



SRINIVASAN COLLEGE OF ARTS & SCIENCE

(Affiliated to Bharathidasan University, Trichy)

PERAMBALUR - 621 212



**Total Quality Management,
2 Marks, 5 Marks and 10 Marks questions with Answer**

UNIT-I INTRODUCTION

1. Define Total Quality?

TQM is an enhancement to the traditional way of doing business. It is the art of managing the whole to achieve excellence. It is defined both a philosophy and a set of guiding principles that represent the foundation of a continuously improving organization. It is the application of quantitative methods and human resources to improve all the processes within an organization and exceed customer needs now and in the future. It integrates fundamental management techniques, existing improvement efforts, and technical tools under a disciplined approach.

2. Define Quality?

Quality = Performance x Expectations

3. What are the Dimensions of Quality?

- Features
- Conformance
- Reliability
- Durability
- Service
- Response
- Aesthetics
- Reputation

4. Give the Basic Concepts of TQM?

- A committed and involved management to provide long-term top-to-bottom organizational support.
- An unwavering focus on the customer, both internally and externally.
- Effective involvement and utilization of the entire work force.
- Continuous improvement of the business and production process.
- Treating suppliers as partners.
- Establish performance measures for the processes.

5. Give the Principles of TQM?

- Constancy of purpose: short range and long range objectives aligned
- Identify the customer(s); Customer orientation
- Identification of internal and external customers
- Continuous improvement

- Workflow as customer transactions
- Empower front-line worker as leader
- Quality is everybody's business
- For a service industry, some elements of quality are:
 - Empathy
 - Trust; i.e. expertise, integrity, courtesy
 - Responsiveness
 - Tangible product attractiveness (curb appeal)
 - Reliability, on time, no interruptions

6. Give the Obstacles associated with TQM Implementation?

- Lack of management commitment
- Inability to change organizational culture
- Improper planning
- Lack of continuous training and education
- Incompatible organizational structure and isolated individuals and departments
- Ineffective measurement techniques and lack of access to data and results.
- Paying inadequate attention to internal and external customers.
- Inadequate use of empowerment and teamwork.

7. Give the Analysis Techniques for Quality Costs?

- i. Trend Analysis
- ii. Pareto Analysis

8. Define Quality Costs?

Quality Costs are defined as those costs associated with the non-achievement of product or service quality as defined by the requirements established by the organization and its contracts with customers and society.

9. Give the primary categories of Quality cost?

- Preventive cost category
- Appraisal cost category
- Internal failure cost category
- External failure cost category

10. Give the typical cost bases?

- Labor
- Production
- Unit
- Sales

11. How will you determine the optimum cost?

- Make comparison with other organizations
- Optimize the individual categories
- Analyze the relationships among the cost categories

12. State the Quality Improvement Strategy?

- Reduce failure costs by problem solving
- Invest in the “right” prevention activities
- Reduce appraisal costs where appropriate and in a statistically sound manner
- Continuously evaluate and redirect the prevention effort to gain further quality improvement.

13. Define Quality Planning?

A quality plan sets out the desired product qualities and how these are assessed and define the most significant quality attributes. It should define the quality assessment process. It should set out which organizational standards should be applied and, if necessary, define new standards.

14. Give the Objectives of TQM?

- To develop a conceptual understanding of the basic principles and methods associated with TQM;
- To develop an understanding of how these principles and methods have been put into effect in a variety of organizations;
- To develop an understanding of the relationship between TQM principles and the theories and models studied in traditional management;
- To do the right things, **right** the first time, every time.

15. What is needed for a leader to be effective?

To be effective, a leader needs to know and understand the following:

- People, paradoxically, need security and independence at the same time.
- People are sensitive to external rewards and punishments and yet are also strongly self-motivated.
- People like to hear a kind word of praise.
- People can process only a few facts at a time; thus, a leader needs to keep things simple.
- People trust their gut reaction more than statistical data.
- People distrust a leader’s rhetoric if the words are inconsistent with the leader’s actions.

16. What is the important role of senior management?

- Listening to internal and external customers and suppliers through visits, focus groups and surveys.
- Communication.
- To drive fear out of the organization, break down barriers, remove system roadblocks, anticipate and minimize resistance to change and in general, change the culture.

17. What are the general duties of a quality council?

(i) Develop, with input from all personnel, the core values, vision statement, mission statement, and quality policy statement.

(ii) Develop the strategic long-term plan with goals and the annual quality improvement program with objectives.

- (iii) Create the total education and training plan.
- (iv) Determine and continually monitor the cost of poor quality.
- (v) Determine the performance measures for the organization, approve those for the functional areas, and monitor them.
- (vi) Continually, determine those projects that improve the processes, particularly those that affect external and internal customer satisfaction.
- (vii) Establish multifunctional project and departmental or work group teams and monitor their progress.
- (viii) Establish or revise the recognition and reward system to account for the new way of doing business.

18. What does a typical meeting agenda contain after establishing the TQM?

- Progress report on teams
- Customer satisfaction report
- Progress on meeting goals
- New project teams
- Recognition dinner
- Benchmarking report

19. What are the various quality statements?

- Vision Statement
- Mission Statement
- Quality Policy Statement

20. Give the basic steps to strategic quality planning?

- Customer needs
- Customer positioning
- Predict the future
- Gap analysis
- Closing the gap
- Alignment
- Implementation

21. What is a quality policy?

The Quality Policy is a guide for everyone in the organization as to how they should provide products and service to the customers. The common characteristics are

- Quality is first among equals.
- Meet the needs of the internal and external customers.
- Equal or exceed the competition.
- Continually improve the quality.
- Include business and production practices.
- Utilize the entire work force.

UNIT –II

TQM PRINCIPLES

1. What is a mission statement?

The mission statement answers the following questions: who we are, who are the customers, what we do, and how we do it.

2. What is a vision statement?

The vision statement is a declaration of what an organization should look like five to ten years in a future.

3. What are the important factors that influenced purchases?

1. Performance
2. Features
3. Service
4. Warranty
5. Price
6. Reputation

4. Give the need for a feedback in an organization?

1. Discover customer dissatisfaction.
2. Discover relative priorities of quality.
3. Compare performance with the competition.
4. Identify customer's needs.
5. Determine opportunities for improvement.

5. List the tools used for feedback?

1. Comment cards
2. Surveys
3. Focus groups
4. Toll-free telephone lines
5. Customer visits
6. Report cards
7. The internet
8. Employee feedback
9. American Customer Satisfaction Index

6. What are the activities to be done using customer complaints?

1. Investigate customer's experience both positive and negative, and then acting on it promptly.
2. Develop procedures for complaint resolution
3. Analyze complaints.
4. Work to identify process and material variations and then eliminate the root cause.
5. When a survey response is received, a senior manager should contact the customer and strive to resolve the concern.
6. Establish customer satisfaction measures and constantly monitor them.

7. Communicate complaint information, as well as the results of all investigations and solutions, to all people in the organization.
8. Provide a monthly complain report to the quality council
9. Identify customer's expectations beforehand rather than afterward through complaint analysis.

7. What are the elements of customer service?

1. Organization
2. Customer care
3. Communication
4. Front-line people
5. Leadership

8. Define Customer Retention?

Customer retention represents the activities that produce the necessary customer satisfaction that creates customer loyalty, which actually improves the bottom line. It is the nexus between the customer satisfaction and the bottom line.

9. Define Employee Involvement?

Employee involvement is a means to better meet the organization's goals for quality and productivity at all levels of an organization.

10. State Maslow's Hierarchy of Needs?

- Survival
- Security
- Social
- Esteem
- Self-actualization

11. State Frederick Herzberg's Two-factor theory?

Herzberg found that people were motivated by recognition, responsibility, achievement and the work itself.

12. What does an employee want?

1. Interesting work
2. Appreciation
3. Involvement
4. Job security
5. Good pay
6. Promotion/growth
7. Good working conditions
8. Loyalty to employees
9. Help with personal problems
10. Tactful discipline

13. What are the concepts to achieve a motivated work force?

1. Know thyself
2. Know your employees
3. Establish a positive attitude
4. Share the goals
5. Monitor progress
6. Develop interesting work
7. Communicate effectively
8. Celebrate success

14. Define Empowerment?

Empowerment means invest people with authority. Its purpose is to tap the enormous reservoir of creativity and potential contribution that lies within every worker at all levels. Empowerment is an environment in which people have the ability, the confidence, and the commitment to take the responsibility and ownership to improve the process and to initiate the necessary steps to satisfy customer requirements within well-defined boundaries in order to achieve organizational values and goals.

15. What are the three conditions necessary to create the empowered environment?

- Everyone must understand the need for change.
- The system needs to change for the new paradigm
- The organization must enable its employees.

16. What are the types of teams?

1. Process improvement team
2. Cross-functional team
3. Natural work teams
4. Self-directed / self-managed work team

17. What are the characteristics of successful teams?

1. Sponsor
2. Team charter
3. Team composition
4. Training
5. Ground rules
6. Clear objectives
7. Accountability
8. Well-defined decision procedures
9. Resources
10. Trust
11. Effective problem solving
12. Open communications
13. Appropriate leadership
14. Balanced participation
15. Cohesiveness

18. What are the decision-making methods?

- Non-decision
- Unilateral decision
- Handclasp decision
- Minority-rule decision
- Majority-rule decision
- Consensus

19. What are the stages of team development?

1. Forming
2. Storming
3. Norming
4. Performing
5. Adjourning

20. Give some common team problems?

1. Floundering
2. Overbearing participants
3. Dominating participants
4. Reluctant participants
5. Unquestioned acceptance of opinions as facts
6. Rush to accomplish
7. Attribution
8. Discounts and “plops”
9. Wanderlust: digression and tangents
10. Feuding team members

21. Define Recognition and Reward?

Recognition is a form of employee motivation in which the organization publicly acknowledges the positive contributions an individual or team has made to the success of the organization.

Reward is something tangible to promote desirable behavior. Recognition and reward go together to form a system for letting people know they are valuable members of the organization.

22. What are the types of appraisal formats?

1. Ranking
2. Narrative
3. Graphic
4. Forced choice

23. What are the benefits of employee involvement?

1. Employee Involvement improves quality and increases productivity because
2. Employees make better decisions
3. Employees are more likely to implement and support decisions they had a part in making.
4. Employees are better able to spot and pinpoint areas for improvement.
5. Employees are better able to take immediate corrective action.

6. Employee involvement reduces labor/management hassle by more effective communications and cooperation.
7. Employee involvement increases morale by creating a feeling of belonging to the organization.
8. Employees are better able to accept change because they control the work environment.
9. Employees have an increased commitment to unit goals because they are involved.

24. What are the basic ways for a continuous process improvement?

1. Reduce resources
2. Reduce errors
3. Meet or exceed expectations of downstream customers
4. Make the process safer
5. Make the process more satisfying to the person doing it.

25. What are the steps in the PDSA cycle?

1. The basic Plan-Do-Study-Act is an effective improvement technique.
2. Plan carefully what is to be done
3. Carry out the plan
4. Study the results
5. Act on the results by identifying what worked as planned and what didn't.

26. What are the phases of a Continuous Process Improvement Cycle?

1. Identify the opportunity
2. Analyze the process
3. Develop the optimal solutions
4. Implement
5. Study the results
6. Standardize the solution
7. Plan for the future

27. Define 5S?

5S Philosophy focuses on effective work place organization and standardized work procedures. 5S simplifies your work environment, reduces waste and non-value activity while improving quality efficiency and safety.

- **Sort** – (Seiri) the first S focuses on eliminating unnecessary items from the workplace.
- **Set In Order** (Seiton) is the second of the 5Ss and focuses on efficient and effective storage methods.
- **Shine:** (Seiso) Once you have eliminated the clutter and junk that has been clogging your work areas and identified and located the necessary items, the next step is to thoroughly clean the work area.
- **Standardize:** (Seiketsu) Once the first three 5S's have been implemented, you should concentrate on standardizing best practice in your work area.
- **Sustain:** (Shitsuke) This is by far the most difficult S to implement and achieve. Once fully implemented, the 5S process can increase morale, create positive impressions on customers, and increase efficiency and organization.

28. What is a Kaizen?

Kaizen is a Japanese word for the philosophy that defines management's role in continuously encouraging and implementing small improvements involving everyone. It is the process of continuous improvement in small increments that make the process more efficient, effective, under control and adaptable.

29. What are the three key elements to a partnering relationship?

- Long-term commitment
- Trust
- Shared vision

30. What are the ten conditions for the selection and evaluation of suppliers?

I. The supplier understands and appreciates the management philosophy of the organization.

II. The supplier has a stable management system.

III. The supplier maintains high technical standards and has the capability of dealing with future technological innovations.

IV. The supplier can supply precisely those raw materials and parts required by the purchaser, and those supplied meet the quality specifications.

V. The supplier has the capability to produce the amount of production needed or can attain that capability.

VI. There is no danger of the supplier breaching corporate secrets.

VII. The price is right and the delivery dates can be met. In addition, the supplier is easily accessible in terms of transportation and communication.

VIII. The supplier is sincere in implementing the contract provisions.

IX. The supplier has an effective quality system and improvement program such as ISO/QS 9000.

X. The supplier has a track record of customer satisfaction and organization credibility.

31. What are the four phases of inspection?

- i. 100% inspection
- ii. Sampling
- iii. Audit
- iv. Identity check

32. What are the objectives of Performance measures?

- i. Establish baseline measures and reveal trends.
- ii. Determine which processes need to be improved.
- iii. Indicate process gains and losses.
- iv. Compare goals with actual performance.
- v. Provide information for individual and team evaluation.
- vi. Provide information to make informed decisions.
- vii. Determine the overall performance of the organization.

33. What are the characteristics used to measure the performance of a particular process?

- i. Quantity
- ii. Cost
- iii. Time

- iv. Accuracy
- v. Function
- vi. Service
- vii. Aesthetics

34. Give the six basic techniques for presenting performance measures?

- a) Time series graph
- b) Control chart
- c) Capability index
- d) Taguchi loss function
- e) Cost of poor quality
- f) Malcolm Baldrige National Quality Award

35. Give the usage of an effective recognition and reward system?

- Serves as a continual reminder that the organization regards quality and productivity as important.
- Offers the organization a visible technique to thank high achievers for outstanding performance.
- Provides employees a specific goal to work toward. It motivates them to improve the process.
- Boosts morale in the work environment by creating a healthy sense of competition among individuals and teams seeking recognition.

36. How will you improve the performance appraisal system?

- Use rating scales that have few rating categories.
- Require work team or group evaluations that are at least equal in emphasis to individual-focused evaluations.
- Require more frequent performance reviews where such reviews will have a dominant emphasis on future planning.
- Promotion decisions should be made by an independent administrative process that draws on current-job information and potential for the new job.
- Include indexes of external customer satisfaction in the appraisal process.
- Use peer and subordinate feedback as an index of internal customer satisfaction.
- Include evaluation for process improvement in addition to results.

37. What are the typical measurements frequently asked by managers and teams?

- Human Resource
- Customers
- Production
- Research & Development
- Suppliers
- Marketing/Sales
- Administration

38. What are the criteria to evaluate the performance measures?

- Simple
- Few in number
- Developed by users
- Relevance to customer
- Improvement
- Cost
- Visible
- Timely
- Aligned

16 MARKS

1. Explain Juran trilogy for Continuous Process Improvement?

- Planning
- Control
- Improvement

2. Explain the PDSA cycle?

The basic Plan-Do-Study-Act is an effective improvement technique.

- Plan carefully what is to be done
- Carry out the plan
- Study the results
- Act on the results by identifying what worked as planned and what didn't.

