SINGAPORE PRODUCTIVITY ASSOCIATION

Productivity Link

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Contents

Quality Tools & Methodology

Continuous Improvement Tools

Continuous improvement tools are employed to maximise an organisation's competitive advantage by helping individuals and teams work smarter to identify the root cause of problems and solve them. These tools are used to reduce product variation, increase customer satisfaction, reduce waste and increase profits.

Just in Time Methodology

Just in Time (JIT) is a "manufacturing philosophy" that permits organisations to make continuous and significant improvements in their operational flow. The fundamental aim of JIT is "to ensure that production is as close as possible to a continuous process from receipt of raw materials/components through to shipment of finished goods".

In a manufacturing/assembly environment, JIT provides for the cost effective production and delivery of only the necessary quality parts, in the right quantity, at the right time and place. JIT uses a minimum of facilities, equipment, materials and human resources. JIT is accomplished through the application of specific techniques, which require total worker involvement and teamwork.

Benefits of JIT

Among the benefits of JIT include;

- Set up times are significantly reduced in the factory. Cutting setting up time allows organisation to improve on their bottom line, increases efficiency and allows the organisation to focus on other areas that need improvement. This also allows for the organisation to reduce or eliminate inventory for changeover time.

- Improvement in the flow of goods from warehouse to shelves. With employees focus on their specific areas, it allows them to process goods faster and not become fatigued from performing too many tasks at once. Small or individual piece lot sizes reduce lot delay inventories, which simplifies inventory flow and its management.

- Efficiently use employees who possess multiple skill sets. Having employees trained to work on different parts of the inventory cycle allows companies to move workers where they are needed.

- JIT provides better scheduling and work hour consistency. Workers need not work when there is no demand for a product at the time. This will save the organisation's money, either by not having to pay workers or by having them focusing on other work.

- Increased emphasis on supplier relationships.

- Supplies come in around the clock, keeping workers productive and businesses focused on turnover. Focusing management on deadlines makes the employees work hard to meet company goals, in pursuit of job satisfaction, promotion or even higher pay.

Cost of Quality – Reducing Costs the Smart Way

Cost of Quality or COQ, is a measurement used for assessing the waste or losses from some defined processes such as, machine, production line, plant, department, company, etc. COQ refers to the costs associated with providing poor quality product or service.

Why is COQ Important?

Through the various research and studies done, it is found that costs of poor quality can range from 15 to 40 per cent of business costs, and many organisations do not know what their quality costs are due to the lack of reliable statistics.

COQ can be used to "identify the global optimum for a process, and monitor that process' progress towards its global optimum". Global optimum is defined as "the best possible outcome from all physically possible operating modes, combinations and permutations of the current process".

Four Elements of COQ

The cost of quality comprises two main elements; the cost of good quality and the cost of poor quality. The cost of poor quality affects the "internal and external costs resulting from failing to meet requirements". The cost of good quality affects the costs for

investing in the prevention of non-conformance to requirements, and costs for appraising a product or service for conformance to requirements.

Cost of quality comprises four elements;

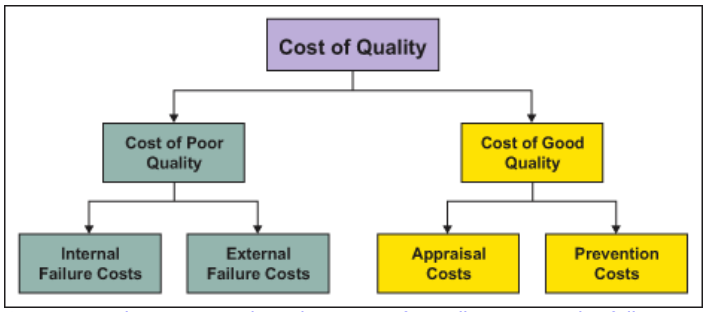
i. External failure cost

ii. Internal failure cost

iii. Inspection (appraisal) cost

iv. Prevention cost

Cost of Quality



Source: Buthmann, A. (2009). Cost of quality: Not only failure costs. Retrieved October 29, 2009, from http://europe.isixsigma.com/library/content/c070502a.asp

i. External failure cost

External failure cost is associated with the defects found after the customer receives the product or service, which lead to customer dissatisfaction. It may involve the costs incurred for processing customer complaints, customer returns, warranty claims, product recalls, repairing goods and redoing services, etc.

ii. Internal failure cost

Internal failure cost is associated with defects found before the customer receives the product or service. It may involve re-working, re-inspection, re-testing, material review, material downgrades, etc.

iii. Inspection (appraisal) cost

Appraisal cost is the cost incurred to determine the degree of conformance to quality requirements (measuring, evaluating or auditing). It may involve the costs incurred for re-work, delays, inspection, re-testing, downtime, shortages, process or service audits, calibration of measuring and test equipment etc.

