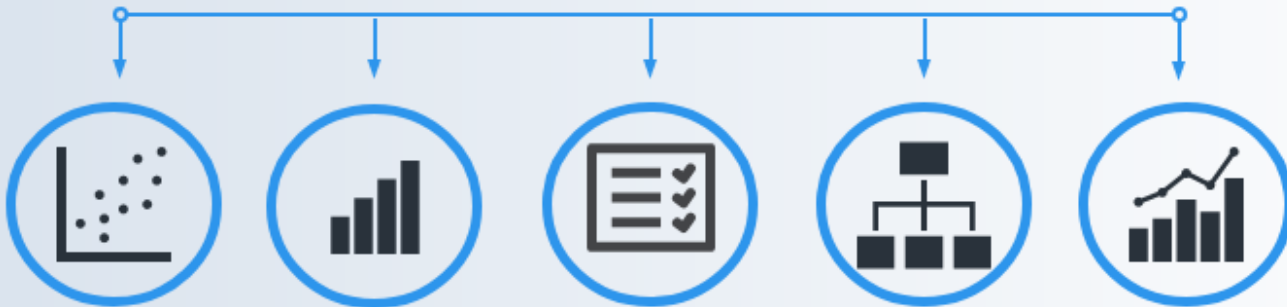


TQM Tools and its Principles



TQM TOOLS



- ✓ **Total Quality Management (TQM)** tools and techniques are used to identify potential problems, frequency of their occurrences and method to control these problems for adopting best class practices.
- ✓ This integrated system of principles, methods, and best practices that provide framework for organizations to strive for excellence in everything they do.
- ✓ No two organizations have the same TQM implementation.
- ✓ Number of great TQM models that organizations can use include Deming Application Prize, Malcolm Baldrige Criteria for Performance Excellence, the European Foundation for Quality Management.

- ✓ **TQM organizations have processes that continuously collect, analyze, and act on customer information.**
- ✓ **Integrate customer knowledge with other information and use planning process to orchestrate action throughout organization to manage day to day activities and achieve future goals.**
- ✓ **TQM organizations understand that customers will only be satisfied if they consistently receive products and services that meet their needs.**
- ✓ **TQM organizations use techniques of process management to develop cost-controlled processes that are stable and capable of meeting customer expectations.**

- ✓ **Process improvement is even applied to the TQM system itself.**
- ✓ **Final element of TQM model is total participation.**
- ✓ **In TQM organizations, top management takes personal responsibility for implementing, nurturing, and refining all TQM activities.**
- ✓ **They make sure people are properly trained, capable, and actively participate in achieving organizational success.**
- ✓ **Management and employees work together to create an empowered environment where people are valued.**

Six Sigma

1. A business strategy to achieve excellence by applying different statistical, TQM and Project Management tools.
2. A set of practices designed to improve manufacturing processes and limited defects, but its application was subsequently extended to other types of business processes.
3. In Six Sigma, a defect is defined as any process output that does not meet customer specifications, or that could lead to creating an output that does not meet customer specifications.
4. Ability of manufacturing processes to produce high proportion of output within specification.
5. Processes that operate with 'six sigma quality' over short term produce long-term defect levels below **3.4 defects per million opportunities (DPMO)**
6. Its implicit goal is to improve all processes to that level of quality.
7. Bill Smith first formulated particulars of methodology at Motorola in 1986.
8. Heavily inspired by six preceding decades of quality improvement methodologies such as quality control, TQM, and 'Zero Defects', based on work of pioneers (Shewhart, Deming, Juran, Ishikawa, Taguchi).

1.

- Continuous efforts to achieve stable and predictable results are of importance to business success

2.

- Manufacturing and business processes have characteristics that can be measured, analyzed, improved and controlled

3.

- Achieving sustained quality improvement requires commitment from entire organization particularly from top-level management

Six Sigma doctrines assert that.....

Methods.....

