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TenStep Supplemental Paper

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A Seven Step Approach to Quality Improvement

"Quality is never an accident, it is always the result of an intelligent effort"- John Ruskin.

So is quality improvement! It is a result of a sequence of systematic steps and methodologies, adopted by an organization to sustain the quality of a process.

The previous article outlined the approach and working of two quality improvement methodologies - Shainin Strategies and Six-Sigma. Hereunder, are seven steps that a typical quality improvement methodology follows:

Step 1: Identify, relate and analyze

Identify the factors that are critical to quality (CTQ). This Critical to Quality factors in turn are affected by factors called *'Influence Issues'*. Analyze the impact of influence issues on CTQ factors and their effect on the quality of the end product or process. Such an analysis can guide a quality improvement project in an organization.

Represent this analysis in the form of a network called the *exploratory network*. This exploratory network describes the problem under investigation, clearly indicating the impact of influence factors on the Critical to Quality factors. Based on this, the team can determine the quality improvement strategy.

Step 2: Understand the nature of influence issues

Influence issues are categorized into three different groups, based on their impact on a CTQ. They are

- *Controllable issues*
  Controllable issues are the "influence issues" which can be controlled. This can reduce the impact on CTQ factors.
- *Issues of annoyance*
  Issues of annoyance are the "influence issues" which cannot be controlled directly. Their impact on CTQs is eradicated or compensated by varying other process variables involved.
- *The uncontrollable issues*
  Uncontrollable issues are the "influence issues" which have a definite negative, undesirable impact on the CTQs.

Step 3: Different stages in quality improvement

Having determined the nature of influence issues, the quality improvement team must devise a strategy to improve quality. A typical Quality Improvement Strategy would comprise of the following five steps.

a) **Describe:** The team describes and identifies the CTQ factors.

b) **Discover:** The team identifies influence issues that impact the CTQ factors.

c) **Explain:** The team explains the relation between the influence issues and their impact on CTQ factors.

d) **Test:** The team validates the influence issues.

e) **Wrap-up:** Based on the above steps, the team devises a strategy to improve and sustain quality.

The quality improvement strategy revolves around discover, test and wrap-up stages.

Step 4: Guidelines for identifying the CTQs

The *description* phase of Quality Improvement Strategy detailed earlier identifies the CTQ factors. However, it is necessary to understand and infer the CTQ factors in quantifiable terms. The team then specifies the desired standards that the CTQ factors are expected to meet.

The amount of deviation from the required standards is observed and the team identifies the stage when the problem is considered resolved. Also the specifications of the specimens under consideration are observed.

Step 5: Guidelines for identifying the influence issues

In the *discover* stage of Quality Improvement Strategy, the team identifies the influence issues. To identify the right influence issues, the team can

- Study the experimental data available
- Change the perception of the individuals working on the process
- Browse through the available standard information

Some guidelines to identify the right issues are described below.

Zeroing in: The influence issues should be classified into various groups. Such classification will help the team eliminate the entire group when they find that they do not impact the CTQ factors much. Thus it will not require the team to test each one of the influence issues and then eliminate them.

Standard search categories: The quest for influence issues should not be confined to the technical aspects. The search must be universal and include search categories like man, equipment, and infrastructure, approach implemented, components and elements used, the metric system used, or even the ambience.

Data search: Observe the data patterns to identify the right influence issues.

Drawing analogies: The team can import influence issues identified earlier, if it confronts quality problems similar to those confronted earlier.

Step 6: Assumptions and observations

The team initially commences assuming certain issues and in the process of experimentation acquires knowledge about them. Based on the observations made the

team can validate or modify the assumptions accordingly. Interpreting the relation between the assumptions and the observations rightly will lead to significant process improvement.

Step 7: Action plan

At this step, the team is equipped with influence issues and their nature of impact on CTQs. Now the team needs to devise a methodical strategy to reduce their impact on the CTQs. There are several methods to achieve the same. Some of them are briefly described below.

1. *Setting mean:* The controllable influence issues can be manipulated in order to minimize the deviation between mean and standard CTQ values.
2. *Design to robustness:* The controllable influence issues can be varied in order to make the CTQ factors more tolerant to the issues of annoyance.
3. *Design to tolerance:* The impact of issues of annoyance on CTQs minimized or removed.
4. *Feed-forward control:* A controllable influence issue is continually altered to balance the negative impact of issues of annoyance on the CTQs.
5. *Feedback control:* Controllable influence issues are identified and altered to minimize the impact of deviations in the process due to unidentifiable factors.
6. *Creating a foolproof process:* An attempt is made to eliminate deviations due to influence issues or minimize their impact on the CTQs.

A methodical approach would best help a company implement the right quality improvement strategy. The seven steps described in this article describe one such approach to effectively improve process quality.