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Review Article

Quality Control Techniques: Empowering Total Quality Practices

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ABSTRACT

Total Quality Management is an invaluable resource for organizations seeking to enhance their quality management practices. This guide explores Total Quality Management principles and quality control techniques to achieve excellence in products and services. The study starts by outlining the core ideas of Total Quality Management (TQM), highlighting its all-encompassing approach to quality that incorporates all facets of a company. At the heart of the TQM philosophy lies fostering a culture centered on continuous improvement and customer satisfaction. The guide systematically outlines various quality control techniques, ranging from statistical methods such as Six Sigma and statistical process control to management strategies like lean management. Each technique is meticulously explained, providing practical insights and real-world applications. The review highlights the adaptability of these techniques across diverse industries and organizational structures, making it an invaluable resource for organizations striving to enhance their quality management practices within the paradigm of TQM. In this paper, we provide an overview of quality control techniques in total quality management.

INTRODUCTION

Quality:

The term quality refers to "the extent to which products and/or services are viewed by all stakeholders as having added value through specification compliance and the extent to which they are viewed as having added excellence through a motivated workforce, to meeting customer satisfaction." Total Quality Control was

initially defined by Feigenbaum in 1961 as a system that efficiently integrates the efforts of various groups within an organization to develop, maintain, and improve quality. This system enables production and service at the most cost-effective quantities that allow for complete client satisfaction.

Total Quality Management:

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The goal of total quality management, a management strategy, is to improve processes and products to increase customer satisfaction and organizational success. Using this method, an organization's services, products, processes, and culture may all be improved by its people TQM places a strong emphasis on managing

organizational processes methodically while focusing on customer satisfaction and quality improvement. In addition, TQM calls for creating organizations like councils and teams dedicated to improving quality, which aids in keeping these goals front and center.

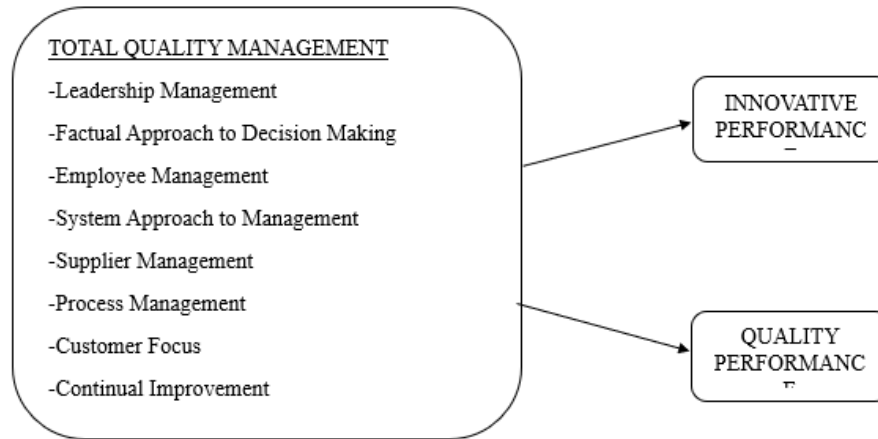


Fig1: Conceptual Model

Customer Satisfaction and Ongoing improvement are key components of the total quality management philosophy. The objective of Total Quality Management is to improve the quality of all products, services, and internal processes within an organization. The tenets of Total Quality Management (TQM) include that quality should be embedded in the company's culture and that all business personnel should be responsible for ensuring that quality requirements are met. To improve operations and eliminate defects, TQM uses a variety of techniques and tools, including

statistical process control, root cause analysis, and continuous improvement teams. Although TQM is frequently connected to industrial and manufacturing environments, it may be implemented in any firm that aims to increase quality and customer satisfaction. To improve performance, TQM demands a dedication to ongoing development as well as a readiness to adapt systems and procedures. TQM is a sustained effort to raise customer satisfaction and quality, not a one-time thing.