- **Six Sigma projects follow two project methodologies inspired by Deming's Plan-Do-Check-Act Cycle.**
- **These methodologies, composed of five phases each bearing acronyms DMAIC (Define Measure Analysis Improve Control) and DMADV (Define Measure Analyze Design and Verify).**

DMAIC

Used for projects aimed at improving an existing business process. DMAIC is pronounced as 'duh -mayick'.

DMADV

Used for projects aimed at creating new product or process designs. DMADV is pronounced as 'duh-madvee'.

DMAIC	DMADV
<i>Define</i> the problem, the voice of the customer, and the project goals, specifically	<i>Define</i> design goals that are consistent with customer demands and the enterprise strategy.
<i>Measure</i> key aspects of the current process and collect relevant data.	<i>Measure</i> and identify CTQs (characteristics that are Critical To Quality), product capabilities, production process capability, and risks.
<i>Analyze</i> the data to investigate and verify cause-and-effect relationships. Determine what the relationships are, and attempt to ensure that all factors have been considered. Seek out root cause of the defect under investigation.	<i>Analyze</i> to develop and design alternatives, create a high-level design and evaluate design capability to select the best design.
<i>Improve</i> or optimize the current process based upon data analysis using techniques such as design of experiments, <i>poka yoke</i> or mistake proofing, and standard work to create a new, future state process. Set up pilot runs to establish process capability.	<i>Design</i> details, optimize the design, and plan for design verification. This phase may require simulations.
<i>Control</i> the future state process to ensure that any deviations from target are corrected before they result in defects. Implement control systems such as statistical process control, production boards and visual workplaces and continuously monitor the process.	<i>Verify</i> the design, set up pilot runs, implement the production process and hand it over to the process owner(s).

Differences between DMAIC and DMADV

Lean Manufacturing:

- It is a way of manufacturing that increases speed and reduces unnecessary wastes.
- Also called Toyota Production System, TPS is a production system inspired by Japanese concept of kaizen (strategy of continuous improvement).
- Lean focus on quality and quantity control to eliminate waste and reduce costs.
- Main goal of 'Lean Manufacturing' is to eliminate waste.
- 'Waste' refers especially to excess input materials and useless processing steps.
- Goal of 'eliminating waste' may also be stated as providing exactly what the customer values for the lowest cost of production.
- 'Lean' implies 'cutting the fat' or 'trimming waste', where 'fat' or 'waste' refer to whatever is not valued by customer. 'Lean Manufacturing' is to use materials and processes that add value for customer.

