IE407 Total Quality Management
Lecture 20

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Reminder: SA grade

- SA grade will be determined by the attendance system
- More than 8 absents will automatically lead to SA grade
- Please be careful about your attendance in lectures

Besterfield Chapter 5: Continuous Process Improvement

Juran Trilogy

Planning

Control

Improvement

Juran Trilogy: Control

- Processes are kept under control by using feedback loops consisting of the following steps:
  - Determine items/subjects to be controlled and their units of measure
  - Set goals for the controls and determine what sensors need to be put in place to measure the product, process, or service
  - Measure actual performance
  - Compare actual performance to goals
  - Act on the difference

Juran Trilogy: Control - 2

- Statistical process control is the primary technique for achieving control
  - Basic tools include Pareto diagrams, flow diagrams, cause-and-effect diagrams, check sheets, histograms, control charts, and scatter diagrams
  - Process capability information is used to determine if the process is capable and is centered

Juran Trilogy: Improvement

- Improvement is achieving levels of performance that are significantly higher than current levels
  - Process improvement can be **incremental** or **breakthrough**
- Quality council initiates improvement by
  - Identifying the improvement projects, and
  - Establishing project teams with a project owner
    - The teams must be provided with necessary resources to determine causes, create solutions, and establish controls
- Project teams should employ the problem-solving method described in later slides
- Quality council ensures that improvement is continuous and never-ending

Improvement Strategies

- Four primary improvement strategies
  - Repair
    - First level: quick fix repair of defective item supplied to customer
    - Second level: identification of root causes and their elimination
    - Repair does not make process better than the original design
  - Refinement
    - Refinement improves efficiency and effectiveness incrementally
    - For example, doing things a bit quicker, better, easier, or with less waste
    - The slow pace of improvement may not give rise to resistance from employees

Improvement Strategies - 2

- Four primary improvement strategies (continued)
  - Renovation
    - Major or breakthrough improvement
    - Innovation and technological advancement are key features of this approach
    - Renovation requires more investment than repair or refinement
  - Reinvention
    - An entirely new product, service, process, or activity is developed based on a complete understanding of customer's requirements
    - It is like starting with a clean slate forgetting the existing practice
    - Reinvention is likely to give organization a competitive advantage
    - Employees are more likely to resist anything that they have never experienced before

Types of Problems

Types of Problems

- Compliance
  - A structured system, having standardized inputs, process, and outputs, is performing unacceptably
  - Problem is identified by comparing the performance with the previously laid down standards
    - It may also be identified by feedback from the internal or external customer
  - Such problems pose a challenge to determine the root causes
    - The standards cannot address all the potential problems in advance
- Unstructured
  - Similar to compliance but the system is not standardized
  - Such problems are usually identified by negative customer feedback

Types of Problems - 2

- Efficiency
  - Efficiency problems are more of a concern of owner or operator than a customer
  - The output is of acceptable quality but cost is in excess of expectations
  - Identification of such problems occur from benchmarking and operator suggestion
- Process design
  - Ill designed or obsolete processes need revision to bring them up-to-date by utilization of the advances in technology
  - Such problems are identified by poor performance, benchmarking or introduction of new products

Types of Problems - 3

- Product design
  - Development of new products and the improvement of existing products
  - Product design aims to prevent process and end user problems
  - Product design is usually necessitated due to better performance of competing products
  - The major challenge is to comprehensively identify user needs and translate them in product attributes and specifications

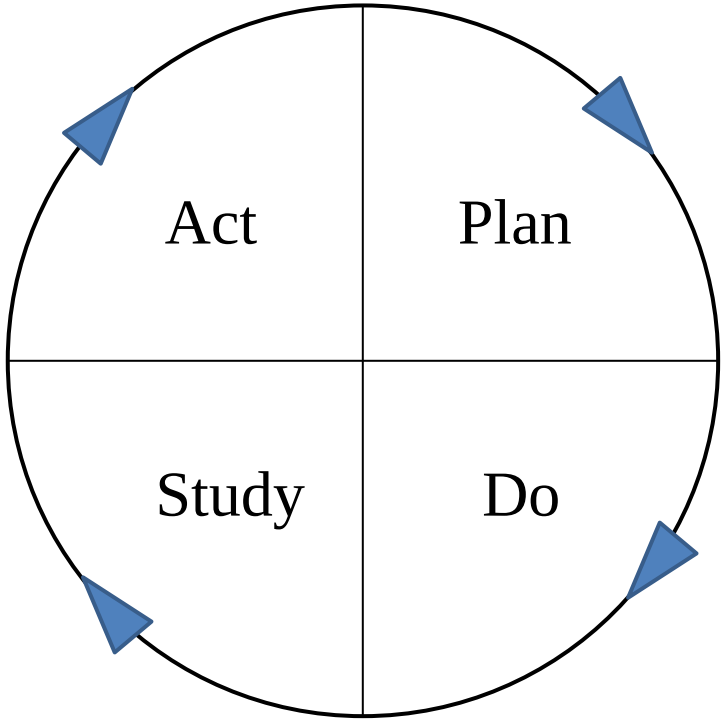
Approaches towards Continuous Process Improvement

