



renaissance

college of commerce & management

B.B.A. VI Semester

Subject: Total Quality Management

SYLLABUS

Class: - B.B.A. VI Semester

Subject: - Total Quality Management

Unit-I	Introduction – Evolution of quality, Definition, Concept and Features of TQM, Eight building blocks of TQM.
Unit-II	TQM thinkers and Thought – Juran Trilogy, PDCA cycle, 5S, Kaizen, Crosby's theory on Quality Management, Quality Performance Excellence Award- Deming Application Award, European Quality Award, Malcolm Baldrige National Quality Award.
Unit-III	TQM tools- Benchmarking: Definition, concepts, benefits, elements, reasons for benchmarking, process of benchmarking, FMEA, Quality Function Deployment (QFD) – House of Quality, QFD Process, Benefits, Taguchi Quality Loss Function, Total Productive Maintenance (TPM) – Concept and need.
Unit-IV	Six Sigma- Features of six sigma, Goals of six sigma, DMAIC, Six Sigma implementation.
Unit-V	Statistical Process Control- Central Tendency, The seven tools of quality, Normal curve, Control charts, Process Capability.
Unit-VI	Quality Systems- ISO 9000, ISO 9000:2000, ISO 14000, other quality systems.



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UNIT I

Quality has been an age-old concern: The discerning customer in shops and market-places has applied 'quality techniques', prodding and turning fruits and vegetables testing for firmness, freshness and fitness for the purpose of consumption. If the product was not adequate the purchase would not take place. In the hustle and bustle of cattle markets farmers argued and bartered over the fitness of animals for breeding, dairy farming or consumption, providing evidence for their case by inspection against criteria learned from their forefathers. Those shoppers and farmers passed on their knowledge to their children, and similarly it was passed on to their children's children.

Eager market traders would get short shrift from her if clothes had weak stitching, zips got stuck when zipping, fruits were marked and bruised or vegetables appeared old and unpalatable. The issue of quality of goods and services is not new. Throughout history society has demanded that providers of goods and services should meet their obligations. As long ago as 1700 BC King Hammurabi of Babylon introduced the concept of product quality and liability into the building industry of the time by declaring: ...if a building falls into pieces and the owner is killed then the builder shall be put to death. If the owner's children are killed then the builders' children shall be put to death.

Quality in the Middle Ages - The maintenance of quality was one of the key functions of the craft guilds of the Middle Ages with only those workers who could achieve acceptable quality standards being admitted to membership. Until the advent of mass production, building quality into a product was the job of a craftsman, what is referred to as 'operator quality control'. Skilled craftsmen produced high quality products and had pride in their work. Tradesmen gained a reputation for quality products through skilled craftsmanship that was maintained over time by enforcing lengthy apprenticeship of newcomers to masters-of-the-trade. Tradesmen worked in small tightly knit and controlled firms. Monopolistic guilds were organized to ensure achievement of a high level skill and quality throughout its membership and the trade.

Quality During the Industrial Revolution - The Industrial Revolution revolutionized the manufacturing of products. Mass production set in large factories employing armies of people gave rise to new management ways. There were workers, supervisors and foremen, and managers. Establishment of factories and this new organizational structure led to the withering of many small business trades, and the removal of apprentices and masters from positions. Frederick Taylor's scientific management brought in efficient operations to increase output through mass production by breaking down jobs into parts with each part carried out by individual specialized workers. Practical use of Taylor's "scientific management," built around specialization and the division of labour, reached a high point with the advent of the mass production line with the workers performing repetitious tasks on a mammoth scale.

Quality between the World Wars - The effort of the First World War demanded yet more mass production. Quality became a pressing issue with forces requiring reliable products to arrive on time. With this came the recognition that quality had been central to the allies' success in the war. This led to the formation of associations and institutes, and to the publication of formalized ideas in Quality. In Britain, for example, the Technical Inspection Association was formed in 1919, becoming incorporated as the Institution of Engineering Inspection in 1922. In 1931, W. A. Shewhart of the famous AT&T Bell Laboratories, published Economic Control of Quality of Manufactured Product. This gave the Taylorian discipline a much sounder 'scientific footing'. It converted statistical methods into a manufacturing discipline. A precise and measurable definition of manufacturing control was worked out. Stringent techniques for monitoring and evaluating day-to-day production and improving quality were dictated. In 1932 Shewhart visited the University of London to lecture and to discuss his and others' research ideas. This visit attracted significant interest which led to the formation of the Industrial and Agricultural Section of the Royal Statistical Society and the publication by the British Standards Institute (BSI) of the first standard on quality control.



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The American Approach to Quality - The failure of American corporations to listen to Deming and Juran has often been commented on. In retrospect it appears to be one of the century's most profound errors. At the time, however, it was understandable. In terms of quality, American products were as good as European ones and far better than those produced in Japan. The American preoccupation was on lowering prices and the vehicle for achieving this was generally recognized to be lowering labor costs. The innovation strategy favored by the United States in the post-war years was the only strategy in a period of low-cost resources, expanding markets and low international competition.

At that time, quantity was more important than quality, and management was more concerned with increasing sales than with reducing costs. Western industry believed this would last for ever and ignored the quality-based teachings of experts such as W. E. Deming and Joseph Juran, who, consequently, decided to turn their attention to the East. In a 1993 Harvard Business Review article, Juran also made much of the fact that his Japanese audiences in the early 1950s were the chief executives of major corporations, whereas his North American listeners were primarily engineers and quality inspectors. Juran's message was not, he admitted, new or revolutionary.

Making things to a specific design and then inspecting them for defects was something the Egyptians had mastered 5000 years previously when building the pyramids. The American engineers weren't ready for history lessons. Deming was similarly well received in Japan. In 1951, the first award ceremony for the now prestigious Deming Prize was held.

Japan's Approach to Quality - Japan, having been burned to the ground during the war, encouraged a climate of change from the start. Japanese managers took seriously the warnings about forthcoming changes in the customer's perception of quality and about the future demands for faster development of customer-oriented products and services. So they successfully combined the strategy of innovation with that of continuous quality improvement; this brought a reduction in costs, faster development times, prompt deliveries, customer satisfaction, and enormous competitive advantage internationally. The Western approach was always based on the belief that innovation alone was enough for survival and growth. This has already been proved wrong on many occasions.

The British Approach to Quality - Meanwhile the British approach was slow and backward compared to the establishment of quality as an important managerial issue in North America, and the tidal wave sweeping over Japan. Belatedly, in 1961, the National Council for Quality Reliability was set up as part of the British Productivity Council. The Council became defunct when the British Ministry of Technology withdrew financial support. Quality in Britain then found its home in the British Quality Association.

WHAT IS QUALITY?

The Oxford American Dictionary defines quality as "a degree or level of excellence."

According to Garvin - Quality is an unusually slippery concept, easy to visualize and yet exasperatingly difficult to define. The word 'quality' normally conveys notions of nebulous factors that are not readily measured or tied down. Quality conveys a positive connotation to whatever it is applied.

A FEW OTHER MEANINGS ASSOCIATED WITH THE WORD QUALITY ARE: (MAKE THIS LINE DARK).

- A good product
- Sturdy
- Durable
- Made of best materials
- Easy to operate
- Nice in appearance and touch
- Produced with care

These when translated into a broader sense mean



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- Description of consumer wishes
- Observance of terms of delivery
- Has good documentation
- Is available at a reasonable price
- A product meeting laid down specifications.

E.g. when we buy a T.V., we look at the following parameters- Brand, Sales talk / Sales Brochure, Picture and Sound Quality, Size / Dimensions, Appearances, Weight, Terms of payment, Maintenance cost, Terms of delivery, Installation, Servicing / skills

QUALITY THEREFORE CAN BE DESCRIBED AS:

“MEETING THE STATED AND IMPLIED NEEDS OF THE CUSTOMER” - K.pleski ET (1993) proposes that it would help in the understanding of quality if we differentiate between customer perceived quality, which they term ‘true quality’ and business process quality, which they term ‘internal quality’. This differentiation would then point up the internally focused nature of many quality management programmed offerings and show the need for paying more attention to ‘true quality’, and hence a more outward looking role. Success in quality management is seen as deriving from linking up both aspects of quality. Further, there may be a danger of excessive internal focus in calling everyone a customer. Here the problem in regarding employees as internal customers is again that the ‘real’ customer, that is the one who pays for the service, can be overlooked.

QUALITY FROM THE CONSUMER'S PERSPECTIVE.

A business organization produces goods and services to meet its customer's needs. Quality has become a major factor in a customer's choice of products and service. Customers know that certain companies produce better-quality products than others, and they buy accordingly. That means a firm must consider how the consumer defines quality.

The dimensions of quality primarily for manufactured products a consumer looks for in a product include the following:

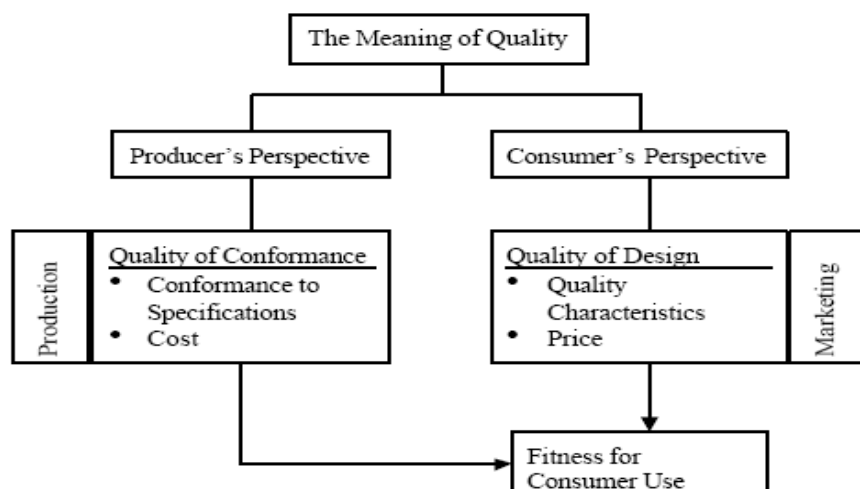
1. Performance: The basic operating characteristics of a product; for example, how well a car handles or its gas mileage.
2. Features: The “extra” items added to the basic features, such as stereo CD or a leather interior in a car.
3. Reliability: The probability that a product will operate properly within an expected time frame; that is, a TV without repair for about 7 years.
4. Conformance: The degree to which a product meets preestablished standards.
5. Durability: How long the product lasts; its life span before replacement.
6. Serviceability: The ease of getting repairs, the speed of repairs, and the courtesy and competence of the repair person.
7. Aesthetics: How a product looks, feels, sounds, smells, or tastes.
8. Safety: Assurance that the customer will not suffer injury or harm from a product; an especially important consideration for automobiles.
9. Other perceptions: Subjective perceptions based on brand name, advertising and the like.

QUALITY FROM THE PRODUCER'S PERSPECTIVE



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FACTORS AFFECTING QUALITY

Markets New products are hitting the market at an explosive rate. Many of these products are manufactured by material and methods unheard till a few years back. Customers demand and get better products today. As markets broaden in scope, the scope of goods and services become more and more specialized. Firms today must be very flexible and be able to respond rapidly and appropriately in different markets worldwide.

Money As competition has increased, profit margins have decreased. Automation forced companies to spend heavily on new equipment's and processes. To absorb these costs productivity has to be increased, which means less production, reworks and scrap has to be kept to the minimum. Quality costs have to be kept low which means cost saving due to quality improvement has to be kept in prime focus.

Man The rapid growth of technology and opening of new fields have created a great demand for workers with specialized knowledge. This specialization of people has created a need for persons who can bring together this knowledge to plan and create operating systems that will bring the desired results.

Materials Due to high material costs engineers have to constantly keep coming up with ways to bring down the cost of material used. They also need to come up with new alternate materials that can replace costlier older material.

Machines The demand to cut costs is forcing companies to use newer machines, which will deliver better quality and product using lesser cycle times. Further the machines need to deliver higher quantities also to keep production costs low. This means maintaining of these machines also becomes critical as any and only down time of these machines leads to increased costs.

Management today responsibility for product quality has to be distributed among various functions. Eg.- Design of design for quality of product design. Manufacturing for process quality, service for after sales quality and marketing for establishing the quantity of the new product required. This means that top management must ensure proper allocation of responsibilities to all to achieve the organization goals.

Motivation The increased complexity of the product means that every employee has to give his best if quality is to be maintained. This requires that Quality consciousness among employees are high. This can be achieved only through continuous education and motivation of the work force. Motivation therefore needs to be on the top of the agenda for any management team of an organization.

Modern Methods of Information With the spread of computers, data collection, storage retrieval retrieved and transmission of information has become easy. This also means that the right information can be given to the right person at his workplaces be it on the machines or in the office.

Conclusion - From the above we see that there are many factors affecting Quality and organization must continually change to keep pace with these requirements. As responsible citizens it is our duty to demand Quality from our suppliers and deliver Quality to our customers. Quality is an endless journey. It is like walking towards the horizon. No matter how much far you walk, it does not change where the horizon is.



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INTRODUCTION TO TQM

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

Total: Make up of the whole.

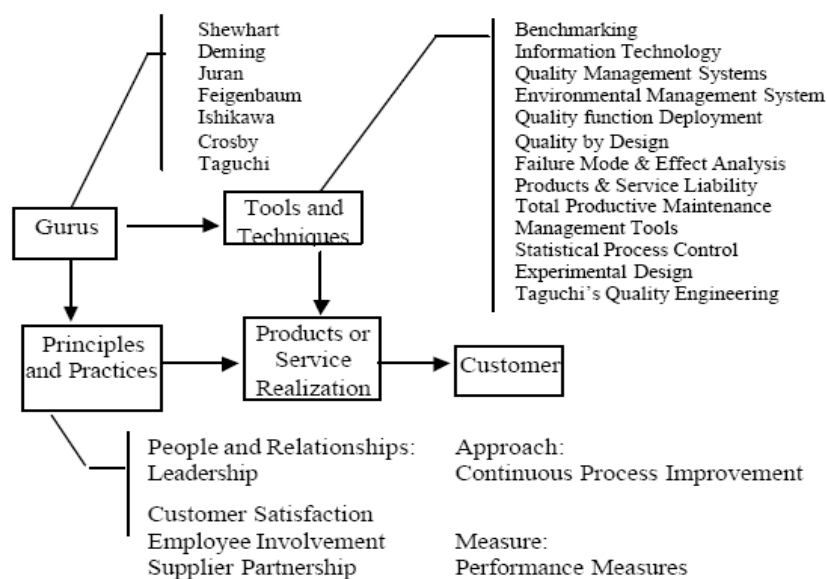
Quality: Degree of excellence a product or service provides.

Management: Act, art, or manner of handling, controlling, directing, etc.

THE PRINCIPLES OF TOTAL QUALITY MANAGEMENT

1. Primary responsibility for product quality rests with top management.
2. Quality should be customer focused and evaluated using customer-based standards.
3. The production process and work methods must be designed consciously to achieve quality conformance.
4. Every employee is responsible for achieving good product quality.
5. Quality cannot be inspected into a product, so make it right the first time.
6. Quality must be monitored to identify problems quickly and correct quality problems immediately.
7. The organization must strive for continuous improvement.
8. Companies must work with, and extend TQM programs to their suppliers to ensure quality inputs.

TQM Frame work



DOES TQM ALWAYS SUCCEED ?

The most common causes for TQM failures appear to be the following:

1. Lack of Commitment by Top Management.
2. Focusing on Specific Techniques Rather Than on the System.
3. Not Obtaining Employee Buy-in and Participation.
4. Program Stops with Training.
5. Expecting Immediate Results, Not a Long-Term Payoff.
6. Forcing the Organization to Adopt Methods That Are Not Productive or Compatible with its Production System and Personnel.

THE DEMING PHILOSOPHY

1. Create constancy of purpose for continual improvement of product and service.
2. Learn and Adopt the New Philosophy



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3. Understand the Purpose of Inspection
4. Stop Awarding Business Based on Price Alone
5. Improve Constantly and Forever the System of Production and Service
6. Institute Training on the Job
7. Adopt and Institute Modern Methods of Leadership
8. Drive Out Fear, Create Trust, and Create a Climate for Innovation
9. Break down barriers between departments and individuals.
10. Eliminate the Use of Slogans, Posters and Exhortations for the Work Force
11. Eliminate Numerical Quotas for the Work Force
12. Remove Barriers that Rob People of Pride of Workmanship
13. Encourage Education and Self-Improvement for Everyone.
14. Take Action to Ensure Top Management's Permanent Commitment to Accomplish the Transformation.