3. Explain Kaizen principle?

Kaizen is a Japanese word for the philosophy that defines management's role in continuously encouraging and implementing small improvements involving everyone. It is the process of continuous improvement in small increments that make the process more efficient, effective, under control and adaptable

4. Explain how the employee will be involved in doing a process?

- Employee empowerment
- Customer retention
- Recognition and reward
- Performance appraisal
- Motivation

5. Explain in detail about Juran trilogy

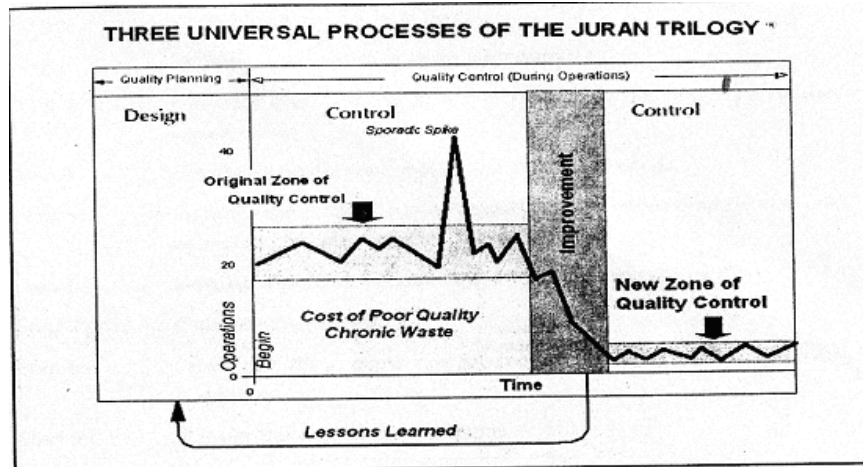
Juran expressed his approach to quality in the form of the Quality trilogy. Managing for quality involved three basic processes:

Quality Planning: This involves identifying the customer (both internal and external), determining their needs, design goods and services to meet these needs at the established quality and cost goals. Then design the process and transfer this to the operators.

Quality Control: Establish standards or critical elements of performance identify measures and methods of measurements, compare actual to standard and take action if necessary.

Quality Improvement: Identify appropriate improvement projects, organize the team, discover the causes and provide remedies and finally develop mechanisms to control the new process and hold the gains.

The relationship among the three processes is shown in the Quality Trilogy figure below:



The errors made during the initial planning result in a higher cost which Juran labeled Chronic Waste: At the beginning, the process stays within control limits. A quality improvement project is initiated and succeeds in reducing chronic waste.

6. Write a note on quality planning

The Quality Trilogy

Quality Planning: Determine quality goals; implementation planning; resource planning; express goals in quality terms; create the quality plan.

Philosophy

- Management is largely responsible for quality
- Quality can only be improved through planning
- Plans and objectives must be specific and measurable
- Training is essential and starts at the top
- Three step process of planning, control and action

The Quality Planning Roadmap

- Step 1: Identify who are the customers
- Step 2: Determine the needs of those customers
- Step 3: Translate those needs into our language (the language of the organization)
- Step 4: Develop a product that can respond to those needs
- Step 5: Optimize the product features so as to meet the company's needs as well as customers' needs
- Step 6: Develop a process, which is able to produce the product
- Step 7: Optimize the process
- Step 8: Prove that the process can produce the product under operating conditions
- Step 9: Transfer the process to operations

Ten Steps to Continuous Quality Improvement

- Step 1: Create awareness of the need and opportunity for quality improvement

Step 2: Set goals for continuous improvement

Step 3: Build an organization to achieve goals by establishing a quality council, identifying problems, selecting a project, appointing teams and choosing facilitators

Step 4: Give everyone training

Step 5: Carry out projects to solve problems

Step 6: Report progress

Step 7: Show recognition

Step 8: Communicate results

Step 9: Keep a record of successes.

Step 10: Incorporate annual improvements into the company's regular systems and processes and thereby maintain

7. Discuss the importance of “employee involvement” and “motivation” for enhancing quality?

Importance of “employee involvement”

In a Harvard Business Review article, David Gumpert described a small “microbrewery” where the head of the company attributed their success to a loyal, small, and involved work force. He found that keeping the operation small, strengthened employee cohesiveness and gave them a feeling of responsibility and pride. This anecdote tells a lot about small groups and how they can impact motivation, productivity, and quality. If quality is the objective, employee involvement in small groups and teams will greatly facilitate the result because of two reasons: motivation and productivity.

The theory of motivation, but not necessarily its practice, is fairly mature, and there is substantial proof that it can work. By oversimplifying a complex theory, it can be shown why team membership is an effective motivational device that can lead to improved quality.

Teams improve productivity as a result of greater motivation and reduced overlap and lack of communication in a functionally based classical structure characterized by territorial battles and parochial outlooks. There is always the danger that functional specialists, if left to their own devices, may pursue their own interests with little regard for the overall company mission. Team membership, particularly a cross-functional team, reduces many of these barriers and encourages an integrative systems approach to achievement of common objectives, those that are common to both the company and the team. There are many success stories. To cite a few:

- Globe Metallurgical Inc., the first small company to win the Baldrige Award, had a 380 percent increase in productivity which was attributed primarily to self-managed work teams.

- The partnering concept requires a new corporate culture of participative management and teamwork throughout the entire organization. Ford increased productivity 28 percent by using the team concept with the same workers and equipment.

- Harleysville Insurance Company's Discovery program provides synergism resulting from the team approach. The program produced a cost saving of \$3.5 million, along with enthusiasm and involvement among employees.

- At Decision Data Computer Corporation middle management is trained to support “Pride Team”.

- Martin Marietta Electronics and Missiles Group has achieved success with performance measurement teams (PMTs).

- Publishers Press has achieved significant productivity improvements and attitude change from the company's process improvement teams (PITs).

- Florida Power and Light Company, the utility that was the first recipient of the Deming Prize, has long had quality improvement teams as a fundamental component of their quality improvement program.

Motivation

In psychology, **motivation** refers to the initiation, direction, intensity and persistence of behavior. Motivation is a temporal and dynamic state that should not be confused with personality or emotion. Motivation is having the desire and willingness to do something. A motivated person can be reaching for a long-term goal such as becoming a professional writer or a more short-term goal like learning how to spell a particular word. Personality invariably refers to more or less permanent characteristics of an individual's state of being (e.g., shy, extrovert, conscientious). As opposed to motivation, emotion refers to temporal states that do not immediately link to behavior (e.g., anger, grief, happiness).

Drive theory

There are a **number** of drive theories. The **Drive Reduction Theory** grows out of the concept that we have certain biological needs, such as hunger. As time passes the strength of the drive increases as it is not satisfied. Then as we satisfy that drive by fulfilling its desire, such as eating, the drive's strength is reduced. It is based on the theories of Freud and the idea of negative feedback systems, such as a thermostat. There are several problems, however, that leave the validity of the Drive Reduction Theory open for debate. The first problem is that it does not explain how secondary reinforcers reduce drive. For example, money does not satisfy any biological or psychological need but reduces drive on a regular basis through a pay check (see: second-order conditioning). Secondly, if the drive reduction theory held true we would not be able to explain how a hungry human being can prepare a meal without eating the food before the end of the preparation. Supposedly, the drive to satiate one's hunger would drive a person to consume the food; however we prepare food on a regular basis and "ignore" the drive to eat. Thirdly, a drive is not able to be measured and therefore cannot be proven to exist in the first place (Barker 2004).

Rewards and incentives

A reward is that which is given following the occurrence of a behavior with the intention of acknowledging the positive nature of that behavior, and often with the additional intent of encouraging it to happen again. The definition of reward is not to be confused with the definition of reinforcer, which includes a measured increase in the rate of a desirable behavior following the addition of something to the environment. There are two kinds of rewards, extrinsic and intrinsic. Extrinsic rewards are external to, or outside of, the individual; for example, praise or money. Intrinsic rewards are internal to, or within, the individual; for example, satisfaction or accomplishment. It was previously thought that the two types of motivation (intrinsic and extrinsic) were additive, and could be combined to produce the highest level of motivation. Some authors differentiate between two forms of intrinsic motivation: one based on enjoyment, the other on obligation. In this context, obligation refers to motivation based on what an individual thinks ought to be done. For instance, a feeling of responsibility for a mission may lead to helping others beyond what is easily observable, rewarded, or fun.

INTRINSIC MOTIVATION

Intrinsic motivation is evident when people engage in an activity for its own sake, without some obvious external incentive present. A hobby is a typical example. Intrinsic motivation has been intensely studied by educational psychologists since the 1970s, and numerous studies have found it to be associated with high educational achievement and enjoyment by students.

There is currently no “grand unified theory” to explain the origin or elements of intrinsic motivation. Most explanations combine elements of Bernard Weiner’s attribution theory, Bandura’s work on self-efficacy and other studies relating to locus of control and goal orientation. Thus it is thought that students are more likely to experience intrinsic motivation if they:

- Attribute their educational results to internal factors that they can control (eg. the amount of effort they put in, not ‘fixed ability’).
- Believe they can be effective agents in reaching desired goals (eg. the results are not determined by dumb luck.)
- Are motivated towards deep ‘mastery’ of a topic, instead of just rote-learning ‘performance’ to get good grades.

Note that the idea of reward for achievement is absent from this model of intrinsic motivation, since rewards are an extrinsic factor.

In knowledge-sharing communities and organizations, people often cite altruistic reasons for their participation, including contributing to a common good, a moral obligation to the group, mentorship or ‘giving back’. This model of intrinsic motivation has emerged from three decades of research by hundreds of educationalists and is still evolving.

EXTRINSIC MOTIVATION

Traditionally, **extrinsic motivation** has been used to motivate employees:

- Tangible rewards such as payments, promotions (or punishments).
- Intangible rewards such as praise or public commendation.

Within economies transitioning from assembly lines to service industries, the importance of intrinsic motivation rises:

- The further jobs move away from pure assembly lines, the harder it becomes to measure individual productivity. This effect is most pronounced for knowledge workers and amplified in teamwork. A lack of objective or universally accepted criteria for measuring individual productivity may make individual rewards arbitrary.
- Since by definition intrinsic motivation does not rely on financial incentives; it is cheap in terms of dollars but expensive in the fact that the inherent rewards of the activity must be internalized before they can be experienced as intrinsically motivating.

However, intrinsic motivation is no panacea for employee motivation. Problems

Include:

- For many commercially viable activities it may not be possible to find any or enough intrinsically motivated people.
- Intrinsically motivated employees need to eat, too. Other forms of compensation remain necessary.
- Intrinsic motivation is easily destroyed. For instance, additional extrinsic motivation is known to have a negative impact on intrinsic motivation in many cases, perceived injustice in awarding such external incentives even more so.

8. Explain the issues related to customer's complaints and retention?

CUSTOMER COMPLAINTS:

CUSTOMER COMPLAINTS Unlike the customer's feedback the customer complaints are reactive, and they are important in gaining data on customer perceptions.

A dissatisfied customer can easily become a lost customer because of their frustrations. This customer dissatisfaction becomes a measure for organizational process improvement measures. Every single complaint should be accepted, analyzed, and acted upon to again win over customer's confidence. Since more than 50% of the dissatisfied customers will buy again if they are complaint has been heard and resolved. By adopting a positive approach the complaints can be seen as an opportunity to obtain information and provide a positive service to the customer.

Handling the customer complaints

1. Investigate customer's experiences by actively receiving the customer feedback and then acting promptly.
2. Develop procedures for complaint resolution that include empowering front-line employee.
3. Analyze complaints; try to put them in a category for speedy response.
4. Work to identify process and material variations and then eliminate the root cause. 'more inspection' is not a corrective action.
5. After receiving the response, a senior manager should contact the customer and strivetop resolve the concern
6. Establish customer satisfaction measures and constantly monitor them
7. Communicate complaint information, as well as the results of all inquiries and solutions, to all people in the organization.
8. Provide a monthly complaint report to the quality council for their evaluation and if needed, the assignment of process improvement teams.
9. Identify customer's expectations in advance rather than afterward through complaint analysis.

CUSTOMER RETENTION:

CUSTOMER RETENTION Customer retention represents the activities that produce the necessary customer satisfaction which in turn creates the customer loyalty. Customer retention moves customer satisfaction to the next level by determining what is truly important to the customers and making sure that the customer satisfaction system focuses valuable resources on things that are important to the customer. Customer retention is the connection between customer satisfaction and the bottom line. World-class companies know that continuous improvement and customer satisfaction should go hand-in-hand. Improved service to the customer is a costlier affair, so an organization must determine its return on the service investment. For this the important service elements that significantly improve revenues and market share should be determined. One survey indicates, it requires five times of effort to win a new customer than retaining a present customer. In this context customer retention is important for organizational success.

9. Discuss about the three quality statements, giving an example for each?

VISION STATEMENT

It is a short declaration of what an organization aspires to be tomorrow.

Example

Disney Theme Park - Happiest place on earth

Polaroid - Instant photography

Successful visions provide a guideline for decision making

MISSION STATEMENT:

It answers the following questions

Who we are?

Who are the customers?

What we do?

How we do it?

It describes the function of the organization. It provides a clear statement of purpose for employees, customers & suppliers

A simpler mission statement is

“To meet customer’s transportation and distribution needs by being the best at moving their goods on time, safely and damage free”

- National Railways

QUALITY POLICY STATEMENT:

It is guide for everyone in the organization as to how they should provide products and services to the customers.

- Common characteristics are
- Quality is first among equals
- Meet the needs of the internal & external customers
- Equal or exceed competition
- Continuously improve the quality
- Utilize the entire workforce

10) What are the benefits of employee involvement?

Employee involvement improves quality and increases productivity because

- Employees make better decisions using their expert knowledge of the process
- Employees are better able to spot and pin-point areas for improvement.
- Employees are better able to take immediate corrective action.
- Employee involvement reduces labour / management friction.
- Employee involvement increases morale.
- Employees have an increased commitment to goals because they are involved.

11) Explain briefly how employee empowerment relates to employee involvement?

Employee involvement is a philosophy practiced by companies that gives their employees stake in decisions that directly affect their jobs, while employee empowerment is a corporate structure that allows non-managerial employees to make autonomous decisions. Each one is a distinct practice and is usually mutually exclusive to one another, though the benefits can be similar.

The main benefits of employee involvement and empowerment are enhanced morale, more productivity, healthier coworker relationships and creative thinking.

Improved Morale

Involving employees in decisions and policy changes that directly affect their job, while empowering employees to be more autonomous, greatly improves morale at large. When employees are treated as an asset and their input is given consideration, confidence increases among every team member, and the company sees significant gains in different facets such as productivity and loyalty.

Moreover, improved morale can increase an employee's longevity with the company. The longer the employee is associated with the company, the more experienced they become, making them mentors to new employees and indispensable to managerial staff.

Team Cohesion

Although employee empowerment is largely designed to give each employee autonomy, it likewise fosters better relationships between employees and with their managers, because employees that are given more independence tend to form better working relationships. Each sees the other as mutually benefiting from their working relationship. In addition, more self-governance in the workplace lessens dependence on managers and supervisors and redirects that reliance laterally to coworkers.

Innovation

Employee empowerment helps to cultivate innovation. Employees that have a stake in the growth and sustainability will offer more ideas and problem-solving solutions when obstacles arise. Moreover, as the employee meets particular challenges or finds improvements in policies, procedures or products, it will foster growth and more critical and imaginative thinking. Employees may see a particular issue differently than a manager and be able to think of a creative solution, which may not be considered in a closed circle of managerial staff.

12) What is a Team? List out characteristics of a successful team?

Employee involvement is optimized by the use of teams.

A *team* is defined as a group of people working together to achieve common objectives or goals.

Teamwork is the cumulative actions of the team during which each member of the team subordinates his individual interests and opinions to fulfill the objectives or goals of the group.

WHY TEAMS WORK

1. Many heads are more knowledgeable than one.
2. The whole is greater than the sum of its members.
3. Team members develop a rapport with each other.
4. Teams provide the vehicle for improved communication.

TYPES OF TEAMS

1. Process improvement team.
2. Cross – functional team.
3. Natural work teams.
4. Self – Directed / Self – Managed work teams.

CHARACTERISTICS OF SUCCESSFUL TEAMS

1. Sponsor
2. Team Charter
3. Team Composition
4. Training
5. Ground Rules
6. Clear Objectives
7. Accountability
8. Well-Defined decision procedure
9. Resources
10. Trust
11. Effective Problem Solving
12. Open Communication

13. Appropriate Leadership
14. Balanced Participation
15. Cohesiveness

13) What are the factors that KAIZEN focuses for continuous improvement?

Kaizen is a Japanese word for the philosophy that defines management's roles in continuously encouraging and implementing small improvements involving everyone.

It focuses on simplification by breaking down complex progress into their sub – processes and then improving them.

The Kaizen improvement focuses on the use of

- Value – added and non – value work activities.
- Muda, which refers to the seven classes of waste – over-production, delay, transportation, processing, inventory, wasted motion, and defective parts.
- Principles of motion study and the use of cell technology.
- Principles of materials handling and use of one – piece flow.
- Documentation of standard operating procedures.
- The five S's for workplace organization.
- Visual management.
- Just – in – time principles.
- Poka – Yoke.
- Team dynamics

UNIT-III
STATISTICS PROCESS CONTROL

1. Define statistics?

Statistics is defined as the science that deals with the collection, tabulation, analysis, interpretation, and presentation of quantitative data.