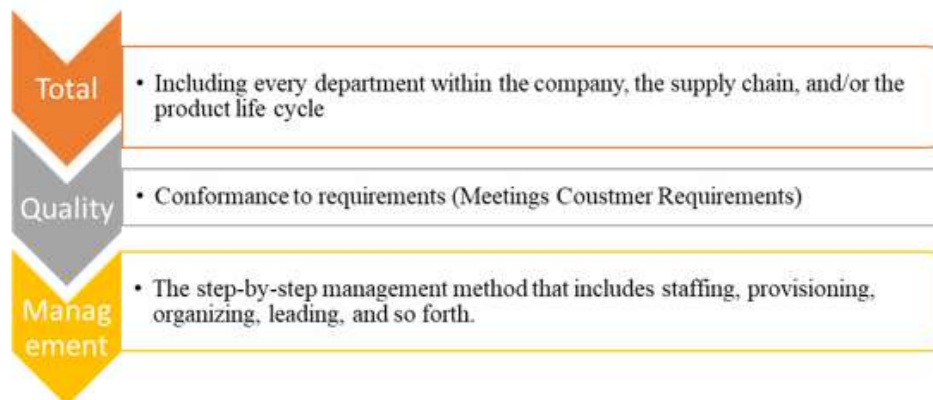


Fig2: Total Quality Management

Customer satisfaction: Ensuring customer satisfaction relies heavily on the quality of products and services offered. Customers are willing to pay a premium for high-quality products and services, making it imperative that businesses prioritize quality in all their offerings. By delivering quality products and services, businesses can establish their reputation in the market and create a loyal customer base.

1. **Competitive advantage:**

High-quality services and products can set an enterprise apart from its competitors. Customers are willing to pay more for high-quality services and products, which gives the company a competitive edge in the marketplace. This can result in increased market share and profitability.

2. **Reduced costs:**

Quality can lead to lower costs for a business. When services and products are of high quality, there are fewer defects and less waste, which can result in cost savings. In addition, high-quality services and products require less rework, which can save time and money.

3. **Improved efficiency:**

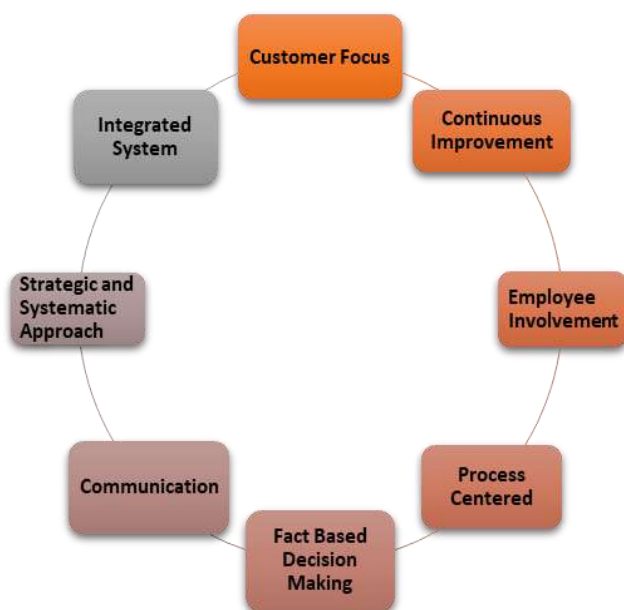
Effectiveness in corporate operations can also be improved by quality. Excellent quality reduces errors and rework, saving time and money for goods and services. Productivity and profitability may increase as a consequence.

4. **Better decision-making:**

Companies may make better decisions by using high-quality data. By keeping an eye on measurements, businesses can improve efficiency by making data-driven decisions.

Principles of Total Quality Management

"Total Quality Management" is a corporate approach that emphasizes collaboration, communication, and ongoing process improvement as a means of raising the caliber of goods, services, and customer happiness. Organizations may deliver high-quality goods and services that both meet and exceed consumer expectations by using the framework that TQM principles offer.