Kaizen

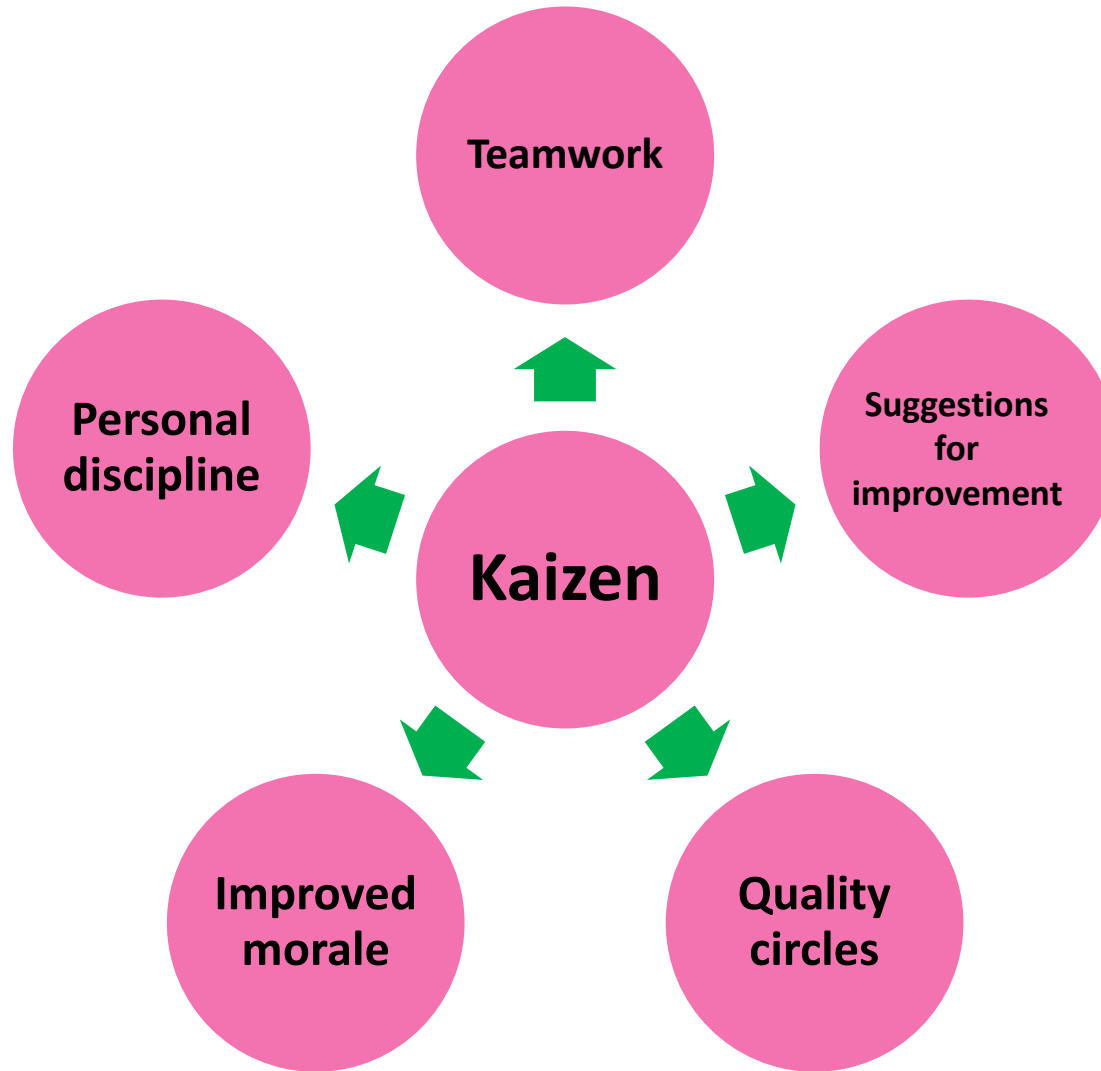
- **Kaizen (Japanese for ‘improvement’ or ‘change for the better’) refers to practices that focus upon continuous improvement of processes in manufacturing, engineering, supporting business processes and management.**
- **Applied in health-care, life-coaching, government, banking and many other industries.**
- **Refers to activities that continually improve all functions and involves all employees from CEO to assembly line workers.**
- **By improving standardized activities and processes, kaizen aims to eliminate waste.**
- **Kaizen was first implemented in several Japanese businesses after the Second World War.**

Cycle of kaizen activity can be defined as:



**This is also known as the Shewhart cycle,
Deming cycle, or PDCA**

Five Main Elements of Kaizen.....



Lean Six Sigma:

- It is combination of Six Sigma and Lean Manufacturing concept to reduce errors and increase productivity side by side.
- ‘Lean’ and ‘Six Sigma’ methodologies seem quite different but a company can benefit by wisely uniting these approaches.
- Six Sigma project would concentrate on analysis and finish by implementing rigid controls.
- ‘Lean’ project seems to assume the analysis is complete, since it does not explain how to minimize or maximize.

Six Sigma Project Methodology	Lean Project Methodology
Select projects to maximize financial improvement but define a limited project scope	Minimize inputs and wasted outputs
Look at the problem from the customer's point of view	Maximize throughput of any process
Investigate and document the business process, including inputs and outputs	Start a process to meet the customer's request, rather than to build inventory
Use statistics: take samples and analyze for variations	Produce what the customer requires, correctly, the first time
Minimize variations to ensure repeatable quality	Build 'continuous improvement' into every process, by bringing suppliers and front-line workers 'into the loop'

Total Productive Maintenance (TPM):