2. What is a measure of central tendency?

A measure of central tendency of a distribution is a numerical value that describes the central position of the data or how the data tend to build up in the center. There are three measures in common in use in quality viz, the average, the median and the mode.

3. What is Measures of dispersion?

Measures of dispersion describe how the data are spread out or scattered on each side of the central value. The measures of dispersion used are range and standard deviation.

4. What is a normal curve?

The normal curve is a symmetrical, unimodal, bell-shaped distribution with the mean, median and mode having the same value.

5. What is the use of the control chart?

The control chart is used to keep a continuing record of a particular quality characteristic. It is a picture of process over time.

6. Give the objectives of the attribute charts?

- Determine the average quality level.
- Bring to the attention of management any changes in the average.
- Improve the product quality.
- Evaluate the quality performance of operating and management personnel.
- Determine acceptance criteria of a product before shipment to the customer.

7. Define Six Sigma Problem Solving Method?

- **Define** - improvement opportunity with an emphasis on increasing customer satisfaction.
- **Measure** - determine process capability (Cp/ Cpk) & dpmo (defects per million opportunities).
- **Analyze** - identify the vital few process input variables that affect key product output variables (“Finding the knobs”).
- **Improve** - Make changes to process settings, redesign processes, etc. to reduce the number of defects of key output variables.
- **Control** - Implement process control plans, install real-time process monitoring tools, and standardize processes to maintain levels.

8. What are the new seven management tools?

- i. Affinity Diagram
- ii. Interrelationship Digraph
- iii. Tree Diagram
- iv. Matrix Diagram

- v. Prioritization Matrices
- vi. Process Decision Program Chart
- vii. Activity Network diagram

9. Give the seven tools of quality?

1. Pareto Diagram
2. Process Flow Diagram
3. Cause and effect diagram
4. Histogram
5. Control charts
6. Scatter diagrams

10. Give the usage of C&E diagrams?

- Analyze actual conditions for the purpose of product or service quality improvement, more efficient use of resources, and reduced costs.
- Eliminate conditions causing nonconformities and customer complaints.
- Standardize existing and proposed operations.
- Educate and train personnel in decision-making and corrective-action activities.

11. Define Six Sigma?

Six-Sigma is a business process that allows organizations to drastically improve their bottom line by designing and monitoring everyday business activities in ways that minimize waste and resources while increasing customer satisfaction. It is achieved through continuous process measurement, analysis & improvement.

12. What are the various histogram shapes?

- Symmetrical
- Skewed right
- Skewed left
- Peaked
- Flat
- Bimodal
- Plateau distribution
- Comb distribution
- Double peaked distribution

13. Differentiate Population & Sample?

Population represents the mathematical world and Sample represents the real world. A population frequency distribution is represented by a smooth curve whereas a sample frequency distribution is represented by a histogram.

14. Give the sources of variation?

- Equipment
- Material
- Environment

- Operator

15. Define Run chart?

A run chart is a very simple technique for analyzing the process in the development stage or, for that matter, when other charting techniques are not applicable.

16. Define Control chart?

Control chart is a means of visualizing the variations that occur in the central tendency and the dispersion of a set of observations. It is a graphical record of the quality of a particular characteristic.

17. What is the procedure for constructing the tree diagram?

Choose an action –oriented objective statement from the interrelationship diagram, affinity diagram, brainstorming, team mission statement, and so forth. Using brainstorming, choose the major headings. Generate the next level by analyzing the major headings.

18. Give at least five standard formats of matrix diagram?

- L-shaped
- T-shaped
- Y-shaped
- C-shaped
- X-shaped

19. What are the benefits of an activity network diagram?

- A realistic timetable determined by the users.
- Team members understand the role in the overall plan.
- Bottlenecks can be discovered and corrective action taken.
- Members focus on the critical tasks.

16 MARKS

1. Six sigma concept can be applied to non-manufacturing processes. Do you agree with this statement? Justify your answer with a suitable example.

The Six Sigma revolution has systematically taken over various sectors of the industry owing to its methodological process variations of working towards achieving targets and eliminating any defects occurring in them throughout the procedure. Since it aims at providing top class service and works towards being a reliable and valuable enterprise for its customers, it has made an entry into areas such as banking, telecommunications, marketing, insurance, healthcare, software and construction.

Range of Six Sigma

Earlier the scope of Six Sigma was limited to manufacturing processes, which accounted for only two percent of the United States industry. Nowadays, the non-manufacturing corporations such as IT management, Human Resource, Sales and services have also realized the need for top quality and are implementing Six Sigma to improve their service value. In most non-manufacturing organizations, quality of the soft processes is banked on heavily for the company's success.

The non-manufacturing course follows the 5S code under Six Sigma system, which is Sort, Set in order, Shine, Standardize and Sustain. The company requires classifying various items and then eliminates the ones, which are not related to the process and red tags them. This clears space for a much-required process that needs to be implemented on a daily basis. Secondly, it defines a work path for all individuals, decreasing the wastage of labor and focusing on specified details of the job. Polishing the work skills and worker's knowledge is also focused on to keep the work force updated with the latest developments of the world in fields of science, technology, economics, and others.

Need For Six Sigma in Non-Manufacturing Ground

The non-manufacturing corporations mainly deal with customers, suppliers and clients on a routine basis. It encompasses those soft processes that are the driving force behind the production and distribution of every product and service. The soft processes are human centric and each situation is a unique case hence, it requires scientific application to reduce and manage the variances. This necessitates standardization, as the quantity of automated equipment is less and human resource is greater.

Performance and Efficiency

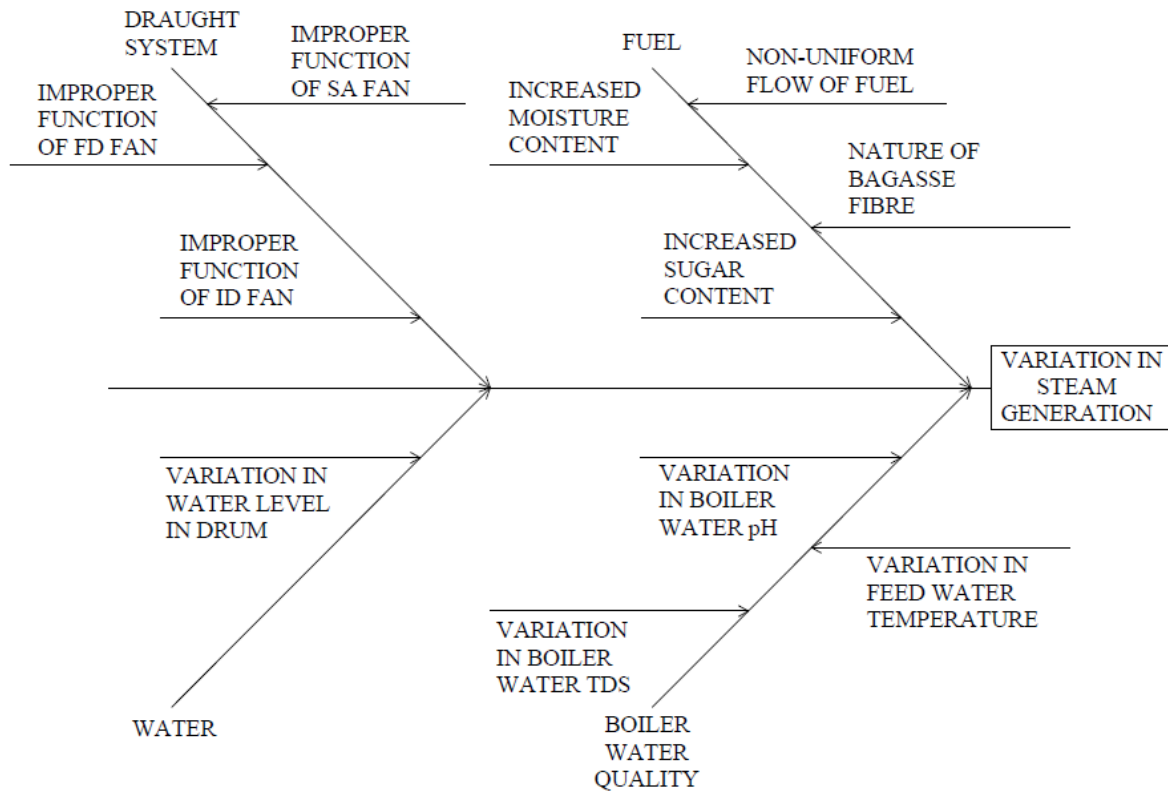
Efficiency is another factor which demands Six Sigma application. The managers are required to think and formulate utility processes to enhance the working conditions for subordinates thereby extracting optimum work out of them. There would be no point in extracting work from employees unless and until it is efficient to further the productivity, quality and quantity. Six Sigma provides tools that can be implemented to boost labor confidence and motivate them to better performance levels thus increasing not only their advancement but also elevates the company standards in the market.

Practical Aspects of Implementation

Managing finances is the basic aim of all non-manufacturing concerns. To maintain an organization's status is a difficult job and furthering its stand is a Herculean task. Without adequate finances the company cannot sustain itself and implementing Six Sigma would help in sorting out the accounting needs.

Six Sigma has chances of working wonders for the non-manufacturing sector if the managers and policy makers are more receptive towards changes and new conceptual ideas.

2) Illustrate the cause and effect diagram with a simple example.



STEPS IN CONSTRUCTING A CAUSE & EFFECT DIAGRAM:

- Define the problem or effect to be analyzed.
- Form the team to perform the analysis. Often the team will uncover potential causes through brainstorming.
- Draw the effect box and the centerline.
- Specify the major potential cause categories and join them as boxes connected to the centerline.
- Identify the possible causes and classify them into the categories in step d. Create new categories, if necessary.
- Rank orders the causes to identify those that seem most likely to impact the problem.
- Take corrective action.

3) What is tree diagram? How is it useful for quality management?

Tree Diagram

Also called: systematic diagram, tree analysis, analytical tree, hierarchy diagram

The tree diagram starts with one item that branch into two or more, each of which branch into two or more, and so on. It looks like a tree, with trunk and multiple branches.

It is used to break down broad categories into finer and finer levels of detail.

Developing the tree diagram helps you move your thinking step by step from generalities to specifics

When to Use

- When an issue is known or being addressed in broad generalities and you must move to specific details, such as when developing logical steps to achieve an objective.
- When developing actions to carry out a solution or other plan.
- When analyzing processes in detail.
- When probing for the root cause of a problem.
- When evaluating implementation issues for several potential solutions.
- After an affinity diagram or relations diagram has uncovered key issues.
- As a communication tool, to explain details to others.

Procedure

1. Develop a statement of the goal, project, plan, problem or whatever is being studied. Write it at the top (for a vertical tree) or far left (for a horizontal tree) of your work surface.

2. Ask a question that will lead you to the next level of detail. For example:

o For a goal, action plan or work breakdown structure: “What tasks must be done to accomplish this?” or “How can this be accomplished?”

o For root-cause analysis: “What causes this?” or “Why does this happen?”

o For gozinto chart: “What are the components?” (Gozinto literally comes from the phrase “What goes into it?” Brainstorm all possible answers. If an affinity diagram or relationship diagram has been done previously, ideas may be taken from there. Write each idea in a line below (for a vertical tree) or to the right of (for a horizontal tree) the first statement. Show links between the tiers with arrows.

o Do a “necessary and sufficient” check. Are all the items at this level necessary for the one on the level above? If all the items at this level were present or accomplished, would they be sufficient for the one on the level above?

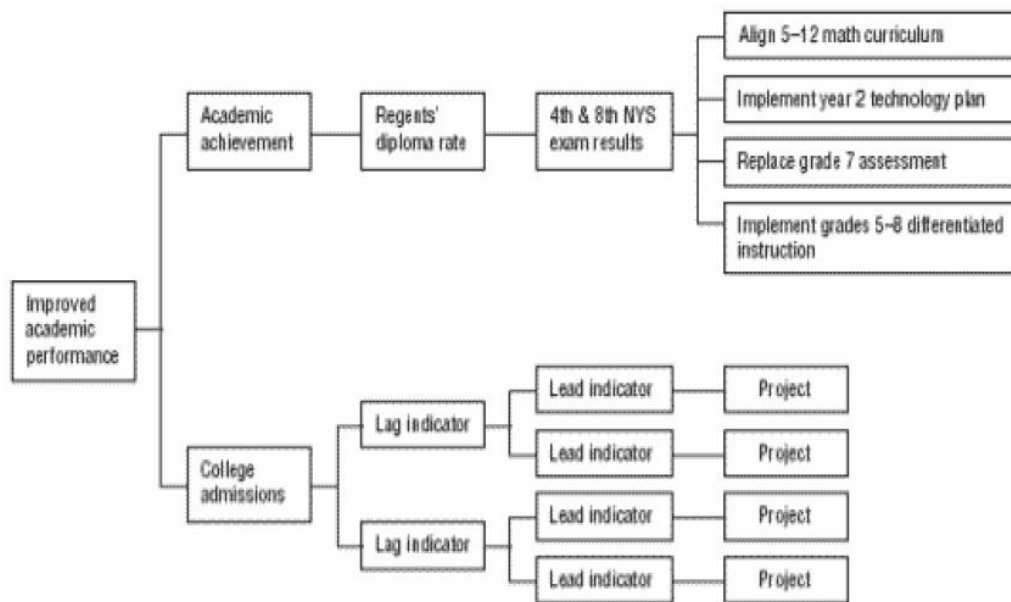
o Each of the new idea statements now becomes the subject: a goal, objective or problem statement. For each one, ask the question again to uncover the next level of detail. Create another tier of statements and show the relationships to the previous tier of ideas with arrows.

Do a “necessary and sufficient check” for each set of items.

o Continue to turn each new idea into a subject statement and ask the question. Do not stop until you reach fundamental elements: specific actions that can be carried out, components that are not divisible, root causes.

o Do a “necessary and sufficient” check of the entire diagram. Are all the items necessary for the objective? If all the items were present or accomplished, would they be sufficient for the objective?

The district has three fundamental goals. The first, to improve academic performance, is partly shown in the figure below. District leaders have identified two strategic objectives that, when accomplished, will lead to improved academic performance: academic achievement and college admissions.



Tree diagram example

Lag indicators are long-term and results-oriented. The lag indicator for academic achievement is Regents' diploma rate: the percent of students receiving a state diploma by passing eight Regents' exams.

Lead indicators are short-term and process-oriented. Starting in 2000, the lead indicator for the Regents' diploma rate was performance on new fourth and eighth grade state tests.

Finally, annual projects are defined, based on cause-and-effect analysis that will improve performance. In 2000–2001, four projects were accomplished to improve academic achievement. Thus this tree diagram is an interlocking series of goals and indicators, tracing the causes of system wide academic performance first through high school diploma rates, then through lower grade performance, and back to specific improvement projects.

4) What is a critical success factor? How is it important in bench marking?

Critical success factor (CSF) is a management term for an element that is necessary for an organization or project to achieve its mission. It is a **critical factor** or activity required for ensuring the **success** of a company or an organization

Six critical success factors in bench making:

In a publication for the National Academy of Public Administration, author Dr.

Sharon L. Caudle identified six critical success factors that ensure government re-engineering initiatives achieve the desired results:

1. Understand re-engineering.

- o Understand business process fundamentals.
- o Know what re-engineering is.
- o Differentiate and integrate process improvement approaches.

2. Build a business and political case.

- o Have necessary and sufficient business (mission delivery) reasons for re-engineering.
- o Have the organizational commitment and capacity to initiate and sustain re-engineering.
- o Secure and sustain political support for re-engineering projects.

3. Adopt a process management approach.

- o Understand the organizational mandate and set mission-strategic directions and goals cascading to process-specific goals and decision making across and down the organization.
- o Define, model, and prioritize business processes important for mission performance.
- o Practice hands-on senior management ownership of process improvement through personal involvement, responsibility, and decision making.
- o Adjust organizational structure to better support process management initiatives.
- o Create an assessment program to evaluate process management.
- 4. Measure and track performance continuously.**
- o Create organizational understanding of the value of measurement and how it will be used.
- o Tie performance management to customer and stakeholder current and future expectations.
- 5. Practice change management and provide central support.**
- o Develop human resource management strategies to support reengineering.
- o Build information resources management strategies and a technology framework to support process change.
- o Create a central support group to assist and integrate reengineering efforts and other improvement efforts across the organization.
- o Create an overarching and project-specific internal and external communication and education program.
- 6. Manage re-engineering projects for results.**
- o Have a clear criteria to select what should be re-engineered.
- o Place the project at the right level with a defined reengineering team purpose and goals.
- o Use a well-trained, diversified, expert team to ensure optimum project performance.
- o Follow a structured, disciplined approach for re-engineering.