TQM six basic Concepts

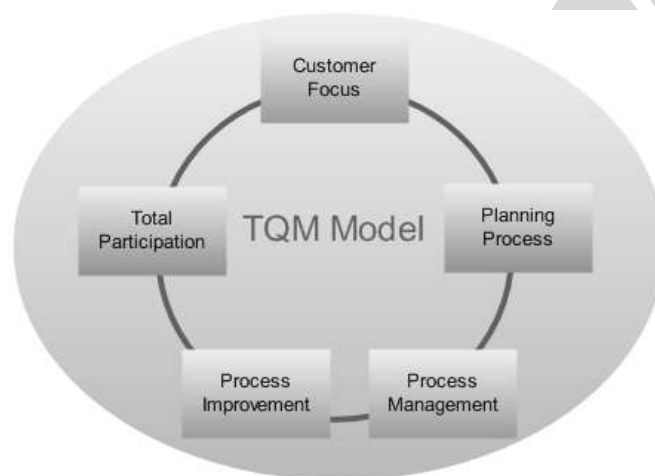
- Management commitment to TQM principles and methods & long term Quality plans for the Organisation
- Focus on customers – internal & external
- Quality at all levels of the work force.
- Continuous improvement of the production/business process.
- Treating suppliers as partners
- Establish performance measures for the processes.

Effects of poor Quality

- Low customer satisfaction
- Low productivity, sales & profit
- Low morale of workforce
- More re-work, material & labour costs
- High inspection costs
- Delay in shipping
- High repair costs
- Higher inventory costs
- Greater waste of material

Benefits of Quality

- Higher customer satisfaction
- Reliable products/services
- Better efficiency of operations
- More productivity & profit
- Better morale of work force
- Less wastage costs
- Less Inspection costs
- Improved process
- More market share
- Spread of happiness & prosperity
- Better quality of life for all.





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Role of TQM leaders

Everyone is responsible for quality, especially senior management and the CEO; however, only the latter can provide the leadership system to achieve results. Senior management's role is not longer to make the final decision, but to make sure the team's decision is aligned with the quality statements of the organization. Push 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 leader sends a strong message to subordinates when that leader asks if they have read a particular book or article. The needed resources must be provided to train employees in the TQM tools and techniques, the technical requirements of the job, and safety. Resources in the form of the appropriate equipment to do the job must also be provided.

- All are responsible for quality improvement especially the senior management & CEO's
- Senior management must practice MBWA
- Ensure that the team's decision is in harmony with the quality statements of the organisation
- Senior TQM leaders must read TQM literature and attend conferences to be aware of TQM tools and methods
- Senior managers must take part in award and recognition ceremonies for celebrating the quality successes of the organisation
- Coaching others and teaching in TQM seminars
- Senior managers must liaise with internal, external and suppliers through visits, focus groups, surveys
- They must live and communicate TQM.

TQM implementation

- Begins with Sr. Managers and CEO's
- Timing of the implementation process
- Formation of Quality council
- Union leaders must be involved with TQM plans implementation
- Everyone in the organisation needs to be trained in quality awareness and problem solving
- Quality council decides QIP projects.

Quality Council

In order to build quality into the culture, a quality council is established to provide over all direction. It is the driver for the TQM engine. In a typical organization the council is composed of the chief executive officer (CEO); the senior managers of the functional areas, such as design, marketing, finance, production, and quality; and a coordinator or consultant. If there is a union, consideration should be given to having a representative on the council.

A **coordinator** is necessary to assume some of the added duties that a quality improvement activity requires. The individual selected for the coordinator's position should be a bright young person with executive potential. That person will report to the CEO.

The responsibility of the coordinator is to build two-way trust, propose team needs to the council, share council expectations with the team, and brief the council on team progress. In addition, the coordinator will ensure that the teams are empowered and know their responsibilities. The coordinator's activities are to assist the team leaders, share lessons learned among teams, and have regular leaders' meetings.

In smaller organizations where managers may be responsible for more than one functional area, the number of members will be smaller. Also, a consultant would most likely be employed rather than coordinators.



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- The quality council includes CEO and Senior managers of the functional areas -research, manufacturing, finance, sales, marketing etc. and one co-ordinator and a union representative.
- Duties- To develop the Quality statements eg. Vision, Mission, Quality policy statements, Core values etc.
- To develop strategic long-term plans and annual quality improvement programme.
- Make a quality training programme
- Monitor the costs of poor quality.
- Determine the performance measures for the organisation
- Always find projects that improve the processes and produce customer satisfaction.
- Establish work-group teams and measure their progress.
- Establish and review the recognition and reward system for the TQM system

Once the TQM program is well establish, a typical meeting agenda might have following items.
Progress report on teams.

1. · Customer satisfaction report.
2. · Progress on meeting goals.
3. · New project teams.
4. · Recognition dinner.
5. · Benchmarking report.

Eventually, within three to five years, the quality council activates will become so ingrained in the culture of the organization that they will become a regular part of the executive meeting. When this state is achieved, a separate quality council is no longer needed. Quality becomes the first item on the executive meeting agenda.

Core Values, Concepts, and Framework- Unity of purpose is key to a leadership system. Core values and concepts provide that unity of purpose. The core values and concepts enable a framework for leaders throughout the organization to make right decisions. The foster TQM behavior and define the culture. Each organization will need to develop its own values. Given here are the core values, concepts, and framework for the Malcolm Baldrige National Quality Award. They can be used as a starting point for any organization as it develops its own and it is made up of some elements which are given by different TQM Specialists viz –

1) Visionary Leadership -An organization's senior leaders need to set directions and create a customer orientation clear and visible quality values, and high expectations. Values, directions, and expectations need to address all stakeholders. The leaders need to ensure the creation of strategies, systems, and methods for achieving excellence.

2) Customer-Driven Excellence - Quality is judged by customers. All product and service characteristics that contribute value to the customer and lead to customer satisfaction, preference, and retention must be the focus of an organization's management system. This concept of quality includes not only the product and service characteristics that meet basic customer requirements, but it also includes those features and characteristics that differentiate them from competing offerings. Such differentiation may be based upon new or modified offerings, combinations of product and service offerings, customization of offering, rapid response, or special relationships. Customer-driven quality is thus a strategic concept. It is directed toward customer retention, market-share gain, and growth.

Organizational learning can result in –

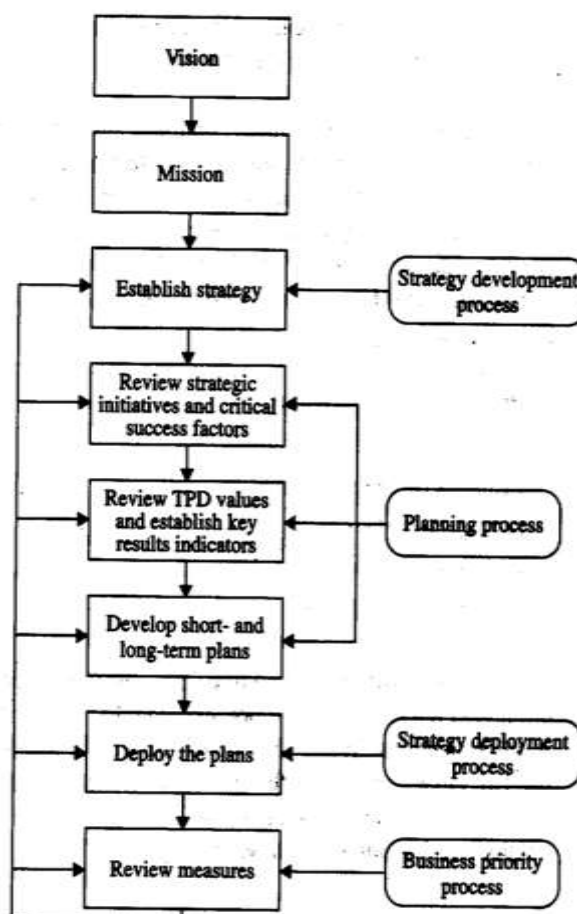
- (1) Enhancing value to customers through new and improved products and services;
- (2) Developing new opportunities;
- (3) Reducing errors, defects, waste, and related costs;

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- (4) Improving responsiveness and cycle time performance;
- (5) Increasing productivity and effectiveness in the use of all resources; and
- (6) Enhancing your organization's performance in fulfilling its public responsibilities and service as a good citizen.

(1) More satisfied and versatile employees who stay with the organization, (2) Organizational cross-functional learning, and (3) an improved environment for innovation.

3) Valuing Employees and Partners - An organization's success depends increasingly upon the skills, knowledge, creativity, and motivation of its employees and partners. Valuing employees means committing to their satisfaction, development, and well-being. Increasingly, this involves more flexible, high-performance work practices tailored to employees with diverse workplace and home life needs.



[Corning's TPD Model]

- (1) Demonstrating your leaders' commitment to your employees' success,
- (2) Recognition that goes beyond the regular compensation system,
- (3) Development and progression within your organization,
- (4) Sharing your organization's knowledge so your employees can better serve your customers and contribute to achieving your strategic objectives, and
- (5) Creating an environment that encourages risk-taking.



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For example, Southwest Airlines always puts customers second, and employees first. Southwest lives up to its promises to employees, so there is no sense of betrayal to keep people from enthusiastically contributing. It refuses to layoff employees even when airline workers are laid off industry wide. Southwest has the most productive workforce servicing twice the number of passengers per employee of any other airline.

4) Agility - Success in global markets demands agility. All aspects of ecommerce require and enable more rapid, flexible, and customized responses. Organizations face ever-shorter cycles for the introduction of new and improved products and services, as well as for faster and more flexible response to customers. Major improvements in response time often require simplification of work units and processes and the ability for rapid changeover from one process to another. Cross-trained and empowered employees are vital assets in such a demanding environment.



5) Focus on the Future - Focus on the future requires understanding the short- and long-term factors that affect an organization and the marketplace. Pursuit of sustainable growth and market leadership requires a strong future orientation and a willingness to make long-term commitments to key stakeholders.

An organization's planning should anticipate many factors, such as customers' expectations, new business and partnering opportunities, the increasingly global marketplace, technological developments, the evolving e-commerce environment, new customer and market segments, evolving regulatory requirements, societal expectations, and strategic moves by competitors.



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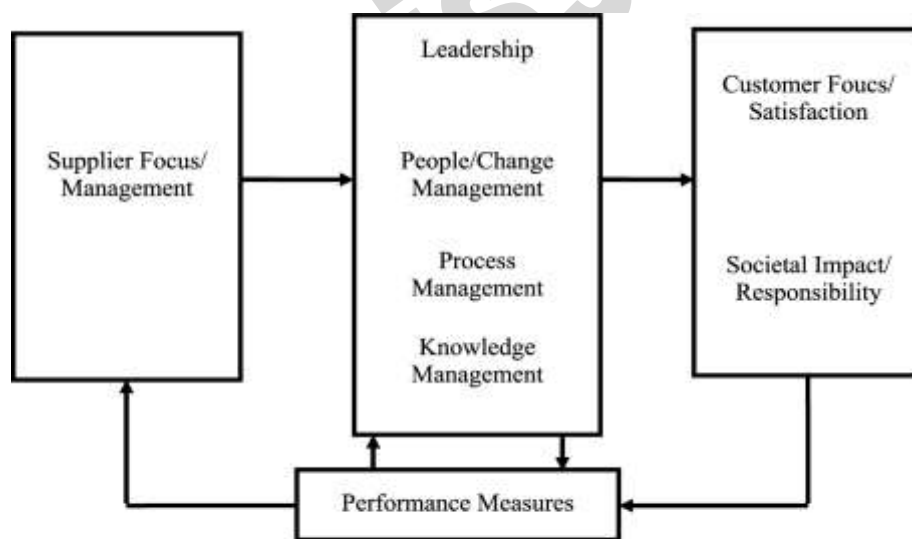
Strategic objectives and re- source allocations need to accommodate these influences. A focus on the future includes developing employees and suppliers, creating opportunities for innovation, and anticipating public responsibilities.

6) Managing for Innovation - Innovation means making meaningful change to improve an organization's products, services, and processes and to create new value for the organization's stakeholders. Innovation should lead an organization to new dimensions of performance.

7) Management by Fact - Analysis refers to extracting larger meaning from data and information to support evaluation, decision making, and operational improvement. Analysis entails using data to determine trends, projections, and cause and effect relationships that might not otherwise be evident. Analysis supports a variety of purposes, such as planning, reviewing overall performance, improving operations, change management, and comparing your performance with competitors' or with "best practices" benchmarks.

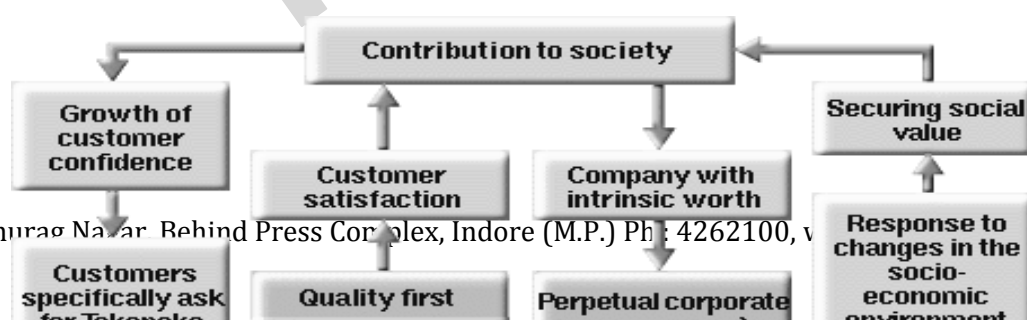
A major consideration in performance improvement and change management involves the selection and use of performance measures or indicators. A comprehensive set of measures or indicators tied to customer and/or organizational performance requirements represents a clear basis for aligning all activities with your organization's goals.

8) Public Responsibility and Citizenship -



Continuous Improvement

An organization's leaders should stress the need to practice good citizenship. Basic expectations to adhere to business ethics and protection of public health, safety, and the environment should be maintained. Protection of health, safety, and the environment includes an organization's operations, as well as the life cycles of products and services.





Practicing good citizenship refers to leadership and support—within the limits of an organization's resources—of publicly important purposes. Leadership as a rate citizen also entails influencing other organizations. For example, an organization might lead or participate in efforts to help define the obligations of its industry to its communities.

9) Focus on Results and Creating Value - An organization's performance measurements need to focus on key results. Results should be used to create and balance value for your key stakeholders—customers, employees, stockholders, suppliers and partners, the public, and the community. By creating value for key stakeholders, an organization builds loyalty and contributes to growing the economy. To meet the sometimes conflicting and changing aims that balancing value implies, organizational strategy should explicitly include key stakeholder requirements.

10) Systems Perspective - The Baldrige Criteria provide a systems perspective for managing an organization to achieve performance excellence. The Core Values form the building blocks and the integrating mechanism for the system. However, successful management of overall performance requires organization-specific synthesis and alignment. Synthesis means looking at an organization as a whole and builds upon key business requirements, including strategic objectives and action plans.

11) Quality Statements - In addition to the core values and concepts, the quality statements include the vision statement, mission statement, and quality policy statement. Once developed, they are only occasionally reviewed and updated. They are part of the strategic planning process.

