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7. Total Quality Management (TQM)

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7.1 Introduction:

In the present global scenario every company whether it is manufacturing or service, government or non- government focusing on product quality as it is the only strategy through which customers can be retained , and it is the key for continues success, the aim of any business is long term profitability and earnings achieved by satisfying customers while keeping production cost at minimum and total quality management is a popular management philosophy and practice designed to enhance productivity, quality, reducing waste and increase customer satisfaction.

TQM is one of the techniques of quality management beside ISO (International standard Organization), Six sigma, just in time, Kaizan, benchmarking etc. TQM is a management system that takes into consideration all the areas of operation in an organization. TQM is the continuous process of detecting and reducing or eliminating errors in manufacturing it streamlines supply chain management, improves the customer experience and ensures that employees are up to speed with training, TQM aims to hold all parties involved in production, process accountable for the overall quality of the final product or service. It is the unique concept started first in Japan then in US and now all around the world companies are following this technique. TQM is used all industries including manufacturing, banking and finance, medicine and can be applied to all the departments in an individual organization. Successful case studies of TQM are Toyota, Motorola, Ford, Xerox, HP, Amazon, Apple, Starbucks. As TQM started with from the quality, quality is the ability to meet customer's expectations, the dimension of quality can be features, performance, reliability, durability, servicing ability etc.

7.2 Concept of TQM:

TQM is the commonly known broad and systematic philosophical approach for managing organizational quality which emphasizes on continuous quality improvement involving all the employees in the pursuit of customer satisfaction through achieving quality excellence, it fosters a culture of ingrained quality, teamwork, proactive problem solving and commitment to excellence aiming to eliminate defects, reduce waste and enhance overall performance. TQM requires strong leadership commitment, systematic process and employee engagement

TQM is a comprehensive management approach that works horizontally across an organization, involving all departments and employees and extending backward and forward to include both suppliers and clients/customers.

According to International Organization for standardization, "TQM is a management approach for an organization, centred on quality, based on the participation of all its members and aiming at long term success through customer satisfaction and benefits to all members of the organization and to society"

TQM is Composed of Three Paradigms:

1. **Total:** Involving the entire organization, supply chain, and/or product life cycle.
2. **Quality:** Degree of Excellence a product or service provide.
3. **Management:** The system of managing with steps like Plan, Organize, Control, Lead, Staff, provisioning and the likes

TQM is an extensive and structured organization management approach that focuses on continuous quality improvement of product and services by using continuous feedback.

7.2.1 Historical Background of TQM:

The term TQM is actually originated in 20th century from the word Quality which means meeting and satisfying customer's requirements, it traced back to 1920 in the United States when the concept of quality control emerged as distinct discipline when statistical theory was first applied to product quality control method in manufacturing, the seed of quality management were planted as first the principle of scientific management however its systematic development gained prominence post-world war II.

In 1930 Walter Shewhart developed the methods for statistical analysis and control of quality. In 1950's W. Edward Deming's and Joseph M. Juran taught methods for statistical analysis and control of quality to Japanese engineers and executives. In 1960, Dr. K. Ishikawa formalized "quality circles" - the use of small groups to eliminate variation and improve processes. In 1968 Japanese companies named their approach to total quality as "companywide quality control" it is around this time Total quality management philosophy embraced. Japan's success in quality and productivity spurred global interest in TQM during the 1980s, Western countries implement total quality management in response to intense market competition. Alongside the economic shift beyond the manufacturing sector, the versatile approach was adopted in a variety of service sectors, such as healthcare, education, finance etc.

7.3 Quality Management Gurus:

W. Edward Deming, Philips B. Crosby, Armand V. Feigenbaum, Kaoru Ishikawa and Joseph M. Juran can be considered the most important gurus of the quality management movement.

W. Edward Deming:

W. Edward Deming was one of the pioneers of quality management, when top managers in USA focused on marketing, production, quantity and financial performance Dr. Deming and Juran went to Japan and began transformation from shoddy to world class goods and

advocated methods which signals shift in a process that will likely leads to goods and services not meeting customer requirements and emphasized on overall organizational approach to managing quality and identified 14 points critical for improving quality, Deming's consulting work for the Japanese economy had very favorable effects on the country's goods and services Soon, he was hailed as a local hero.