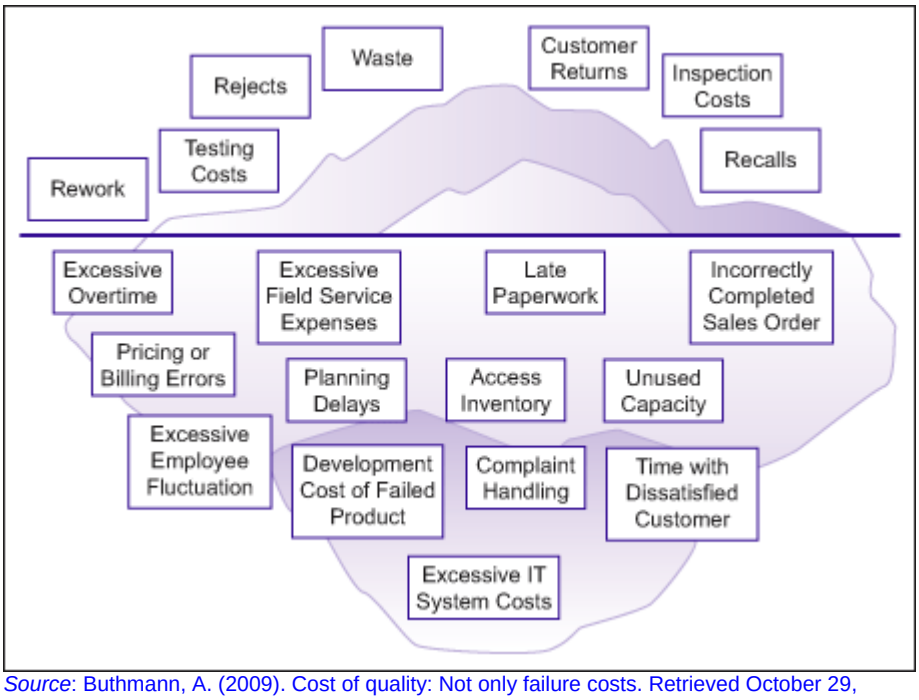
iv. Prevention cost

Prevention cost is the cost incurred to prevent poor quality from arising in products or services. It may involve the cost incurred for new product review, quality planning, supplier surveys, process reviews, error proofing, quality improvement team meetings, quality improvement projects, quality education and training, etc.

The total quality costs are the sum of the four costs mentioned above. They represent the difference between the actual cost of a product or service, and the potential (reduced) cost given no sub-standard or no defective products.

Often, many of the costs of quality are hidden and difficult to identify by formal measurement systems. The iceberg model, as presented below, is often used to illustrate this matter. “Only a minority of the costs of poor and good quality are obvious – appear above the surface of the water. But there is a huge potential for reducing costs under the water. Identifying and improving these costs will significantly reduce the costs of doing business.”

The Iceberg Model of Cost of Quality



Source: Buthmann, A. (2009). Cost of quality: Not only failure costs. Retrieved October 29, 2009, from http://europe.isixsigma.com/library/content/c070502a.asp

Cost Reduction Through 5S Methodology

The 5S methodology is a Japanese methodology, comprising five Japanese words;

i. Seiri (Sort)
ii. Seiton (Set in Order)
iii. Seiso (Shine)
iv. Seiketsu (Standardise)
v. Shitsuke (Sustain)

The 5S methodology, also referred to as a housekeeping methodology, is a systematic process, which improves quality and productivity through "maintaining an orderly workplace and using visual cues to achieve more consistent operational results". It also provides a methodology for organising, cleaning, developing and sustaining a productive work environment, and encourages workers to improve on their working environment and assist them in reducing waste, unplanned downtime, and in-process inventory.