- ✓ Juran's Trilogy
- ❖ Shewhart/Deming: Plan-Do-Study-Act cycle
- ❖ Kaizen

The PDSA (or PDCA) Cyle

- PDSA: Plan – Do – Study – Act (Deming)
- PDCA: Plan – Do – Check – Act (Shewhart)

- PDSA is an effective improvement cycle



The PDSA (or PDCA) Cyle - 2

- Plan
  - Plan carefully what is to be done
- Do
  - Carry out the plan (do it)
- Study
  - Study the results. Did it work?
- Act
  - Act on the results. Repeat cycle

Kaizen

A philosophy of continuous improvement
that has its origins in Japan

Kaizen

- Kaizen defines the management's role in continuously encouraging and implementing small improvements involving everyone
  - Kaizen relies heavily on a culture that encourages suggestions by operators to continually try to incrementally improve their job or process
  - It focuses on simplification by breaking down complex processes into their sub-processes and then improving them
  - Improvements in small increments makes the improvement process more efficient, effective, under control, and adaptable
    - Small improvements usually involve little expense

Kaizen - 2

- The main concepts and techniques of Kaizen are:
  - Identification of value-added and non-value-added activities
  - Elimination of seven classes of waste (Japanese word for waste is *Muda*)
    - 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 the use of one-piece flow
  - Documentation of standard operating procedures
  - The five S's for workplace organization
    - Proper arrangement(seiko), orderliness(seiton), personal cleanliness(seiketso), cleanup(seiso), and discipline(shitsuke)

Kaizen - 3

- The main concepts and techniques of Kaizen are (continued)
  - Visual management by means of visual displays that everyone in the plant can use for better communication
  - Just-in-time principles to produce only the units in the right quantities, at the right time, and with the right resources
  - Poka-yoke to prevent or detect errors
  - Team dynamics, which include problem solving, communication skills, and conflict resolution

Reengineering

Reengineering

- Reengineering is the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical measures of performance
  - Juran calls it Breakthrough as it achieves unprecedented levels of performance
  - Reengineering and Kaizen are strongly in contrast with each other in their approaches towards improvement

Six Sigma

Six sigma is rigorous statistical approach towards continuous process improvement

Six Sigma

- Sigma (σ) is a Greek symbol that is used in statistics to denote population standard deviation
  - If specification limits are set at $\pm 6\sigma$ and process is centered then probability of producing a defective item is 2 in a billion
  - See Figure 5-5 on page 141
  - See Tables 5-4 and 5-5 on pages 142-143
- You can learn more about Six Sigma methodology at the following URLs
  - http://www.slideshare.net/vivekissar/basic-six-sigma-presentation
  - I have made this presentation available on LMS
- Please read the paper "Six Sigma at General Electric" available on LMS

Six Sigma and You

The Classical View of Quality "99% Good" (3.8σ)	*The Six Sigma View of Quality "99.99966% Good" (6σ)*
20,000 lost articles of mail per hour	*Seven lost articles of mail per hour*
Unsafe drinking water almost 15 minutes each day	*One minute of unsafe drinking water every seven months*
5,000 incorrect surgical operations per week	*1.7 incorrect surgical operations per week*
2 short or long landings at most major airports daily	*One short or long landing at most major airports every five years*
200,000 wrong drug prescriptions each year	*68 wrong drug prescriptions each year*
No electricity for almost 7 hours each month	*One hour without electricity every 34 years*

Source: Carroll. Green Belt Course

References

- Besterfield, Dale H. and others. 2019. *Total Quality Management,* 5th edition. Pearson India