The "Deming Prize" was founded by Japanese union of scientist and engineers (JUSE) in 1951 to recognised Deming's contributions to Japan.

Deming's 14 management principles enable industry leaders achieve quality gains, and they may be summed up as follows:

1. Develop a steadfast commitment to the enhancement of your offerings.
2. Take up the new way of thinking. No longer will acceptable levels of delay, errors, and shoddy work be tolerated.
3. Stop relying so much on random checks. Instead, insist on empirical proof that quality is embedded from the start.
4. Stop giving out contracts only on pricing.
5. Identify issues. Management's responsibility is to constantly improve the system.
6. Update workplace education using cutting-edge techniques
7. Foremen's duties should shift from counting to ensuring high quality in order to use new production management techniques.
8. Get rid of the worry so that everyone may contribute to the organization successfully.
9. Remove silos within organizations
10. Avoid pressuring employees with arbitrary numbers or catchy phrases to achieve unattainable increases in output.
11. Do away with quota-based performance criteria.
12. Take away the obstacles that prevent hourly workers from taking pleasure in their job.
13. Start an intensive training and education programmes
14. Establish a system at the highest levels of management that will makes the aforementioned goals a daily focus.

Dr. Joseph M. Juran:

He was the second American guru to be brought to Japan in 1954 to teach and supervise "quality control courses" to the country's top business executives after Deming, he focused more on management side of quality assurance, the book ‘Quality control Handbook’ originally published in 1951, established him as a pioneer in the field of quality management, he emphasized the managerial aspects of planning, organizing, and controlling, and they centered on the responsibility of leadership to achieve quality as well as the need for setting goals, so he emphasized a managerial approach to a similar analogy for better quality results through three basic processes or ‘Juran’s Trilogy’ consist of three critical components of quality management :

Quality planning, Quality Control and quality improvement. He is also credited with introducing the Pareto principle in the quality field, which states that 80% of the effects come from 20% of the causes.

A. V. Feigenbaum:

Dr. Armand V. Feigenbaum was a quality expert from the United States, he is known for developing the concept of quality control which focuses on integrating all aspects of an organization's operation to achieve quality, he also introduced the idea of cost of quality as a way to measure the impact of poor quality on an organization In 1951, Feigenbaum released his first book, the "Quality Control Handbook," and became known as the "guru" who first presented the notion of "Total Quality Control" (TQC). His theory is on a "prevention-based approach" that places a premium on designing high-quality products and services and optimizing the processes at their origin.

Philips B. Crosby:

Philip Bayard Crosby is widely recognized for his "Zero Defects" and "quality is free" theories. He held that an effective quality management must be "based on prevention- based system" and that errors can arise from a lack of employee knowledge and focus Crosby said that management is responsible for 80 percent of an organization's quality issue, hence their focus should be on fixing such issues in the same way as Deming and Juran's suggestions for enhancing quality, Crosby proposed a set of 14 directives for business leaders to follow. He also defined several stages of management of quality maturity which may be used to evaluate an organization's level of excellence management development.

The five stages of quality management maturity are:

1. Unpredictability,
2. awaking,
3. illumination,
4. knowledge and
5. Assurance

Crosby's Philosophy

1. Quality means conformance to requirements not elegance
2. There is no such thing as quality problem
3. There are no such things as economics of quality, it is cheaper to do job right the first time
4. There is only performance measurement is the cost of quality- cost of non-conformance

7.4 Basic Elements of Improvement:

Determination (Commitment by Top management), Education (of the employees towards zero defects), Implementation (of organizational process towards Zero defects)

7.4.1 Principles of TQM:

The American Society of Quality (ASQ) outlines seven principles within their strategic and systematic approach (ISO 9000).