The key benefits of the 5S methodology are;

- Understand the importance of improving productivity in the organisation through 5S
- Identify and eliminate waste in the organisation
- Acquire sufficient knowledge and skills for improving the workplace through 5S

Method and Implementation Approach

5S is a cyclical methodology and results in continuos improvement.

Source: Lean manufacturing and the environment: 5S. (2009, October 15). Retrieved October 29, 2009, from http://www.epa.gov/lean/thinking/fives.htm

i. Seiri (Sort)

Sort or also known as organisation, focuses on "eliminating unnecessary items from the workplace that are not needed for current production operations". It involves using a visual method called "red tagging", which is an effective method in identifying unneeded items. Red tagging involves evaluating the necessity of each item in a work area and dealing with it appropriately. Items that are deemed not important for operations or that are not in the proper location or quantity will be classified under red tag items. These items are then moved to a central holding area for

subsequent disposal, recycling or reassignment. Often, organisations are able to reclaim valuable floor space and eliminate items such as broken tools, scrap, and excess raw materials through sorting.

ii. Seiton (Set in Order)

Set in order or also known as straighten, focuses and maximises on efficiency. It focuses on creating "efficient and effective storage methods" to arrange items for easy usage and uses labels so that items can be easily located and put away. Set in order can only be carried out once unneeded items are identified and put away during the sorting.
Strategies for effective set in order include;

- painting floors
- affixing labels and placards to designate proper storage locations and methods
- outlining work areas and locations
- installing modular shelving and cabinets

iii. Seiso (Shine)

Shine emphasises on the need to keep the workplace clean and neat, after the clutter in the work areas are eliminated and remaining items are organised. Daily follow-up cleaning is essential to sustain the improvement. A clean environment enables "workers to notice malfunctions in equipments such as leaks, vibrations, breakages, and misalignments". These changes, if left unattended, could lead to possible equipment failure or loss of production.

iv. Seiketsu (Standardise)

Standardising the best practices in work area should be put in place after sorting, set in order and shine are implemented. Standardise involves standardising work practices or operating in a consistent manner. The process involves the assignment of the 5S job responsibilities, integrating 5S duties into work duties, and checking on the maintenance of 5S. Some useful tools that could be used are; job cycle charts, check lists, visual cues, etc. The second part of standardise is prevention, which emphasises on the prevention of

accumulation of unneeded items, and prevention of procedures from breaking down.

v. Shitsuke (Sustain)

Sustain involves sustaining the discipline, which refers to maintaining and reviewing standards. Staff should ensure that all correct procedures are undertaken and maintained at all times. Tools for sustaining the 5S include signs and posters, newsletters, pocket manuals, team and management check-ins, performance reviews, and department tours.

Process Management

Process management comprises the "ensemble of activities of planning and monitoring the performance of a process". It involves the "concept of defining macro and micro processes, assigning ownership, creating responsibilities for the owners who control the processes, and measuring the performance of each process". It also involves the application of knowledge, skills, tools, techniques and systems to define, visualise, measure, control, report and improve processes with the goal to meet customer requirements profitably.

Benefits of Process Management

With an effective process management in place, communication among workers will be unified and commonly understood. The expected end results of executing each project are expressed in process mappings. Through the expression of the common picture paradigm using processes, it aids in achieving the goals and visions for the expected end result.

The DMAIC Methodology

The DMAIC (Define, Measure, Analyse, Improve, Control) methodology is an incremental process improvement, which taps on the Six Sigma methodology. DMAIC refers to "data-driven quality strategy for improving processes". Each step in the cyclical DMAIC process is essential to ensure the best results possible. DMAIC methodology is useful in improving an existing business process to reduce defects.

Source: Marketing bullseye 2: Think six sigma. (2006, July 24). Retrieved October 30, 2009, from http://decker.typepad.com/welcome/2006/07/marketing_bulls_1.html

Define

Define is the first step in the process. This step involves defining the organisation's specific goals in achieving outcomes that are consistent with both the customers' demands and business strategy. It also includes defining the customer, their Critical to Quality (CTQ) issues, and the core business process involved, defining project boundaries; the stop and start of the process, and defining the process to be improved by mapping the process flow.

