aimed primarily at preventing non-conformity at all stages from design through to servicing.
**Field of Application**

This International Standard is applicable in contractual situations when:

(a) The contract specifically requires design effort and the product requirements are stated principally in performance terms or they need to be established.

(b) Confidence in product conformance can be attained by adequate demonstration of certain supplier’s capabilities in design, development, production, installation and servicing.

**ISO 9001 : Clause Titles**

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<td>4.1. Management responsibility</td>
<td>4.11. Inspection, measuring and test equipment</td>
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<td>4.2. Quality system</td>
<td>4.12. Inspection and test status</td>
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<td>4.3. Contract review</td>
<td>4.13. Control of non-conforming product</td>
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<td>4.5. Document control</td>
<td>4.15. Handling, Storage, Packaging and delivery</td>
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<td>4.14. Corrective action</td>
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<td>4.15. Handling, Storage, Packaging and delivery</td>
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These 20 criteria can be considered as formalized checklists against which an organisation’s quality system can be measured and are, therefore, an appropriate way for a purchaser to contractually define the degree of quality assurance he wishes his supplier to provide. ISO 9002 is of a similar nature but excludes design and servicing. ISO 9003 is a very much less rigorous standard, which only covers final inspection.
Certification

Properly accredited third party certification bodies can assess a company's quality management system and, if they judge it complies with the relevant criteria of ISO 9000, issue a certificate, which provides independent, authoritative evidence of that company's systems. In the European Community there is a policy to use elements of certification as part of the product approval method so that products can carry the CE mark. There are a number of alternative routes to such product approval and individual directives for product groups will indicate which of these routes is acceptable.

Advantages of Certification

These are fairly clear as they give objective and credible evidence that an organisation's quality system is satisfactory. This provides 'comfort' to customers and absolves them from making detailed quality checks on their suppliers.

Disadvantages of Certification

The major disadvantage is that certification only relates to the management system and not the quality of the product or service itself. It is implied in quality system certification that the product (or service) quality is separately and correctly specified and agreed with the customer.

A minor disadvantage is that the interpretation of the system criteria is made by the certification body and not by the customer and supplier acting together. Since different customers have different needs then it is possible that a 'certified' system may not provide the controls needed for all classes.
THE TOOLS AND TECHNIQUES FOR TQM

TQM relies on correct and quantitative definitions of quality. This implies measurement techniques. Measurement techniques are required for the system, the processes and the product. In many cases a statistical approach is needed for measurement in that sampling of some sort is relied upon to predict the quality performance. Therefore, almost all measurement techniques of both process and product rely on statistical methods\textsuperscript{34}.

Statistical Process Control

Statistical Process Control (SPC) seems to mean different things to different people, to most it is the monitoring of manufacturing or assembly processes using some form of control chart with corrective action being taken as and when necessary. To others it signifies any statistical application at all.

Statistical Process Control is, in essence, just what it says. Taking the words one at a time:

- Statistical means that proper methods are necessary for collecting and interpreting numerical data.
- Process is perhaps the key word of the three, implying that process knowledge is all-important.
- Control means operating the process so that defined product features can be maintained within known capabilities.
Statistical Methods

Whenever jargon is used, the real aim is to gain process knowledge so that this can be used to make informed decisions, both at the day-to-day operational level and for tactical and strategic purposes. This, the questions reflecting these levels might be:

01. Is adjustment needed to keep current production on target?
02. Is a particular machine, line or process suitable to use for a new job?
03. Is there a case for capital investment to meet new customer requirements?

To gain this process knowledge in a systematic and cost effective way, it is essential to use statistical methods. Statistical methods are designed for dealing with variation in observed data and for making valid inferences from samples, which are often only small; these are exactly the situations, which occur regularly in manufacturing processes (letting contracts, handling administration, dealing with customer queries).

Application Phases

With respect to achieving the required product quality, there are several phases which a company will normally go through in its use of statistical methods.

01. Studies to find out what the present situation is: For example, are specifications currently being met for individual parts, for sub-assemblies, for finished product? If not, what is the extent of the problem? What is it costing?
02. Process capability studies to assess the best (that is, minimum variability of product) that can be achieved by careful running of the process under existing conditions.
03. Monitoring of Processes to achieve statistical control and to keep them there.