1. **Customer Focus:** The first and prime principle of TQM is to focus on existing as well potential customer. Consumer are the only ultimate judge to determine the superior or inferior quality of products, so no matter how much resources are pooled in on employee training, upgrading machines, incorporating quality design, process and standards etc. organizations to implement TQM across all fronts to keeping in mind the customers and enduring organization culture to anticipate and respond to customer input and feedback, understanding, meeting exceeding customers' expectations.
2. **Employee Involvement:** Employees at all levels from top to the bottom must be involved, dedicated and committed to achieve goals and objectives of organization for that employee must empowered by giving training, participation in decision making and in addressing quality related problems and making workspace more open and devoid of fear.
3. **Leadership Commitment:** Leadership is important in maintaining unity of purpose, direction and engagement of people at all levels, by create conducive environment for working and directing the efforts towards achieving organizational quality objectives. It can be achieved by communicating the organizations mission, vision, policy, strategy throughout the organization, establishing culture of trust and integrity, encouraging commitment to quality by setting own example, standard behavior, by providing training, resources and authority to employees for accomplishing duties successfully.
4. **Process oriented approach:** The process may be it is inside or outside the organization should be sound enough to avoid hurdle in smooth flow of work so company needs to monitor and the improve the process consistently to yield sound output, it is the process or the system can be a cause of delay in action or poor service to the customers so quality management system consist of interrelated process understanding the result of the process adopted, defining objectives to be achieved through present system, establishing authority, responsibility, accountability for managing process, ensuring availability of information of interconnectivity of system for achieving quality, managing risks which can affect overall system and monitoring, analyzing the system time to time for improvement in quality performance.
5. **Continuous improvement:** To make customer satisfied continuous improvement in the process, method and product is essential, by it company will find new ways, methods in producing better quality product and production and will be more competitive and fulfill customer's expectation, company's need to adopt strategic approach for continuous improvement through their planning, vision and mission.
6. **Facts based decision making:** A factual approach to decision making is very crucial for achieving TQM, all kinds of decision whether major, minor, policy, strategic, departmental etc. should be based on facts, statically or situation-based analysis instead of emotions-based companies must collect data and analyze the data which will lead to accuracy and efficiency in decision making
7. **Supplier Relationship:** For sustained success the organization has to maintain long term relationship with suppliers and for that it needs to be managed efficiently to maintain supply chain that provides stable flow of goods and services. It can be achieved through mutual benefit, sharing information resources and expertise, by encouraging improvements and achievements in suppliers, sharing organizational goals and values, measuring performance and providing performance feedback, collaborative developmental activities.
8. **Integrated system:** Every business functions as integrated unit instead of single unit it comprises of various departments horizontally with different functional purposes, and

works at cross purposes, but they are interrelated and interdependent hence there is a need to develop such a collaborative system to avoid dysfunction amongst the department The International Organization for Standardization (ISO) describes this principle: "Identifying, understanding, and managing interrelated processes as a system, contributes to the organization's effectiveness and efficiency in achieving its objectives."

7.5 Techniques or Tools of TQM:

The tools and technique of TQM helps in identifying, analyzing and assessing qualitative and quantitative data relevant to business. These tools can identify procedure, ideas, statistics cause and effect concern and other issues relevant to the organization each of which cane used to enhance the effectiveness, efficiency, standardization and overall quality of product, procedure and environment. According to quality Inc. America there are near about 100 Quantitative and qualitative techniques of TQM including brainstorming, focus group, checklist, charts, graphs, diagram etc. used in different situation and act as guidelines

1. **Cause and Effect (Fishbone Diagram):** Cause and Effect, Fishbone, Ishikawa Diagram called Fishbone diagram introduced by Kaoru Ishikawa, named for its resemblance to fish bone helps in identifying various factors (Causes) leading to an effects or problems and help in deriving meaningful relationship, the purpose of diagram is to relate cause and effects, it helps organize and relate factors providing a sequential view of any issue. This quality management tool works by defining quality related problem on the right-hand side of the diagram with individual root causes and sub causes branching off to tis left.