Measure

This step involves the measurement of the performance of the core business process involved. A base measurement is required to determine if defects have been reduced. In this step, it is essential that accurate measurements are made and relevant data must be collected for future comparisons to be measured in determining if defects have been reduced. This step involves developing a data collection plan for the process, collection of data from many sources to determine types of defects and metrics, and comparing data collected customer survey results to determine shortfall.

Analyse

Analysis is a crucial step in determining relationships and the factors of causality. Cause and effect is extremely necessary and must be considered when trying to understand how to fix a problem. This step involves analysing the data collected and process map to determine root causes of defects and opportunities for improvement. It includes identifying gaps

between current performance and goal performance, prioritising opportunities to improve and identifying sources of variation.

Improve

Making improvements or optimising processes based on measurements and analysis can ensure that defects are lowered and processes are streamlined. This step involves improving the target process by designing creative solutions to fix and prevent problems. It also includes creating innovate solutions using technology and discipline, and developing and deploying implementation plan.

Control

This last step in the DMAIC methodology ensures that any variances stand out and are corrected before they can influence a process negatively causing defects. Controls can be in the form of pilot runs to determine if the processes are capable. Once data is collected, a process can transition into a standard production. However, continued measurement and analysis must ensue to keep processes on tract and free of defects. This step involves controlling the improvements to keep the process on the new course. It prevents reverting to the “old way”, and requires the development, documentation and implementation of an ongoing monitoring plan. It also institutionalises the improvements through the modification of systems and structures (staffing, training, incentives).

Workplace Improvement

Workplace improvement is necessary to ensure a successful and efficient business operation in a highly competitive environment. It involves areas such as cost reduction, quality improvement and resource optimisation. However, it also important to keep in mind to “recognise the importance of synergy between different improvement efforts and the need for commitment at all levels of the organisation to achieve a total system-wide improvement”.

Key Benefits of Workplace Improvement

Some key benefits of workplace improvement are;

- It reduce costs through the identification and elimination of all forms of wastages that do not add value to the products
- It improves the quality of work and products by improving design, process and maintenance
- Organisations will achieve higher operating efficiency by improving work methods and procedures
- It reduces lead-time by introducing better concepts and principles in manufacturing systems
- Organisations will achieve a better flow of work by improving plant and workplace layouts

Kobayashi's 20 Keys to Workplace Improvement

Kobayashi's 20 Keys method is a benchmarking and improvement approach that offers a way to examine and systematically improve the strength of the organisation. It focuses on 20 different but inter-related aspects and defines 20 characteristics that companies require to stay flexible and adaptive.

1. Cleaning and organising
   Workplace should be kept clean and tidy at all times.
2. Rationalising the system/management of objectives
3. Improving team activities
   Focus on teamwork to involve everyone in enthusiastic improvements.
4. Reducing inventory (shortening lead times)
   Address overproduction and reduce costs and timescales.
5. Quick changeover technology
   Reduce times to change machines to enable more flexible working.
6. Manufacturing value analysis (methods improvement)

Creating improvement as a “way of life”, by constantly making work better and the workplace a better place to work.

7. Zero monitor manufacturing
   Build systems that avoid the need for physical presence of worker. This will increase efficiency.

8. Coupled manufacturing

9. Maintaining Equipment
   Allow workers, who are the users of the machines, to maintain them, rather than external vendors. This allows for constant adjustment and minimum downtime.

10. Time control and commitment

11. Quality assurance system

12. Developing your supplies
    Build a good relationship/rapport with the suppliers. Work with them to constantly improve the value chain.

13. Eliminating waste (treasure map)
    Constant identification and elimination of things that do not add value is necessary.

14. Empowering workers to make improvements
    Train workers to do more highly skilled tasks to increase their value.

15. Skill versatility and cross training
    Allow workers to work with other divisions or departments to gain experience in other areas.

16. Production scheduling
    Involves the timing of operations that create flow and a steady stream of on-time, high-quality, low-cost products.

17. Efficiency control
    Balance financial concerns with other areas, which indirectly affect costs.

18. Using information systems

19. Conserving energy and materials
    Conserve energy and materials to avoid wastage, for both the company and the broader society and environment.

20. Leading technology and site technology

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Articles may be delivered to clients, upon request.

Books are available at the Lee Kong Chian Reference Library.

Recommended Readings

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