The utilization of the three statements varies considerably from organization to organization. VIZ-

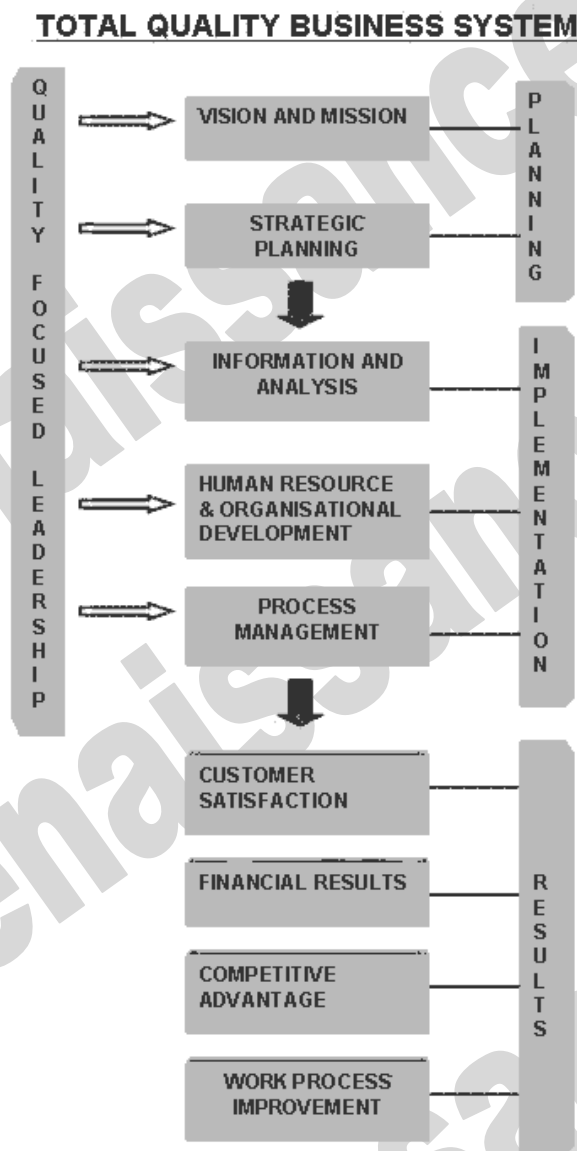
- Vision statement – a short declaration of what the organization hopes to be tomorrow.
- Mission statement – a statement of purpose –who we are, who are our customers, what we do, and how we do it.
- Quality policy – is a guide for everyone in the organization, how they should provide products and services to the customers & it comprises –
 1. · Quality is first among equals.
 2. · Meet the needs of the internal and external customers.
 3. · Equal or exceed the competition.
 4. · Continually improve the quality:



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5. · Include business and production practices.
6. · Utilize the entire work force.



EIC- EXPORT INSPECTION COUNCIL

INTRODUCTION - The Export Inspection Council (EIC) was set up by the Government of India under Section 3 of the Export (Quality Control and Inspection) Act, 1963 (22 of 1963), in order to ensure sound development of export trade of India through Quality Control and Inspection and for matters connected thereof.

EIC is an advisory body to the Central Government, which is empowered under the Act to:

- ▶ Notify commodities which will be subject to quality control and/ or inspection prior to export,
- ▶ Establish standards of quality for such notified commodities, and
- ▶ Specify the type of quality control and / or inspection to be applied to such commodities.

Besides its advisory role, the Export Inspection Council, also exercises technical and administrative control over the five Export Inspection Agencies (EIAs), one each at Chennai, Delhi, Kochi, Kolkata



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and Mumbai established by the Ministry of Commerce, Government of India, under Section 7 of the Act for the purpose of implementing the various measures and policies formulated by the Export Inspection Council of India.

Export Inspection Council, either directly or through Export Inspection Agencies, its field organisation renders services in the areas of: Certification of quality of export commodities through installation of quality assurance systems (In-process Quality Control and Self Certification) in the exporting units as well as consignment wise inspection. Certification of quality of food items for export through installation of Food safety Management System in the food processing units. Issue of Certificates of origin to exporters under various preferential tariff schemes for export products.

ORGANISATION SETUP - Under the Export Quality Control & Inspection Act, 1963, the Council, which is constituted by the Central Government, is the apex body, and has powers to constitute specialist committees to assist it in discharge of its functions. Accordingly, the Council has constituted Administrative Committee to advise it on administrative matters and a Technical Committee to advise it on technical matters.

SERVICES RENDERED BY EIC - EIC, either directly or through the Export Inspection Agencies, its field organizations, renders services in the areas of:

- Certification of quality of export commodities through installation of quality assurance systems (In-process Quality Control and Self-Certification) in the exporting units as well as consignment-wise inspection.
- Certification of quality of food items for export through installation of Food Safety Management Systems in the food processing units as per international standards.
- Issue of different types of Certificates such as Health, Authenticity etc. to exporters under various product schemes for export.
- Issue of Certificates of Origin to exporters under various preferential tariff schemes for export products.
- Laboratory testing services.
- Training and technical assistance to the industry in installation of Quality and Safety Management Systems based on principles of Hazard Analysis Critical Control Point (HACCP), ISO-9001: 2000, ISO: 17025 and other related international standards, laboratory testing etc.
- Recognition of Inspection Agencies as per ISO 17020 and Laboratories as per ISO 17025 and utilizing them for export inspection and testing.

Conclusion -In rendering the above services, EIAs are backed by qualified technical manpower, having nearly forty years of diversified experience of quality control and inspection of notified commodities including their testing as per international standards/importing countries' standards or the foreign buyers' specifications.

VOLUNTARY INSPECTION

1. Inspection by the exporter himself -The primary responsibility for inspection of the goods rests with the exporter himself. He should conduct the inspection of the goods during the process of manufacturing, at the stage of finished product and also in regard to the packaging and packing materials. It is essential that the manufacturer should install proper quality control system in the factory to check the quality at all stages of manufacture of the goods. The merchant exporter should enter into an arrangement with the supplier of goods to provide for inspection during the process of manufacture as well as for the finished product. If needed, the services of qualified quality control personnel should be taken for this purpose.

2. Inspection by buyer's representative -Many a time, the foreign buyer may arrange for inspection of goods through his own representative in the exporter country before the goods are dispatched by the exporter. The exporter can send the shipment only when the buyer's



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representative issues a satisfaction report to the exporter. The advantage to the exporter is that the buyer cannot raise the question of substandard quality or the poor quality of the goods once his representative clears the shipment of the goods.

3. Inspection by buying agent -In cases where the export order is placed with the exporter through a buying agent in his country, the goods can be dispatched only after the buying agent has issued the satisfaction report to the exporter. Buying agents conduct inspection at different stages to ensure the shipment conforms to the quality requirements of the exporter. The buying agent conducts inspection of the quality at the time of purchase of the raw materials, during the manufacturing process; at the finished product stage and finally before packaging and packing of the goods. The exporter can send the shipment only after getting this certification of inspection from the buying agent.

4. Inspection by private sector agencies -Sometimes, the buyer may specify an inspection agency in the exporter's country to satisfy himself as regards quality of the goods. In such a case, the exporter should approach that agency in his country and get the pre-shipment inspection completed. In India, one of the leading agencies in the private sector is the SGS India Ltd. with its head office in Mumbai. The exporter should ascertain the procedure and documentation formalities of the agency concerned so that the inspection of goods can be arranged to ensure timely shipment of goods.

SELF-CERTIFICATION

With the experience gained over the years in operating the Compulsory Quality Control and Pre-shipment Inspection Scheme in India, there has been a qualitative change in the inspection system also. Recently, self-certification system has been introduced which is based on the concept that a manufacturing unit having established reputation for its products with sufficient in-built responsibility for quality assurance, could be permitted to certify its own products for export. For the purpose of operating this system, a manufacturing unit found qualifying against the prescribed norms, which amongst other include the following:

- | | |
|---|----------------------------------|
| a) Product Quality | e) Process Control |
| b) Design and Development | f) Laboratory |
| c) Raw Materials /Bought out Components | g) Quality Audit |
| d) Organisation and personnel for Quality Control | h) Packaging |
| | i) After-sales-service; and |
| | j) House-keeping and Maintenance |

The unit approved under this system is recognized by notification under section 7 of the Act as the Agency for Quality Control and Inspection of specific products manufactured in the unit. The system removed the need for the manufacturing unit to seek certificate of inspection from an outside Agency which provides an added advantage in the mechanism of exportation.



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UNIT III

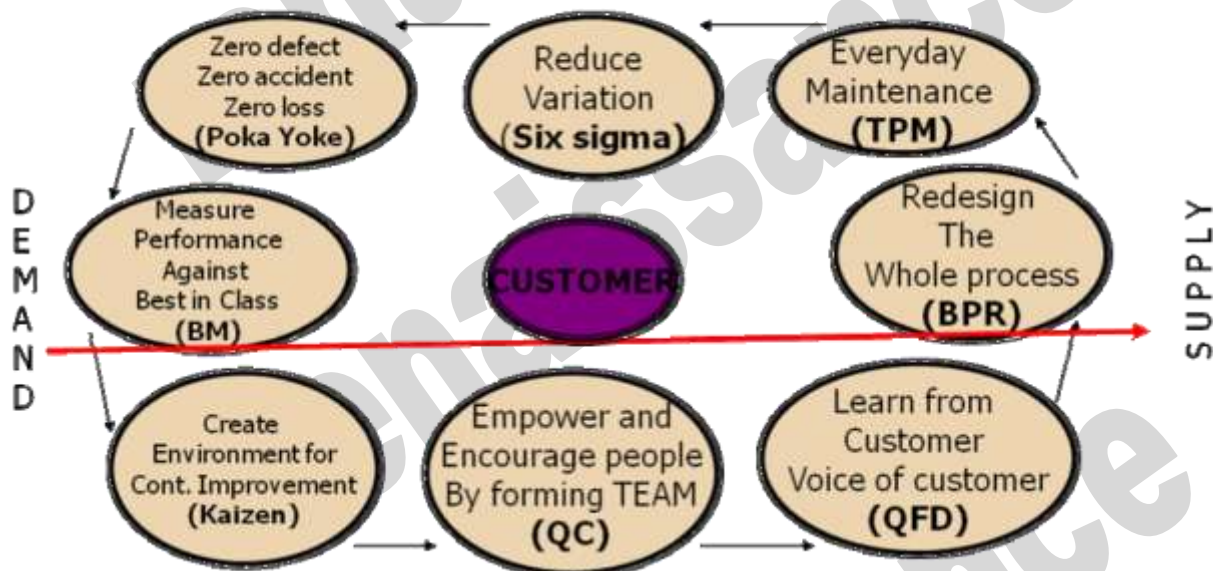
Different techniques for TQM: Benchmarking

Introduction:

When an organization / company want to maintain a level of quality that satisfy their customers at the appropriate time and price then that organization must follow some quality management techniques for fulfil those principles and planning. The techniques are:

- Benchmarking
- Kaizen
- Quality Circle
- Quality Function Deployment (QFD)
- Business Process Reengineering
- Total Productive Maintenance
- Six Sigma,
- Poka Yoka etc.

Techniques: universe of TQM



Actually the important principles of Total Quality are:

1. Focus or delighting the customer
2. Participation and team work
3. Continuous improvement and learning
4. Zero defect (maximum level)

Planning for quality must always start with the product attributes (or specifications) which are important to the customers. A method must then be devised to test and measure quality for each of product attributes. Next, the quality standards are set against which the actual quality is compared. Quality planning also involves setting of quality objectives, establishing quality strategies and formulating quality policies:



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Benchmark and Benchmarking:

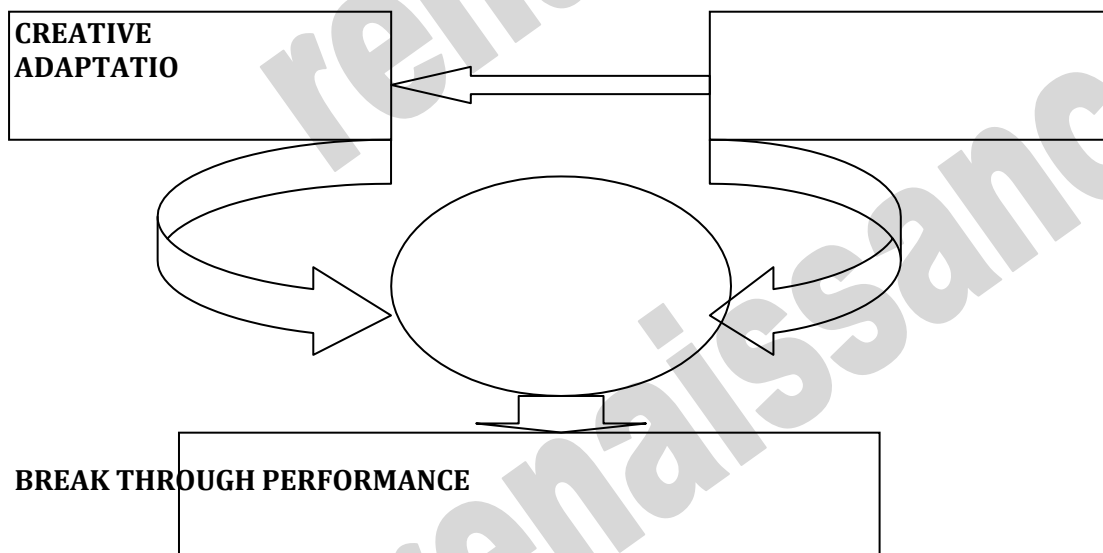
A benchmark is a point of reference against which things are measured. In business, these points of reference or standards can be measured by questions about the product or service e.g. how many, how much time, how much money, how reliable or how well made it is, by studying other organizations and comparing the answers to these questions, we will be able to measure our performance against that of others. As a result, an organization will be able to set new goals, and adapt the best practices to their organization. This exactly helps them to satisfy their customers with the best quality, cost, product and services.

Benchmarking is an effective technique, which helps organizations to create quality targets in the *Strategic Quality Management Process*.

Benchmarking is a systematic method by which an organization can continuously measure themselves against the best industry practices or world class or 'Best in Class' and improve accordingly. Simply it is "the search of industry best practices that lead to superior performance"

Benchmarking is systematic and continuous measurement improvement Process: A process of continuously measuring and comparing an organization's business processes against process leaders anywhere in the world to gain information which will help the organization to take action to improve performance.

WHAT IS OUR PERFORMANCE
LEVEL, HOW DO WE





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Thus, the goal of benchmarking is to make the best in class target for the organization, based on the information from both internal and external sources. The secret to benchmarking technique is “borrow – adopt – refine” the best attributes for continuous growth and development.

When Benchmarking?

Where there are 8 negative answers like:

1. Is the company's QMS properly developed, documented and implemented - no.
2. Are there systems to allocate appropriate resources and funding for the effective implementation of QMS- no.
3. Company's great strength areas are measured – no.
4. Company's great weakness areas are measured – no.
5. Company's great opportunities are measured – no.
6. Areas have threats for its survival – no.
7. Customer needs assessed and rectified – no.
8. KSF application is central focus- no.

Levels of Benchmarking in Competitive environment:

- Internal benchmarking – within one's org.
- Competitive benchmarking – analysis the performance and practices of best – in – class companies.
- Non – competitive benchmarking – is learning something about a process a company wants to improve by benchmarking.
- World class benchmarking- ambitious and looking towards recognized leader

General areas of Benchmarking / where benchmarking: Operational Strategies:

- Inventory management
- Inventory control

Marketing management

- Customer service levels
- Purchasing
- Billing and collection
- Purchasing practices

Quality Improvement efforts / process

- Management of quality councils
- Overall equipment effectiveness etc.

H.R. Practices

- Talent Acquisition / Search
- Training and Development
- Compensation management etc.

Supply chain management

- Warehousing and distribution
- Transportation

Types of Benchmarking:

There are (7) seven types of Benchmarking:

- Performance or operational benchmarking



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- Process or functional benchmarking
- Strategic benchmarking
- Functional Benchmarking
- Internal Benchmarking
- External Benchmarking
- International Benchmarking

A. Performance or operational benchmarking:

- It involves – pricing, technical quality, features and other quality
- Performed by reverse engineering in which competitor's products are taken apart and analyzed
- It is also known as competitive benchmarking

B. Process or Functional benchmarking:

- Centres on work processes such as billing, order entry or employee training.
- It identifies the most effective practices in companies that perform similar functions, no matter in what Industry.

C. Strategic Benchmarking:

- Examines how companies compete and seeks the winning strategies that have led to competitive advantage and market success.
- Determine how well a company is prepared to compete in a segment and to help define a best-in-class competitor is to construct a key success factor (KSF).

KEY SUCCESS FACTOR MATRIX (KSF)					
Key success factor	Competitive analysis – Computer Industry Segment				
	Performance Rating				
	Weight	Our Company	Competitor A	Competitor B	Competitor C
Sales Force					
Distribution					
Suppliers					
R&D					
Service					
Cost Structure					

D. Functional benchmarking: or generic benchmarking – is used when an organization look to benchmark with partners drawn from different business sectors or areas of activity to find ways of improving similar functions or work processes. This sort of benchmarking can lead to innovation and dramatic improvements.