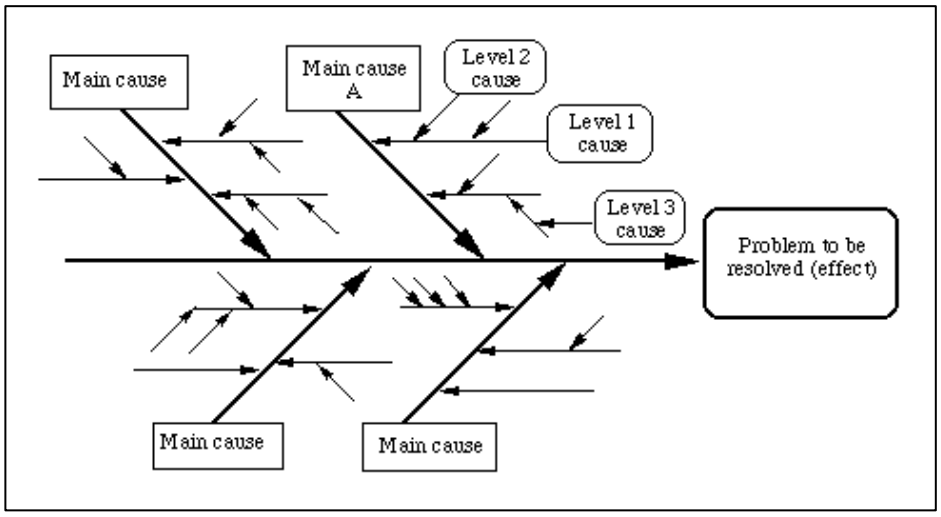

Figure 7.1: Cause and Effect Diagram

2. **Flowcharts:** flowcharts are graphical presentation tool for identifying process constructing flow charts leads to better understanding of process and better understanding is essential for improvement, it is a tool to find out bottlenecks and

unnecessary steps within the system or process. It presents detailed steps in a process logically by using standard symbol, sign, text and arrows lines shows direction of flow, it enables modelling of process, problems, opportunities and decision points etc. It helps in-

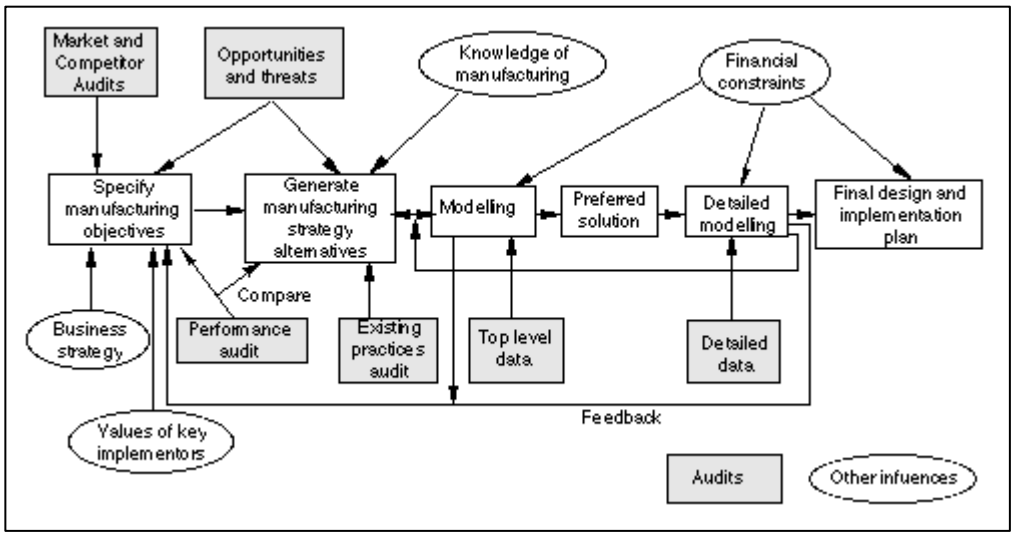

Figure 7.2: Flowchart

3. **Checklists:** checklist can be a non-statistical metrics, structured table, or form for collecting data, it helps in analyzing data, it lists down all important data point and events, it presents data in tabular form, thus it keeps on updating or marking the status on their occurrence which helps in understanding the progress, defects pattern and even causes for defects. They are non- statistical and easy to understand, this helps us in making decision on facts and not on assumptions it is generally used to check all aspects of situation, as data is presented graphically one can analyze the areas for improvement.