Some form of control chart application usually does this. Statistical control
means that the process output is predictable in a statistical sense; that is, the extent
of variability about a specified average value for each of the relevant product
performance characteristics can confidently be stated and expected.

04. Process and Product Improvement: From any one of the first three phrases,
taken together with customer feedback and any gathering of intelligence which, as
stated earlier, may well be obtained by statistical techniques, it may be apparent
that product performance specifications are not being met. Perhaps they are being
met, but only just and at great cost, and may be also a competitor is supplying
effectively to a tighter specification – that is, most of his units of a given product
are more nearly at their target values of performance. These are clear signals that
process to consider improving processes before external events make it
imperative. Designed experiments are a major tool to guide process
improvement.

Figure 1.1 shows, mentioned earlier, the effect of progressing through the phases, the last
one of which, process and product improvement, is never ending and is, therefore, what
we should be aiming for with a TQM programme. The boundary between each phase is
not as clear-cut as some writers seem to suggest. For example, data collected to see what
the initial process state is like may well contain within themselves a realistic indication of
process capability. Again, control charts maintained and acted upon in phase 3 may well
lead to effective process improvement without the need to carry out a formal experiment.

The goal should always be to have sufficient process knowledge so that it can be applied
to achieve the product characteristics that the customer wants – first time, on-time, every
It is also good practice to try to stay ahead of immediate requirements and to take the long-term view.

**Useful Statistical Techniques**

There are many statistical procedures available, most of those in the literature being designed to squeeze the maximum information from available data. As a result, they tend to appear complicated and can thus be rather difficult to understand. Fortunately, for industrial application, simple methods are perfectly adequate most of the time for gaining control and making improvement. Thus a company can make much progress if all of its employees are familiar with these basic tools. Many of the tools are graphical, which adds to their effectiveness. The tools, which are generally useful, include the following:

- Frequency distributions and histograms to display overall variability
- Time series plots
- The normal distribution and its relationship to the standard deviation
- Normal probability paper
- Process capability indices, Cp and Cpk
- Control charts – sample mean and range, pre-control, number defective, number of defects.
- Multi-vari charts
- Scatter diagrams
- Factorial experiments

**Product and Process Improvement**

There is currently much emphasis on improving products through better design and through improvement of the processes which manufacture them.
can be helpful in this by identifying causes of performance variation to allow its subsequent reduction by removal or reduction of those controllable causes. They also provide a systematic approach; to finding out such things as those design parameters which:

(i) Minimize the effect of uncontrollable environmental factors on the product (robust design);
(ii) Reduce manufacturing cost without degrading product quality;
(iii) Have a large influence on the mean value of the performance characteristic but little of not effect on its variability.
(iv) Have no detectable influence on the performance characteristics of the product.

Much of the recent work on effectively-designed industrial experiments has been inspired by Taguchi. Although the statistical designs he uses are basically not new, his approach in simplifying their application (so that industrial experiments are actually carried out) is of great benefit. He has, however, been criticized by some for the statistical inefficiency of his technique of analysis using the signal-to-noise ratio. Taguchi seems to be the originator of the concept of using properly constructed experiments in parameter design. This is aimed at reducing both manufacturing cost and the cost to the customer (what he calls the product quality or "loss to society") after the product is shipped. The concept here is reduction of waste, which could be considered as an alternative definition of quality. The statistically based tools are the most powerful and, obviously, the most quantitative but other measurement tools are available and widely used.
Failure Mode and Effect Analysis

This is a semi-quantitative technique for analyzing the potential causes of failure (or poor quality) and effects. Hence, it leads to remedial action (note, statistical process control identifies the existence of poor quality but does not, in itself, identify the cause).

Audits

The compliance with and effectiveness of a quality system can only be measured by audit (see Clause 4.17 of ISO 9001). Auditing is the sampling of the system to check that the system (not the product) is (or is not) satisfactory. Some times a product audit is carried out in that a sample of final product is tested in a very detailed manner (this technique is used sometimes in the automotive industry).

Cause and Effect Diagrams

These are often known as Ishikawa diagrams. They provide an easy to see presentation off potential causes of a problem and are therefore to be used as a basis for analysis (often by brainstorming techniques). It is convenient to present the possible causes as follows:

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Equipment Environment

With 5 main causes, each of which can be broken down into subsections. It should be noted that these techniques are designed to aid analysis by focusing the thinking in a systematic way to select the areas where effort to improve quality will be most effective. It essentially consists of listing the components of a system (this could be either a product or a process) and identifying the possible failure modes of each component. These can then be analysed to indicate the critical areas of a product or process where the
'quality effort' should best be directed. The important aspect is to ensure that all possible failure modes are identified by systematically analyzing each stage of the process.