E. Internal Benchmarking: Involves seeking partners from within the same organization. The main advantages of IB are that access to sensitive data and information is easier, standard data is often readily available and usually less time and resources are needed.



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F. External Benchmarking: Involves seeking outside organizations that are known to be best in class. External benchmarking provides opportunities of learning from those who are at the cutting edge, although it must be remembered that not every best practice solution can be transferred to others. In addition, EB may take up more time and resources to ensure the comparability of data and information, credibility of findings and development of sound recommendations.

G. International Benchmarking: It is used where partners are sought from other countries because best practitioners are located elsewhere in the world. Globalization and advances in IT are increasing opportunities for international projects. However, this can be more time and resources to set up and implement and the results may need careful analysis due to national differences.

Phases of Benchmarking:

Benchmarking is usually treated as a structural process. The structure is best provided by developing a step by step model. Any type of benchmarking process model should provide an adequate framework for the successful planning and execution of a benchmarking exercise. It should be flexible enough to encourage people to modify the process to suit their needs and project requirements. There are 5 stages of Benchmarking:

- **Planning:** Identify the product, service or process to be benchmarked
- **Analysis:** Determine the gap between the firm's current performance and that of the firm's benchmarked and identify the causes of significant gaps.
- **Integration:** Establish goals and obtain the support of managers who must provide the resources for accomplishing the goals
- **Action:** Develop action plans, and team assignment, implement the plans, monitor progress and recalibrate benchmark as improvements are made.
- **Maturity:** Leadership position attained, best practices fully integrated into process.

XEROX 's twelve steps of benchmarking (1980): Phase 1: Planning

1. Identify what to benchmark;
2. Identify comparative companies;
3. Determine data collection method & collect data.

Phase 2: Analysis

4. Determine current performance gap;
5. Project future performance levels.

Phase 3: Integration

6. Communicate finding and gain acceptance;
7. Establish functional goals.

Phase 4: Action

8. Develop action plans;
9. Implement specific actions & monitor progress;
10. Recalibrate benchmarks.

Phase 5: Maturity

11. Attain leadership position
12. Fully integrate practices into processes.



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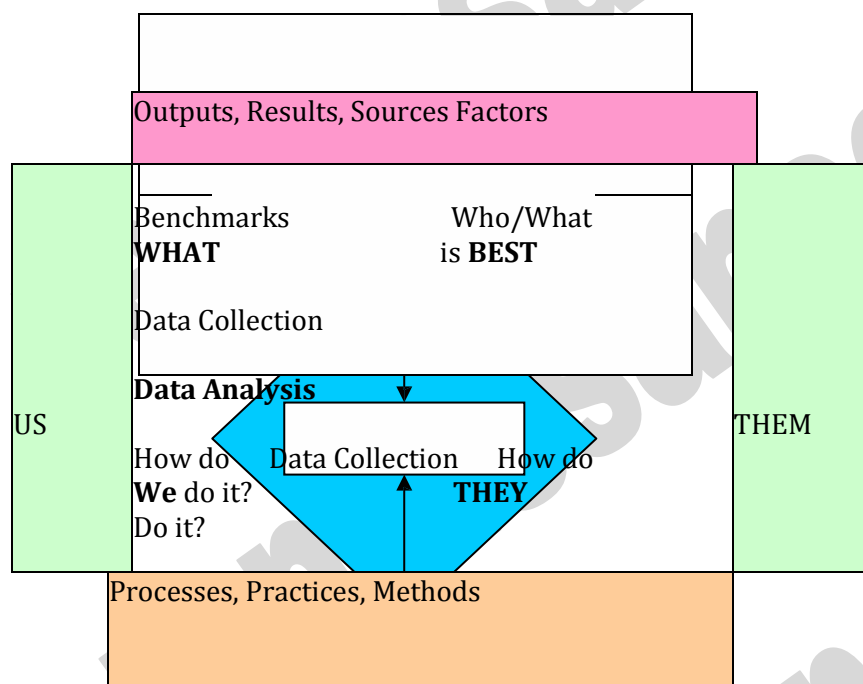
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The Process and of Benchmarking:

Therefore, the process of Benchmarking may involve asking 4 key questions:

1. What should we benchmark?
2. Whom should we benchmark?
3. How do we perform the process?
4. How do they perform the process?

These 4 questions formed the basis on which Boeing, Digital equipments company, Motorola and Xerox jointly developed a benchmarking template.



Organizations that benchmark, adapt the process to best fit their own needs and culture. Although the number of steps in the process may vary from organization to Organization, the following SEVEN steps contain the core method of bench marking:

- Step – 1: Determine the focus areas to be benchmark / identify what to benchmark. Step –2: Carry out assessment on the existing practices to understand the current performance.
- Step – 3: Determine what to measure – example compensation/ incentives structure for sales people
- Step – 4: Define the standard against which you are going to benchmark Identify who to benchmark
- Step – 5: Set goals and Carry out BM exercise
- Step – 6: Implement the action plan
- Step -7: Improve performance based on the information obtained through continuous Monitoring

1. Most organizations have a strategy that defines how the firm wants to position it and compete in the market place. This strategy is usually expressed in terms of mission and vision statements. Supporting these statements is set of critical activities, which the organization must to successfully to realize its vision. They are often referred to as critical success factors. In general, when deciding **what to benchmark**, it is best to begin by thinking about the mission and critical success factors.



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2. To compare practices to outside benchmarks it is first necessary to thoroughly understand and document the current process by applying techniques like flow diagrams, cause effect diagram etc. When documenting the process, it is important to quantify it. Units of measures must be determined. The key metrics like – unit costs, hourly rates, asset measures, quality measures etc. must be compared during the benchmarking and investigation.

3. Once internal processes are understood and documented, it is possible to make decisions about who to benchmark and how to conduct the study. Benchmarking plan is a learning process including:

- To use information in the public domain to focus the inquiry
- To find appropriate benchmark pictures
- Determine data collection method and collect data.

4. Three techniques are mainly used for this Step:

- Questionnaire
- Site Visit
- Focus Group Discussion

5. Learning from the data collected in a benchmarking study involves answering a series of questions.

- Is there a gap between the organization's performance and the performance of the best – in – class organization?
- What is the gap, how much is it?
- Why is there a gap, what does the best in class do differently that is better
- If best – in – class practices have adapted, what would be the resulting improvement.

6. When a benchmarking study levels a negative gap in performance, the objective is to change the process to close the gap. Benchmarking is a waste of time if change does not occur as a result. To effect change, the findings must be communicated to the people within the organization who can be able to make improvement. The findings must translate to goals and objectives, and action plans must be developed to implement new processes.

7. Monitor the entire process and find out the key areas where more improvement is needed and finally document the final results.

Different Approaches to Benchmarking

AT&T's 12 step process	XEROX 12 step process
1. Determine who the clients are – who will use the information to improve their processes	1. Identify what is to be benchmark
2. Advance the clients from the literacy stage to the champion stage	2. Identify comparative organizations
3. Test the environment. Make sure the clients can and	3. Determine data collection method and



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will follow through with benchmarking findings	collect data.
4. Determine urgency panic or disinterest indicates little chance for success.	4. Determine current performance Gap.
5. Determine scope and type of benchmark needed	5. Project future performance levels.
6. Select and prepare the team	6. Communicate B.M findings and gain acceptance
7. Overlay the benchmarking process on to the business planning process	7. Establish functional Goals
8. Develop business management plan	8. Develop action plans
9. Analyze the data	9. Implement specific actions and monitor progress
10. Integrate the recommended actions	10. Recalibrate benchmarks.
11. Take Actions	11. Attain leadership position ;
12. Continue Improvement	12. Fully integrate practices into processes

Factors to be kept in mind to ensure success with bench marking:

- Benchmarking must have the full support of senior management and they should actively involve. with this process
- For benchmarking team and process training is very imp.
- Benchmarking should be a team activity
- Benchmarking is an ongoing process.
- Benchmarking efforts must be organized, planned, and carefully managed.
- Used, correctly, benchmarking can lead you to the competitive edge in today's business market place.



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Advantages:

- Benchmarking is a systematic method by which organizations can measure themselves against the best Industry practices
- It promotes superior performance by providing an organized framework through which organization learn how the “best in class” do things.
- It helps for continuous improvement.
- Benchmarking inspire managers (and organization) to compete.
- Through Benchmark process organization can borrow ideas, adopt and refine them to gain competitive advantages.

Disadvantages:

The most resistant criticism of Benchmarking comes from the idea of copying others. BM is not a panacea. It is not a strategy nor is it intended to be a business philosophy. Therefore, it is a time taking technique.

Conclusion

Now a days, more than 60% companies in the world uses this technique for fixing their target for continuous improvement. For them it is an important tool. But to be effective it must be used properly. It breaks down (waste money, time and energy and some times morale too) if process owners and managers feel threatened or do not accept and act on the findings. Finally, benchmarking is not a substitute for innovation; however, it is a source of ideas from outside the organization.

Kaizen:

‘Kai’ the Japanese word means change, while ‘Zen’ means good (for the better), so kaizen means improvement. It is an effective tool of continuous improvement in small increments that make the process more efficient, effective, under control and adaptable. It focuses on simplification by breaking down complex processes into their sub processes and then improving them. Massaki Imai, the chairman of the Cambridge Corporation, an international management consultancy firm based in Tokyo, propound this useful technique in 1986.

Kaizen relies heavily on a culture change that encourages suggestions by operators who continuously try to incrementally improve their jobs or processes.

Innovation is seen as major changes in the wake of technological breakthroughs, or the introduction of the latest management concepts or production techniques. Innovation is dramatic, a real attention getter. Kaizen is continuous and incremental, and its results are seldom immediately visible. Since Innovation requires large investment but little effort to maintain it because its effort orientation is technology, that means innovation may be challenging, creative and constructive but not cost effective; other hand Kaizen requires little investment but great effort to maintain it, because its effort orientation is People that means Kazen is not only for challenging, creative and constructive but cost effective too. This is we can consider as C4 – Innovation.



Kaizen Cycle



The management of the company encourages suggestion or kaizens from employees regarding possible improvements in their respective work areas. The employees are awarded on giving a large number of useful suggestions. These rewards are more of recognition such as 'kaizen man of the month' titles and certificates or small gifts rather than monetary rewards.

The objectives of Kaizen:

- To build ownership and establishing the acceptable working culture / environment because kaizen relies heavily on a culture change that encourages suggestions by operators who continuously try to incrementally improve their jobs or processes.
- To determining capital cost projects.
- To involves slow but steady incremental improvements.
- To create participatory approach on creativity and updated fashion design as per taste of the customer.
- To create zero defect production in the production line.

Kaizen mainly focus on:

1. Value - added and non-value – added work activities.
2. 'Muda" (work without a product or effort wasted), which refers to the seven classes of waste – over production, delay, transportation, processing, inventory, wasted motion and defective parts.
3. Principle of the motion study and the use of cell technology.
4. Principles of materials handling and use of one-piece flow.
5. Documentation of standard operating procedures.
6. The 5S for work place organization, which are five Japanese words that mean sort/ proper arrangements (**Seiko**), Sort in orderliness (**Seiton**), shine / personal cleanliness (**Seiketsu**), standardize (**Seiso**) and self discipline (**Shitsuke**).
7. Visual management by means of visual displays that everyone in the plant can use for better communications.



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8. Just – in – time principles to produce only the units in the right quantities, at the right time, and with the right resources.
9. Poka – yoka to prevent or defect errors.
10. Team dynamics, which include problem solving, communication skills, and conflict resolution.

How Kaizen works:

The concept of continuous improvement is applied in all directions:

- industrial processes can be improved
- working methods can be improved
- quality defects can be eliminated
- waste can be reduced
- Customer service can be bettered
- The working environment can be improved
- Boss/subordinates relationship can be improved.

Now, improvements in industry can be obtained in many ways: new technology can bring improvement to a process or to products' quality - technology can also bring improvements in productivity and in efficiency - it can also bring improvements to customer service - external consultants can bring improvements to working methods, to processes, to interpersonal relations. But these types of improvements do not fall under the *Kaizen* umbrella.

Kaizen is improvement through *the poor man approach*: the poor man does not spend money on improvements because he has no money to throw at it - he rather uses his wisdom, and his brain, and his creativity, and his talent, and his patience....

Kaizen is brain power

This is the real power of *Kaizen*: by using their brain to obtain improvements, people perfect their skills and increase even more their talent. And there is an extra benefit: they are more satisfied. If you are a wealthy man, and build a sumptuous villa designed by the best architect in town, you may or may not be as satisfied as the average man who, through years of patient, creative work has transformed his house into a cosy, warm nest, filled with handmade decorations, each corner showing his dedication, each ornamental object purchased through intelligent savings but selected with care and rich in taste, and each detail showing and proving his love..... Each step of improvement, once completed, brings satisfaction, but probably the real satisfaction is in the improvement process itself: because improving mainly or primarily through creative efforts is a tough challenge, and challenge is a wonderful source of satisfaction.

Tools for kaizen

Surely, brain alone is not sufficient: specific techniques are available for Kaizen oriented people to perform effectively. Like a home improver needs to know sufficiently about interior decorating, and antiques' restoration, and soft furnishing (and landscaping, painting, plumbing, wallpapering.....), similarly the industrial *Kaizen* improver needs:



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- To know about problem-solving techniques, and tools for creativity, and *Pareto* and *Ishikawa Diagrams* (to mention but a few of the available instruments for systematic improvement).
- Valid *Kaizen* requires an extra skill from people: the ability to work effectively in team. Starting from the assumption that "the Pope and the Peasant together know more than the Pope alone", the Japanese have extensively deployed and mastered the "team" concept for real, methodical improvement.
- Their *Quality Circles*, for instance, are known world-wide.

In western industrial environments the concept of "effective team for systematic improvement" has somehow failed to deliver high level results, mainly due to considerable cultural differences. The ability to perform in team effectively, intentionally and regularly, with the objective of improving systematically all weak areas of an enterprise, seems to be, in the western world, not as high as in the far east. And many attempts to transplant Japanese methods and *Kaizen* approaches into western enterprises have somehow failed. The truth is that the original *Kaizen* concept must be tailored to suit not only the western industrial environment, but even the specific enterprise, taking into due consideration its culture and values (and objectives, strategies policies.....). Like a home improver cannot and will not merely transform his house following recommendations and ideas of an interior decorating magazine (ideas that he will rather vet and adapt to his or her specific needs and taste), similarly an enterprise willing to undergo a process of continuous, systematic improvement will have to identify, define and deploy a specific "style" and specific, personalised methods to pave its "road to excellence".

Kaizen Sheet:

A kaizen sheet is a useful way of depicting the information relating to the implementation of a kaizen suggested by an individual or a group of workers.

In Kaizen sheet important components are:

1. Kaizen theme (What and which)
2. Problem identified
3. Cause analysis (why why analysis)
4. Root cause
5. Idea / possible alternative solutions
6. Counter measures
7. Before counter measures (How)
8. After counter measures
9. Implemented by (Who)
10. Target and targeted date (when)
11. Benefits / Result after implementation
12. Comparative analysis (before and after)
13. Place of Implementation (Where)



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Name of the company / Organization	KAIZEN SHEET	Where: Machine: Unit: Date:
Kaizen theme: (What and Which)	How many and when:	
Problem	Counter Measure	Benefits: how
Analysis (Why, why)	Before counter measure	
Root Cause	After counter measure	Scope and plan for horizontal development
Idea / Alternatives	Implemented by:	Kaizen No. Zone:
5W and 1H (WHAT, WHERE, WHEN, WHO, WHY and HOW)		

Gemba Kaizen:

Muda in Japanese means work without a product or effort wasted. *Muri* refers to an overburden system. *Mura* means unevenness in the flow of work. Masaaki Imai, chairman of Kaizen Institute, propounded the concept of Gemba Kaizen. *Gemba* means 'real place' or the place where the real action takes place like factory or shop floor in an Industry, while in the service sector; Gemba refers to the administrative offices. According to M. Imai: Gemba is the teacher of any effective manager, when he or she goes to gemba, what they see is the real data. The report from gemba they read sitting at their office, desk is merely secondary information.