Deliveries Not On Time

Delivery personnel: Trig Buyer

Week Ending: 4/16

Reason	Day					Total
	Mon	Tues	Wed	Thurs	Fri	
Backup in the kitchen					||	2
Traffic	|		||		|	4
Car problems	|	|	|			3
Delayed at previous delivery				|||	||	5
Total	2	1	3	3	5	14

Figure 7.3: Checklist

4. **Check Sheets:** Check sheets are used to collect quantitative or qualitative data, while collecting quantitative data it is called tally sheets, a check sheet collect data in the form of check or tally marks that indicate how many times a particular value has occurred, allowing to quickly zero in on defects or errors within your process or products and even causes of defects, which can be control within time.
5. **Control Charts:** Control charts is also called as Shewhart chart named after Walter A. Shewhart is basically a statistical chart which helps in determining if an industrial process is within control and capable to meet the customer defined specification limits, the very purpose of control chart is to determine if the process is stable and capable within current condition. In control chart data are plotted against time in X-axis, control chart will always have a central line, upper line and lower line, central line for Average and mean, upper line for the upper control limit and lower line for lower control limit, by comparing current data to these lines, experts can draw conclusion about the variations in process or production, it helps in predicting various process performance and production pattern.

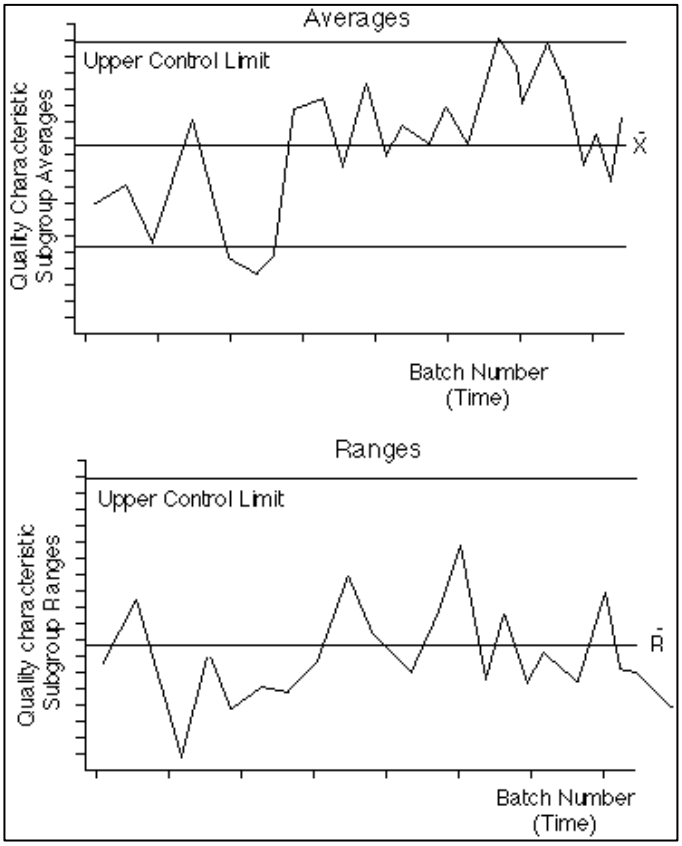

Figure 7.4: Control Charts

6. **Run Charts:** Run charts are similar to control charts but instead of showing upper and lower control limits, it shows the performance of one or more process over time to detect trends, shifts, cycle, it compares a performance before and after implementation of a solution to measure its impact, assess whether improved performance has been

sustained. In a typical run charts there are data on X and Y- axis once the data points are connected the central line is put between the graph and the control line is called median. It looks like this-