- ❑ **New way of carrying maintenance activities and invented by Japanese.**
- ❑ **TPM is a manufacturing-led initiative that creates a collaborative approach among all stakeholders within an organization — particularly between operations and maintenance — in an effort to achieve production efficiency, uninterrupted operations and ensure a quick, proactive maintenance response to prevent equipment-specific problems.**
- ❑ **Goal of TPM is to create a production environment free from mechanical breakdowns and technical disturbances by involving everybody in maintenance duties without heavily relying on mechanics or engineers.**

- ❑ Modernization and ongoing automation in different industries have noticeably amplified the gap between operators and their machines.
- ❑ Today, TPM builds the classical Japanese concepts of autonomous maintenance with process mapping for cross-functional duties.
- ❑ This create lean organization with reduced cycle time and improved operational efficiency.

TOTAL PRODUCTIVE MAINTENANCE



Environmental Management System (ISO 14001):

- ❑ It is standard given by ISO to facilitate organization to reduce their wastes that are harmful for environment.
- ❑ ISO 14001 was first published in 1996 and specifies actual requirements for an environmental management system.
- ❑ It applies to those environmental aspects which the organization has control and over which it can be expected to have an influence.
- ❑ ISO 14001 is often seen as corner stone standard of the ISO14000 series.



Laboratory Management System (ISO/IEC 17025):

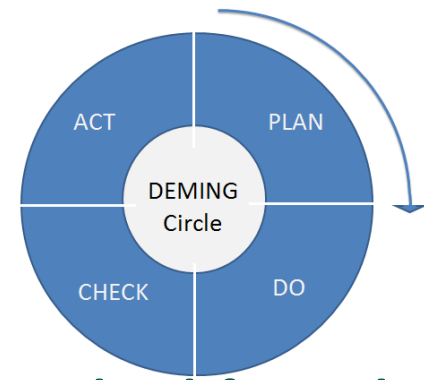
- It is a standard for laboratories for their accreditation.
- ISO/IEC 17025:2005 specifies general requirements for competence to carry out tests and calibrations, including sampling.
- Covers testing and calibration performed using standard, non-standard and laboratory-developed methods.
- Applicable to all organizations performing tests and/ or calibrations. Eg., first -second- and third-party laboratories, and laboratories where testing and/or calibration forms part of inspection and product certification.
- ISO/ IEC 17025:2005 is for use by laboratories in developing their management system for quality, administrative and technical operations.
- Laboratory customers, regulatory authorities and accreditation bodies may use it in confirming competence of laboratories.

5S:

- ❑ Methodology for improvement in daily and business life in five steps.
- ❑ As waste is potential gain, so eliminating waste is a gain.
- ❑ 5S philosophy focuses on effective work place organization, implies work environment, reduction in waste while improving quality and safety.
- ❑ 5S philosophy is becoming a hallmark in the world of manufacturing.
- ❑ System hinges on five Japanese concepts: **seiri, seiton, seison, seiketsu, and shitsuke.**
- ❑ This program can be adapted to other business models as well, bringing the Kaizen way to a variety of workplaces.
- ❑ Kaizen is a process of improvement that requires efforts for the entire team, from management to workers. They come together to create a faster, better way of working without high cost and maximizes efficiency.

5S Principle

Principle	Meaning
<i>Seiri</i>	Sorting Out
<i>Seiton</i>	Systematic Arrangement
<i>Seison</i>	Spic and Span
<i>Seiketsu</i>	Standardizing
<i>Shitsuke</i>	Self-discipline



PDCA Cycle:

- ❑ Imai stated the Japanese executives recast the Deming wheel from the 1950 JUSE seminar into the Plan –Do-Check-Act (PDCA) cycle.