Gemba management follows 5 golden rules, called the 5 – gemba principle, as follows:

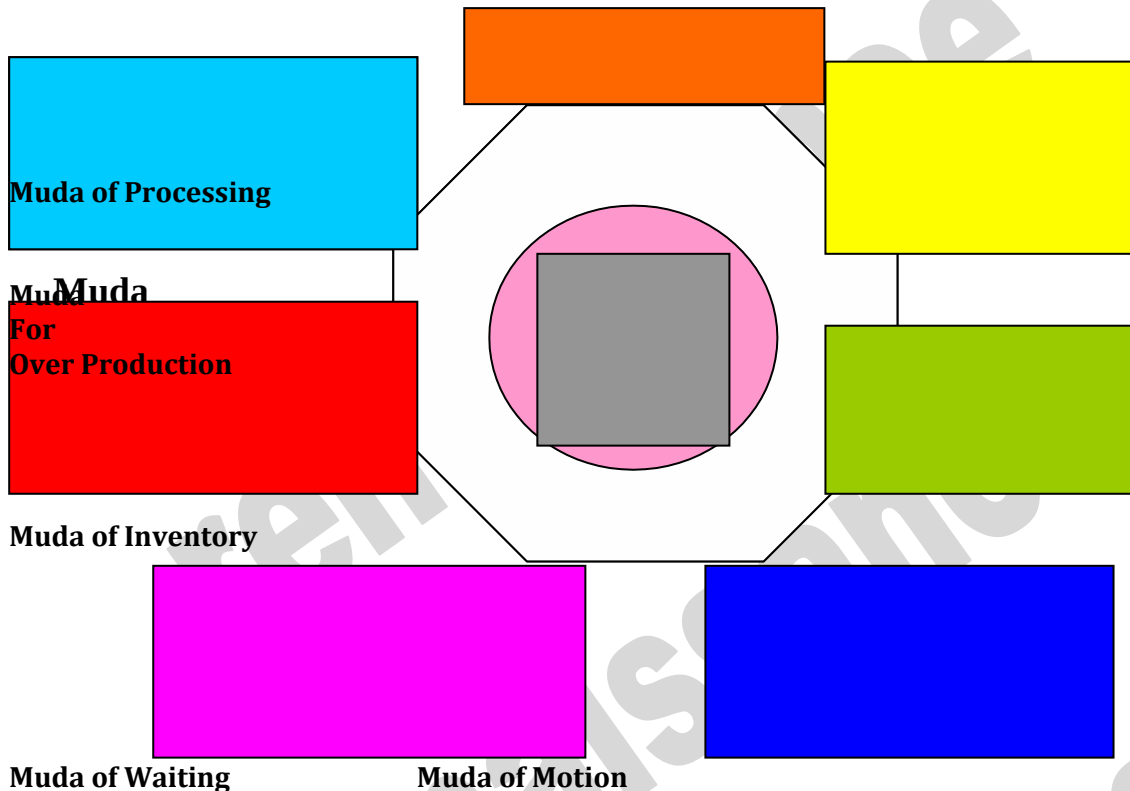
1. When a trouble (abnormality) happens, go to gemba first and observe it by own eyes.
2. Check with *gembutsu*- means some tangible things on which you can put your hands (machines, tools, rejects, and customer complaints).
3. Take temporary counter measures on the spot for ongoing solution but do not address the real issue that adds to the extent.
4. Find out the root cause: by repeating the question 'why' several times with the team manager can find out the root cause of the problem.
5. Standardize for prevention of recurrence – once the root cause is identified, counter measures came up with solutions; it is the time to standardize such a countermeasure so that the same problem will not recur.



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One major tool of Gemba Kaizen is Muda Elimination. Various types of muda are as follows:



Values of Kaizen in Total Quality Management:

- Safety
- Security
- High productivity
- Quality
- Commitment and partnership
- Cost effectiveness in entire business environment
- Team concept and ownership

Kaizen effects at Taj Hotels:

The famous Taj Hotels (Rs. 687 crore India Hotels Corporation Ltd) belong to the TATA group. The Taj Hotels chain is ranked amongst the best three hotel chains in Asia, but the aim is to be among the top chains in the world. Over the past three years, the group has institutionalized both the kaizen approach and total productive maintenance. Sr. vice president (corporate quality) Mr. H.N. Shrinivas, personally visited the world's leading hotel chains such as the Ritz Carlton (Marriott group) and four seasons to pick up the best practices.

The Taj group benchmarked with **Ritz Carlton** on customer satisfaction measurement in luxury hotels. It has also adopted its 'three steps to service' philosophy which is used for defining performance requirements of employees at all levels – warm welcome, anticipatory, service, and farewell.



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According to Taj Hotels, three functions should happen simultaneously within any organization – maintenance, **innovation**, and **kaizen**. Maintenance refers to maintaining the current status, where procedures are set and the standard standards implemented. Innovation refers to breakthrough activities initiated by top management, buying new machines, new equipments, developing new markets, directing R & D, change of strategy etc. In the middle, there is kaizen, small steps but continuing improvements ‘without large capital investments’. Kaizen should be implemented by the staff at all levels with encouragement and direction from the management. Taj Hotels follow the ten basic tips for kaizen implementation:

- Discard conventional fixed ideas
- Think of how to do it, not why it cannot be done.
- Do not make excuses, start by questioning on current practices
- Do not search perfection, do it right way, even it for only 50% of the target.
- For any mistake, correct it right away.
- Don't spend money for kaizen, use wisdom.
- Wisdom is brought out when faced with hardship.
- Ask ‘why? Five times and seek root causes.
- Seek the wisdom of ten people rather than the knowledge of one.
- In kaizen, ideas are infinite and sky is the limit.

Energy conservation at Taj Bengal, Kolkata – an example	
Before Kaizen	After Kaizen
Electrical energy was being wasted due to misuse of electricity operated kitchen equipments such as hot ranges, ovens etc.	After a proper study and discussion with the concerned team, all the under used electrically operated kitchen equipments have been disconnected and removed
Fresh air and exhaust fans were running beyond the operating hours in various kitchen	Timers have been provided for the fresh and the exhaust fans of various kitchens.
Air conditioners of various offices were running beyond working hours	Timers have been provided for the air – conditioners of various offices.
Unwanted lights in lobby corridors were on during the night.	The 300W halogen lights have been replaced with 70W metal halide lamps. Timer have been provided and cabling modified for the alternative handy lights of lobby corridors
ULTIMATE GAINS FROM THIS KAZEN APPLICATION AT TAJ	
Annual savings of Rs. 19.62 lakh and in terms of savings in electricity, there is a total savings of 4,01,317 KWH annually.	



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Finally, there are always two external forces acting on an organization:

1. The improvements made by competition
2. The ever-increasing pressure from customers and the market.

A company will fail if its people have "Let's stop here", 'Hold performance at this level', or "We have done enough" attitude. Therefore, it is important to build awareness of Kaizen as a continuous process through out the company; use the Kaizen strategy as management tool within the TQM movement.

Quality Circle

Historical Background and why an organisation should institutionalise this concept

Dr. K. Ishikawa started Quality Control Circles (known as Quality Circles in India and in many nations) originally for the self and mutual development of the workmen. They are also a very logical outcome of the Japanese drive for training and accomplishment in quality control and quality improvement.

From the early 1950's, Japanese learnt from the seed courses of Dr. E. Deming's on statistical methods for quality control and Dr. J. Juran's courses on Quality Management. With zeal for learning and self-sufficiency, they vigorously promoted quality education by local experts across their country. It began with massive education of engineers, and then top and middle managers, supervisory levels.

Under their system of organising work, it became logical to extend training on quality to the Gemba-cho', the 'leading hand' of the workers in a section. Dr. Kaoru Ishikawa and his associates realised the immense potential of front line employees. It is not only the best way to help people to develop their own potential but also from the organisation point of view for contribution through training, development and motivation for quality control and improvement.

The training featured intra departmental groups of 10 or so workers seated around a table and hence the name 'QC Circle'. This thought revolution has been of immense benefit to Japan as a country, to the Japanese organisations that adopted it and to most of the ASEAN countries who have been pursuing it.

Problem solving was no more the exclusive purview of supervisors and managers (with workers only to do as told) but the people who are performing the tasks at work place are trained and empowered to solve work related problems and recommend solutions. Persons becoming members of Quality Circles realise and develop their potential, individually and in groups, acquiring new skills and competencies. Such competencies only will help to improve their performance and capabilities for their own betterment.

ROAD MAP RECOMMENDED AND USED BY QCFI FOR THIS PROCESS

Assessment of the prevalent conditions in the organisation/units/divisions through a survey.

Exposure programme to top management, senior management, discussion on survey findings and decisions for next steps.



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Formation of a Quality Council/Steering Committee and choice of the coordinator and facilitators; roles and responsibilities of each.

Working out an action plan and schedule, taking care to incorporate.

Key concerns arising from the survey findings and actions agreed upon.

- Developing facilitators and internal trainers through intensive training.
- Exposure to all the supervisory/middle management personnel, from areas where Quality Circles are to be started.
- Exposure to all the workmen in the division/unit where initially circle formation is aimed at formation of the initial Circles, education and training to all the members of the Circles on the processes, tools, techniques, maintenance of records, etc.
- Guiding and troubleshooting in the implementation stage by attending monthly review meetings of the steering committee/quality council for the first 6 months and bi-monthly, afterwards

What is quality circle?

A group of employees who perform similar duties and meet at periodic intervals, often with management, to discuss work-related issues and to offer suggestions and ideas for improvements, as in production methods or quality control, called quality circle.

Therefore quality circle is nothing but a small group of employees who come together to discuss with the management issues related to either quality control or improvement in production methods form a Quality Control Circle (QCC). These employees usually work in the same areas, and voluntarily meet on a regular basis to identify, analyze and solve their problems.

Key Characteristics of quality circle:

- A circle, usually consisting of 6-8 members, from the same section.
- Membership of a Quality Circle is voluntary.
- Circle members should meet regularly, ideally once a week, in particular place also in particular time.
- Circle members select a name for their circle in the first meeting and elect a leader to conduct the meetings.
- Members are specially trained in problem solving and analysis techniques in order to play their role effectively.
- Circle works on a systematic basis to identify and solve work – related problems for improving quality and productivity not just discussing them.
- The management must ensure that solutions are implemented quickly once they have been accepted
- The management must give appropriate and proper recognition to solution

Why Quality Circle:

It is said that 95% of the problems in workshops can be solved through quality control tools. The Japanese have experienced this! The quality control tools useful for QCCs are Pareto Diagrams, Cause-and-Effect Diagrams, Stratification, Check Sheets, Histograms, Scatter Diagrams, Graphs and Control Charts. Also, logical thinking and experience are a must for solving problems. Therefore the



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main objectives of QC are:

- To improve quality and productivity.
- To reduce the cost of products or services by waste reduction, safety, effective utilization of resources, avoiding unnecessary errors and defects.
- To identify and solve work-related problems and interfere with production as a team.
- To tap the creative intelligence of people working in the org. and make full use of human resources.
- To improve communication within the organization.
- To improve employees loyalty and commitment to the organization and its goals. **(Promoting**

Morale of employees)

- To build a happy, bright, meaningful work environment.
- To satisfy the human needs of recognition, achievement and self development

The benefits of introducing a quality control circle program in the work place are many.

- Heightened quality awareness reveals faults in the system that might obstruct good practices.
- It improves the quality of your firm's products and services, thereby increasing the value of your brand, and securing your customers' confidence. The quality of customer relationship management can be further enhanced by using help desk software from the likes of Pro software.
- The people who are part of the quality control circle will feel a sense of ownership for the project. Higher yields and lower rejection rates also result in enhanced job satisfaction for workers, which in turn drives them to contribute more.
- A quality control circle program also brings about improved two-way communication between the staff and the management.
- Finally, the financial benefits will certainly exceed the costs of implementing the program. A study revealed that some companies improved their savings ten fold!

Basic Organizational Structure of QC:

A quality circle should have an appropriate organizational structure for its effective and efficient performance. The structure may vary from one org. to another, but it is useful to have basic framework as a model:





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In a typical organization, the structure of a QC may consist of the following elements:

- **Steering committee** – Gen. manager / works manager, rep. from top management, rep. of human resource development and a rep. of employees' union.
- **Coordinator:** an administrative officer / personnel officer from middle level management.
- **Facilitator:** senior supervisory officer / foreman. A facilitator may manage up to 10 circles. A facilitator is usually from one of the three departments – quality control, production or training.
- **Circle Leader:** circle leaders may be from the lowest level of supervisors. A circle leader organises and conducts circle activities.
- **Circle members:** line and / or staff workers (circle members should attend all meetings as far as possible, offer suggestions and ideas, participate actively in group processes, and attain training seriously.

How to implement quality circle:

- Firstly, the management is informed about the quality control circle process that is being planned.
- A committee is formed, and key persons such as a coordinator and in- house coach are selected.
- The scope is defined, and areas of application identified.
- First-line supervisors in the identified areas are given QCC presentations. It is important to make these impressive, and valuable tips on the subject are available.
- This is followed up with extensive training for coordinators and middle management on the process and their roles.
- Employees are invited to become members of a circle, and trained suitably once they sign up. Thus, a circle is formed and begins work. These may give rise to other circles.
- Problems are discussed and solved in a systematic manner in the QCCs. It is very important that solutions are implemented as quickly as possible, to maintain the momentum.

Usually QCC programs must operate in all sections of the company i.e., in the offices, service operations and manufacturing. But remember, while the size of the company is not important to a program's success, the following factors certainly are:

- Voluntary participation.
- Management support.
- Employee empowerment.
- Training programs.
- Team work.
- Problem solving skills.

Conclusion:

Generally, a quality control circle program requires the same framework as an ISO 9000 quality standard with regard to the management structure and training. Hence, QCCs should be part and



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parcel of your company's Total Quality Management (TQM) initiative. However, QC followed some ethics, those are:

- Criticise ideas, not persons.
- The only stupid question is the one that is not asked.
- Everyone in the team is responsible for the team's progress.
- Be open to other's ideas.
- Pay, terms of employment and other negotiable items are excluded.

Limitation OR when QC is inactive?

- Inadequate Training
- Unsure of Purpose
- Not truly Voluntary
- Lack of Management Interest
- Quality Circles are not really empowered to make decisions.
- Too many suggestions.

QUALITY FUNCTION DEPLOYMENT (QFD):

Introduction:

QFD is a technique used to carry the voice of the customer through design and the production process. It is actually, a customer – driven planning process to guide the design, manufacturing and marketing of goods. It tries to eliminate the gap between: What customer want in a new product and what the product must deliver. QFD is designed to help planners focus on characteristics of a new or existing product or service from the viewpoints of customer/market segments, company, or technology- development needs.

QFD was originated at Bridgestone Tyre, Kurume plant, where the quality chart was used for the first time in 1966. Dr. Mizuno, professor of the Tokyo Institute of Technology, is credited with initiating the Quality Function Deployment (QFD) system. The first application of QFD was at Mitsubishi, Heavy Industries Ltd., in the Kobe Shipyard, Japan, in 1972. Professor Yoji Akao (Asahi University, Tokyo) has been credited with developing this technique to the present form. QFD was successfully implemented by Mini – Vans by Toyota in 1977.

Quality function deployment (QFD) was originally developed by Yoji Akao in 1966 when the author combined his work in quality assurance and quality control points with function deployment used in Value Engineering. Mr. Akao described QFD as a “method to transform user demands into design quality, to deploy the functions forming quality, and to deploy methods for achieving the design quality into subsystems and component parts, and ultimately to specific elements of the manufacturing process.”

QFD is a structured method in which CRs are translated into appropriate Technical Descriptors / specifications for every stage of product development and production. It is a technique consisting of a series of interlocking Matrices that translates customer need into product and process characters.

Therefore, QFD is a technique used to carry the voice of the customer through design and the production process. It is actually, a customer – driven planning process to guide the design,



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manufacturing and marketing of goods. It tries to eliminate the gap between what customer want in a new product and what the product must deliver.

QFD is designed to help planners focus on characteristics of a new or existing product or service from the viewpoints of market segments, company, or technology- development needs. The technique yields graphs and matrices. QFD has been used by several corporations and organizations.