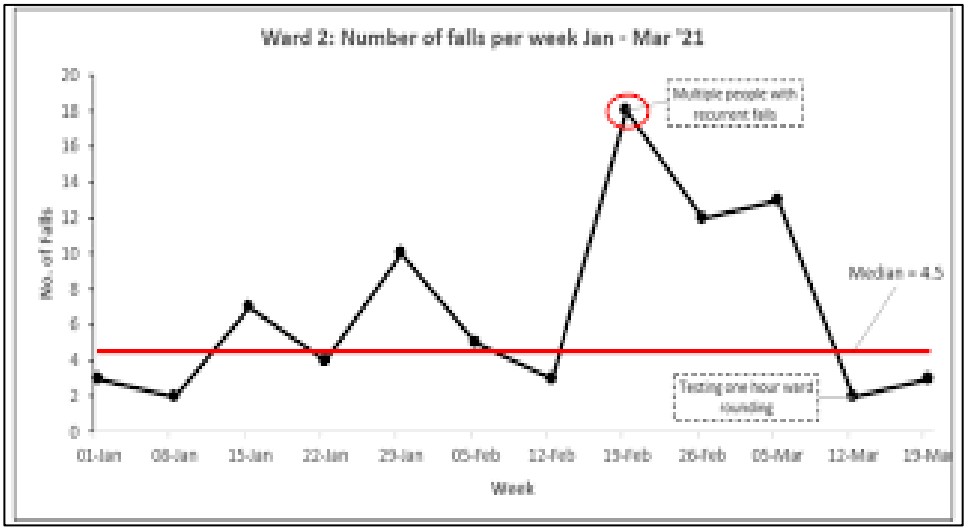

Figure 7.5: Run Charts

7. **Scatter Diagrams (Shewhart Chart):** Scatter diagram or scatter plots is statistical tool that depicts dependent variables on Y- axis and independent variables on X- axis plotted as dots on their common intersection points, joining these dots can highlight any existing relationship among these variables. The purpose of scatter diagram is to establish a relationship between problem and causes that are affecting. The relationship can be linear, curvilinear, exponential, logarithmic, quadratic, polynomial etc. stronger the correlation, stronger the relationship will hold true, the variables can be positively or negatively related

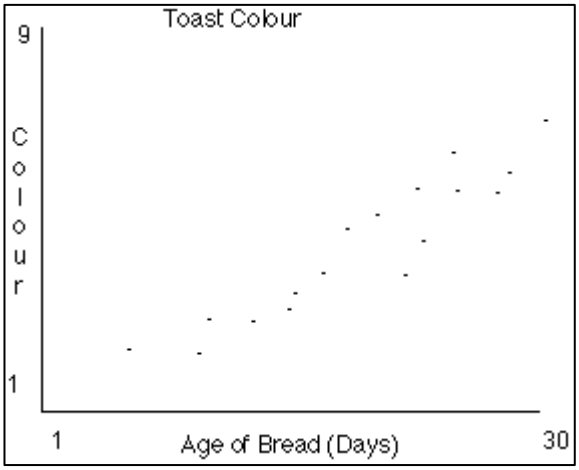

Figure 7.6: Scatter diagram

8. **Pareto Analysis:** Pareto principle displays degree of importance for each element, it is named after Italian economist. In 1906, Italian economist Vilfredo Pareto discovered that 80% of the land in Italy was owned by just 20% of the people in the country and further his research. As a quality control tool, the pareto chart operates according to 80-20 Rule, this rule assumes that in any process 80% of processes or system's problems are caused by 20 % of major factors and the remaining 20% of problems are caused by 80% of minor factors. suggests that most effects come from relatively few causes, in quantitative terms 80% of the problems come from 20% of the causes (machine, raw material or employees etc.), 80% of the wealth is owned by 20% of the people. It is a combination of bar and line graph it depicts individual values using bars and cumulative total is represented by the line.