5) Prepare a FMEA work sheet for an induction motor's shaft failure or a failure of your choice.

Failure modes and effects analysis (FMEA) is a procedure for analysis of potential failure modes within a system for the classification by severity or determination of the failures' effect upon the system. It is widely used in the manufacturing industries in various phases of the product life cycle and is now increasingly finding use in the service industry as well. Failure causes are any errors or defects in process, design, or item especially ones that affect the customer, and can be potential or actual. *Effects analysis* refers to studying the consequences of those failures.

Step 1: Severity

Determine all failure modes based on the functional requirements and their effects. Examples of failure modes are: Electrical short-circuiting, corrosion or deformation. It is important to note that a failure mode in one component can lead to a failure mode in another component. Therefore each failure mode should be listed in technical terms and for function. Hereafter the ultimate effect of each failure mode needs to be considered. A failure effect is defined as the result of a failure mode on the function of the system as perceived by the user. In this way it is convenient to write these effects down in terms of what the user might see or experience. Examples of failure effects are: degraded performance, noise or even injury to a user. Each effect is given a **severity number(S)** from 1(no danger) to 10(important). These numbers help an engineer to

prioritize. If the severity of an effect has a number 9 or 10, actions are considered to change the design by eliminating the failure mode, if possible, or protecting the user from the effect. A severity rating of 9 or 10 is generally reserved for those effects which would cause injury to a user or otherwise result in litigation.

Step 2: Occurrence

In this step it is necessary to look at the cause of a failure and how many times it occurs. This can be done by looking at similar products or processes and the failures that have been documented for them. A failure cause is looked upon as a design weakness. All the potential causes for a failure mode should be identified and documented. Again this should be in technical terms. Examples of causes are: erroneous algorithms, excessive voltage or improper operating conditions. A failure mode is given a **probability number(O)**, again 1-10. Actions need to be determined if the occurrence is high (meaning >4 for non-safety failure modes and >1 when the severity-number from step 1 is 9 or 10). This step is called the detailed development section of the FMEA process.

Step 3: Detection

When appropriate actions are determined, it is necessary to test their efficiency. Also a design verification is needed. The proper inspection methods need to be chosen. First, an engineer should look at the current controls of the system, that prevent failure modes from occurring or which detect the failure before it reaches the customer. Hereafter one should identify testing, analysis, monitoring and other techniques that can be or have been used on similar systems to detect failures. From these controls an engineer can learn how likely it is for a failure to be identified or detected. Each combination from the previous 2 steps, receives a **detection number(D)**. This number represents the ability of planned tests and inspections at removing defects or detecting failure modes. After these 3 basic steps, Risk Priority Numbers (RPN) are calculated. Risk Priority Numbers RPN do not play an important part in the choice of an action against failure modes. They are more threshold values in the evaluation of these actions. After ranking the severity, occurrence and detectability the RPN can be easily calculated by multiplying these 3 numbers: $RPN = S \times O \times D$ This has to be done for the entire process and/or design. Once this is done it is easy to determine the areas of greatest concern. The failure modes that have the highest RPN should be given the highest priority for corrective action. This means it is not always the failure modes with the highest severity numbers that should be treated first. There could be less severe failures, but which occur more often and are less detectable.

6)Develop procedure for implementation of SIX sigma in a manufacturing organization.

Six Sigma has evolved over the last two decades and so has its definition. Six Sigma has literal, conceptual, and practical definitions. Features that set Six Sigma apart from previous quality improvement initiatives include –

- A clear focus on achieving measurable and quantifiable financial returns from any project.
- An increased emphasis on strong and passionate management leadership and support.[1]

- A special infrastructure of "Champions," "Master Black Belts," "Black Belts," etc. to lead and implement the Six Sigma approach.[1]
- A clear commitment to making decisions on the basis of verifiable data, rather than assumptions and guesswork.
- At Motorola University, we think about Six Sigma at three different levels:
 - As a metric
 - As a methodology
 - As a management system

Essentially, Six Sigma is all three at the same time.

Six Sigma as a Metric

The term "Sigma" is often used as a scale for levels of "goodness" or quality. Using this scale, "Six Sigma" equates to 3.4 Defects Per Million Opportunities (DPMO). Six Sigma started as a defect reduction effort in manufacturing and then applied to other business processes for the same purpose. Taking the 1.5 sigma shift into account, short-term sigma levels correspond to the following long-term DPMO values (one-sided):

- One Sigma = 690,000 DPMO => efficiency 31%
- Two Sigma = 308,000 DPMO => efficiency 69.2%
- Three Sigma = 66,800 DPMO => efficiency 93.32%
- Four Sigma = 6,210 DPMO => efficiency 99.379%
- Five Sigma = 230 DPMO => efficiency 99.977%
- Six Sigma = 3.4 DPMO => efficiency 99.9997%

Six Sigma as a Methodology

As Six Sigma has evolved, there has been less emphasis on the literal definition of 3.4 DPMO, or counting defects in products and processes. Six Sigma is a business improvement methodology that focuses an organization on:

- Understanding and managing customer requirements
- Aligning key business processes to achieve those requirements
- Utilizing rigorous data analysis to minimize variation in those processes
- Driving rapid and sustainable improvement to business processes

At the heart of the methodology is the DMAIC model for process improvement. DMAIC is commonly used by Six Sigma project teams and is an acronym for:

DMAIC - The basic methodology consists of the following five steps:

- Define** process improvement goals that are consistent with customer demands and the enterprise strategy.
- Measure** key aspects of the current process and collect relevant data.
- Analyze** the data to verify cause-and-effect relationships. Determine what the relationships are, and attempt to ensure that all factors have been considered.
- Improve** or optimize the process based upon data analysis using techniques like Design of Experiments.
- Control** to ensure that any deviations from target are corrected before they result in defects. Set up pilot runs to establish process capability, move on to production, set up control mechanisms and continuously monitor the process.

DMADV

The basic methodology consists of the following five steps:

- **Define** design goals that are consistent with customer demands and the enterprise strategy.
- **Measure** and identify CTQs (characteristics that are **Critical ToQuality**), product capabilities, production process capability, and risks.
- **Analyze** to develop and design alternatives, create a high-level design and evaluate design capability to select the best design.
- **Design** details, optimize the design, and plan for design verification. This phase may require simulations.
- **Verify** the design, set up pilot runs, implement the production process and hand it over to the process owners.

Implementation roles - One of the key innovations of Six Sigma is the professionalizing of quality management functions. Prior to Six Sigma, quality management in practice was largely relegated to the production floor and to statisticians in a separate quality department. Six Sigma borrows martial arts ranking terminology to define a hierarchy (and career path) that cuts across all business functions and a promotion path straight into the executive suite.

Six Sigma identifies several key roles for its successful implementation.[12]

- **Executive Leadership** includes the CEO and other members of top management. They are responsible for setting up a vision for Six Sigma implementation. They also empower the other role holders with the freedom and resources to explore new ideas for breakthrough improvements.
- **Champions** are responsible for Six Sigma implementation across the organization in an integrated manner. The Executive Leadership draws them from upper management. Champions also act as mentors to Black Belts.
- **Master Black Belts**, identified by champions, act as in-house coaches on Six Sigma. They devote 100% of their time to Six Sigma. They assist champions and guide Black Belts and Green Belts. Apart from statistical tasks, their time is spent on ensuring consistent application of Six Sigma across various functions and departments.
- **Black Belts** operate under Master Black Belts to apply Six Sigma methodology to specific projects. They devote 100% of their time to Six Sigma. They primarily focus on Six Sigma project execution, whereas Champions and Master Black Belts focus on identifying projects/functions for Six Sigma.
- **Green Belts** are the employees who take up Six Sigma implementation along with their other job responsibilities. They operate under the guidance of Black Belts.

7) Explain the seven traditional quality tools with suitable examples.

Seven Tools of Quality

The discipline of Total Quality Control uses a number of quantitative methods and tools to identify problems and suggest avenues for continuous improvement in fields such as manufacturing. Over many years, total quality practitioners gradually realized that a large number of quality related problems can be solved with seven basic quantitative tools, which then became known as the traditional “Seven Tools of Quality”.

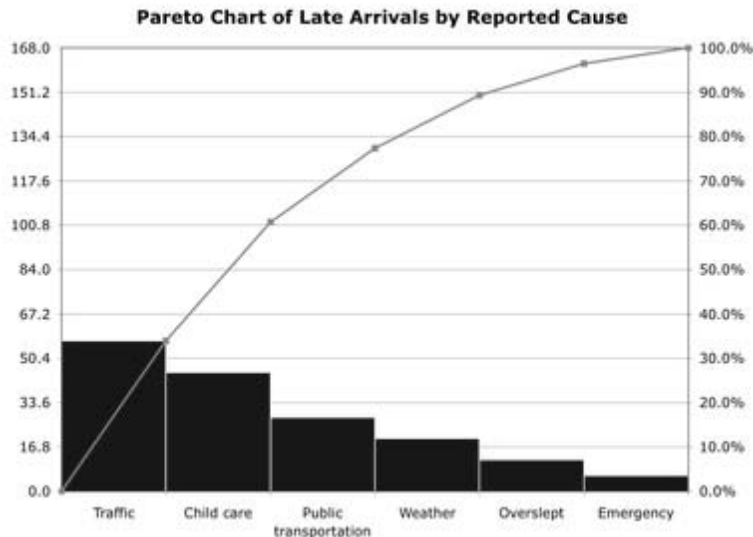
These are:

- Ishikawa diagram
- Pareto chart
- Check sheet
- Control chart
- Flowchart
- Histogram
- Scatter diagrams

These tools have been widely used in most quality management organizations, and a number of extensions and improvements to them have been proposed and adopted.

Pareto chart

A **Pareto chart** is a special type of bar chart where the values being plotted are arranged in descending order. It is named for Vilfredo Pareto, and its use in quality assurance was popularized by Joseph M. Juran and Kaoru Ishikawa.



Simple example of a **Pareto chart** using hypothetical data showing the relative frequency of reasons for arriving late at work.

The Pareto chart is one of the seven basic tools of quality control, which include the histogram, **Pareto chart**, check sheet, control chart, cause-and-effect diagram, flowchart, and scatter diagram.

Typically the left vertical axis is frequency of occurrence, but it can alternatively represent cost or other important unit of measure. The right vertical axis is the cumulative percentage of the total number of occurrences, total cost, or total of the particular unit of measure. The purpose is to highlight the most important among a (typically large) set of factors. In quality control, the Pareto chart often represents the most common sources of defects, the highest occurring type of defect, or the most frequent reasons for customer complaints, etc.

Check sheet

The **check sheet** is a simple document that is used for collecting data in real time and at the location where the data is generated. The document is typically a blank form that is designed for the quick, easy, and efficient recording of the desired information, which can be either quantitative or qualitative. When the information is quantitative, the check sheet is sometimes called a tally sheet.

A defining characteristic of a check sheet is that data is recorded by making marks (“checks”) on it. A typical check sheet is divided into regions, and marks made in different regions have different significance. Data is read by observing the location and number of marks on the sheet. 5 Basic types of Check Sheets : Classification : A trait such as a defect or failure mode must be classified into a category Location : The physical location of a trait is indicated on a picture of a part or item being evaluated Frequency : The presence or absence of a trait or combination of traits is indicated. Also number of occurrences of a trait on a part can be indicated Measurement Scale:

A measurement scale is divided into intervals, and measurements are indicated by checking an appropriate interval Check List : The items to be performed for a task are listed so that, as each is accomplished, it can be indicated as having been completed.

Control chart

The **control chart**, also known as the ‘**Shewhart chart**’ or ‘**process-behaviour chart**’ is a statistical tool intended to assess the nature of variation in a process and to facilitate forecasting and management. A control chart is a more specific kind of a run chart.

The control chart is one of the seven basic tools of quality control, which include the histogram, Pareto chart, check sheet, control chart, cause and- effect diagram, flowchart, and Performance of control charts

When a point falls outside of the limits established for a given control chart, those responsible for the underlying process are expected to determine whether a special cause has occurred. If one has, then that cause should be eliminated if possible. It is known that even when a process is *in control* (that is, no special causes are present in the system), there is approximately a 0.27% probability of a point exceeding *3-sigma* control limits. Since the control limits are evaluated each time a point is added to the chart, it readily follows that *every* control chart will eventually signal the possible presence of a special cause, even though one may not have actually occurred. For a Shewhart control chart using *3-sigma* limits, this *false alarm* occurs on average once every $1/0.0027$ or 370.4 observations. Therefore, the *in-control average run length* (or incontrol ARL) of a Shewhart chart is 370.4. Meanwhile, if a special cause does occur, it may not be of sufficient magnitude for the chart to produce an immediate *alarm condition*. If a special cause occurs, one can describe that cause by measuring the change in the mean and/or variance of the process in question. When those changes are quantified, it is possible to determine the out-of-control ARL for the chart.

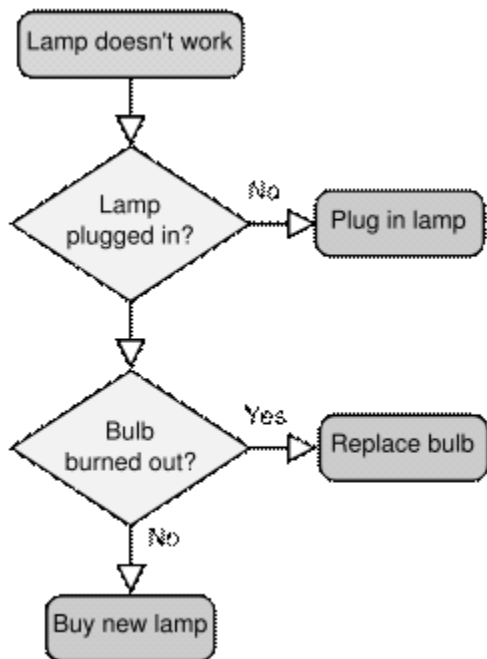
It turns out that Shewhart charts are quite good at detecting large changes in the process mean or variance, as their out-of-control ARLs are fairly short in these cases. However, for smaller

changes (such as a 1- or 2-sigma change in the mean), the Shewhart chart does not detect these changes efficiently. Other types of control charts have been developed, such as the EWMA chart and the CUSUM chart, which detect smaller changes more efficiently by making use of information from observations collected prior to the most recent data point.

Criticisms

Several authors have criticised the control chart on the grounds that it violates the likelihood principle. However, the principle is itself controversial and supporters of control charts further argue that, in general, it is impossible to specify a likelihood function for a process not in statistical control, especially where knowledge about the cause system of the process is weak.

Some authors have criticised the use of average run lengths (ARLs) for comparing control chart performance, because that average usually follows a Geometric distribution, which has a high variability.



A simple flowchart for what to do if a lamp doesn't work

A **flowchart** (also spelled **flow-chart** and **flow chart**) is a schematic representation of an algorithm or a process flowchart is one of the seven basic tools of quality control, which include the histogram, Pareto chart, check sheet, control chart, cause-and-effect diagram, flowchart, and scatter diagram. See Quality Management

Glossary. They are commonly used in business/economic presentations to help the audience visualize the content better, or to find flaws in the process.