Purpose of QFD

The main purpose of QFD is to ensure that CRs are incorporated into every aspects of the design and production process. However, in 1987, the QFD research group of the Japanese Society of Quality Control (JSQC) led by Akao published a final survey report on the status of QFD application among 80 Japanese companies. The companies surveyed listed the following as the purpose o using QFD:

- Setting design quality and planned quality
- Benchmarking competitive process
- New product development that sets the company apart form competitors analyzing and accumulating market quality information
- Deploying design intent into manufacturing
- Identifying control points for the Gemba

The Quality Function Deployment (QFD) Technique:

The structure of the QFD is based on a set of Matrices. The main matrix relates CRs (WHAT) and their corresponding technical requirements (HOW)

CRs	Importance to the customer	TDs			
					Relationship Matrix

The primary planning tool used in QFD is the “**House of Quality**”. The house of quality translates the voice of the customer into design requirements that meet specific values. It also matches those requirements against the ability of the organization to meet them. The basic structure of QFD can be thought of as a framework of a house like:





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1. Identifying the Customer and determining Customer Requirements: Who is the customer? In addition to the person buying the product, the customers of the design engineer would also include the manufacturing and assembly engineers and workers. (or anyone else downstream of the design process). The goal is to develop a list of all the customer requirements (made up in the customer's own words) that will affect the design. This should be accomplished with the whole design team, based on the results of customer surveys.

2. Identify Technical Descriptors / Requirements (Voice of the organization): The ceiling or second floor, of the house contains the technical descriptors / requirements. The goal of the house of quality is to design or change the design of a product in a way that meets or exceeds the customer expectations.

- Each engineering characteristics must directly affect a customer perception and be expressed in measurable terms.
- These characteristics are an expression of the voice of the customer.
- Brainstorming among the engineering staff is a suggested method for determining the technical descriptors.
- Eventually, technical requirements are the "hows" by which the company respond to the "whats" – customer requirements.

3. Interrelationship between Customer requirements & Technical requirements: The next step in building a house of quality is to compare customer requirements and technical descriptors and determine their respective relationships.

- The interior walls of the house are the relationships between customer requirements and technical descriptors.
- Customer expectations (customer requirements) are translated into engineering characteristics (technical descriptors)

4. Interrelationship between Technical Descriptors: The roof of the house is the inter-relationship between any pair of technical descriptors. Various de notes these relationships. **For**

Example: the symbol ⊙ denote a very strong relationship, ○ for a medium relationship and ◐ denotes a weak relationship. This relationships indicate answers to questions such as, "How does one change of product attributes affect others"? And assessment of trade-offs between attributes.

5. Competitive Assessment through Competitive Benchmarking: The goal here is to determine how the customer perceives the competition's ability to meet each of the requirements. This forces awareness of what already exists and points out opportunities for improving upon that which already exists. **Each competing product is compared with customer requirements. Some comparisons are objective and others are subjective.**

6. Prioritizing the Customers Requirements: A weighting factor is generated for each requirement. The weighting factor will give the designer an idea of how much effort, time and money to invest in achieving each requirement.

7. Translating the Customer Requirements into Measurable Engineering



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Requirements: The goal here is to develop a set of engineering requirements (often called design specifications) that are measurable for use in evaluating the proposed designs:

1. Transform the customer requirements into engineering requirements and
2. make sure that the engineering requirements are measurable.

Benefits of Quality Function Deployment:

QFD was originally implemented to reduce start up costs. Organizations using QFD have reported a reduced product development time. For example US car manufacturers of the late 1980s and early 1990s needed an average of 5 years to put a product on the market, from drawing board to showroom, where as Honda put a new product on the market in two and a half years and Toyota did it in 3 years. Both organizations credit this reduced time to the use of QFD. Product quality and , consequently, customer satisfaction improve with QFD due to numerous factors depicted in following:

A. Improve Customer Satisfaction	• Creates focus on customer requirements • Uses competitive information effectively • Prioritizes Resources • Identifies items that can be acted upon • Structures resident information
B. Reduce Implementation Time	• Decreases mid stream decisions changes • Limits post introduction problems • Avoids future development redundancies • Identifies future application opportunities • Surfaces missing assumption
C. Promotes Teamwork	• Based on consensus • Creates communication at interfaces • Identifies actions at interfaces • Creates global view of details
D. Provides Documentation	• Documents rationale for design • Is easy to assimilate • Adds structure to the information • Adapts to changes • Provide frameworks for sustainability analysis

Operational process of QFD:

1. When an organization decides to implement QFD, the project manager and team members need to be able to commit to form small team and significant time to it, especially in the early stage.
2. Priorities of the project must be inform to all departments within the organization, so team members can budget their time accordingly.
3. Formation of two teams designing a new product or improving existing products (Team members are from marketing, design, quality, finance and production).
4. Periodic team meetings
5. Inter team communication and feedback
6. Improve the quality as well (fulfil the customer requirements)



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Application of QFD:

The first application of QFD was at Mitsubishi, Heavy industries Ltd. in the Kobe Shipyard, Japan in 1972. After 4 years of case study development refinement, and training, QFD was successfully implemented in the production of mini – vans by Toyota. Using 1977 as a base, a 20% reduction in start up costs was reported in the launch of the new van in October 1979, a 38% reduction by Nov.1982 and a cumulative 61% reduction by April 1984. QFD was first introduced in the United States in 1984 by Dr. Clausing of Xerox. QFD can be applied to practically any manufacturing or service industry. It has become a standard practice by most leading organizations, who also require it of other suppliers.

Conclusion:

Because QFD concentrates on customer expectations and needs, a considerable amount of efforts is put into research to determine customer expectations. This process increases the initial planning stage of the project definition phase in the development cycle. But the result is a total reduction of the overall cycle time in bringing to the market – a product that satisfies the customer.

The driving force behind QFD is that the customer dictates the attributes of a product. Customer satisfaction, like quality, is defined as meeting or exceeding customer expectations. Words used by the customers to describe their expectations are often referred to as the **voice of the customer**.

Sources for the determining customer expectations are focus groups, surveys, complaints, consultants, standards and federal regulations. Frequently, customer's expectations are vague and general in nature. It is the job of the QFD team to analyze these customers' expectations into more specific customer requirements. Customer requirements must be taken literally and not incorrectly translated into what organization officials' desire.

QFD begins with marketing to determine what exactly the customer desires from a product. During the collection of information, the QFD team must continually ask and answer numerous questions, such as:

- What does the customer really want?
- What are the customer's expectations?
- Are the customers expectations used to drive the design process?
- What can the design team do to achieve customer satisfaction?

Finally, the goal of QFD is not only to meet as many customer expectations and needs as possible, but also to exceed customers' expectations.

Business Process Reengineering:

Introduction: "Incremental improvement" and 'Total customer satisfaction' are the main mantra in competitive edge of any business. But to incremental improvement and TCS, improvement/change in manufacturing process is not enough, need radical change in inter functional, inter organizational and customer based processes. Similarly, in service industry, rapid changes in information technology and its applications have been a major enabler of successful business.

In 1990, two Americans, **James Champy and Michael Hammer** presented the idea of business



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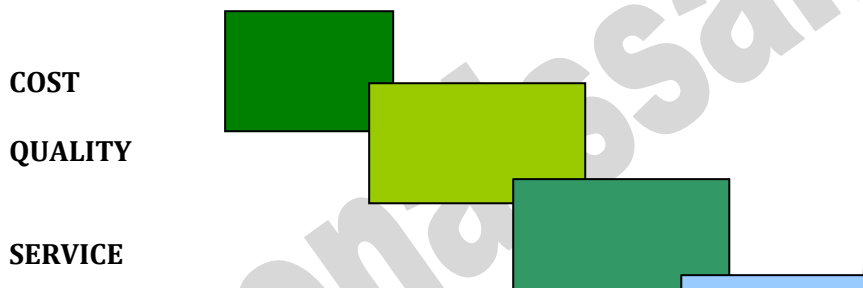
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process reengineering. They coined the word: '**Business Process Reengineering (BPR)**' in their famous book – "**Reengineering the corporation**" published in 1993.

What is BPR?

According to **Michael Hammer**, Reengineering has been defined as " the fundamental rethinking and radical design of business processes to achieve dramatic or break through improvement in critical contemporary measures of performance such as **Cost, Quality, Service and Speed**."



Therefore, Business Process Reengineering or process reengineering, or simply reengineering is focused on break through improvement to dramatically improve the quality and speed of work and to reduce its cost by fundamentally changing the processes by which works get done.

Hammer states that B.P may be defined as a set of logically related task to achieve a defined business outcome. A set of process forms a business system the way in which a business unit or a collection of units carries out its business. Requirement of Reengineering process are:

1. **Critical processes** – core business process rather functional process
2. **Strong leadership** – a sense of ownership
3. **Cross functional team** for continuous growth - top down and bottom up initiatives can be combined – the top down for performance targets and the bottom up for deciding from to achieve the target.
4. **Information Technology**: who need the information when they need it and when?
5. **Clean state philosophy**: price target for the product or services, deduct profit desired and then find a process that providing what customers wants at the price the customer will pay.
6. **Process analysis** – what, where, when, why and the outcomes.



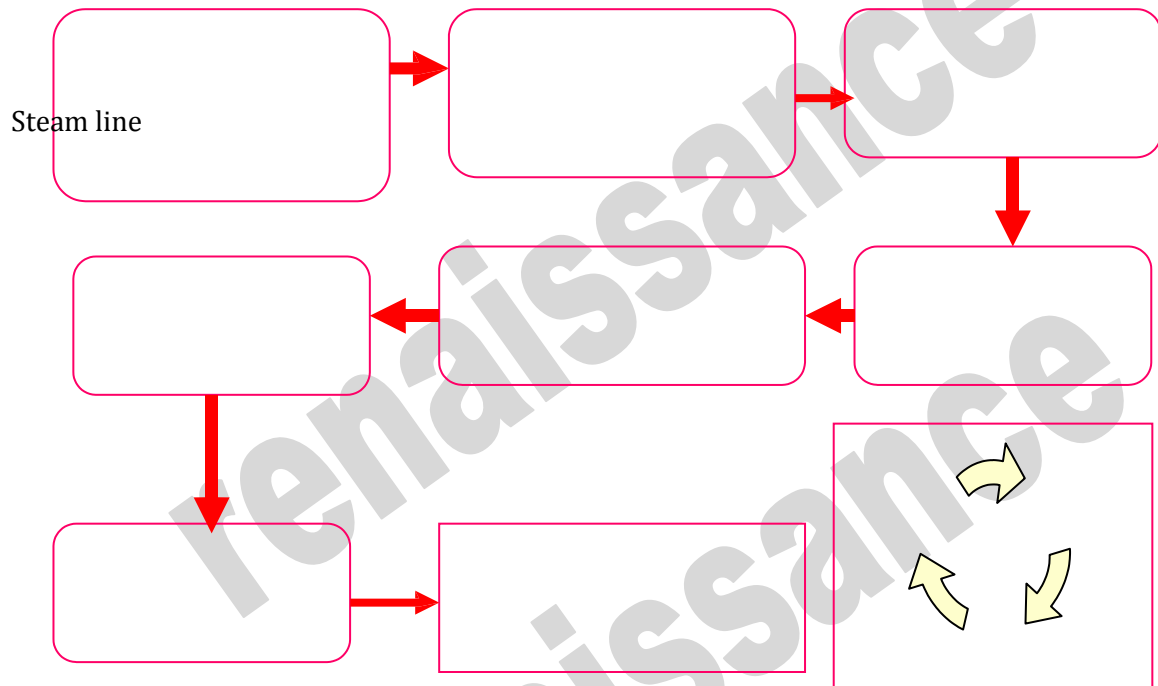
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Develop

Business

Vision and process objectives

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Measurement And Control

Continuous
Improvement

Rethink Redesign

Retool

Fig. Business Process Reengineering Process Flow

When and why BPR is required?

or organizations that want to survive and grow, improvement is not an option but a compulsion and key to success. When an organization realizes that the old ways of doing things needs changing or its customers are taking over its market share, or not, many processes in the organization may need reengineering, not a major tweak, but a major overhaul. Some of the symptoms that signal that it is the time to start reengineering these are:

- If takes too long time for an organization to move its products from conception to the market place as compared to its competitors.
- The budgeting process may be too complex
- The services provided by the organization are not compatible with its customers needs.

Assuming that a company has decided that its processes are ineffective and inefficient the following are the major steps the company should embark on to redesign its process:

1. Strategic Redesign of Process:

- Understand and measure existing processes
- Identify processes to be redesign
- Develop business vision and process objectives.

2. Identify information technology levels:

- 100% utilization of a new technology
- Brainstorming sessions to identify new approaches

3. Design and build a prototype of the process:

- Plan as per strategic redesign



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- Implementing organizational and technical aspects

4. Involvement of Right teams of people

5. Continuous feedback and improvement of processes.

BPR / Reengineering entail the following seven rules or principles:

1. Organize around outcomes, not tasks
2. Have those who use the output of the process perform the process.
3. Merge information processing work into the real work that procedures the information
4. Treat geographically dispersed resources as through them work centralized.
5. Link parallel activities instead of integrating their results.
6. Put the decision point where the work informed and build control into the process.
7. Capture information once at the sources.

Reengineering in Service Industry:

Like manufacturing industry, RE is similar important for service industry also. According to Janson 3 salient features of reengineering in the Service sector are:

1. Make the customer the starting point for change
2. Design work processes in light of organizational goals and
3. Restructure to support front line performance

Impacts:

- Human dimension - focuses on customers and employees
- Work process dimension – multi skilled services profession
- Technology dimension – new techniques and automations

Benefits of Reengineering:

1. Achievements of radical changes in performance measured by cost, cycle time, services and quality.
2. Boosting competitiveness in the operational networks
3. Helps to think big (revolutionary thinking)
4. Helps to make noticeable changes in the pace and quality of response to customers needs
5. Resulting new org. designs that helps firms respond better to competitive pressures, increase market shares and profitability and improve cycle times, cost ratio and quality (org. renewal)
6. Bring change in the corporate culture, encourage workers for better participation and better result.
7. Reengineering has helped to create more challenging and more rewarding jobs with broader responsibilities for employees.

Limitations:

1. Not a panacea for all problems
2. Not simple or easily done, not is it appropriate for all processes for all organization.
3. Use of information technology is a must to gain significant process improvement.
4. Improvement of processes requires active participation of people who actually perform the work.

Reengineering Process and TQM:

Michael Hammer argues that the two concepts are compatible and actually complement each



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other. Both concepts have the same focus – “customer satisfaction”

However, the relevance of REP in TQM are as follows:

TQM has advocated continuous and incremental improvement of processes (Kaizen) where as reengineering is about radical discontinuous change (break through improvement) through process innovation.

However, the reengineering gave; together with quality Gurus such as Deming and Juran all agreed that innovation and break through in processes are essential parts of Quality Management. In fact incremental and breakthrough improvements are complementary approaches that fall under TQM umbrella. Reengineering requires the support of TQM to be successful.



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UNIT –IV

What is Six Sigma?

First, what it is not. It is not a secret society, a slogan or a cliché. Six Sigma is a highly disciplined process that helps us focus on developing and delivering near-perfect products and services. Why "Sigma"? The word is a statistical term that measures how far a given process deviates from perfection. The central idea behind Six Sigma is that if you can measure how many "defects" you have in a process, you can systematically figure out how to eliminate them and get as close to "zero defects" as possible. Six Sigma has changed the DNA of GE — **it is now the way we work** — in everything we do and in every product we design.

GE's Evolution Towards Quality

GE began moving towards a focus on quality in the late '80s. Work-Out®, the start of our journey, opened our culture to ideas from everyone, everywhere, decimated the bureaucracy and made boundaryless behavior a reflexive, natural part of our culture, thereby creating the learning environment that led to Six Sigma. Now, Six Sigma, in turn, is embedding quality thinking — process thinking — across every level and in every operation of our Company around the globe. Work-Out® in the 1980s defined how we behave. Today, Six Sigma is defining how we work and has set the stage for making our customers feel Six Sigma.

GE's Evolution Towards Quality

Six Sigma Quality:

The Road to Customer Impact

Key Strategy Initiatives:

QMI, NPI, OTR, SM, Productivity, Globalization

Change Acceleration Process:

Increase Success and Acceleration Change

Process Improvement:

Continuous Improvement, Reengineering

Productivity/Best Practices:

Looking Outside GE

Work-Out/Town Meetings:

Empowerment, Bureaucracy Busting

1990

TIME



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Key Elements of Quality ... Customer, Process and Employee There are three key elements of quality: customer, process and employee. Everything we do to remain a world-class quality company focuses on these three essential elements.

...the Customer

Delighting Customers

Customers are the center of GE's universe: they define quality. They expect performance, reliability, competitive prices, on-time delivery, service, clear and correct transaction processing and more. In every attribute that influences customer perception, we know that just being good is not enough. Delighting our customers is a necessity. Because if we don't do it, someone else will!