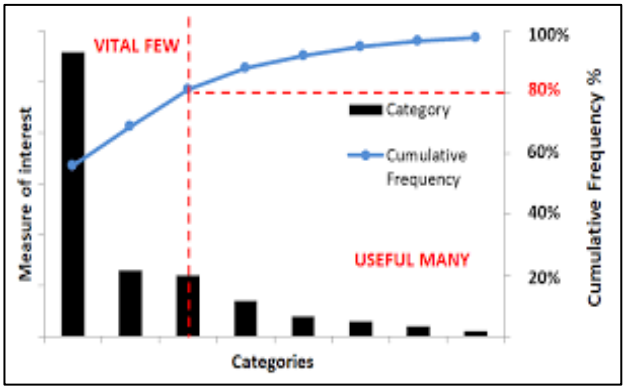

Figure 7.7: Pareto Principle

9. **Histogram:** Karl Pearson introduced Histogram. It is a bar graph representing the frequency distribution on each bar. With a structure similar to bar graph each bar within a histogram represents group while the height of the bar represents the frequency of data within that group. It helps us to study the density of data in any given distribution and understand the factors or data that repeat more often. Histogram helps in prioritizing factors and identifying the areas that needs utmost attention immediately. A histogram is a graph in which the continuous variable is clustered into categories and the value of each cluster is plotted to give a series of bars as below and without using such kind of graphics a problem is difficult to analyze recognize or identify

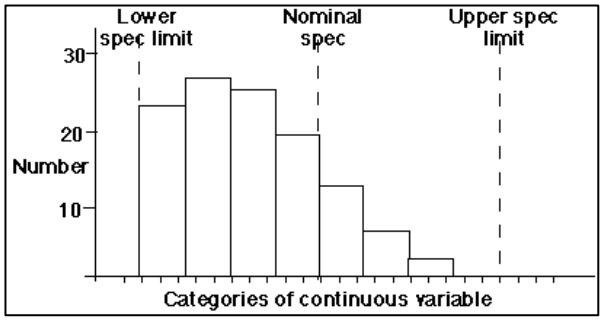

Figure 7.8: Histogram

7.6 Advantages and Disadvantages of TQM:

7.6.1 Advantages or Benefits of TQM:

1. **Improved Customer Satisfaction:** As the customer is the center of TQM all the activities, decisions are taken into effect considering customer's needs, expectations, choices and demand also continuous customer's feedback is taken and considering the feedback continuous change in goods and services are done hence customer satisfaction will be higher in organizations using TQM.
2. **Enhanced Operational Efficiency:** TQM encourages standardization of material, process and all the resources which leads to smooth functioning in every aspect of the organization leads to better utilization of time and resources in turn improves efficiency of the organization as a whole
3. **Increased Competitive Advantage:** TQM focus on quality differentiate organization from competitors also companies are able to build strong brand loyalty and reputation and in turn gain competitive advantage by consistently delivering high standards products.
4. **Reduced Costs:** As TQM focus on reduction in waste, errors, by considering them right from its origin so it prevents defects to occur in the process therefore it reduces large amount of costs.
5. **Boost Employee Morale:** TQM involves all the employees at all levels in quality improvement fostering a sense of involvement and ownership amongst employees leads to cooperation, and job satisfaction in employees and boost the morale of employees.
6. **Greater Market Share:** As TQM leads to customer satisfaction, and continuous product improvement, customer will prefer the organization over competitors, will lead to increased market share.
7. **Continual Improvement:** TQM encourages a culture in organization to regularly evaluate their products, process, services and performances and for making improvements. This leads to enhanced quality and efficiency.
8. **Higher Profitability:** The combination of Improved efficiency, reduction in cost, boosting employee morale and customer satisfaction will increase market performance and market share leads to higher profitability.
9. **Better Reputation:** Because of commitment to quality products and services leads to better reputation amongst customers and other stakeholder, companies using TQM are often viewed positively compared to others.

7.6.2 Disadvantages:

1. **Costly Implementation:** TQM is a costly affair which no small organization can bear as it involves continuous product improvement, training of employees, restructuring of organization, process modification which increases cost burden.
2. **Time Consuming:** Implementing TQM is a time-consuming process as it involves all employees, all departments at all levels, any change in the organization goes through long process of decision making and in training of employees, modification in process needs considerable amount of time therefore it is time consuming affair.
3. **Resistance to Change:** TQM implementation can encounter employee's resistance to change continuously which is a very challenging task to maintain and retain the

employees for long term, this can slow down the process and will affect the desired result in long term.

4. **Dependence On Employees:** The success of TQM implementation is highly dependent on employee's commitment and involvement from top to the bottom, even after providing training if employees do not perform positively will hinder the effectiveness of the TQM programme.

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