Symbols

A typical flowchart from older Computer Science textbooks may have the following kinds of symbols:

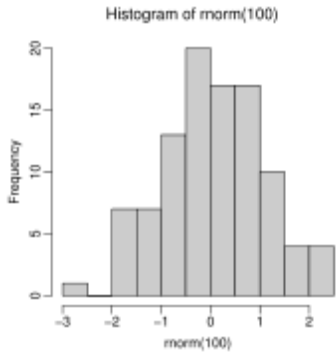
- **Start** and **end** symbols, represented as lozenges, ovals or rounded rectangles, usually containing the word “Start” or “End”, or another phrase signaling the start or end of a process, such as “submit enquiry” or “receive product”.
- **Arrows**, showing what’s called “flow of control” in computer science. An arrow coming from one symbol and ending at another symbol represents that control passes to the symbol the arrow points to.
- **Processing steps**, represented as **rectangles**. Examples: “Add 1 to X”; “replace identified part”; “save changes” or similar.
- **Input/Output**, represented as a parallelogram. Examples: Get X from the user; display X.
- **Conditional** (or **decision**), represented as a diamond (rhombus). These typically contain a Yes/No question or True/False test. This symbol is unique in that it has two arrows coming out of it, usually from the bottom point and right point, one corresponding to Yes or True, and one corresponding to No or False. The arrows should always be labeled. More than two arrows can be used, but this is normally a clear indicator that a complex decision is being taken, in which case it may need to be broken-down further, or replaced with the “pre-defined process” symbol.
- A number of other symbols that have less universal currency, such as:
 - A **Document** represented as a rectangle with a wavy base;
 - A **Manual input** represented by rectangle, with the top irregularly sloping up from left to right. An example would be to signify data-entry from a form;
 - A **Manual operation** represented by a trapezoid with the longest parallel side utmost, to represent an operation or adjustment to process that can only be made manually.
 - A **Data File** represented by a cylinder

Flowcharts may contain other symbols, such as connectors, usually represented as circles, to represent converging paths in the flow chart. Circles will have more than one arrow coming into them but only one going out. Some flow charts may just have an arrow point to another arrow instead. These are useful to represent an iterative process (what in Computer Science is called a loop). A loop may, for example, consist of a connector where control first enters, processing steps, a conditional with one arrow exiting the loop, and one going back to the connector. Off-page connectors are often used to signify a connection to a (part of a) process held on another sheet or screen. It is important to remember to keep these connections logical in order. All processes should flow from top to bottom and left to right.

A flowchart is described as “cross-functional” when the page is divided into different “lanes” describing the control of different organizational units. A symbol appearing in a particular “lane” is within the control of that organizational unit. This technique allows the analyst to locate the responsibility for performing an action or making a decision correctly, allowing the relationship between different organizational units with responsibility over a single process.

Histogram

For the histogram used in digital image processing, see Color histogram.



In statistics, a **histogram** is a graphical display of tabulated frequencies. A histogram is the graphical version of a table which shows what proportion of cases fall into each of several or many specified categories. The categories are usually specified as non-overlapping intervals of some variable. The categories (bars) must be adjacent. The word *histogram* is derived from *histos* and *grammain* Greek, the first meaning *web* or *mast* and the second meaning *drawing*, *record* or *writing*. A histogram of something is thus, etymologically speaking, a drawing of the web of this something. The histogram is one of the seven basic tools of quality control, which also include the Pareto chart, check sheet, control chart, cause-and-effect diagram, flowchart, and scatter diagram. See also the glossary of quality management

8) Explain the various stages of FMEA with the help of Case study?

1. Specifying possibilities
 - a. Functions
 - b. Possible failure modes
 - c. Root causes
 - d. Effects
 - e. Detection/Prevention
2. Quantifying risk
 - a. Probability of cause
 - b. Severity of effect
 - c. Effectiveness of control to prevent cause
 - d. Risk priority number
3. Correcting high risk causes
 - a. Prioritizing work
 - b. Detailed action
 - c. Assigning action responsibility
 - d. Check points on completion
4. Revaluation of risk
 - a. Recalculation of risk priority number

UNIT-IV TQM TOOLS

1. Define Benchmarking?

Benchmarking is a systematic method by which organizations can measure themselves against the best industry practices. The essence of benchmarking is the process of borrowing ideas and adapting them to gain competitive advantage. It is a tool for continuous improvement.

2. Enumerate the steps to benchmark?

- a) Decide what to benchmark
- b) Understand current performance
- c) Plan
- d) Study others
- e) Learn from the data
- f) Use the findings

3. What are the types of benchmarking?

- i. Internal
- ii. Competitive
- iii. Process

4. What are the benefits of QFD?

- i. Customer driven
- ii. Reduces implementation time
- iii. Promotes teamwork
- iv. Provides documentation

5. What are the steps required to construct an affinity diagram?

- i. Phrase the objective
- ii. Record all responses
- iii. Group the responses
- iv. Organize groups in an affinity diagram

6. What are the parts of house of quality?

- i. Customer requirements
- ii. Prioritized customer requirements
- iii. Technical descriptors
- iv. Prioritized technical descriptors
- v. Relationship between requirements and descriptors
- vi. Interrelationship between technical descriptors

7. How will you build a house of quality?

- a) List customer requirements
- b) List technical descriptors
- c) Develop a relationship matrix between WHATs and HOWs\
- d) Develop an interrelationship matrix between HOWs
- e) Competitive assessments

- f) Develop prioritized customer requirements
- g) Develop prioritized technical descriptors

8. Define FMEA?

Failure Mode Effect Analysis is an analytical technique that combines the technology and experience of people in identifying foreseeable failure modes of a product or process and planning for its elimination.

9. What are the stages of FMEA?

1. Specifying possibilities
 - a. Functions
 - b. Possible failure modes
 - c. Root causes
 - d. Effects
 - e. Detection/Prevention
2. Quantifying risk
 - a. Probability of cause
 - b. Severity of effect
 - c. Effectiveness of control to prevent cause
 - d. risk priority number
3. Correcting high risk causes
 - a. Prioritizing work
 - b. Detailed action
 - c. Assigning action responsibility
 - d. Check points on completion
4. Reevaluation of risk
 - a. Recalculation of risk priority number

10. What are the goals of TPM?

The overall goals of Total Productive Maintenance, which is an extension of TQM are

- i. Maintaining and improving equipment capacity
- ii. Maintaining equipment for life
- iii. Using support from all areas of the operation
- iv. Encouraging input from all employees
- v. Using teams for continuous improvement

11. Give the seven basic steps to get an organization started toward TPM?

- a) Management learns the new philosophy
- b) Management promotes the new philosophy
- c) Training is funded and developed for everyone in the organization
- d) Areas of needed improvement are identified
- e) Performance goals are formulated
- f) An implementation plan is developed
- g) Autonomous work groups are established

12. What are the major loss areas?

- i. Planned downtime
- ii. Unplanned downtime
- iii. Idling and minor stoppages
- iv. Slow-downs
- v. Process nonconformities
- vi. Scrap

13. What are the generic steps for the development and execution of action plans in benchmarking?

- Specify tasks.
- Sequence tasks.
- Determine resource needs.
- Establish task schedule.
- Assign responsibility for each task.
- Describe expected results.
- Specify methods for monitoring results.

14. What are the phases of QFD process?

- i. Product planning
- ii. Part development
- iii. Process planning
- iv. Production planning

15. What are the several types of FMEA?

- Design FMEA
- Process FMEA
- Equipment FMEA
- Maintenance FMEA
- Concept FMEA
- Service FMEA
- System FMEA
- Environment FMEA etc.

16. Define TPM?

T: Total = All-encompassing by maintenance and production individuals working together.

P: Productive = Production of goods and services that meet or exceed customer's expectations.

M: Maintenance = Keeping equipment and plant in as good as or better than the original condition at all times.

16 MARKS

1) Explain the Bench marking Process and reasons to Benchmark?

Benchmarking is a systematic method by which organizations can measure themselves against the best industry practices. The essence of benchmarking is the process of borrowing ideas and adapting them to gain competitive advantage. It is a tool for continuous improvement.

Steps to benchmark

- Decide what to benchmark
- Understand current performance
- Plan
- Study others
- Learn from the data
- Use the findings

Types of benchmarking

- internal
- Competitive
- Process

2.Explain the QFD process?

- Product planning
- Part development
- Process planning
- Production planning

3.Explain the House of Quality in Quality Function Deployment?

Parts of house of quality

- Customer requirements
- Prioritized customer requirements
- Technical descriptors
- Prioritized technical descriptors
- Relationship between requirements and descriptors
- Interrelationship between technical descriptors

How to build a house of quality

- List customer requirements
- List technical descriptors
- Develop a relationship matrix between WHATs and HOWs\
- Develop an interrelationship matrix between HOWs
- Competitive assessments
- Develop prioritized customer requirements
- Develop prioritized technical descriptors

4. What is FMEA?Explain the stages of FMEA?

Failure Mode Effect Analysis is an analytical technique that combines the technology and experience of people in identifying foreseeable failure modes of a product or process and planning for its elimination.

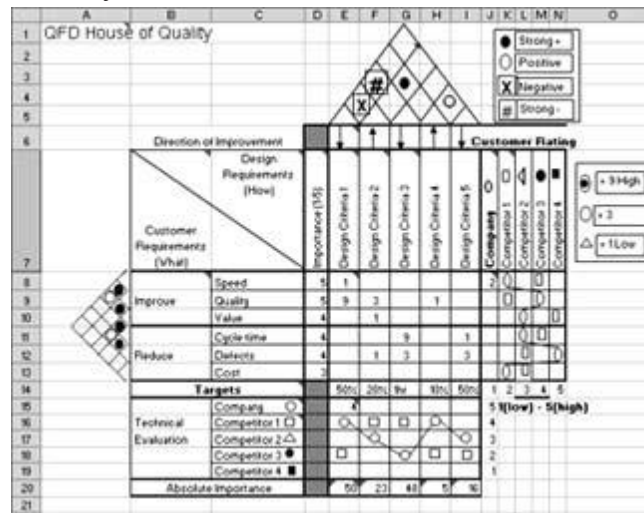
Stages of FMEA

1. Specifying possibilities
 - a. Functions
 - b. Possible failure modes
 - c. Root causes
 - d. Effects
 - e. Detection/Prevention

2. Quantifying risk
 - a. Probability of cause
 - b. Severity of effect
 - c. Effectiveness of control to prevent cause
 - d. Risk priority number
3. Correcting high risk causes
 - a. Prioritizing work
 - b. Detailed action
 - c. Assigning action responsibility
 - d. Check points on completion
4. Reevaluation of risk
 - a. Recalculation of risk priority number

5. Explain in detail about the structure of house of quality

QFD was first put forth in 1966 in Quality Assurance work done by Prof. Yoji Akao and Mr. Oshiumi of Bridgestone Tire. Its purpose was to show the connections between true quality, quality characteristics, and process characteristics. This was done using the Fishbone Diagram, with true quality in the heads and quality and process characteristics in the bones. For more complex products, Mitsubishi Heavy Industry Kobe Shipyards combined these many fishbones into a matrix. In 1979, Mr. Sawada of Toyota Auto Body used the matrix in a reliability study which permitted him to address technical trade-offs in the quality characteristics. This was done by adding a “roof” to the top of the matrix, which he then dubbed the “House of Quality.”



Building a House of Quality:

The House of Quality is actually an assembly of other deployment hierarchies and tables. These include the Demanded Quality Hierarchy (rows), Quality Characteristics Hierarchy (columns),

the relationships matrix which relates them using any one of several distribution methods, the Quality Planning Table (right side room), and Design Planning Table (bottom room).

Many people, who haphazardly learned the over-simplified, obsolete version of QFD decades ago and failed to update their knowledge since then, refer to these rooms by undifferentiated terms such as Whats, Hows, etc. Sadly, this includes many book authors, professors, and consultants. This is not a wise way to do QFD because it limits your ability to apply QFD only in the most elementary form. It could be even detrimental for today's businesses that operate in complex environments. It is recommended that such terms be abandoned and that users refer to the actual data by name. This makes sense when there are multiple matrices used and proper naming conventions add clarity to the process.

Critical Tool for Design for Six Sigma Black Belts

The House of Quality has become a critical tool for Design for Six Sigma (DFSS). It serves the purpose of displaying complex transfer functions $Y=f(X)$, where Y are the Critical to Customer Satisfaction factors and X the Critical to Quality factors. Other matrices can perform lower level transfer functions as well. Objective measures, target specifications, tolerances, and DPMO can also be added to the Design Planning Table. KPOV and KPIV can also be related in similar matrix formats.

The Myth about the House of Quality

Most interesting is that in many QFD studies, the House of Quality (HOQ) is *not* the starting point and can even be unnecessary. That "the House of Quality is the QFD" is a myth that is still propagated by many people and books of outdated QFD knowledge, even though Dr. YojiAkao (founder of QFD) has repeatedly warned it is not QFD by itself.

6. Explain the stages involved in developing TPM

Step A - PREPARATORY STAGE:

STEP 1 - Announcement by Management to all about TPM introduction in the organization:

Proper understanding, commitment and active involvement of the top management is needed for this step. Senior management should have awareness programmes, after which announcement is made to all. Publish it in the house magazine and put it in the notice board. Send a letter to all concerned individuals if required.

STEP 2 - Initial education and propaganda for TPM

Training is to be done based on the need. Some need intensive training and some just an awareness. Take people who matters to places where TPM has already been successfully implemented.

STEP 3 - Setting up TPM and departmental committees

TPM includes improvement, autonomous maintenance, quality maintenance etc., as a part of it. When committees are set up it should take care of all these needs.

STEP 4 - Establishing the TPM working system and target

Now each area is benchmarked and fix up a target for achievement.

STEP 5 - A master plan for institutionalizing

Next step is implementation leading to institutionalizing wherein, TPM becomes an organizational culture. Achieving PM award is the proof of reaching a satisfactory level.

STEP B - INTRODUCTION STAGE

This is a ceremony and we should invite all, including suppliers as they should know that we want quality supply from them. related companies and affiliated companies who can be our customers, sister concerns etc. Some may learn from us and some can help us and customers will get the communication from us that we care for quality output.

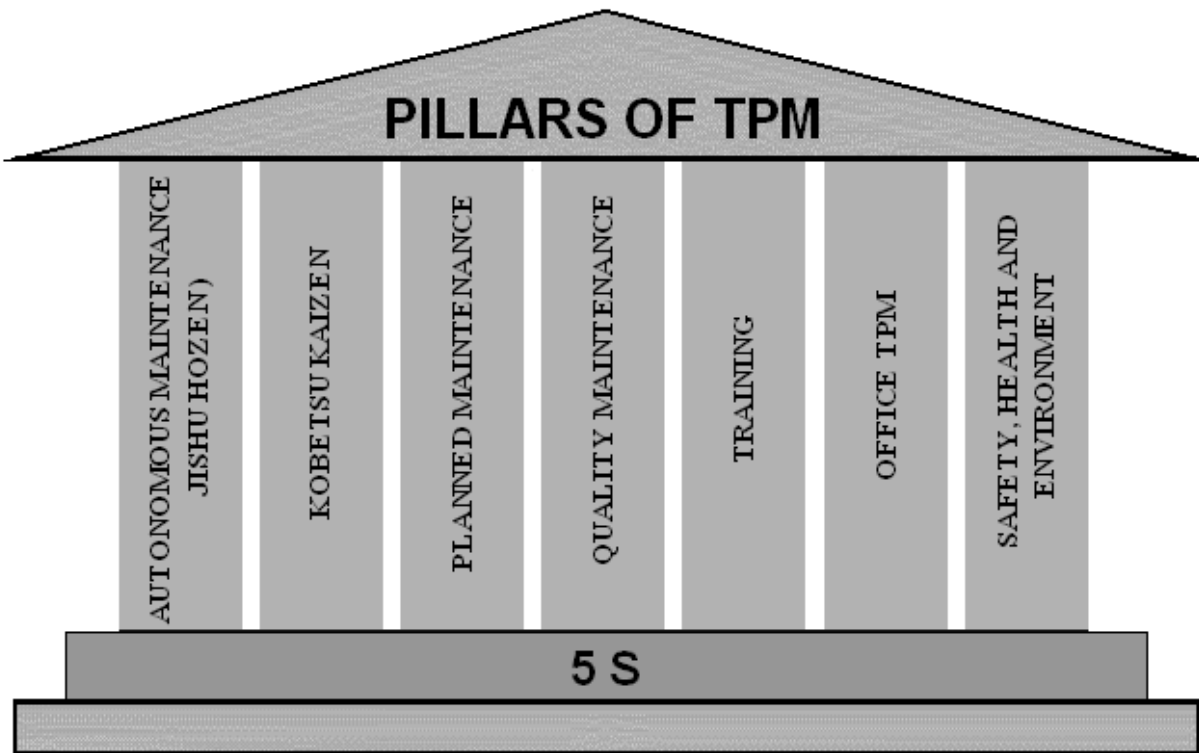
STAGE C - IMPLEMENTATION

In this stage eight activities are carried which are called eight pillars in the development of TPM activity. Of these four activities are for establishing the system for production efficiency, one for initial control system of new products and equipment, one for improving the efficiency of administration and are for control of safety, sanitation as working environment.

STAGE D - INSTITUTIONALIZING STAGE

By all these activities, one would have reached maturity stage. Now is the time for applying for PM award. Also think of a challenging level to which you can take this movement.

