

Continuous Improvement Practices of the Lean Six Sigma Process Approach within an Engineering Product Testing Capability

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Abstract

The study evaluates the extent to which continuous improvement initiatives are implemented to enhance the Lean Six Sigma process approach within an engineering product testing capability, thereby reducing the observed long product testing turnaround and cycle times. The research methodology employs an interpretive approach, using a structured, open-ended questionnaire in sixteen focus group interviews, yielding N=16. A descriptive approach using a structured online questionnaire administered to 100 engineering product testing personnel (N=100) was considered. The signed agreement between the product-testing capabilities and the researcher granted the researcher access to participants' email addresses.

Participants were invited to participate in the data collection process via email, and a project brief poster outlining the research rationale was shared with them. Based on captured interview responses and a review of the literature, three major themes and nine subthemes were identified for qualitative data analysis. At the same time, two empirical factors and nine variables/terms were identified through exploratory factor analysis to guide quantitative data analysis. Participants' experience ranged from 5 to 20 years, and all were located within South Africa across 5 provinces.

The paper presents 12 findings: three from an interpretive analysis and nine from a descriptive analysis. These findings indicate that engineering product testing capabilities partially apply Lean Six Sigma principles; however, excessive turnaround and cycle times are observed. The paper is limited to information obtained from twenty-six product-testing capabilities facilities within an organ of a state self-revenue-generating organisation. Therefore, the pace at which the studied product-testing capability transitions to the fourth industrial revolution is negligible. The study examines the practical implications of the current adopted performance status quo and presents several strategies to enhance output performance for the organisation's benefit. It is therefore highly recommended that product testing capabilities also consider the identified improvement opportunities and recommended solutions. Socially, the study's improvement initiatives highlight current product-testing capabilities and performance inefficiencies, and offer recommendations to address the causes and effects that lead to further increases in excessive turnaround and cycle times. The study's original value contribution identifies opportunities to strengthen state-owned revenue-generation product-testing capabilities, research-institution testing capabilities, industrial laboratories, and medical laboratories by applying or enhancing the deployed Lean Six Sigma to improve the performance of product-testing frameworks, laboratories, and medical laboratories by applying or enhancing the deployed Lean Six Sigma to improve the performance of product-testing frameworks.

Keywords

Continuous improvement, cycle times, lean, six sigma, lead times, turnaround times.