Seven Quality Concepts

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Abstract

The Seven Quality Concepts were born from the teachings of quality guru W. Edwards Deming. Kaoru Ishikawa sought to bring comprehensible quality control measures to all workers in industry by giving them a set of standardized tools. Ishikawa formalized the Seven Quality Concepts that included the Cause and Effect Diagram, Pareto Diagram, Flow Charts, Checksheets, Scatter Diagrams, Histograms and Control Charts. Ishikawa believed that significant improvements could be achieved using these mostly easily learned techniques. While some are purely graphical in nature, the majority are based on statistical data. Though these techniques vary widely in their approach and outcomes, if used properly, they can bring a better understanding of the overall health of any project. For example, the Cause and Effect Diagram can help determine the root cause of a problem while the Pareto Diagram serves to show where the biggest gains can be achieved while highlighting the vital few. Flow Charts provide a visual depiction of a process while Scatter Diagrams attempt to find a relationship between project variables. No matter which of the seven concepts you choose to employ the underlying output is the same, project quality improvement!

Seven Quality Concepts

The Seven Quality Concepts (7QC) are a set of graphical techniques that are used in quality control. After attending a series of lectures by renowned quality pundit W. Edwards Deming, Kaoru Ishikawa, a former associate professor at the University of Tokyo, sought to democratize quality by making quality control comprehensible to all workers. Motivated by Deming's lectures, Ishikawa formalized what came to be known as Seven Basic Tools of Quality Control that included Cause and Effect Diagrams, Pareto Charts, Flow Charts, Checksheets, Scatter Diagrams, Histograms and Control Charts. Ishikawa alleged that 90% of an organizations problems could be improved using these seven tools that could, with the exception of Control Charts, be easily taught to any employee (Moore, 2007).

Cause and Effect Diagrams

Cause and Effect Diagrams, also known as Ishikawa and fishbone diagrams, are useful in identifying contributory symptoms of a problem by revealing the root cause. The nature of the diagram forces the user to work backwards as they identify both the likely and non-likely causes of the problem. The basic structure places the effect at one end of the diagram and as causes are identified by brainstorming they become spines, or vertebrae, that creates a graphical representation of the analysis (Moore, 2007).

Cause and Effect Diagrams can be used to monitor and control project quality by identifying a relationship between the problem and the root cause(s). Once the root causes are identified the project team can implement a corrective action (Institute, 2013). Any corrective action would follow the prescribed change control process for said project.

Pareto Diagram

"The Pareto Principle states that 80% of a problem can be attributed to 20% of the causes" (Moore, 2007). The Pareto Diagram is a vertical bar diagram that organizes information by categories that measure either frequencies or consequences (Institute, 2013). This displays the vital few sources responsible for the problem from highest to lowest relative to the measurable effect (Moore, 2007).

To effectively monitor and control project quality the project team can use the Pareto Diagram to identify the where the highest possible gains can be made (Moore, 2007). The project team can then use this information to develop a corrective action to address the vital items revealed. Continued routine use of the Pareto Diagram can not only ensure that corrective actions are effectively addressing the problem, but it will continue to highlight those items where the most gain can be made.

Flow Charts

Flow Charts are non-statistical visual depictions of a process (Moore, 2007). They display the sequence of steps within the process and transform one or more inputs into one or more outputs through the possibility of branching the steps (Institute, 2013). Constructed using a series of various shapes connected by lines and arrows that depict movement within the process, Flow Charts show activities, decision points, branching loops, parallel paths and order of processing (Institute, 2013 Moore, 2007).

In an effort to monitor and control project progression, the project management team can use a Flow Chart to help identify redundant and non-value-adding steps within the process (Moore, 2007). Flow Charts are also useful in helping a project team better understand and estimate the cost of quality in a process (Institute, 2013). A perfect example of a Flow Chart

would be a Stage-Gate or Phase-Gate process that will help determine whether the project will continue as planned, the project will be modified, the stage/ phase should be extended, or the project will be terminated.

Checksheets

Checksheets, also known as tally sheets, are like Flow Charts in that they are non-statistical in nature. They are simple in design being comprised of a table that captures the incidences of the variable, or variables, to be measured. Data is collected on the Checksheets by manually entering tick marks as the event occurs (Moore, 2007).

Checksheets can be most useful to a project team when used to collect data during a quality inspection (Institute, 2013). The graphical representation on the Checksheets can alone be used to monitor and control the project. However, greater results may be realized if the data from the Checksheets is entered into a Pareto Diagram, or one of the other 7QC tools Moore, 200&).

Scatter Diagrams

A Scatter Diagram seeks to identify if a relationship between two variables exists. More graphical that statistical, ordered pairs (X, Y) are plotted on a graph using the two variables as the axes (Moore, 2007). The direction of correlation may be positive (proportional), negative (inverse), or there may be no pattern of correlation. In those occurrences when correlation is established, a regression line can used to estimate how changing the independent variable can influence the dependent variable (Institute, 2013).

A project team could use a scatter diagram to identify a relationship between changes to project schedule, cost, or both. For instance, if a change request is submitted the project team could enter the data for the proposed change and see how it affects the other activities within the

project. Based on the outcomes the team would have a better understanding of how the effects of the change might alter productions times and/or costs.

Histograms

Much like a Pareto Chart, a Histogram is a type of bar chart (Moore, 2007). They are used to portray the "central tendency, dispersion and shape of a statistical distribution" (Institute, 2013). However, they do not consider the influence of time on the existing variation within a distribution (Institute, 2013). Histograms are commonly used to discriminate the frequency of occurrence in lengthy lists of data (Moore, 2007).

Histograms are a great way to predict project success or failure based on past performance of similar projects. However, they might also be useful in current projects if the project is lengthy and has upcoming processes that might benefit from analysis of completed similar tasks. By better understanding the outcomes of previous activities the project team could make adjustment to avoid past mistakes, or align itself with past successes.

Control Charts

Control Charts are used to determine if a process is stable and/or had predictable performance (Institute, 2013). A complex statistical tool by design, Control Charts measure process change over time. As data is collected it is plotted against upper and lower control limits that have been previously defined and agreed upon. The type of data to be measured, whether attributable or variable, determines the type of Control Chart to use. However, the Run Chart is often the most frequently used because it is suitable for both types of data (Moore, 2007).

The project management team, or an appropriate stakeholder, could use the calculated control limits of a Control Chart to identify points in which corrective action might need to be taken to control project stability. They could also use the Control Chart to monitor various types

of output variables. Moreover, Control Charts could be used monitor variances to schedule and cost, as well as the volume and frequency of changes in scope (Institute, 2013).

Summary

The Seven Quality Concepts seek quality improvement not based on personal knowledge, but on facts. The techniques can be used singularly or in combination with one another to identify areas in need of improvement; the complexity of the problem may dictate the need to use additional 7QC tools. If the concern for quality exists within your organizations culture the 7QC techniques should not only be taught to your employees, it should be embraced by management.

References

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