7. Explain the pillars of TPM and its benefits?



PILLAR 1 - 5S

TPM starts with 5S. Problems cannot be clearly seen when the work place is unorganized. Cleaning and organizing the workplace helps the team to uncover problems. Making problems visible is the first step of improvement.

SEIRI - Sort out:

This means sorting and organizing the items as critical, important, frequently used items, useless, or items that are not needed as of now. Unwanted items can be salvaged. Critical items should be kept for use nearby and items that are not be used in the near future, should be stored in some place. For this step, the worth of the item should be decided based on utility and not cost. As a result of this step, the search time is reduced.

SEITON - Organise:

The concept here is that “Each items has a place, and only one place”. The items should be placed back after usage at the same place. To identify items easily, name plates and colored tags has to be used. Vertical racks can be used for this purpose, and heavy items occupy the bottom position in the racks.

SEISO - Shine the workplace:

This involves cleaning the work place free of burrs, grease, oil, waste, scrap etc. No loosely hanging wires or oil leakage from machines.

SEIKETSU - Standardization:

An employee has to discuss together and decide on standards for keeping the work place / machines / pathways neat and clean. These standards are implemented for the whole organization and are tested / inspected randomly.

SHITSUKE – Self-discipline:

Consider 5S as a way of life and bring about self-discipline among the employees of the organization. This includes wearing badges, following work procedures, punctuality, dedication to the organization etc.

PILLAR 2 - JISHU HOZEN (Autonomous maintenance) :

This pillar is geared towards developing operators to be able to take care of small maintenance tasks, thus freeing up the skilled maintenance people to spend time on more value added activity and technical repairs. The operators are responsible for the upkeep of their equipment to prevent it from deteriorating.

Policy:

1. Uninterrupted operation of equipment's.
2. Flexible operators to operate and maintain other equipment's.
3. Eliminating the defects at source through active employee participation.
4. Stepwise implementation of JH activities.

JISHU HOZEN Targets:

1. Prevent the occurrence of 1A / 1B because of JH.
2. Reduce oil consumption by 50%

3. Reduce process time by 50%
4. Increase use of JH by 50%

Steps in JISHU HOZEN:

1. Preparation of employees.
2. Initial cleanup of machines.
3. Take counter measures
4. Fix tentative JH standards
5. General inspection
6. Autonomous inspection
7. Standardization and
8. Autonomous management

Each of the above mentioned steps is discussed in detail below.

1. Train the Employees: Educate the employees about TPM, its advantages, JH advantages and Steps in JH. Educate the employees about abnormalities in equipments.
2. Initial cleanup of machines
 - o Supervisor and technician should discuss and set a date for implementing step1
 - o Arrange all items needed for cleaning
 - o On the arranged date, employees should clean the equipment completely with the help of maintenance department.
 - o Dust, stains, oils and grease has to be removed.
 - o Following are the things that has to be taken care while cleaning. They are Oil leakage, loose wires, unfastened nuts and bolts and worn-out parts.
 - o After clean up problems are categorized and suitably tagged. White tags are place where problems can be solved by operators. Pink tag is placed where the aid of maintenance department is needed.
 - o Contents of tag is transferred to a register.
 - o Make note of area which were inaccessible.
 - o Finally close the open parts of the machine and run the machine.
3. Counter Measures :
 - o Inaccessible regions had to be reached easily. E.g., If there are many screws to open a fly wheel door, hinge door can be used. Instead of opening a door for inspecting the machine, acrylic sheets can be used.
 - o To prevent work out of machine parts necessary action must be taken.
 - o Machine parts should be modified to prevent accumulation of dirt and dust.
4. Tentative Standard :
 - o Schedule should be made regarding cleaning, inspection and lubrication and it also should include details like when, what and how.
5. General Inspection :

- o The employees are trained in disciplines like pneumatics, electrical, hydraulics, lubricants and coolants, drives, bolts, nuts and safety.
 - o This is necessary to improve the technical skills of employees and to use inspection manuals correctly.
 - o After acquiring this new knowledge the employees should share this with others.
 - o By acquiring this new technical knowledge, the operators are now well aware of machine parts.
6. Autonomous Inspection
- o New methods of cleaning and lubricating are used.
 - o Each employee prepares his own autonomous chart / schedule in consultation with supervisor.
 - o Parts which have never given any problem or part which don't need any inspection are removed from list permanently based on experience.
 - o Including good quality machine parts. This avoid defects due to poor JH.
 - o Inspection that is made in preventive maintenance is included in JH.
 - o The frequency of cleanup and inspection is reduced based on experience.
7. Standardization
- o Upto the previous step only the machinery / equipment was the concentration. However in this step the surroundings of machinery are organized. Necessary items should be organized, such that there is no searching and searching time is reduced.
 - o Work environment is modified such that there is no difficulty in getting any item.
 - o Everybody should follow the work instructions strictly.
 - o Necessary spares for equipments is planned and procured.
8. Autonomous Management :
- o OEE and OPE and other TPM targets must be achieved by continuous improvement through Kaizen.
 - o PDCA (Plan, Do, Check and Act) cycle must be implemented for Kaizen.

PILLAR 3 - KAIZEN :

“Kai” means change, and “Zen” means good (for the better). Basically kaizen is for small improvements, but carried out on a continual basis and involve all people in the organization. Kaizen is opposite to big spectacular innovations. Kaizen requires no or little investment. The principle behind is that “a very large number of small improvements are more effective in an organizational environment than a few improvements of large value. This pillar is aimed at reducing losses in the workplace that affect our efficiencies. By using a detailed and thorough procedure we eliminate losses in a systematic method using various Kaizen tools. These activities are not limited to production areas and can be implemented in administrative areas as well.

Kaizen Policy:

1. Practice concepts of zero losses in every sphere of activity.

2. Relentless pursuit to achieve cost reduction targets in all resources
3. Relentless pursuit to improve over all plant equipment effectiveness.
4. Extensive use of PM analysis as a tool for eliminating losses.
5. Focus of easy handling of operators.

Kaizen Target:

Achieve and sustain zero losses with respect to minor stops, measurement and adjustments, defects and unavoidable downtimes. It also aims to achieve 30% manufacturing cost reduction.

Tools used in Kaizen:

1. PM analysis
2. Why - Why analysis
3. Summary of losses
4. Kaizen register
5. Kaizen summary sheet.

PILLAR 4 - PLANNED MAINTENANCE:

It is aimed to have trouble free machines and equipment's producing defect free products for total customer satisfaction. This breaks maintenance down into 4 "families" or groups which was defined earlier.

1. Preventive Maintenance
2. Breakdown Maintenance
3. Corrective Maintenance
4. Maintenance Prevention

With Planned Maintenance we evolve our efforts from a reactive to a proactive method and use trained maintenance staff to help train the operators to better maintain their equipment.

Policy:

1. Achieve and sustain availability of machines
2. Optimum maintenance cost.
3. Reduces spares inventory.
4. Improve reliability and maintainability of machines.

Target:

1. Zero equipment failure and break down.
2. Improve reliability and maintainability by 50 %
3. Reduce maintenance cost by 20 %
4. Ensure availability of spares all the time.

Six steps in planned maintenance:

1. Equipment evaluation and recoding present status.
2. Restore deterioration and improve weakness.
3. Building up information management system.
4. Prepare time based information system, select equipment, parts and members and map out plan.

5. Prepare predictive maintenance system by introducing equipment diagnostic techniques and
6. Evaluation of planned maintenance.

PILLAR 5 - QUALITY MAINTENANCE:

It is aimed towards customer delight through highest quality through defect free manufacturing. Focus is on eliminating non-conformances in a systematic manner, much like Focused Improvement. We gain understanding of what parts of the equipment affect product quality and begin to eliminate current quality concerns, then move to potential quality concerns. Transition is from reactive to proactive (Quality Control to Quality Assurance).

QM activities are to set equipment conditions that preclude quality defects, based on the basic concept of maintaining perfect equipment to maintain perfect quality of products. The conditions are checked and measure in time series to verify whether that measure values are within standard values to prevent defects. The transition of measured values is watched to predict possibilities of defects occurring and to take counter measures beforehand.

Policy

1. Defect free conditions and control of equipment's.
2. QM activities to support quality assurance.
3. Focus of prevention of defects at source
4. Focus on poka-yoke. (fool proof system)
5. In-line detection and segregation of defects.
6. Effective implementation of operator quality assurance.

Target

1. Achieve and sustain customer complaints at zero
2. Reduce in-process defects by 50 %
3. Reduce cost of quality by 50 %.

Data requirements:

Quality defects are classified as *customer end defects* and *in-house* defects. For customer-end data, we have to get data on,

1. Customer end line rejection
2. Field complaints.

In-house, data include data related to products and data related to processes.

Data related to product

1. Product wise defects
2. Severity of the defect and its contribution - major/minor
3. Location of the defect with reference to the layout
4. Magnitude and frequency of its occurrence at each stage of measurement
5. Occurrence trend in the beginning and the end of each production/process/ changes. (Like pattern change, ladle/furnace lining etc.)
6. Occurrence trend with respect to restoration of breakdown/modifications/ periodical replacement of quality components.

Data related to processes:

1. The operating condition for individual sub-process related to men, method, material and machine.
2. The standard settings/conditions of the sub-process
3. The actual record of the settings/conditions during the defect occurrence.

PILLAR 6 - TRAINING :

It is aimed to have multi-skilled revitalized employees whose morale is high and who is eager to come to work and perform all the required functions effectively and independently. Education is given to operators to upgrade their skill. It is not sufficient to know only “Know-How” but they should also learn “Know-why”. By experience they gain, “Know-How” to overcome a problem, what is to be done. This they do without knowing the root cause of the problem and why they are doing so. Hence, it becomes necessary to train them on knowing “Know-why”. The employees should be trained to achieve the four phases of skill. The goal is to create a factory full of experts. The different phases of skills are

Phase 1 : Do not know.

Phase 2 : Know the theory but cannot do.

Phase 3 : Can do but cannot teach

Phase 4 : Can do and also teach.

Policy :

1. Focus on improvement of knowledge, skills and techniques.
2. Creating a training environment for self-learning based on felt needs.
3. Training curriculum / tools /assessment etc conducive to employee revitalization
4. Training to remove employee fatigue and make work enjoyable.

Target :

1. Achieve and sustain downtime due to want men at zero on critical machines.
2. Achieve and sustain zero losses due to lack of knowledge / skills / techniques
3. Aim for 100 % participation in suggestion scheme.

Steps in educating and training activities :

1. Setting policies and priorities and checking present status of education and training.
2. Establish training system for operation and maintenance skill upgradation.
3. Training the employees for upgrading the operation and maintenance skills.
4. Preparation of training calendar.
5. Kick-off of the system for training.
6. Evaluation of activities and study of future approach.

PILLAR 7 - OFFICE TPM :

Office TPM should be started after activating four other pillars of TPM (JH, KK, QM, PM). Office TPM must be followed to improve productivity, efficiency in the administrative functions and identify and eliminate losses. This includes analyzing processes and procedures towards increased office automation. Office TPM addresses twelve major losses. They are:

1. Processing loss
2. Cost loss including in areas such as procurement, accounts, marketing, sales leading to high inventories
3. Communication loss
4. Idle loss
5. Set-up loss
6. Accuracy loss
7. Office equipment breakdown
8. Communication channel breakdown, telephone and fax lines
9. Time spent on retrieval of information
10. Nonavailability of correct on line stock status
11. Customer complaints due to logistics
12. Expenses on emergency dispatches/purchases

How to start office TPM ?

A senior person from one of the support functions e.g. Head of Finance, MIS, Purchase etc should be heading the sub-committee. Members representing all support functions and people from Production & Quality should be included in the sub-committee.

TPM co-ordinate plans and guides the sub-committee.

1. Providing awareness about office TPM to all support departments
2. Helping them to identify P, Q, C, D, S, M in each function in relation to plant performance
3. Identify the scope for improvement in each function
4. Collect relevant data
5. Help them to solve problems in their circles
6. Make up an activity board where progress is monitored on both sides – results and actions along with Kaizens.
7. Fan out to cover all employees and circles in all functions.

Kobetsu Kaizen topics for Office TPM :

- Inventory reduction
- Lead time reduction of critical processes
- Motion and space losses
- Retrieval time reduction.
- Equalizing the work load
- Improving the office efficiency by eliminating the time loss on retrieval of information, by achieving zero breakdown of office equipment like telephone and fax lines.

Office TPM and its benefits :

1. Involvement of all people in support functions for focusing on better plant performance
2. Better utilized work area
3. Reduce repetitive work

4. Reduced inventory levels in all parts of the supply chain
5. Reduced administrative costs
6. Reduced inventory carrying cost
7. Reduction in number of files
8. Reduction of overhead costs (to include cost of non-production/non-capital equipment)
9. Productivity of people in support functions
10. Reduction in breakdown of office equipment
11. Reduction of customer complaints due to logistics
12. Reduction in expenses due to emergency dispatches/purchases
13. Reduced manpower
14. Clean and pleasant work environment.

PILLAR 8 - SAFETY, HEALTH AND ENVIRONMENT:

Target:

1. Zero accident,
2. Zero health damage
3. Zero fires.

In this area focus is on to create a safe workplace and a surrounding area that is not damaged by our process or procedures. This pillar will play an active role in each of the other pillars on a regular basis.

A committee is constituted for this pillar which comprises representative of officers as well as workers. The committee is headed by Senior Vice-President (Technical).

Utmost importance to safety is given in the plant. Manager (safety) is looking after functions related to safety. To create awareness among employees various competitions like safety slogans, quiz, drama, posters, etc. related to safety can be organized at regular intervals.

Conclusion:

Today, with competition in industry high all times, TPM may be the only thing that stands between success and total failure for some companies. It has been proven to be a program that works. It can be adapted to work not only in industrial plants, but in construction, building maintenance, transportation, and in a variety of other situations. Employees must be educated and convinced that TPM is not just another “*program of the month*” and that management is totally committed to the program and the extended time frame is necessary for full implementation. If everyone involved in a TPM program does his or her part, an unusually high rate of return compared to resources invested may be expected.

8. List and explain the various measures of performance in evaluating the success of an organization?

1. Purpose: The purpose of a Performance Improvement Plan is to communicate to the employee the specific job performance areas that do not meet expected standards.

2. Develop a Performance Improvement Plan:

- a) Clearly state why the employee's job performance is a concern and how it impacts the work environment.
- b) Summarize the facts and events that necessitate the development of a Performance Improvement Plan.
- c) Develop specific and measurable steps to improve performance and include the employee's ideas for improvement.
- d) Establish reasonable timelines for improved performance on each expectation.
- e) Conduct periodic reviews on a regular basis to monitor progress being made toward the expected outcome and provide feedback.
- f) Communicate consequences for failure to meet expectations and sustain improved performance.

3. Implement the Performance Improvement Plan:

- a) Document each step of the Performance Improvement Plan
- b) Provide constructive feedback to help the employee understand how he/she is doing and what is expected.
- c) Focus on the job and not on the person. Concentrate on a specific behavior to enable the employee to understand what you want and why.

The individual will feel less defensive.

* Example with focus on behavior: "Your report is two days late."

* Example with focus on person: "You are not very reliable about getting things done on time."

- d) Always meet with the employee and provide an opportunity for discussion and feedback.
- e) At the end of the Performance Improvement Plan period, the supervisor will determine if the process was satisfactorily completed or if progressive discipline will be implemented in conjunction with Human Resources.

9. Discuss the need for Taguchi's loss function?

Loss functions

Taguchi's reaction to the classical design of experiments methodology of R. A. Fisher was that it was perfectly adapted in seeking to improve the mean outcome of a process. As Fisher's work had been largely motivated by programmes to increase agricultural production, this was hardly surprising. However, Taguchi realised that in much industrial production, there is a need to produce an outcome *on target*, for example, to machine a hole to a specified diameter or to manufacture a cell to produce a given voltage. He also realised, as had Walter A. Shewhart and others before him, that excessive variation lay at the root of poor manufactured quality and that reacting to individual items inside and outside specification was counter-productive.

He therefore, argued that quality engineering should start with an understanding of the cost of poor quality in various situations. In much conventional industrial engineering the cost of poor quality is simply represented by the number of items outside specification multiplied by the cost of rework or scrap. However, Taguchi insisted that manufacturers broaden their horizons to consider cost to society. Though the short-term costs may simply be those of nonconformance, any item manufactured away from nominal would result in some loss to the customer or the wider community through early wear-out; difficulties in interfacing with other parts, themselves probably wide of nominal; or the need to build-in safety margins. These losses are externalities and are usually ignored by manufacturers. In the wider economy the Coase Theorem predicts that they prevent markets from operating efficiently. Taguchi argued that such losses would

inevitably find their way back to the originating corporation (in an effect similar to the tragedy of the commons) and that by working to minimise them, manufacturers would enhance brand reputation, win markets and generate profits.