1. **Customer Focus:** Businesses prioritizing customer needs and expectations follow Total Quality Management. This approach involves understanding customer preferences and

striving to exceed them with high-quality products and services, To achieve this, organizations must continuously improve

their processes and focus on customer satisfaction.

2. **Continuous improvement:** "Total Quality Management emphasizes continuous improvement in people, culture, processes, and products. A plan-do-check-act (PDCA) cycle is used to do this, which entails identifying areas for improvement, putting changes into place, assessing the outcomes, and modifying the process as necessary.
3. **Employee involvement:** Total Quality Management acknowledges that providing high-quality goods and services depends on employees. It entails giving staff members the freedom to own their jobs and encouraging them to offer suggestions and insights to enhance procedures.
4. **Process entered:** The core tenet of Total Quality Management is the importance of process improvement in delivering high-quality products and services. This means finding waste and eliminating it, streamlining workflow, and improving quality control procedures.
5. **Fact-based decision-making:** Total Quality Management uses data to influence choices regarding customer satisfaction and process enhancement. To pinpoint problem areas and track advancement, data must be gathered and analyzed.
6. **Communication:** Effective communication is fundamental to the success of TQM. It involves the exchange of information, ideas, and feedback among all levels of an organization, including employees, management, suppliers, and customers. Clear and open communication ensures that everyone understands the organization's quality objectives, processes, and expectations. It also facilitates problem-solving and decision-making. and

collaboration, improving quality and performance.

7. **Strategic and Systematic Approach:** TQM involves a methodical and strategic approach to managing quality, where efforts to improve quality are guided by a clear mission, vision, and objectives that align with the organization's overall strategic goals. It entails systematic planning, implementation, measurement, and continuous refinement of processes to achieve consistent and sustainable improvements in quality performance.
8. **Integrated System:** To develop a coherent and unified approach to quality management. Total Quality Management (TQM) emphasizes the integration of all organizational activities and functions. The incorporation of quality considerations into all facets of the organization's activities, ranging from product development and production to marketing, sales, and customer support, is guaranteed by this integration.

Benefits of TQM:

- Improved Customer Satisfaction
- Enhanced Operational Efficiency
- Increased Competitive Advantage
- Reduced Costs
- Boosted Employee Morale
- Greater Market Share
- Higher Profitability
- Better Reputation
- Increased Innovation

a. Improved Customer Satisfaction:

TQM places a strong emphasis on comprehending the requirements and expectations of customers. It entails routinely getting consumer input and adjusting offerings to meet needs better. Consequently, companies implementing Total Quality Management (TQM) typically witness elevated levels of customer satisfaction.



b. Enhanced Operational Efficiency:

TQM promotes standardization and systematic procedures. This lowers the possibility of mistakes and redoing, improving time and resource use. Thus, operating efficiency is increased.

c. Increased Competitive Advantage:

The emphasis on quality in TOM can set a business apart from its rivals. By continuously providing high-quality goods or services, businesses can establish a strong brand reputation and acquire a competitive edge.

d. Reduced Costs:

The goal of TQM is to prevent defects rather than just detect them. Errors are significantly easier to rectify when discovered early in the process rather than after they have already occurred. There are large cost savings as a result.

e. Boosted Employee Morale:

TQM involves all staff members in quality improvement, promoting ownership and involvement. Increased job satisfaction and morale can result from this collaborative culture, which will raise output.

f. Greater Market Share:

Customers are more inclined to select TQM-assured companies over their rivals, increasing their market share, since TQM yields better product quality and customer happiness.

g. Continual Improvement:

Continuous improvement is encouraged by TQM. It motivates businesses to continuously assess their operations, output, and customer satisfaction and make necessary adjustments. As a result, efficiency and quality are continuously improved.

h. Higher Profitability:

Higher profitability may result from TQM's combination of enhanced productivity, lower costs, and increased market share. Prioritizing quality also helps businesses cultivate a devoted clientele, which boosts long-term profitability.

i. Better Reputation:

TQM-implementing businesses are frequently seen favorably by stakeholders and customers due to their dedication to quality. This has the potential to fortify their brand and improve their reputation.

j. Increased Innovation:

TQM promotes an innovative and problem-solving culture. Workers are given the freedom to recognize problems with quality and provide fixes. In addition to providing quick fixes, this encourages staff to think creatively and outside the box, which promotes creativity.