Design

- ❑ Plan: Product design corresponds to the planning phase of management

Production

- ❑ Do: Production corresponds to doing-making, or working on the product that was designed

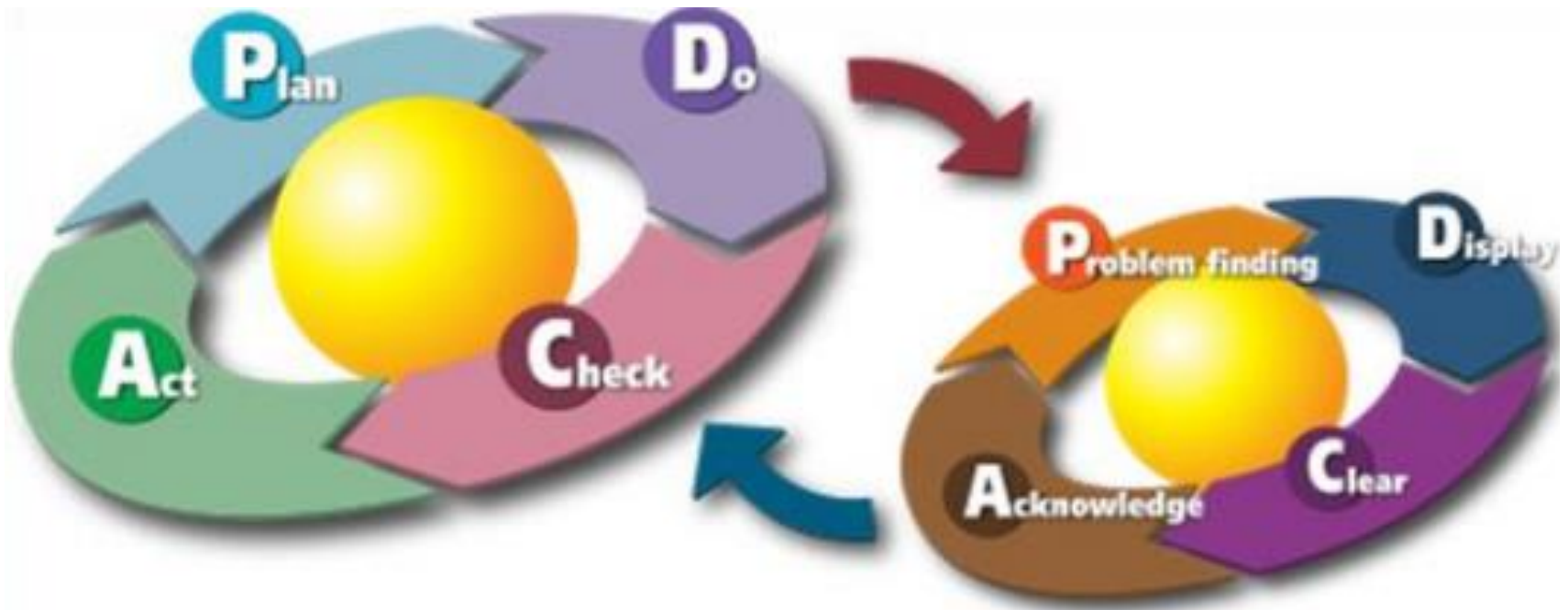
Sales

- ❑ Check: Sales figures confirm whether the customer is satisfied

Research

- ❑ Action: In case of complaint being filed, it has to be incorporated into the Planning phase, and action taken for next round of efforts

Four step cycle for problem solving includes planning (definition of a problem and a hypothesis about possible causes and solutions), doing (implementing), checking (evaluating the results) and action (back to plan if the results are unsatisfactory or standardization if the results are satisfactory). PDCA cycle emphasized the prevention of error recurrence by establishing standards and ongoing modification of those standards. Process of stabilization is often called SDCA (standardize-do-check-action) cycle.



Quality Circles:

- ❖ **It is group of people, who identify problems and give their solution for improvement in daily life and business.**
- ❖ **Quality circles were first seen in the United States (1950's) and later developed by Dr. Kaoru Ishikawa in Japan in the 1960's.**
- ❖ **Voluntary groups of employees who work on similar tasks or share an area of responsibility can participate in quality circle.**
- ❖ **They agree to meet on regular basis to discuss and solve problems related to work.**
- ❖ **They operate on principle that employee participation in decision-making and problem-solving improves quality of work.**
- ❖ **Enhances productivity, improve quality and boost employee morale.**