...the Process

Outside-In Thinking

Quality requires us to look at our business from the customer's perspective, not ours. In other words, we must look at our processes from the outside-in. By understanding the transaction



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lifecycle from the customer's needs and processes, we can discover what they are seeing and feeling. With this knowledge, we can identify areas where we can add

Customer's View of GE's Contribution

**Customer
Process**

A

B

C

significant value or improvement from their perspective.

...the Employee

Leadership Commitment

GE Process

GE's View of Its Contribution

People create results. Involving all employees is essential to GE's quality approach. GE is committed to providing opportunities and incentives for employees to focus their talents and energies on satisfying customers.

All GE employees are trained in the strategy, statistical tools and techniques of Six Sigma quality. Training courses are offered at various levels:

Quality Overview Seminars: basic Six Sigma awareness.

Team Training: basic tool introduction to equip employees to participate on Six Sigma teams.

Master Black Belt, Black Belt and Green Belt Training: in-depth quality training that includes high-level statistical tools, basic quality control tools, Change Acceleration Process and Flow technology tools.

Design for Six Sigma (DFSS) Training: prepares teams for the use of statistical tools to design it right the first time.

Quality is the responsibility of every employee. Every employee must be involved, motivated and knowledgeable if we are to succeed.

The Six Sigma Strategy - To achieve Six Sigma quality, a process must produce no more than 3.4 defects per million opportunities. An "opportunity" is defined as a chance for nonconformance, or not meeting the required specifications. This means we need to be nearly flawless in executing our key processes. Six Sigma is a vision we strive toward and a philosophy that is part of our business culture.

Our Customers Feel the Variance, Not the Mean

Often, our inside-out view of the business is based on average or mean-based measures of our recent past. Customers don't judge us on averages, they feel the variance in each transaction, each product we ship. Six Sigma focuses first on reducing process variation and then on improving the process capability.

Customers value consistent, predictable business processes that deliver world-class levels of quality. This is what Six



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Sigma strives to produce.

GE's Commitment to Quality

GE's success with Six Sigma has exceeded our most optimistic predictions. Across the Company, GE associates embrace Six Sigma's customer-focused, data-driven philosophy and apply it to everything we do. We are building on these successes by sharing best practices across all of our businesses, putting the full power of GE behind our quest for better, faster customer solutions.

Quality Approaches and Models

DFSS – (Design for Six Sigma) is a systematic methodology utilizing tools, training and measurements to enable us to design products and processes that meet customer expectations and can be produced at Six Sigma quality levels.

DMAIC – (Define, Measure, Analyze, Improve and Control) is a process for continued improvement. It is systematic, scientific and fact based. This closed-loop process eliminates unproductive steps, often focuses on new measurements, and applies technology for improvement.

Six Sigma – A vision of quality which equates with only

3.4 defects per million opportunities for each product or service transaction. Strives for perfection.

Quality Tools

Associates are exposed to various tools and terms related to quality. Below are just a few of them.

Control Chart – Monitors variance in a process over time and alerts the business to unexpected variance which may cause defects.

Defect Measurement – Accounting for the number or frequency of defects that cause lapses in product or service quality.

Pareto Diagram – Focuses on efforts or the problems that have the greatest potential for improvement by showing relative frequency and/or size in a descending bar graph. Based on the proven Pareto principle: 20% of the sources cause 80% of any problems.

Process Mapping – Illustrated description of how things get done, which enables participants to visualize an entire process and identify areas of strength and weaknesses. It helps reduce cycle time and defects while recognizing the value of individual contributions.

Root Cause Analysis – Study of original reason for nonconformance with a process. When the root cause is removed or corrected, the nonconformance will be eliminated.

Statistical Process Control – The application of statistical methods to analyze data, study and monitor process capability and performance.

Tree Diagram – Graphically shows any broad goal broken into different levels of detailed actions. It encourages team members to expand their thinking when creating solutions.

Quality Terms

Black Belt – Leaders of team responsible for measuring, analyzing, improving and controlling key processes that influence customer satisfaction and/or productivity growth. Black Belts are full-time positions.

Control – The state of stability, normal variation and predictability. Process of regulating and guiding operations and processes using quantitative data.



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CTQ: Critical to Quality (Critical "Y") – Element of a process or practice which has a direct impact on its perceived quality.

Customer Needs, Expectations – Needs, as defined by customers, which meet their basic requirements and standards.

Defects – Sources of customer irritation. Defects are costly to both customers and to manufacturers or service providers. Eliminating defects provides cost benefits.

Green Belt – Similar to Black Belt but not a full-time position.

Master Black Belt – First and foremost teachers. They also review and mentor Black Belts. Selection criteria for Master Black Belts are quantitative skills and the ability to teach and mentor. Master Black Belts are full-time positions.

Variance – A change in a process or business practice that may alter its expected outcome.



UNIT V

1. INTRODUCTION

Statistical Process Control (SPC) charts offer users the chance to monitor the very heartbeat of their processes. By collecting data they can predict performance. Taking sample readings from a process seems straightforward. Of does it? Look more closely. Do we understand our process fully?

In manufacturing areas we probably do. In non-manufacturing areas we may be less confident. And who collects the data? What sample size is required? How often are samples taken? These are vital questions to those intending to daily use the control chart with a view to improving process performance, particularly in non-manufacturing, or service, areas where the techniques are new.

The control chart has been with us since 1924. It has been tried and proven, and accepted as a highly effective tool in improving processes. In view of the fact that there is currently renewed interest in Shewhart's work, it is important to consider how the control limits were originally set up.

However, at the end of the day, it is the logic and rules of collecting data and interpreting the pattern of points on the chart that is the important issue in understanding process behaviour and the discovery of insights for process improvement.

2. HISTOGRAMS & CHARTS

Figure 4 shows a typical set of readings obtained by collecting samples from a process. Control charting requires the mean of each sample to be used, rather than the individuals. Figure 4 also shows the calculated values of the mean $\bar{X}$ and range R .

x_1	7	8	7	6	8	10	11	8	9	8	7	9	5	7	8	10	7	7	7	7
x_2	7	7	4	7	7	7	10	3	9	7	7	7	10	6	5	4	6	8	11	9
x_3	6	6	9	6	10	8	8	10	4	10	4	7	10	7	6	8	7	10	6	10
x_4	8	7	8	7	5	6	5	7	9	7	10	8	9	6	7	9	7	5	5	9
x_5	5	9	6	9	6	6	5	9	6	3	8	7	8	7	8	6	8	9	8	8
Σx	33	37	34	35	36	37	39	37	36	35	36	38	42	33	34	37	35	39	37	43
$\bar{X}$	6.6	7.4	6.8	7.0	7.2	7.4	7.8	7.4	7.2	7.0	7.2	7.6	8.4	6.6	6.8	7.4	7.0	7.8	7.4	8.6
R	3	3	5	3	5	4	6	7	5	7	6	2	5	1	3	6	2	5	6	3

Figure 4 – Presentation of sample data

The first stage in constructing a control chart for $\bar{X}$ requires $\bar{X}$, the mean, to be plotted against time as shown in Figure 5.

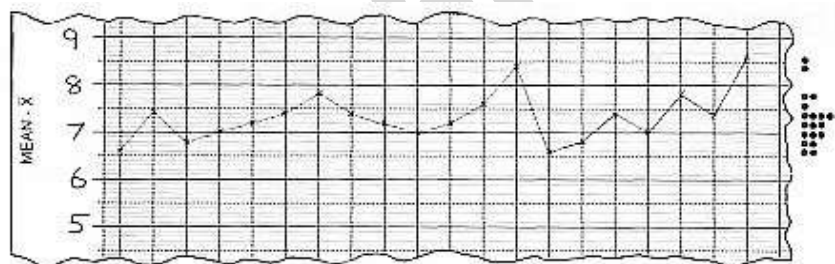


Figure 5 – Plot of the sample mean



The histogram corresponding to these X values is also shown to the right of the chart. This pattern of points over time results in a unique profile of points – or histogram. However, the reverse is not true. For example, if all that is known is the histogram, what can we determine about the process? Very little, in fact. Figure 6 illustrates just three of the many patterns which all give the same histogram. What the histogram does not tell us, therefore, is the manner in which it was built up. We need a graph over time to determine this, and these graphs, commonly called run charts, are a first step in generating control charts.

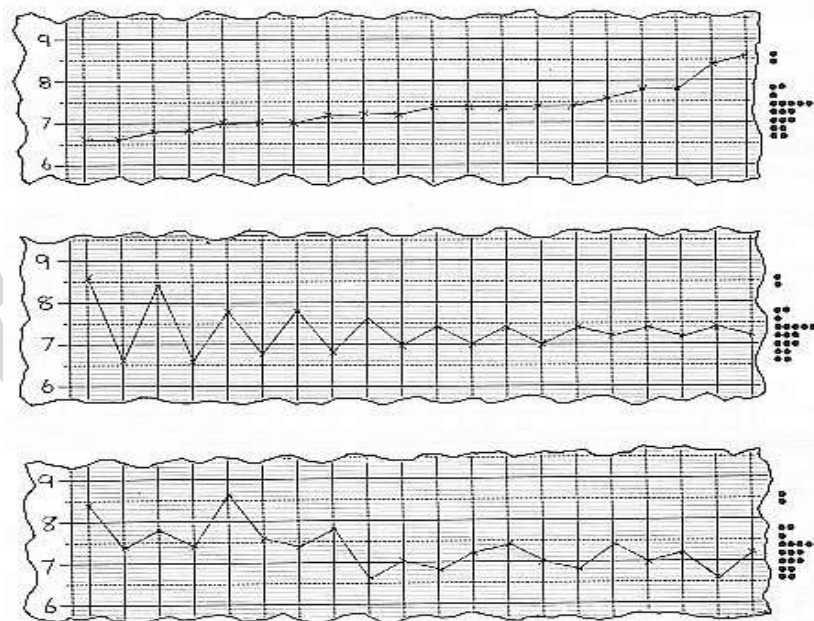


Figure 6 – Run charts from a common histogram

3. COMMON & SPECIAL CAUSES

The form of control chart which we use today was first generated by Shewhart. He recognised that if a process was stable it was also predictable. i.e., once the natural variation of the process has been determined, it is then possible to predict future performance. This natural variation of the process does not alter over time unless action is taken to change the system.

A process is defined as being stable if its natural variation is due to common causes. The process is then said to be under statistical control. If a process is unstable, that is because unusual factors are operating on the process. These factors, known as special causes, result in the process being out of statistical control. Shewhart recognised that we make mistakes at times, in that we take action when we should not do so.

Equally, we sometimes let things drift, assuming the process will right itself, when in fact we should react at the first sign of trouble. Shewhart was therefore aiming to devise a rule which would be sensitive enough to pick up a special cause, but not so sensitive as to react to extremes in terms of common causes.



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Take the figures plotted in Figure 5 as an example. It makes sense to use a central value as a reference point. The best measure of central location is the mean value, that is the 'average' obtained by adding all one hundred readings and dividing the total by 100, giving:
 $733 / 100 = 7.33$

In fact, this mean can be obtained much more directly. We already have the values of the 20 sample means. Hence the overall mean is given by the following calculation:
 $\Sigma X / 20 = 146.6 / 20 = 7.33$

This mean of the sample means is known as the grand mean, or $\bar{\bar{x}}$ (X double bar), thus:
 $\bar{\bar{x}} = 7.33$

Figure 7 shows our run chart of X values together with a line for $\bar{\bar{x}}$ conventionally drawn as a broken line and often called the central line. The question is now where do we draw lines on the chart which will sensibly indicate the presence of special causes?

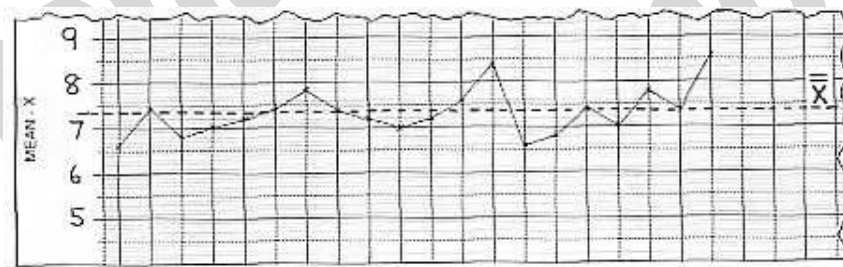


Figure 7 – Run chart for X with central line

4. CONTROL LIMITS

If we draw lines too close to $\bar{\bar{x}}$ as in Fig 6 then we will be reacting too often to points which are really part of the system and not special causes. Fig 7 shows the reverse - lines set so far out that they will not pick up any change unless it is a major one and obvious. A balance between these two cases is required. Shewhart chose lines set at three standard deviations away from $\bar{\bar{x}}$ - commonly known as control limits. Why three standard deviations? Because this number has been found to be economically practical in use over the past 75 years. It keeps a balance between over, and under, reaction to process behaviour patterns. Such limits represent pragmatically powerful markers of change in process performance. They can reliably provide a predictive warning of an onset of instability.

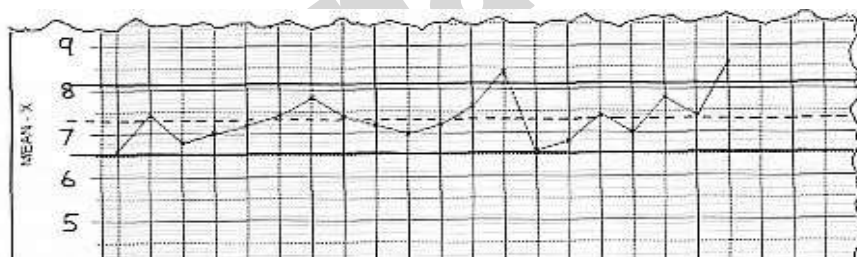




Figure 8 – Control chart for $\bar{X}$



Figure 9 – Run chart with decision lines too near to $\bar{X}$

There is a bit more to it than that, however, as you might expect, and the apparent simplicity of this rule brings with it some controversy. The derivation of the control limits has been a point of discussion on both sides of the Atlantic for over half a century. This is because Shewhart's original thinking has been augmented by others. (In particular we would refer the reader to the work of Don Wheeler, in the US, listed on p 24.)

In order to complete the control chart for $\bar{X}$, we now add a central line and upper and lower control limits (denoted by $UCL_{\bar{X}}$ and $LCL_{\bar{X}}$). This gives us the chart shown in Figure 10.

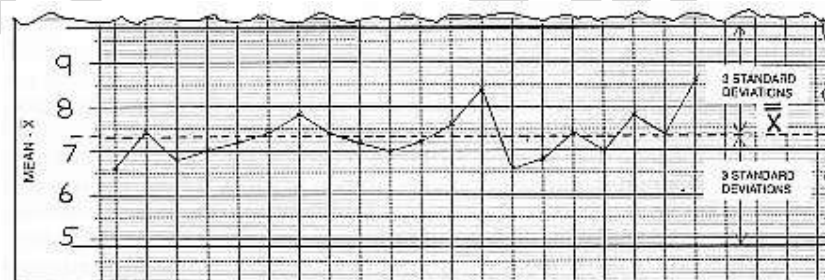


Figure 10 – Run chart with decision lines too far from $\bar{X}$

Determining the position of the lines will involve some simple formulae which depend on whether we are looking at multiple of individual readings. The arithmetic steps to calculate the limits are easy to master and summarised in the Appendix.

5. USING SPC TO DRIVE IMPROVEMENT

Whether charting variables or attributes the approach follows the same sequence: 1) Define the process; 2) Collect the data; 3) Set up the chart; 4) Plot the results; 5) Check on control, and 6) Adjust the process. Let us now consider each in turn. In manufacturing areas a process is easy to understand and define. In non-manufacturing areas it is less so. The processes tend to be more complex and more difficult to specify clearly.

A definition of the process needs to be obtained, but it requires careful preparatory work. Flow charting is a key tool in this definition. An additional problem is that administrative processes are much more people-orientated and as a result, personalities and emotions are involved. (See the companion booklet *The Basics of Deployment FlowCharting & Process Mapping* for details of process mapping).