Quality Control Techniques

There are various quality control techniques used to implement Total quality management including:

- Process Mapping
- Statistical Process Control
- Six Sigma
- Benchmarking
- Kaizen
- Lean Manufacturing

1. Process Mapping:

The practice of visually depicting each step and activity that is engaged in a specific process from beginning to end is called process mapping. It presents a structured process overview, including tasks, decision points, inputs, outputs, and interactions. Process mapping helps organizations analyze their processes, identify inefficiencies, bottlenecks, and opportunities for improvement, and establish a common understanding of how work is performed. Depending on the complexity and specific needs, process documentation can be flowcharts, diagrams, or other graphics. By using process mapping, organizations can improve their processes, streamline workflows, reduce costs, and ultimately deliver better outcomes.

Benefits of Process Mapping:

- By visualizing the entire process from beginning to end, process mapping makes it simpler to see inefficiencies and potential improvement areas.



- This gives team members a clear picture of the procedure, removing any doubt or uncertainty.
- Process bottlenecks that might lead to delays and lower productivity can be found with the aid of process mapping.
- Locating pointless phases in the process that can be skipped, contributes to waste reduction.
- Process mapping shows where improvements may be made to save costs and boost efficiency, which paves the way for process improvement.
- Supporting process improvement initiatives such as Lean or Six Sigma projects.

Swimlane Diagram

Swimlane diagrams, sometimes referred to as cross-functional flowcharts, are process maps that show the distinct roles played by several people or departments during a process. Every department or participant is given a "swimlane," which stands for the duties and activities that are unique to them during the process. Swimlane diagrams improve cross-functional cooperation and responsibility by making the responsibilities and interactions between various stakeholders more-clear.

Benefits of Swimlane Diagrams:

- Clearly defined roles and responsibilities.
- Describes how various stakeholders engage with one another.
- Determines departmental handoffs and any bottlenecks.
- Encourages process improvement by emphasizing accountability and ownership.
- Boosts comprehension and cooperation between different departments

Applications of Swimlane Diagrams:

- Illustrating complete process flows.
- Examining communication gaps and interdepartmental handoffs.
- Finding opportunities for process simplification and optimization.
- Improving departmental or team collaboration and communication.
- Recording intricate procedures involving several parties.

Value Stream Map

One kind of process map called value stream mapping aims to show how resources, information, and activities flow through a process from beginning to conclusion. From the moment the consumer makes their first request until the finished good or service is delivered, it offers a comprehensive picture of the value stream.

Types of Process Mapping:

Flowchart

One of the most popular process maps th overall quality management is the flowchart. They illustrate the process's decision-making points and action sequences with arrows and symbols. Flowcharts display inputs, outputs, and the sequence in which tasks are completed. They offer a clear visual depiction of workflow.

A variety of symbols, including diamonds for decision points, rectangles for activities, and arrows for flow direction, can be included in them. Flowcharts are a flexible tool that may be used to illustrate both straight forward and intricate processes.

Benefits of Flowcharts:

- Easy to understand and communicate.
- Emphasize the logical activity.
- Identify decision points and branching paths.
- Visualize inputs, outputs, and interactions.
- Identify bottlenecks and inefficiencies.

Applications of Flowcharts:

- Documentation of existing processes
- Analyzing the progress of the process and identifying opportunities for improvement.
- Informing stakeholders about the steps in the process.
- Staff training in process workflows.



Value Stream Maps, which show both value-adding and non-value-adding procedures, assist businesses in identifying waste and areas for improvement. VSM is commonly associated with Lean principles and is utilized to support initiatives aimed at continuous improvement.