Such losses are, of course, very small when an item is near to nominal. Donald J. Wheeler characterized the region within specification limits as where we deny that losses exist. As we diverge from nominal, losses grow until the point where losses are too great *to deny* and the specification limit is drawn. All these losses are, as W. Edwards Deming would describe them, unknown and unknowable, but Taguchi wanted to find a useful way of representing them within statistics.

Taguchi specified three situations:

1. Larger the better (for example, agricultural yield);
2. Smaller the better (for example, carbon dioxide emissions); and
3. On-target, minimum-variation (for example, a mating part in an assembly).

The first two cases are represented by simple monotonic loss functions. In the third case, Taguchi adopted a squared-error loss function on the grounds:

It is the first symmetric term in the Taylor series expansion of any reasonable, real-life loss function, and so is a “first-order” approximation;

Total loss is measured by the variance. As variance is additive it is an attractive model of cost; and

There was an established body of statistical theory around the use of the least squares principle.

The squared-error loss function had been used by John von Neumann and Oskar Morgenstern in the 1930s.

Though much of this thinking is endorsed by statisticians and economists in general, Taguchi extended the argument to insist that industrial experiments seek to maximize an appropriate *signal to noise ratio* representing the magnitude of the mean of a process, compared to its variation. Most statisticians believe Taguchi’s signal to noise ratios to be effective over too narrow a range of applications and they are generally deprecated.

UNIT-V
QUALITY SYSTEMS

1. Give the ISO 9000 Series of Standards?

- ISO 9000, “Quality Management and Quality Assurance Standards Guidelines for Selection and Use”.
- ISO 9001, “Quality Systems – Model for Quality Assurance in Design, Development, Production, Installation & Servicing”.
- ISO 9002, “Quality Systems – “Model for Quality Assurance in Production, Installation & Servicing”.
- ISO 9003, “Quality Systems – “Model for Quality Assurance in Final Inspection and test”.
- ISO 9004-1, “Quality Management and Quality System Elements – Guidelines”.

2. What is the need for ISO 9000?

ISO 9000 is needed to unify the quality terms and definitions used by industrialized nations and use terms to demonstrate a supplier’s capability of controlling its processes.

3. Give some other quality systems?

- i. QS-9000
- ii. TE-9000
- iii. AS9000

4. Give the objectives of the internal audit?

- a) Determine the actual performance conforms to the documented quality systems.
- b) Initiate corrective action activities in response to deficiencies.
- c) Follow up on noncompliance items of previous audits.
- d) Provide continued improvement in the system through feedback to management.

5. What are the requirements of ISO 14001?

- i. General requirements
- ii. Environmental policy
- iii. Planning
- iv. Implementation and operation
- v. Checking and corrective action
- vi. Management review

6. What are the benefits of ISO 14000?

a. Global

- Facilitate trade and remove trade barriers
- Improve environmental performance of planet earth
- Build consensus that there is a need for environment management and a common terminology for EMS.

b. Organizational

- Assuring customers of a commitment to environmental management

- Meeting customer requirements
- Maintaining a good public / community relations image
- Satisfying investor criteria and improving access to capital
- Obtaining insurance at reasonable cost
- Increasing market share that results from a competitive advantage
- Reducing incidents that result in liability
- Improving defense posture in litigation
- Conserving input materials and energy
- Facilitating the attainment of permits and authorization
- Improving industry/government relations

7. What are the four elements for the checking & corrective action of ISO 14001?

- a) Monitoring and measuring
- b) Nonconformance and corrective and preventative action
- c) Records
- d) EMS audit

8. What are the seven elements for the implementation & operations of ISO 14001?

- a) Structure and responsibility
- b) Training, awareness and competency
- c) Communication
- d) EMS documentation
- e) Documentation control
- f) Operational control
- g) Emergency preparedness and response

9. What are the four elements for the planning of ISO 14001?

- a) Environmental aspects
- b) Legal and other requirements
- c) Objectives and targets
- d) Environmental Management Programs

10. Give the types of Organizational Evaluation Standards?

- Environmental Management System
- Environmental Auditing
- Environmental Performance Evaluation

11. Give the ISO 9001 requirements?

1. Scope
2. Normative Reference
3. Terms and Definitions
4. Quality Management System
5. Management Responsibility
6. Resource Management
7. Product Realization
8. Measurement, Analysis & Improvement

12. What are the methods of actual audit?

- i. Examination of documents
- ii. Observation of activities
- iii. Interviews

13. Give the types of Product Evaluation Standards?

- Environmental Aspects in Product Standards
- Environmental Labeling
- Life-Cycle Assessment

14. Define Quality Audits?

Quality Audits examine the elements of a quality management system in order to evaluate how well these elements comply with quality system requirements.

16 MARKS

1) Explain the elements of ISO 9000:2000?

- Management responsibility
- The Quality system
- Contract review
- Design control
- Document and data control
- Purchasing
- Control of customer-supplied product
- Product identification and traceability
- Process control
- Inspection and testing
- Control of inspection, measuring and test equipment
- Inspection and test status
- Control of nonconforming product
- Corrective and preventive action
- Handling, storage, packaging, preservation and delivery
- Control of quality records
- Internal quality audits
- Training
- Servicing
- Statistical techniques

2) Explain the implementation and documentation of Quality System?

Implementation steps

- Top management commitment
- Appoint the management representative
- Awareness
- Appoint an implementation team

- Training
- Time schedule
- Select element owners
- Review the present system
- Write the document
- Install the new system.
- Internal audit
- Management review
- Reassessment
- Registration

3) Explain the requirements of ISO 14000?

- General requirements
- Environmental policy
- Planning
- Implementation & operation
- Checking and corrective action
- Management review

4) Explain the Benefits of ISO 14000?

a. Global

- Facilitate trade and remove trade barriers
- improve environmental performance of planet earth
- Build consensus that there is a need for environment management and a common terminology for EMS.

b. Organizational

- Assuring customers of a commitment to environmental management
- Meeting customer requirements
- Maintaining a good public / community relations image
- Satisfying investor criteria and improving access to capital
- Obtaining insurance at reasonable cost
- Increasing market share that results from a competitive advantage
- Reducing incidents that result in liability
- Improving defense posture in litigation
- Conserving input materials and energy
- Facilitating the attainment of permits and authorization
- Improving industry/government relations

5) Discuss about ISO 9000:2000 Quality Systems?

The term I S O 9 0 0 0 refers to a set of quality management standards. ISO 9000 currently includes three quality standards: ISO 9000:2000, ISO 9001:2000, and ISO 9004:2000. ISO 9001:2000 presents requirements, while ISO 9000:2000 and ISO 9004:2000 present guidelines. ISO's purpose is to facilitate international trade by providing a single set of standards that people everywhere would recognize and respect. The ISO 9000 2000 Standards apply to all kinds of organizations in all kinds of areas. Some of these areas include manufacturing,

processing, servicing, printing, forestry, electronics, steel, computing, legal services, financial services, accounting, trucking, banking, retailing, drilling, recycling, aerospace, construction, exploration, textiles, pharmaceuticals, oil and gas, pulp and paper, petrochemicals, publishing, shipping, energy, telecommunications, plastics, metals, research, health care, hospitality, utilities, pest control, aviation, machine tools, food processing, agriculture, government, education, recreation, fabrication, sanitation, software development, consumer products, transportation, design, instrumentation, tourism, communications, biotechnology, chemicals, engineering, farming, entertainment, horticulture, consulting, insurance, and so on. ISO 9000 is important because of its orientation. While the content itself is useful and important, the content alone does not account for its widespread appeal. ISO 9000 is important because of its international orientation. Currently, ISO 9000 is supported by national standards bodies from more than 120 countries. This makes it the logical choice for any organization that does business internationally or that serves customers who demand an international standard of quality. ISO is also important because of its systemic orientation. We think this is crucial. Many people in this field wrongly emphasize motivational and attitudinal factors. The assumption is that quality can only be created if workers are motivated and have the right attitude. This is fine, but it doesn't go far enough. Unless you institutionalize the right attitude by supporting it with the right policies, procedures, records, technologies, resources, and structures, you will never achieve the standards of quality that other organizations seem to be able to achieve. Unless you establish a quality attitude by creating a quality system, you will never achieve a world-class standard of quality.

6) Discuss about the four important documents to be prepared for ISO 9000 certification?

ISO 9000

The ISO 9000 Series, issued in 1987 by the International Organization for Standardization (ISO) is a set of international standards on quality and quality management. The standards are generic and not specific to any particular product.

They were adopted by the American Society for Quality Control (ASQC), now American Society for Quality, and issued in the United States as the ANSI/ASQC Q90 Series (Revised in 1994 as the ANSI/ASQC Q9000 Series). ISO 9000:2000 is the most recent revision of the standards.

ISO 9000 is a family of standards for quality management systems. ISO 9000 is maintained by ISO, the International Organization for Standardization and is administered by accreditation and certification bodies. For a manufacturer, some of the requirements in ISO 9001 (which is one of the standards in the ISO 9000 family) would include:

- a set of procedures that cover all key processes in the business;
- monitoring manufacturing processes to ensure they are producing quality product;
- keeping proper records;
- checking outgoing product for defects, with appropriate corrective action where necessary; and
- Regularly reviewing individual processes and the quality system itself for effectiveness.

A company or organization that has been independently audited and certified to be in conformance with ISO 9001 may publicly state that it is “ISO 9001 certified” or “ISO 9001 registered.” Certification to an ISO 9000 standard does not guarantee the compliance (and therefore the quality) of end products and services; rather, it certifies that consistent business processes are being applied.

Although the standards originated in manufacturing, they are now employed across a wide range of other types of organizations. A “product”, in ISO vocabulary, can mean a physical object, or services, or software. In fact, according to ISO in 2004,

“Service sectors now account by far for the highest number of ISO 9001:2000 certificates - about 31% of the total”

History of ISO 9000

Pre-ISO 9000

During World War II, there were quality problems in many British high-tech industries such as munitions, where bombs were going off in factories. The adopted solution was to require factories to document their manufacturing procedures and to prove by record-keeping that the procedures were being followed. The name of the standard was BS 5750, and it was known as a management standard because it did not specify what to manufacture, but how to manage the manufacturing process.

According to Seddon, “In 1987, the British Government persuaded the International Standards Organisation to adopt BS 5750 as an international standard. BS 5750 became ISO 9000.”

Certification

ISO does not itself certify organizations. Many countries have formed accreditation bodies to authorize certification bodies, which audit organizations applying for ISO 9001 compliance certification. It is important to note that it is not possible to be certified to ISO 9000. Although commonly referred to as ISO 9000:2000 certifications, the actual standard to which an organization’s quality management can be certified is ISO 9001:2000. Both the accreditation bodies and the certification bodies charge fees for their services. The various accreditation bodies have mutual agreements with each other to ensure that certificates issued by one of the Accredited Certification Bodies

(CB) are accepted world-wide.

The applying organization is assessed based on an extensive sample of its sites, functions, products, services and processes; a list of problems (“action requests” or “non-compliances”) is made known to the management. If there are no major problems on this list, the certification body will issue an ISO 9001 certificate for each geographical site it has visited, once it receives a satisfactory improvement plan from the management showing how any problems will be resolved.

An ISO certificate is not a once-and-for-all award, but must be renewed at regular intervals recommended by the certification body, usually around three years. In contrast to the Capability Maturity Model there are no grades of competence within ISO 9001.

7) What are benefits of implementing ISO 14000 standards?

ISO 14000 – ENVIRONMENTAL MANAGEMENT SYSTEM

The overall aim of the Environmental Management systems is **to provide protection to the environment and to prevent pollution.**

- The success of ISO 9000 along with increased emphasis on Environmental issues was instrumental in ISO’s decision to develop Environmental Management Standards.
- In 1991, ISO formed the Strategic Advisory Group on the Environment (SAGE) which led to the formation of Technical Committee (TC) 207 in 1992.
- Mission of TC207 is to develop standards for an Environmental Management System (EMS) which was identified as ISO 14000.

- TC 207 has established six sub-committees

1. Environmental Management System (EMS)
2. Environmental Auditing (EA)
3. Environmental labeling (EL)
4. Environmental Performance Evaluation (EPE)
5. Life-Cycle Assessment (LCA)
6. Terms & Definitions

Environmental Management System (EMS)

EMS has two Evaluation Standards. They are

1. Organization Evaluation Standards
2. Product Evaluation Standards

REQUIREMENT OF ISO 14001

There are six elements

1. GENERAL REQUIREMENTS

- EMS should include policy, planning implementation & operation, checking & corrective action, management review.

2. ENVIRONMENTAL POLICY (Should be based on mission)

- The policy must be relevant to the organization's nature.
- Management's Commitment (for continual improvement & preventing pollution).
- Should be a framework (for Environmental objectives & Targets).
- Must be Documented, Implemented, & Maintained.

3. PLANNING

- Environmental Aspects
- Legal & other Requirements
- Objectives & Targets
- Environmental Management Programs

4. IMPLEMENTATION & OPERATION

- Structure & Responsibility
- Training, Awareness & Competency
- Communication
- EMS Documentation
- Document Control
- Operational Control
- Emergency Preparedness & Response

5. CHECKING & CORRECTIVE ACTION

- Monitoring & Measuring
- Nonconformance & Corrective & Preventive action
- Records
- EMS Audit

6. MANAGEMENT REVIEW

- Review of objectives & targets
- Review of Environmental performance against legal & other requirement
- Effectiveness of EMS elements
- Evaluation of the continuation of the policy

BENEFITS OF ENVIRONMENTAL MANAGEMENT SYSTEM

GLOBAL BENEFITS

- Facilitate trade & remove trade barrier
- Improve environmental performance of planet earth
- Build consensus that there is a need for environmental management and a common terminology for EMS

ORGANIZATIONAL BENEFITS

- Assuring customers of a commitment to environmental management
- Meeting customer requirement
- Improve public relation
- Increase investor satisfaction
- Market share increase
- Conserving input material & energy
- Better industry/government relation
- Low cost insurance, easy attainment of permits & authorization

8) Discuss the various elements of ISO 9000:2000 quality system

Components of the ISO 9000 Series

The ISO 9000 Series includes three standards:

- ISO 9000:2000 Quality Management Systems—Fundamentals and Vocabulary
- ISO 9001:2000 Quality Management Systems—Requirements
- ISO 9004:2000 Quality Management Systems—Guidelines for Performance

Improvement

ISO 9000 family

ISO 9000 includes the following standards:

- **ISO 9000:2005, Quality management systems - Fundamentals and vocabulary.** covers the basics of what quality management systems are and also contains the core language of the ISO 9000 series of standards.
- **ISO 9001:2000 Quality management systems - Requirements** is intended for use in any organization which designs, develops, manufactures, installs and/ or services any product or provides any form of service. It provides a number of requirements which an organization needs to fulfill if it is to achieve customer satisfaction through consistent products and services which meet customer expectations. This is the only implementation for which third-party auditors may grant certifications.
- **ISO 9004:2000 Quality management systems - Guidelines for performance improvements.** Covers continual improvement. This gives you advice on what you could do to enhance a mature system. This standard very specifically states that it is not intended as a guide to implementation.
- ISO 9002:1994 and ISO 9003:1994 were discontinued in the ISO 9000:2000 family of standards. Organizations that do not have design or manufacturing responsibilities (and were previously certified using ISO 9002:1994) will now have to use ISO 9001:2000 for certification. These organizations are allowed to exclude design and manufacturing

requirements in ISO 9001:2000 based on the rules for exception given in Clause 1.2, Permissible Exclusions.

ISO Facts

The International Organization for Standardization (ISO), founded in 1946, is a global federation of national standards organizations that includes some 130 member nations:

- ISO is based in Geneva, Switzerland.
- ISO's mission is to develop standards that facilitate trade across international borders.
- In 1979, the Technical Committee 176 (ISO/TC 176) was established to create international standards for quality assurance.
- Representatives from the United States and many other countries served on the committees responsible for developing ISO 9000.
- Early in the 1990s, the chair of the consortium was a U.S. citizen from American Telephone & Telegraph (AT&T).
- The U.S. standards organization within ISO is the American National Standards Institute (ANSI).
- The American Society for Quality (ASQ) has published a U.S. version of the ISO 9000 standards under the name Q9000.
- ISO serves only as a disseminator of information on system quality.
- ISO 9000 certificates are not issued on behalf of ISO.
- ISO does not monitor the activities of ISO 9000 accreditation bodies. Monitoring is done by accreditation boards within member nations.