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Process data for charting is collected by taking sample readings. Sampling, as opposed to 100% inspection, is not only easier, it is more representative and quicker. The sampling procedure will differ for variables and attributes. For variables, collecting the data involves issues of sample size, number of samples and their frequency. For attributes sampling is the exception, not the rule. Manufacturing examples generally use samples with a size of 5. These are taken from the process at regular intervals and represented on the (X, R) chart. Figure 11 indicates how the data may be collected and organised on a collection sheet ready to be recorded on a control chart.

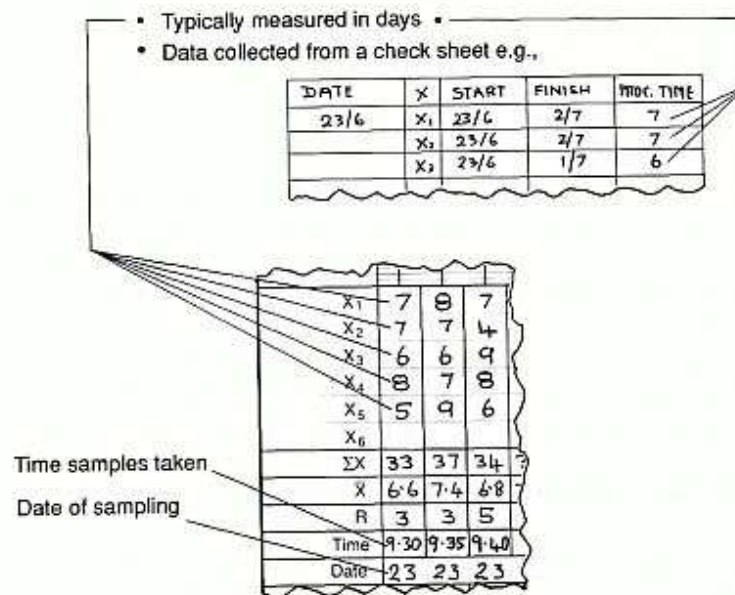


Figure 11 – Collection and recording of sample data

In non-manufacturing, the use of a sample tends to be the exception. In practice it is much more likely that we are looking at single readings - one document, one sales figure, one event. Single reading values are monitored using what we call (X, moving R) charts. However, there is a certain logic about the sequence in which control charts are introduced.

There is a natural flow in progressing from sampled values to dealing with individual values, and there is a danger of confusing the understanding if this sequence is changed. In starting with control charts it is therefore helpful to firstly explore (X, R) charts and then progress to (X, moving R) charts. If we are looking at processing times, for example, then five documents could be tagged first thing in the morning and subsequently the time when each document is completed would be noted. For financial data, for example sales figures, five results would be taken in a suitable manner from the many figures which are available.

The ideal number of different samples needed to construct a chart with control limits is generally 20. There is no reason why interim calculations of process limits could not be carried out on fewer than 20 samples and then updated when 20 samples are available.



In administrative areas the frequency is typically daily, weekly, or even monthly. Judgement will dictate. The nature of the great majority of processes does not allow for sampling at hourly intervals or less, as commonly applied in manufacturing. Odd exceptions may emerge. For example, response times to a computer programme could be taken every 15 minutes. Figure 12 provides a summary of some of the issues associated with sampling.

6. COLLECTING THE DATA

Whatever the organisation, manufacturing or otherwise, personnel should be responsible for monitoring their own processes. Hence, in the same way as operators in manufacturing industry collect data, their equivalents in non-manufacturing - clerical assistants, clerks, technical support staff, managers – should all collect sampled data for their administrative processes.

This may cause problems initially since it is a change from the tradition of looking for trends in data or comparing the data of one period with another. Administrative people recognise that data has traditionally been collected in order to measure levels of productivity, rather than the inherent capability of their processes.

There may be a natural reluctance to assist in an activity which may have repercussions on their own employment. This is understandable but management has the duty to re-assure those who may be confused if process change is to be achieved by the informed analysis of available data with the intention of improvement action.

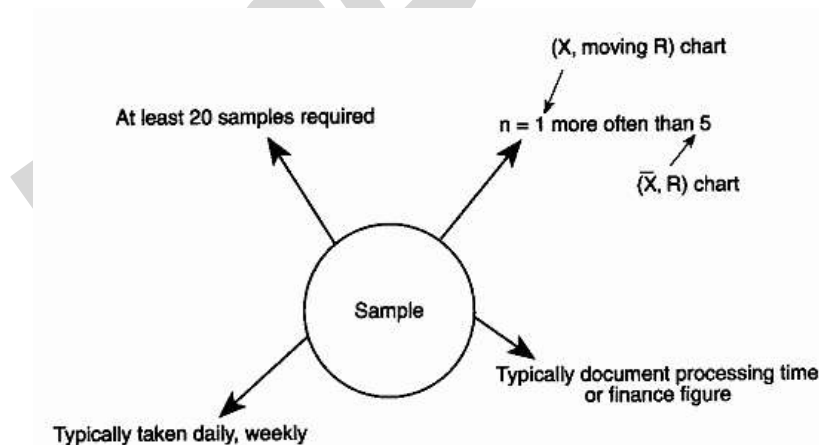


Figure 12 – Issues relating to a sample

Properly handled, however, and in an environment of trust and co-operation, many difficulties should be surmountable. The insights for improvement available from the analysis of such data are considerable and should not be overlooked by any organisation determined to improve its performance and customer service levels.

7. BASIS FOR CONTROL LIMITS

Shewhart designed the control chart so that users could:

- Distinguish between common (systemic) and special (random) causes of variation within a process; and
- Provide a rule for minimising the risk of reacting to a special cause when it is in fact a



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common cause, and not reacting to a special cause when one is present.

He opted, after considerable investigation and experiment, to set his control limits at three standard deviations remove from the mean, central line and applied this rule to all process charts, be they monitoring variable or attribute data. It worked well, was adopted by others, and gradually became the pragmatic standard. The use of this three sigma rule makes no assumptions regarding the nature of the process.

For example, the readings may come from a normal distribution, but we do not know. It is irrelevant in the approach adopted by Shewhart, and later also advocated by Deming. An alternative approach, adopted in the UK and Europe, followed on from the publication of Shewhart's paper.

A brief summary of the normal curve is relevant here. Figure 13 illustrates how a histogram approaches a normal distribution with the properties shown in Figure 14. In particular, for sample mean $\bar{X}$, we have the properties shown in Figure 15. Hence, if we know the distribution is normal, it is suggested that control limits can then be set as shown in Figure 16. The chance, probability, of a point lying outside a particular control limit is then 0.00135 (nearly one part in 1,000).

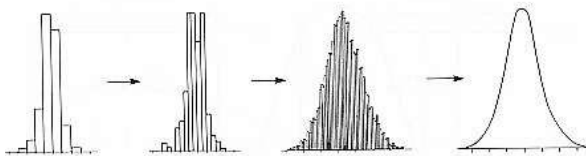


Figure 13 – Generation of a normal curve

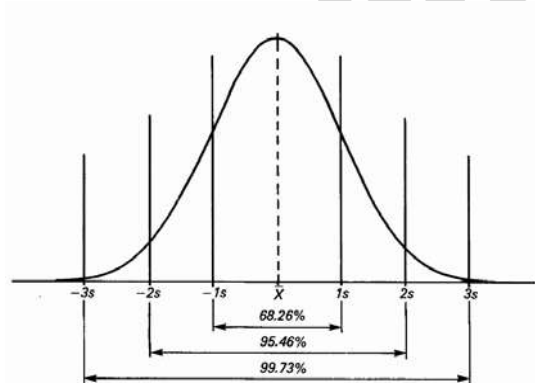


Figure 14 – Areas under the normal curve with corresponding δ values

The British Standards Institute has preferred an operating definition of exactly one in 1,000, corresponding to 3.09 standard deviations from the mean. This subtle difference has not helped in providing a common approach to the generation of control limits and is of no practical advantage in real usage.

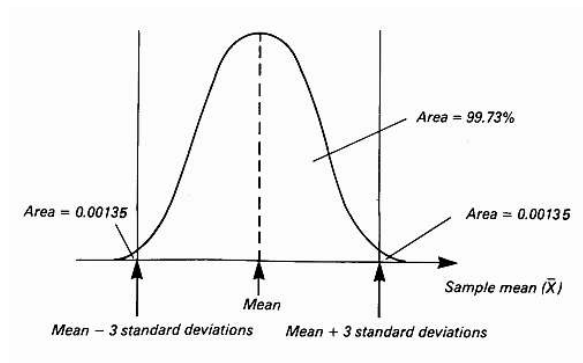


Figure 15 – Normal curve for distribution of sample mean

APPENDIX

Calculations for (X, R) Process Behaviour Charts (SPC using Multiple Average Reading Values)

R	Value of difference between lowest and highest sample
$\bar{R}$	Mean value of R; $\sum R / \text{number of values}$
A2	Constant, depending upon sample size, used to calculate the control limits for X using value of R
D3	Constant, depending upon sample size, used to calculate the lower control limit for R
D4	Constant, depending upon sample size, used to calculate the upper control limit for R
$\bar{x}$	$= \sum X / \text{number of samples (i.e. 20 usually)}$ $R = \sum R / 20$
LCL _x	$= \bar{x} - A2 \bar{R}$ $UCL_x = \bar{x} + A2 \bar{R}$ $LCL_R = D3 \bar{R}$ $UCL_R = D4 \bar{R}$

Calculations for (X, mR) Process Behaviour Charts (SPC using Individual Moving Range Values)

mR	Value of difference between two adjacent samples
$\bar{X}$	Mean value of X; $\sum X / \text{number of values}$
d2	Constant, depending upon sample size, used to calculate the control limits for X. For sample size = 2 the value is 1.128
σ	Best estimate of σ , usually $R / d2 = R / 1.128$
LCL _X	$= \bar{X} - 3 \sigma$ or $\bar{X} - 3(R / 1.128)$ $UCL_X = \bar{X} + 3 \sigma$ or $\bar{X} + 3(R / 1.128)$ $LCL_R = D3 \bar{R}$
UCL _R	$= D4 \bar{R} = 0$ when sample size = 2



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Table of Constants for use in Control Limit calculations

Sample Size	A2	d2	D3	D4
2	1.880	1.128	-	3.267
3	1.023	1.693	-	2.574
4	0.729	2.059	-	2.282
5	0.577	2.326	-	2.114
6	0.483	2.534	-	2.004
7	0.419	2.704	0.076	1.924
8	0.373	2.847	0.136	1.864
9	0.337	2.970	0.184	1.816
10	0.308	3.078	0.223	1.777



UNIT -6

ISO 9000 Introduction and Support Package:

Guidance on the Concept and Use of the Process Approach for management systems

1) Introduction

Key words: management system, process approach, system approach to management

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1. Introduction

This guidance document provides an understanding of the concepts, intent and the application of the “process approach” to the ISO 9000 family of Quality Management System standards. The guidance may also be used to apply the process approach to any management system regardless the type or the size of organization. This includes but is not limited to management systems for:

- Environment (ISO 14000 family),
- Occupational Health and Safety,
- Business Risk,
- Social Responsibility.

This guide also aims to promote a consistent approach to the description of processes and use of process related terminology.

The purpose of the process approach is to enhance an organization’s effectiveness and efficiency in achieving its defined objectives. In relation to ISO 9001:2008 this means enhancing customer satisfaction by meeting customer requirements.

Benefits of the process approach are:

- Integration and alignment of processes to enable achievement of desired outcomes
- Ability to focus effort on process effectiveness and efficiency.
- Provision of confidence to customers, and other interested parties, about the consistent performance of the organization.
- Transparency of operations within the organization.
- Lower costs and creation of shorter cycle times, through the effective use of resources.
- Improved, consistent and predictable results.
- Provision of opportunities for focused and prioritized improvement initiatives.
- Encouragement of the involvement of people and the clarification of their responsibilities.

2. What is a process?

A “Process” can be defined as a “set of interrelated or interacting activities, which transforms inputs



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into outputs". These activities require allocation of resources such as people and materials. Figure 1 shows a generic process.

A major advantage of the process approach, when compared to other approaches, is in the management and control of the interactions between these processes and the interfaces between the functional hierarchies of the organization (as further explained in section 4).

EFFECTIVENESS OF PROCESS = Ability to achieve desired results
Input Requirements Specified (Includes resources)

Interrelated or interacting activities and control methods
Monitoring and Measuring
Output Requirements Satisfied (Result of a process)

EFFICIENCY OF PROCESS = Results achieved vs. resources used

Figure 1. A generic process

Inputs and intended outputs may be tangible (such as equipment, materials or components) or intangible (such as energy or information). Outputs can also be unintended, such as waste or pollution.

Each process has customers and other interested parties (who may be either internal or external to the organization), with needs and expectations about the process, who define the required outputs of the process.

A system should be used to gather data to provide information about process performance, which should then be analyzed to determine if there is any need for corrective action or improvement.

All processes should be aligned with the objectives, scope and complexity of the organization, and should be designed to add value to the organization.

Process effectiveness and efficiency can be assessed through internal or external review processes.

3. Types of processes

3.1 References to processes in ISO 9001:2008:

ISO 9001:2008 states:

In sub clause 0.1 General: *"The design and implementation of an organization's quality management system is influenced by: its business environment, changes in that environment, or risks associated with that environment; its varying needs; its particular objectives; the products it provides; the processes it employs; its size and organizational structure. It is not the intent of this International Standard to imply uniformity in the structure of quality management systems or uniformity of documentation".*



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In sub clause 0.2 Process Approach: *"The application of a system of processes within an organization, together with the identification and interactions of these processes, **and their management to produce the desired outcome**, can be referred to as the "process approach".*

In sub clause 4.1 General requirements: *"The organization shall establish, document, implement and maintain a quality management system and continually improve its effectiveness in accordance with the requirements of this International Standard. The organization shall:*

- a) determine the processes needed for the quality management system and their application throughout the organization (see 1.2),*
- b) determine the sequence and interaction of these processes,*
- c) determine criteria and methods needed to ensure that both the operation and control of these processes are effective,*
- d) ensure the availability of resources and information necessary to support the operation and monitoring of these processes,*
- e) monitor, measure (where applicable), and analyse these processes, and*
- f) implement actions necessary to achieve planned results and continual improvement of these processes.*

These processes shall be managed by the organization in accordance with the requirements of this International Standard".

Based on the above, each organization should define the number and type of processes needed to fulfil its business objectives. It is permissible for a process that is required by ISO 9001:2008 to be part of a process (or processes) that is already established by the organization, or to be defined by the organization in terms that are different to those in ISO 9001.

3.2 Typical types of processes that can be identified:

In accordance with 3.1 above, organizations have to define the number and types of processes needed to fulfil their business objectives. While these will be unique to each organization, it is however possible to identify typical processes, such as:

- *Processes for the management of an organization.* These include processes relating to strategic planning, establishing policies, setting objectives, ensuring communication, ensuring availability of resources for the other organization's quality objectives and desired outcomes and for management reviews.
- *Processes for managing resources.* These include all the processes that are necessary to provide the resources needed for the organization's quality objectives and desired outcomes.
- *Realization processes.* These include all processes that provide the desired outcomes of the organization.
- *Measurement, analysis and improvement processes.* These include the processes needed to measure and gather data for performance analysis and improvement of effectiveness and efficiency. They include measuring, monitoring, auditing, performance analysis and improvement processes (e.g. for corrective and preventive actions). Measurement processes are often documented as an integral part of the management, resource and realization processes; whereas analysis and improvement processes are treated frequently as autonomous processes that interact with other processes, receive inputs from measurement results, and send outputs for the improvement of those processes.

4. Understanding the process approach

A process approach is a powerful way of organizing and managing activities to create value for the customer and other interested parties.



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Organizations are often structured into a hierarchy of functional units. Organizations are usually managed vertically, with responsibility for the intended outputs being divided among functional units.

The end customer or other interested party is not always visible to all involved. Consequently, problems that occur at the interface boundaries are often given less priority than the short-term goals of the units. This leads to little or no improvement to the interested party, as actions are usually focused on the functions, rather than on the intended output.

The process approach introduces horizontal management, crossing the barriers between different functional units and unifying their focus to the main goals of the organization.

The performance of an organization can be improved through the use of the process approach. The processes are managed as a system defined by the network of the processes and their interactions, thus creating a better understanding of added value.

Note: The consistent operation of this network is often referred to as the "system approach" to management. Often the outputs from one process can be the inputs into other processes and are interlinked into the overall network or system (for generic examples, see Figure 3 and Figure 4).