Benefits of Value Stream Maps:

- The course provides a comprehensive knowledge of the value of the chain.
- Determines inefficiencies and non-value-adding tasks.
- Aids in the visualization of the information and material flow.
- Facilitates the identification of chances for improvement.
- Encourages Lean concepts and ongoing enhancement.

Applications of Value Stream Maps:

- Examining the entire process flow.
- Determining and getting rid of process waste.
- Reducing lead times and increasing process cycle times.
- Improving the way value is delivered to clients.
- Encouraging initiatives for service improvement and lean manufacturing.

SIPOC Diagram

A high-level overview of a process is given via SIPOC (Supplier, Inputs, Process, Outputs, Customer) diagrams, which highlight the important players and their interconnections. SIPOC diagrams show the input suppliers, the

stages in the process, the final products, and the clients. They support organizations in comprehending the parameters of the procedure, the necessary inputs, and the anticipated results. SIPOC diagrams act as a foundation for further in-depth process analysis and offer a framework for comprehending processes.

1. Statistical Process Control (SPC)

Statistical process control involves using statistical methods to manage and regulate a manufacturing process or system. It involves monitoring the behavior of processes, identifying faults within internal systems, and providing solutions to production difficulties through the use of SPC tools and methods. SPC is a tool for data analysis-based process monitoring and control. It offers guidance on how to get a process back under control and assists in identifying when it has gotten out of hand. The cost of raw materials is currently increasing, which is beyond the control of most companies. Therefore, businesses should focus on the aspects they can control, such as their processes. Companies must always work to lower costs, increase productivity, and raise the caliber of their output. Although many companies rely on post-production inspection to identify quality issues, they can shift to prevention-based quality controls through the implementation of Statistical Process Control (SPC) procedures. Operators can monitor the performance of a process in real time to detect patterns or changes before they result in waste and non-conforming products.



Fig 3: Statistical Process Control (SPC)

Key Principles of Statistical Process Control:

Process Variation: SPC recognizes that every process has variations. These differences can be

divided into two basic categories Common cause variation is a natural and inherent component of a process that evolves.

Control Charts: The main instrument for statistical process control (SPC) is the control chart. They provide a visual representation of the process performance over time, displaying the process average with the center line on the chart. The permissible variation range is established by the highest and lowest control boundaries. Organizations can ascertain whether a process demonstrates special cause variation or is steady by charting data points on the control chart.

Types of Control Charts:

Various control chart designs are utilized in Statistical Process Control, with the selection depending on the data being measured and the process features being monitored.

i. X-Bar and R Chart:

Process variance and mean (average) are both monitored on this chart. It consists of two charts, the X-bar chart tracking the process mean and the R chart tracking the process range or the difference between the highest and minimum values. This control chart is effective when measuring variables on a continuous scale.

ii. X-Bar and S Chart.

The X-Bar and S chart is used to track the process mean and process variation, much as the X-Bar and R chart. Nevertheless, it tracks the process standard deviation (S) rather than the process range. You may use this control chart with variable data as well.

iii. Individuals (I) Chart:

This chart is used to track process measurements individually. It monitors the data points over time and assists in locating any anomalous or uncontrollable circumstances. When taking individual measurements and dealing with changeable data, the Individual chart works well.

iv. p Chart:

The percentage of non-conforming goods or faults in a process is tracked using the p plot.

Items are categorized as either conforming or non-conforming depending on attribute data. The p chart helps detect any notable departures from the predicted proportion by tracking the percentage of non-conforming items in a sample over time.

v. c Chart:

Used when the number of flaws or non-conformities is being tracked, the c chart is comparable to the p chart. It monitors the number of flaws in a sample and assists in determining when the defect count varies.

