

Quantifying the Impact of Product Defects: A Cost of Poor Quality (COPQ) Approach in Electronics Manufacturing

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Abstract:

In today's highly competitive economic environment, it is important to ensure quality of products and services to sustain businesses in the long run. The financial impact of defective products was assessed in an electronics manufacturing production line using the Cost of Poor-Quality (COPQ) framework. This work identifies the revenue loss incurred over an eight-month period due to various sources of losses such as scrap, rework, and downtime. Analysis of these losses demonstrates high-impact failure reasons that accounted for 80% of respective losses, hence providing granularity to the framework. The mechanism behind the identified causes of failure was investigated, and consequently, four discrete high-level factors that contribute to the COPQ were identified. The analysis revealed that handling issues, ineffective processes, inferior fixture and tooling designs, and wave solder equipment-related issues are significant contributors to the losses. It was indicated that handling issues are expected to account for almost 55.20% of the total cost of poor quality. The study integrated COPQ with sensitivity analysis, which identifies the major drivers of COPQ and determines the degree to which variations in various losses influence the overall COPQ. These results have shown that this framework is effective in identifying important factors that contribute to financial losses and guiding quality improvement initiatives.