Philosophy of ISO 9000

ISO 9000 places the responsibility for the establishment, performance, and maintenance of a quality system directly with a company's top management:

- ISO requires the top management to define a quality policy, provide adequate resources for its implementation, and verify its performance.
- Top management must demonstrate how its employees acquire and maintain awareness of its quality policy.
- The ISO 9000 process strives for generic applicability:
- No specific methods, statistical processes, or techniques are mandated.
- Emphasis is on the overall objective of meeting customer expectations regarding the output of the system quality process.
- ISO has said that it will never issue industry (product-specific) quality guidelines.
- ISO 9000 strives to achieve a quality system by employing the following practices for

Continuous improvement:

- Prevention rather than detection by inspection
- Comprehensive review of critical process points
- On-going communication between the facility, its suppliers, and its customers
- Documentation of processes and quality outcomes
- Management commitment at the highest levels
- ISO 9000 provides a clear definition of the management style required to achieve a "world-class" quality system:

- Formal organization that delineates responsibilities Documented, authorized, and enforced procedures for all key activities
- Full set of archived but periodically analyzed quality outcome records
- Set of periodic reviews to track system quality performance and plan and implement corrective actions
- Philosophy of regulating, but not eliminating, individual initiative in achieving system quality
- ISO 9000 provides a facility with a formal management style leading to system quality. The measure of success in implementing system quality is determined by well organized, well-planned, and well-executed periodic internal and external audits of the processes and quality outcomes of the facility.
- The majority of ISO member nations will not mandate the adoption of the ISO 9000 standards in the foreseeable future. To date, only Australia mandates adoption of the standards.
- How well the ISO standards facilitate trade in the international marketplace will determine how widespread their use becomes.

Advantages

According to *the Providence Business New*, implementing ISO often gives the following advantages:

1. Create a more efficient, effective operation
2. Increase customer satisfaction and retention
3. Reduce audits
4. Enhance marketing
5. Improve employee motivation, awareness, and morale
6. Promote international trade

Problems

A common criticism of ISO 9000 is

- the amount of money
- time
- paperwork required for registration

According to Barnes, “Opponents claim that it is only for documentation.

Proponents believe that if a company has documented its quality systems, then most of the paperwork has already been completed.”

The ISO 9004:2000 standard

ISO 9004:2000 goes beyond ISO 9001:2000 in that it provides guidance on how you can continually improve your business’ quality management system so that it benefits not only your customers but also:

- employees
- owners
- suppliers
- society in general

By measuring these groups’ satisfaction with your business, you’ll be able to assess whether you’re continuing to improve.

Read about ISO 9004:2000 at the British Standards Institution (BSI) website.

The ISO 9000 series, which includes 9001 and 9004, is based around eight quality management principles that the senior managers should use as a framework to improve the business:

Customer focus - they must understand and fulfil customer needs.

Leadership - they should demonstrate strong leadership skills to increase employee motivation.

Involvement of people - all levels of staff should be aware of the importance of providing what the customer requires and their responsibilities within the business.

Process approach - identifying your essential business activities and considering each one as part of a process.

System approach to management - managing your processes together as a system, leading to greater efficiency and focus. You could think of each process as a cog in a machine, helping it to run smoothly.

Continual improvement - this should be a permanent business objective.

Factual approach to decision-making - senior staff should base decisions on thorough analysis of data and information.

9) What are the needs for documentation in Quality Management System?

GUIDELINES FOR PERFORMANCE IMPROVEMENTS

1. Purpose: The purpose of a Performance Improvement Plan is to communicate to the employee the specific job performance areas that do not meet expected standards.

2. Develop a Performance Improvement Plan:

a) Clearly state why the employee's job performance is a concern and how it impacts the work environment.

b) Summarize the facts and events that necessitate the development of a Performance Improvement Plan.

c) Develop specific and measurable steps to improve performance and include the employee's ideas for improvement.

d) Establish reasonable timelines for improved performance on each expectation.

e) Conduct periodic reviews on a regular basis to monitor progress being made toward the expected outcome and provide feedback.

f) Communicate consequences for failure to meet expectations and sustain improved performance.

3. Implement the Performance Improvement Plan:

a) Document each step of the Performance Improvement Plan

b) Provide constructive feedback to help the employee understand how he/she is doing and what is expected.

c) Focus on the job and not on the person. Concentrate on a specific behavior to enable the employee to understand what you want and why.

The individual will feel less defensive.

* Example with focus on behavior: "Your report is two days late."

* Example with focus on person: "You are not very reliable about getting things done on time."

d) Always meet with the employee and provide an opportunity for discussion and feedback.

e) At the end of the Performance Improvement Plan period, the supervisor will determine if the process was satisfactorily completed or if progressive discipline will be implemented in conjunction with Human Resources.

10) Write a brief note on Quality Auditing in QMS?

QUALITY AUDITS

Quality audit means a systematic, independent examination of a quality system.

A quality audit is typically performed at defined intervals and ensures that the institution has clearly-defined internal quality monitoring procedures linked to effective action. The checking determines if the quality system complies with applicable regulations or standards the process involves assessing the standard operating procedures (SOP's) for compliance to the regulations, and also assessing the actual process and results against what is stated in the SOP.

The U.S. Food and Drug Administration requires quality auditing to be done as part of its Quality System Regulation (QSR) for medical devices, title 21 of the United States Code of Federal Regulations part 820.

The process of a Quality Audit can be managed using software tools, often Web-based.

Internal Quality auditing is an important element in ISO's quality system standard, ISO 9001. . With the upgrade of the ISO9000 series of standards from the 1994 to 2000 series, the focus of audits has shifted from procedural adherence only to measurement of the effectiveness of the Quality Management System processes to deliver in accordance with planned results.

Higher education quality audit is an approach adopted by several countries, including New Zealand, Australia, Sweden, Finland Norway and the USA. It was initiated in the UK and is a term designed to focus on procedures rather than quality.

Guidelines for Planning and Performing Quality Audits

ISO 10011-1: 1990

Quality audit objectives

- Quality audits are intended to achieve the following kinds of objectives:
- To determine to what extent your quality system:
- Achieves its objectives.
- Conforms to your requirements.
- Complies with regulatory requirements.
- Meets customers' contractual requirements.
- Conforms to a recognized quality standard.
- To improve the efficiency and effectiveness of your quality management system.
- To list your quality system in registry of an independent agency.
- To verify that your quality system continues to meet requirements.

Professional conduct

- Auditors must behave in a professional manner. Auditors must:
- Have integrity and be independent and objective.
- Have the authority they need to do a proper job.

- Avoid compromising the audit by discussing audit details with auditees during the audit.

The lead auditor's job

A lead auditor's job is to:

- Manage the audit.
- Assign audit tasks.
- Help select auditors.
- Orient the audit team.
- Prepare the audit plan.
- Define auditor qualifications.
- Clarify quality audit requirements.
- Communicate audit requirements.
- Prepare audit forms and checklists.
- Review quality system documents.
- Report major nonconformities immediately.
- Interact with auditee's management and staff.
- Prepare, submit, and discuss audit reports.

Auditor's job

- An auditor's job is to:
- Evaluate the quality system.
- Carry out assigned audit tasks.
- Comply with audit requirements.
- Respect all confidentiality requirements.
- Collect evidence about the quality system.
- Document audit observations and conclusions.
- Safeguard audit documents, records, and reports.
- Determine whether quality policy is being applied.
- Find out if the quality objectives are being achieved.
- See whether quality procedures are being followed.
- Detect evidence that might invalidate audit results.

Client's job

- A client's job is to:
- Initiate the audit process.
- Select the auditor organization.
- Decide whether an audit needs to be done.
- Define the purpose and scope of the audit.
- Ensure that audit resources are adequate.
- Determine how often audits must be done.
- Specify which follow-up actions the auditee should take.
- Indicate which standards should be used to evaluate compliance.
- Select the elements, activities, and locations that must be audited.

- Ensure enough evidence is collected to draw valid conclusions.
- Receive and review the reports prepared by auditors.

NOTE: A “ client ” is the organization that asked for the audit. The client could be an auditee, a customer, a regulatory body, or a registrar.

Auditee’s job

- An auditee’s job is to:
- Explain the nature, purpose, and scope of the audit to employees.
- Appoint employees to accompany and assist the auditors.
- Ensure that all personnel cooperate fully with the audit team.
- Provide the resources the audit team needs to do the audit.
- Allow auditors to examine all documents, records, and facilities.
- Correct and prevent problems that were identified by the audit.

NOTE: An “ auditee ” is the organization being audited or a member of that organization.

When to do an audit

- A client may initiate an audit because:
- A regulatory agency requires an audit.
- A previous audit indicated that a follow-up audit was necessary.
- An auditee has made important changes in:
 - Policies or procedures.
 - Technologies or techniques.
 - Management or organization.
- An auditee may carry out audits on a regular basis to improve quality system performance or to achieve business objectives.

Prepare an audit plan

- The auditor should begin planning the audit by reviewing documents (e.g. manuals) that both describe the quality system and explain how it is attempting to meet quality requirements.
- If this preliminary review shows that the quality system is inadequate; the audit process should be suspended until this inadequacy is resolved.
- Prepare an audit plan. The plan should be prepared by the lead auditor and approved by the client before the audit begins. The audit plan should:
 - Define the objectives and scope of the audit.
 - Explain how long each phase of the audit will take.
 - Specify where and when the audit will be carried out.
 - Introduce the lead auditor and his team members.
 - Identify the quality elements that will be audited.
 - Identify the groups and areas that will be audited.
 - List the documents and records that will be studied.
 - List the people who are responsible for quality and whose areas and functions will be audited.
 - Explain when meetings will be held with auditee’s senior management.

- Clarify who will get the final audit report and when it will be ready.

Perform the quality audit

• **Start the quality audit.** Start the audit by having an opening meeting with the auditee's senior management. This meeting should:

- Introduce the audit team.
- Clarify scope, objectives, and schedule.
- Explain how the audit will be carried out.
- Confirm that the auditee is ready to support the audit process.

• **Prepare audit working papers.**

- Prepare ← checklists ← (use ← to ← evaluate quality management system elements).
- Prepare ← forms ← (use ← to ← record observations and collect evidence).

Collect evidence by:

- Interviewing personnel.
- Reading documents.
- Reviewing manuals.
- Studying records.
- Reading reports.
- Scanning files.
- Analyzing data.
- Observing activities.
- Examining conditions.
- **Confirm interview evidence.** Evidence collected through interviews should, whenever possible, be confirmed by more objective means.
- **Investigate clues.** Clues that point to possible quality management system nonconformities should be thoroughly and completely investigated.
- **Document observations.** Auditors must study the evidence and document their observations.

• **List nonconformities.** Auditors must study their observations and make a list of key nonconformities. They must ensure that nonconformities are:

- Supported by the evidence.
- Cross-referenced to the standards that are being violated.

• **Draw conclusions.** Auditors must draw conclusions about how well the quality system is applying its policies and achieving its objectives.

• **Discuss results.** Auditors should discuss evidence, observations, conclusions, recommendations, and nonconformities with auditee senior managers before they prepare a final audit report.

Prepare the audit report

• **Prepare the final audit report.** The audit report should be dated and signed by the lead auditor. This report should include:

- The detailed audit plan.

- A review of the evidence that was collected.
- A discussion of the conclusions that were drawn.
- A list of the nonconformities that were identified.
- A judgment about how well the quality system complies with all quality system requirements.

An assessment of the quality system's ability to achieve quality objectives and apply the quality system policy.

Submit the audit report. The lead auditor should send the audit report to the client, and the client should send it to the auditee.

Follow-up steps

Take remedial actions. The auditee is expected to take whatever actions are necessary to correct or prevent nonconformities.

Schedule follow-up audit. Follow-up audits should be scheduled in order to verify that corrective and preventive actions were taken.

11) Discuss the various elements of QMS?

First-Party Audits

The first-party audit is also known as an *internal audit* or *self-audit*. It is performed within your own company. This can be a central office group auditing one of the plants, auditing within a division, local audits within the plant, or any number of similar combinations. There are no external customer-supplier audit relationships here, just internal customers and suppliers.

Second-Party Audits

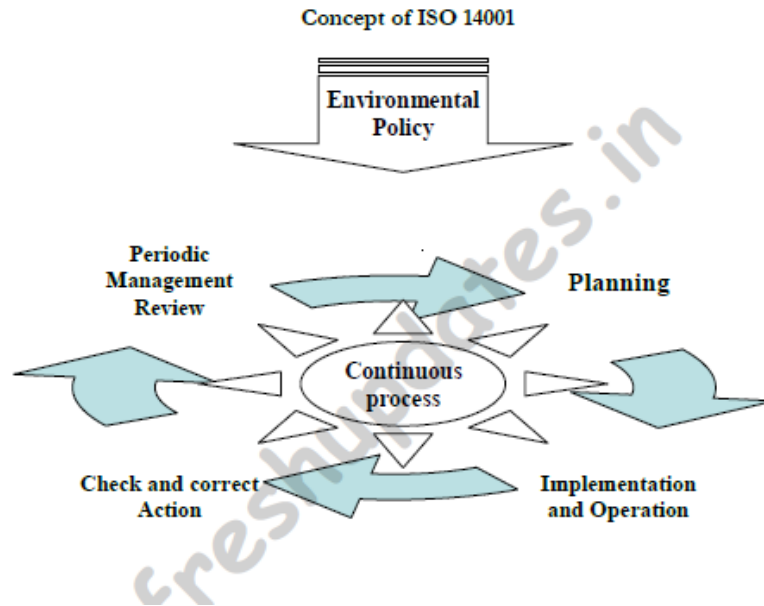
A customer performs a second-party audit on a supplier. A contract is in place and goods are being, or will be, delivered. If you are in the process of approving a potential supplier through the application of these auditing techniques, you are performing a supplier survey. A survey is performed before the contract is signed; an audit is performed after the contract is signed. Second-party audits are also called *external audits*, if you are the one doing the auditing. If your customer is auditing you, it is still a second-party audit, but, since you are now on the receiving end, this is an *extrinsic* (not external) audit.

Third-Party Audits

Regulators or registrars perform third-party audits. Government inspectors may examine your operations to see if regulations are being obeyed. Within the United States, this is quite common in regulated industries, such as nuclear power stations and medical device manufacturers. Through these regulatory audits, the consumer public receives assurance that the laws are being obeyed and products are safe. Registration audits are performed as a condition of joining or being approved. Hospitals and universities are accredited by non-governmental agencies to certain industry standards. Trade organizations may wish to promote the safety and quality of their industry products or services through an audit program and seal of approval. Other countries often use the term *certification* rather than *registration*. Businesses around the world

are registering their facilities to the ISO 9001 standard in order to gain marketing advantage. Done properly, this registration promotes better business practices and greater efficiencies.

12) Explain the features of ISO 14000 and procedure to obtain ISO 14000 Certification?



- **Environment** – Surrounding not just local but global. As air, water, land and natural resources are universal.
- **Environment Aspects** – In terms of organisations activities by its products, process and service. Discharge waste management, emission, energy conservation
- **Environment impact** – How the above impacts the environment
- **Environmental objective** – overall policy of the organisation and their plans for protection **Environmental target** – Set goals towards protecting the environment
- **Requirement of ISO 14001 General Requirement** – EMS policy and activities
- **Environment Policy** - Top management commitment and direction - Current activities and future plans - Policy must be made public
- **Planning** - Environmental Aspects - Legal and other Requirements - Objectives and targets - Environment Management Program
- **Implementation** - Structure and responsibility **and**
- **operation** - Training, awareness, competency - Communication - EMS Documentation - Document control - Operational Control - Emergency preparedness and response
- **Checking and** - Monitoring and measuring
- **Corrective action** - Corrective and preventive action - Records - EMS Audit
- **Management Review** - Review objective and targets - Review performance against legal requirement
- **Benefits of EMS Global** – trade and barrier removal, improve ems, earth a safe place to live.

- **Organizational** – customers are aware, good image, reduce env hazards, energy conservation
- **Health and safety** – employees knows ems is good for him, ems leads to safety security and longevity not just employees but the society as a whole.