Histograms:

Histograms are used to analyze the process output distribution in statistical process control (SPC). Their ability to show the frequency at which certain values occur makes them useful for identifying outliers and other sources of variation.

f. Constructing a histogram involves several steps:

- Data Collection
- Identify the Number of Containers
- Define Bin Intervals
- Count Data Point
- Plot the Histogram

g. Pareto charts:

Pareto charts illustrate the prevalence of various defect types or other quality issues and can be used to prioritize improvement efforts in statistical process control (SPC). They are utilized to identify the most significant causes of variation.

Using Pareto Charts in TQM:

For TQM, Pareto charts are an invaluable tool. They can be applied to any process to determine the primary causes of issues. It can most effectively raise the caliber of goods or services by concentrating remedial activity on these areas.

Another way to monitor the effectiveness of improvement initiatives is to compare Pareto charts from various times to determine which regions are improving and which ones still require work.



2. Six Sigma

Six Sigma is a group of approaches that seeks to reduce variation in business processes to minimize errors, increase efficiency, and improve quality. With just 3.4 errors per million opportunities, the Six Sigma technique aims to achieve an almost flawless level of quality. This is achieved by implementing DMAIC (Define, Measure, Analyze, Improve, Control), a structured approach that streamlines processes, and identifies and eliminates causes of variation. A set of management strategies and instruments known as "Six Sigma" are meant to increase the efficacy and

efficiency of company operations. It provides statistical techniques for removing defects, figuring out what caused errors, and lowering the likelihood of errors. Six Sigma promotes a continuous process improvement culture as a result, enabling businesses to provide their clients with better goods and services. Six Sigma is an evidence-based methodology that improves quality by locating and fixing process errors. Various methodologies, including statistical analysis, are utilized to identify the root cause of problems and execute remedies.

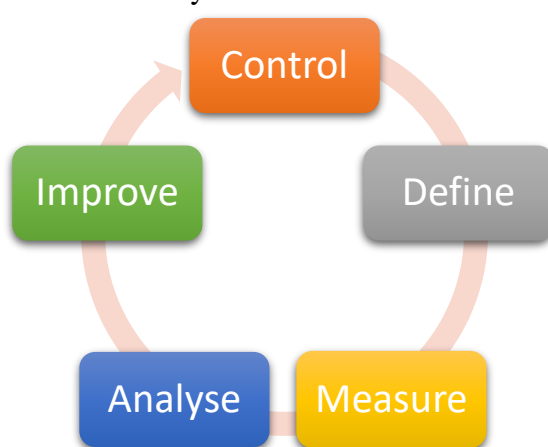


Fig 4: Six Sigma

The Six Sigma Methodology:

Each of the two primary Six Sigma approaches, DMAIC and DMADV, has a recommended set of steps for business transformation. A data-driven technique called DMAIC is used to enhance current goods and services to increase consumer satisfaction. It stands for the five steps, which are: D stands for define, M for measure, A for analyze, I for improve, and C for control. DMAIC is utilized when producing a good or providing a service. The name "etymology" derives from the Greek symbol "sigma" or "σ," which is used in statistics to measure the departure of a process from its mean or aim. "Six Sigma" originates from the statistical bell curve, where a single Sigma represents one standard deviation from the mean. When six Sigmas are present in the process—three

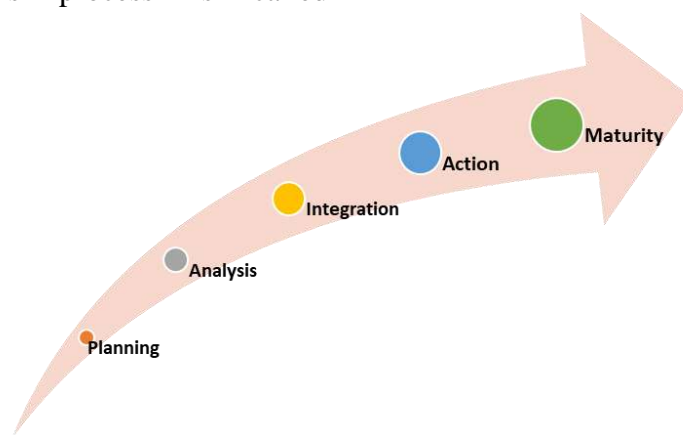
above and three below the mean the defect rate is deemed "extremely low." Origins of Six Sigma: Motorola created Six Sigma in the middle of the 1980s to lower manufacturing process errors. Later, in the 1990s, General Electric adopted and promoted the methodology. The goal of Six Sigma: Reducing errors to the point of nonexistence is the main goal of quality control. This is precisely what Six Sigma strives to accomplish. A Six Sigma level of quality implies that there are no more than 3.4 errors per million opportunities. The DMAIC process: The process used to apply Six Sigma is known by the acronym DMAIC, which stands for Define, Measure, Analyze, Improve, and Control. Specific responsibilities, such as acquiring data, analyzing it, identifying areas in need of improvement, and