CASE OF INDIAN ORGANIZATIONS ON THE PATH OF TQM

- The important aspects of TQM philosophy and the initiatives undertaken to put this philosophy in place are highlighted in the following examples of Indian Organizations. These cases have been taken from the special issue of Business Today (Jan 1995). The words in italics and parentheses indicate the intervention adopted by the organization for TQM.

- At Modi Xerox the belief is that a person does not need to be supervised, but just needs to be supported. The interventions introduced are; The organization structure has been changed from the traditional pyramid to a tree. A suitable training is held for every worker within 90 days of his joining. All work contracts stipulates that an employee must make at least 12 suggestions. Every time an employee makes a suggestion it goes through 31 clearly laid out steps, including translation into action and a reward for the concerned employee. Every time a worker completes a new function he is required to note down all that went into it so as to augment the collective wisdom. (Employee suggestion scheme)

- At BPL four independent teams have been formed to work on indigenisation of Sanyo products. Parallel, team have been deployed to cut idea to product cycle time. (Teams)

- At TI cycles radical re-organization aimed at building quality into every step of the manufacturing process was undertaken. Quicker decision making and empowerment was initiated. Each worker will take on the role of a supplier as well
as a customer. Every worker was also made an internal customer of the previous one. (internal Customer concept)

- At Ranbaxy automation was the strategy as a single human error could destroy the whole organization. A process driven environment was created where each individual skill in isolation becomes irrelevant. Launched a programme of Culture change, continuous improvement and quality management, whose aim is to change the way the employees work. Educated workers continuously on corporate goals. (workmen education on corporate goals)

- At Thermax a Divisional Apex Responsibility Team was formed. Managers were moved from a results-only philosophy to a processes lead to results ethos. Employees were trained to learn the use of ANAAR road map – a methodology to improve processes developed by Dr. Nirdosh Reddy 39. The system was re-vamped to nurture, employee participation in process improvement practices. A 45-minute meeting every day of cross-functional teams is conducted. Work in teams was institutionalized and cross-functional teams ensured that problems were tackled jointly and promptly. The concept of internal customer was created. (Employee performance and team based problem solving)

- AT Hindustan Lever cross-functional teams were formed to filter out unworkable ideas (cross-functional teams)

- AT Oberoi Group it was realized that attitudinal changes are required in employee to meet the six-minute response deadline. The staff strength required at different times of the day was determined to meet this deadline. Every step was defined as a transaction between an internal customer and an internal supplier. Training was accelerated to constantly educate the employees and impart them technical skills. Employees were empowered to innovate as much as necessary in order to delight
customers. Quantifiable quality targets were stipulated for every individual action. Constant reminder was issued on cost of poor quality. Systems were set up to institutionalize personal initiatives (empowerment)

- At AMEX TRS the approach has been to bring down cycle time from 11 days to one-day using problem solving techniques. Ensured consistency in terms of alignment, beliefs and value systems to be followed by everybody in the organization. Provided empowerment to employees to “go out and climb an unheard of tree if necessary” (for listening to the customer) (empowerment)

- At Vysya Bank, the initiative started with imparting 72 hours of training to 30 senior executives and senior managers to turn them into facilitators. Upgraded the staff skills and had few quality circles. The main objective of TQM drive was to achieve maximum possible customer satisfaction followed by employee satisfaction. It was ensured that there was total involvement of people in the process of change and with people’s concurrence only the exercises to change the culture and mindset of the people were initiated. The managers at the division level were empowered to take credit decisions up to certain limits. (Training & empowerment)

- At HDFC, Service Quality Management Process was introduced with services, systems, and empowered employees as its three apexes. Services delivery systems were designed that are customer and employee friendly. People were empowered and the employees facing change were provided with mentors. The theme of learning by doing was adopted for skill improvement. The humane and caring atmosphere was created in HDFC both for employees and customers. Inexperienced people were recruited to eliminate de-training. 750 employees were exposed to the workshop “HDFC Service and You” highlighting what the
customer goes through at every contact point. These workshops discussed what can be cut out and what can be simplified. (Empowerment).

