International Journal of Applied Industrial Engineering
Volume 6 • Issue 1 • January-June 2019

Optimization Methods in Continuous Improvement Models
A Relational Review

Brian J. Galli, Long Island University, Brookville, USA
https://orcid.org/0000-0001-9392-244X

ABSTRACT

There are numerous processes used to implement quality, such as TQM, 6 Sigma, and Lean. For these quality processes to remain effective, a continuous improvement model is required and implemented from time to time. Some of these models include Define, Measure, Analyse, Improve and Control (DMAIC); Plan, Do, Check, and Act (PDCA); Identify, Measure, Problem Analysis, Remedy, Operationalize, Validate, and Evaluate (IMPROVE); and Theory of Constraint (TOC). Furthermore, continuous improvement tools need to remain effective through the use of optimization techniques to produce the best possible outcomes. This article discusses some of the current utilization of these tools and proposes different optimizing techniques and variations to make robust quality implementation tools.

KEYWORDS

Continuous Improvement Model, DFSS, DMAIC, IMPROVE, Optimizing Techniques, PDCA, TQM

INTRODUCTION

Background

One of the weak links in quality is sustaining good quality. It is easy to assume that once a quality system is implemented, it will operate at the desired and expected quality for an extended period. However, this is hardly realistic. A quality improvement project needs to be continuously monitored and tweaked to produce and maintain the desired level of quality. One way to achieve this is a continuous improvement model. Therefore, this paper seeks to discuss some of the ways to optimize the tools and techniques used to improve and maintain good quality in projects. Some tools for a continuous improvement model include:

- Define, Measure, Analyse, Improve and Control (DMAIC)
- Plan, Do, Check, and Act (PDCA)
- Identify, Measure, Problem Analysis, Remedy, Operationalize, Validate, and Evaluate (IMPROVE)

DOI: 10.4018/IJAIE.2019010103

There are special events known in the industry as the "Kaizen Event." This is when the above-stated tools get utilized by employing an optimizing technique. This maintains and further improves the quality of a process.

RESEARCH OBJECTIVE AND PROBLEM STATEMENT

The problem with continuous improvement process optimization begins when the DMAIC process is repeated continuously with the expectations of achieving the same level of success gained prior. This may lead to failure of the process. This paper discusses some implementation techniques of continuous improvement models to enhance the tools' success rate since there is a false expectation that these tools will produce the same successful results.

Research Gap

The existing literature exemplifies what gap exists in the current research. Although much literature demonstrates the pivotal role optimization has concerning continuous improvement projects, there is a gap relating to how this optimization enables a smooth progression in continuous improvement projects. As a result, this study focuses on the gaps existing in related literation regarding optimization and continuous improvement projects. The study evaluates the elements and applicability of modern optimization tools as well as concepts in regard to continuous improvement projects. Thus, this study seeks to fill in the gaps in existing literature.

Originality

This study seeks to contribute to existing literature concerning the effectiveness of optimization methods in continuous improvement projects. By focusing on assessment tools, this study provides a comparison of project optimization methods with other continuous improvement environments. Combining data from different studies helps present this study's analysis and findings in an understanding manner. Furthermore, the study is based on original research conducted to check the overall hypotheses.

The study incorporates viewpoints from varying researchers to recommend innovative ways to resolve the issues arising in continuous improvement environments. The study discusses the methodology used to research along with the overall findings. A design-science-investigate strategy was implemented to permit for identifying both reasonable and hypothetical applications and developing a valid assessment model of continuous improvement environments in conjunction with optimization methods. The study provides an outline of development models by focusing on evaluation instruments to test the hypothesis and reach conclusions. Results from meetings during the research are also provided in the analysis. Initial discovery and suggestions are then provided in the conclusion which further annotates investigative limitations and future research ideas.

Finally, this paper is a vital contribution to the profession. It adds to the gaps in existing literature regarding continuous improvement environments and optimization tools. Findings describing the benefits of this combination are discussed, as well as the pitfalls that may occur, should project management not seek integration of optimization and sustainability. The study employs real-world examples to highlight the value of applying this study's reasoning in the context of real business environments. The study stresses that there is significant value in the study of continuous improvement practices with an emphasis on optimization.

One of the guiding principles of Six Sigma is that the sigma levels (to lower defects, i.e., parts per million opportunities, or DPMO or PPM) are difficult to achieve as one progresses down the path of quality improvement (see Table 1).

Therefore, setting improvement benchmarks without accounting for this phenomenon leads teams to experience lower confidence for not being able to achieve expected results. Furthermore, it gives