putting changes into practice to address those needs, are needed at each stage of the process. The role of data: Two of the most significant applications of Six Sigma in business are tracking improvement progress and identifying the root causes of problems. Statistical tools are frequently employed in data collecting and analysis to aid in the recognition of patterns and trends. The use of statistical tools: Process capability analysis, control charts, and histograms are just a few of the statistical tools that Six Sigma heavily uses. These tools support tracking progress toward improvement objectives and identifying places where improvements can be made. The importance of leadership support: Strong leadership support is essential for Six Sigma to be effective. The methodology has to be endorsed by leaders, and they have to supply the resources required for its use.

4. Benchmarking

Comparing the goods, services, and procedures offered by your business to those of the top players in the field allows you to see where improvements may be made. This process is called

benchmarking. Regardless of whether they serve a different clientele or are in a different industry, this approach helps you obtain useful data that can be used to assess how well your business is performing concerning others that are similar to it. Additionally, Business process re-engineering and incremental improvement are two ways that benchmarking can help organizations discover areas, systems, or processes that require improvement. Comparing a company's performance to that of other businesses in the same industry is known as benchmarking. Finding opportunities for development and adoptable best practices is helpful. Benchmarking is a process that helps businesses to thrive amid change. It involves monitoring important business metrics and practices and comparing them to those of competitors, industry peers, or other firms worldwide. This comparison can be made within business areas or across a variety of organizations. A company can determine where it needs to make adjustments to increase performance by examining the benchmarking findings.



Types of Benchmarking

There are various kinds of benchmarking, such as: Internal benchmarking: Internal benchmarking involves comparing an organization's current performance with its past performance to pinpoint areas for improvement.

Competitive benchmarking:

Comparing an organization's performance to that of its immediate competitors is known as competitive benchmarking.

Functional benchmarking:

Comparing an organization's performance to other organizations in related functional areas is known as functional benchmarking.

Generic benchmarking:

Using generic benchmarking, an organization's performance is compared to that of businesses in similar industries.

5. Kaizen

The word "kaizen" means "continuous improvement" in Japanese. Finding waste, eliminating it, and boosting productivity all require a methodical approach.

Principles of Kaizen:

Kaizen is based on four main principles: waste reduction, teamwork, continual improvement, and respect for people. All employees, even those in senior management, engage in kaizen by seeking out opportunities for improvement and making tiny, progressive changes to improve workflows and output.

Benefits of Kaizen

Improved customer happiness, more productivity, lower costs, and greater employee involvement are all advantages of Kaizen. Kaizen aids in an organization's ability to remain competitive by allowing it to adjust to market shifts and enhance its operations and offerings to serve customers better.

Implementation of Kaizen:

Setting objectives, spotting chances for improvement, examining procedures, putting changes into practice, and assessing the outcomes are all steps in the Kaizen implementation process. The procedure is continual, and all organization members must be dedicated to making improvements regularly.