- At INFOSYS the driving desire was to have quality as HRD. The understanding was that their ASSETS i.e. HR walk out every evening and hence ensure that they walk back in the next morning. The employees were treated as company's customer. Well-defined quality practices were laid down at every stage of HRM - recruitment, reinforcement, rewards, recognition and even Resignation. HR department treats the employees as its customers. Workers' requirements were researched to design benefits and rewards. Adopted 360-degree appraisal to ensure objectivity of assessment. Test and interviews were used to ensure suitable skills and mindset (internal customer orientation).

- ABB also followed the same theme as INFOSYS - Quality as HRD. The focus was shifted from products to people. All direct links between performance and compensation were snapped. Appraisals were re-oriented to reward teams and not individual performance. Uniformity in award of increments in the same grade was ensured. All team members' job and training were planned one year ahead. Senior managers were trained to counsel workers for team functioning (team functioning).

- At Ambuja, motivation and not money was used to involve the workforce in environment management. Appropriate training courses were designed to ensure that all the 720 employees participated in them (employee motivation).

- At IFB every employee including CEO started wearing orange work jackets with IFB quality emblazoned on the back. Extensive training was conducted and quality-inspiring messages were displayed on every square inch of space available on the factory walls. The home and the workplace quality was linked through powerful communication by which the workers were able to understand what
personal quality meant and could relate what product quality entailed. The strong entrepreneurial spirit and the excellent management relations were the strength of the organization and made the people to come forward to learning (training).

These cases indicate that in most of the organizations, the journey to achieve TQM has been taken up through the five dimensions viz., leadership, Customer Orientation, Management of Quality, Continuous Learning and Improvement and Human Resource Management, which are the subject matter of the present study.

All these organizations are in the private sector. This suggests that the Public Sector organizations may not be effective in their efforts to achieve TQM. Further, it was substantiated that public organizations have certain inherent adequacies for achieving TQM. Hence, there is a need to make a comparison between Public Sector and Private Sector organizations on the select dimensions of TQM. Accordingly one of objectives of this study is to make a comparative study between Public and Private Sector organizations.

Quality consciousness is not new to our country. The quality of the Indian textile was famous throughout the world. The 7th century steel pillar at Delhi and the construction of monuments and structures are still the testimonies of the utmost concern and ability to produce quality products in ancient times. In the modern era also, right since the early sixty's, Indian managers are familiar with and using techniques like inspection, statistical quality control etc.
But what is that, which has hindered us from emerging as a nation producing quality products and services? Probably there is no single answer to this question, but one thing is certain i.e. lack of commitment at all levels [individuals, group, organization and nation] to produce quality goods and services. Perhaps we have so far not understood the fact that the customer is the centre of the business world and customer satisfaction is the most important goal of the company. The world competitiveness report 1994, conducted by the Geneva-based World Economic Forum, revealed the real quality practice in use in corporate India:

- India occupies a lowly 28th place in a sample of 41 countries on the price-to-quality parameter.
- The competitiveness report ranks India No. 38 in a sample of 41 countries, with regard to TQM practices.
- India occupies 40th place in a sample of 41 countries, with regard to customer orientation parameter.
- The competitiveness report ranks India No. 39 in a sample of 41 countries, with regard to research and innovation.

The factors that contributed to low quality in India are:

- Emphasis on quantity, instead of quality
- No anticipation of customer future needs.
- No ongoing training programs provided to employees on various skills.
- Poor introduction of new products/services.
- No long term goals.
- Not enough investment in new Equipment.
- Not enough basic research.
• No quality plans or strategies.
• No identification of quality costs.
• No customer based measurement.
• No constant revision of present production methods.
• Less importance to workers' participation and workers role in building quality products.

If corporate India, which has produced poor products for 50 years, is to survive tomorrow, a quality revolution is essential. In this rapidly changing environment, many organizations are striving to sustain their profitability and many more for their existence. The recent policies on liberalization have further toughened the situation. To face such situation successfully, the drive for TQM started in India in 1990s and is gradually gaining popularity in Indian companies.

Thus, TQM is not a magic wand. It has problems and pitfalls. While in the initial phase, there is the problem of getting started, later is the risk of getting stereo typed, running out of new ideas and losing the zeal to move forward. However, these problems are not insurmountable. Given a clear understanding, high commitment and persistent effort, one can hope to get the best results out of TQM.
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