6. Lean Manufacturing

Lean manufacturing seeks to eliminate waste to shorten the time between customer orders and delivery. This refers to various concepts, procedures, and standards for eliminating waste during the entire manufacturing cycle. The Toyota Production System (TPS) is the foundation for the "lean" technique. The main goal here is to implement Continuous Improvement, thereby:

- Reducing costs
- Improving processes
- Reducing reaction time
- Improving customer service
- Increasing quality
- Reducing delivery time
- Eliminating waste

- Increasing productivity and profitability

Key Principles:



Fig 5: The Pillars of Lean Manufacturing

1. Identify and Eliminate Waste:

The goal of lean manufacturing is to recognize and remove waste in all of its manifestations, such as excess inventory, waiting, overproduction, overprocessing, mistakes, and underutilized skills. The objective is to optimize the production process cut costs, and improve quality.

2. Emphasize Continuous Improvement:

Lean manufacturing is a way to do this that incorporates all employees in the organization. Every day, little, gradual changes to the manufacturing process are prioritized over waiting for a major problem to occur. An inventive and ever-improving culture is fostered by this approach.

3. Establish a Pull System:

Pull systems, which are motivated by customer demand as opposed to projections or forecasts, are a component of lean manufacturing. This process lowers the likelihood of overproduction, which can result in waste and unnecessary expenses, as well as inventories.

4. Empower the Workforce:

Lean manufacturing provides employees with the knowledge and skills to identify problems and

come up with solutions. Establishing a cooperative, team-focused culture that encourages idea-sharing and decision-making among staff members is the aim.

CONCLUSION:

A comprehensive strategy for guaranteeing high standards across an organization's services, products, and procedures is total quality management. TQM principles, including customer focus, employee involvement, and process optimization, work together to drive continuous improvement and excellence. Quality control techniques such as statistical process control, Six Sigma, and the PDCA cycle provide structured frameworks for monitoring and enhancing processes. TQM isn't a one-size-fits-all solution but a flexible framework adaptable to organizational needs. Organizations can attain long-term success in the cutthroat business environment of today by emphasizing quality, motivating staff, streamlining procedures, and applying efficient quality control methods.

REFERENCES:

1. Zink, K. and Vob, W., 1999, August. The new EFQM excellence model and its impact on

- higher education institutions. In Proceedings of the TQM for Higher Education Institutions Conference: Higher Education Institutions and the Issue of Total Quality, Verona (Vol. 30, No. 31, pp. 241-55).
2. Albers Mohrman, S., Tenkasi, R.V., Lawler, E.E. and Ledford, G.E., 1995. Total quality management: practice and outcomes in the largest US firms. *Employee relations*, 17(3), pp.26-41.
 3. Mazumder, Bhaskar, Sanjib Bhattacharya, and Abhishek Yadav, 2011. "Total quality management in pharmaceuticals: a review." *International Journal of Pharm Tech Research* 3.1: 365-375.
 4. Wiandari, Ida Ayu Andini, and Gede Sri Darma. "Kepemimpinan, 2017. Total Quality Management, Perilaku Produktif Karyawan, Kinerja Karyawan dan Kinerja Perusahaan." *Jurnal Manajemen Bisnis* 14.2:61-78.
 5. Neyestani, Behnam, 2017, "Seven basic tools of quality control: The appropriate techniques for solving quality problems in the organizations." Available at SSRN 2955721.
 6. Avdagić-Golub, Elma, Adisa Hasković Džubur, and Belma Memić. 2021. "Qualitymanagement as the basis of business company operations for customer satisfaction." *Science, Engineering and Technology* 1.10: 52-58.
 7. Leong T.K & Zakuan N,2014. Review of quality management system research in the management industry, *Int J. Productivity & Quality Management*. Vol. 13 (1).
 8. Prajogo, D.1. and Sohal, A.S., 2001. TQM and innovation: a literature review and research framework. *Technovation*, 21(9), pp.539-558
 9. Dervitsiotis, K.N., 2011. The challenge of adaptation through innovation is based on the quality of the innovation process. *Total Quality Management & Business Excellence*. 22(5), pp.553-566.
 10. Derming WE 1986 Principles for transformation. *Out of the Crisis*, 18, p.96

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