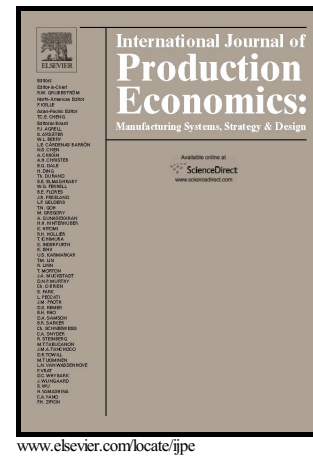


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PII: S0925-5273(17)30113-5
DOI: <http://dx.doi.org/10.1016/j.ijpe.2017.03.019>
Reference: PROECO6688

To appear in: *Intern. Journal of Production Economics*

Received date: 22 November 2016
Revised date: 21 March 2017
Accepted date: 22 March 2017

Cite this article as: Muhammad Arsalan Farooq, Randolph Kirchain, Henriqueta Novoa and Antonio Araujo, Cost of Quality: Evaluating Cost-Quality Trade-Offs for Inspection Strategies of Manufacturing Processes, *Intern. Journal of Production Economics*, <http://dx.doi.org/10.1016/j.ijpe.2017.03.019>

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Abstract

Cost-quality trade-offs are required when manufacturing industries seek to minimize cost and maximize product quality or reliability. We report a challenging cost-quality tradeoff problem for a consumer goods industry where both cost and quality are modeled together. First we present a 10-step systems engineering methodology for quality improvement of manufacturing systems and comprehensively discuss the cost of quality step. The methodology investigates in detail inspection strategies of the manufacturing systems by exploring four alternative strategies. Key elements in this investigation consists of modeling the appraisal costs that involve costs to detect a non-conformed unit through inspection or testing, and failure costs that involve costs of rework, scrap, warranty claims and loss of goodwill and sales. Among the main findings of the research is that optimum inspection strategy can be achieved by modeling the cost savings from each strategy and plotting against non-conforming rates shipped to the customer and additional external failure premium.

Keywords — systems engineering, manufacturing systems, inspection strategies, cost, quality and non-conformance

I. INTRODUCTION

Producing quality and reliable products at a realistic cost has always been a fundamental objective for manufacturers. In recent years, customer expectations for quality at low cost have only intensified. As manufacturers strive to achieve these goals they eventually reach a point where tradeoffs must be made between increasing quality and lowering costs. To guide these tradeoff decisions, the Cost of Quality (CoQ) approach has been developed. This approach models the quality of a system through the costs incurred in providing that quality. As such, the cost of quality can be identified, measured and improved and should be considered an important metric for any manufacturing industry (Sower et al., 2007).

CoQ is better explained as the cost incurred in the design, implementation, operation and maintenance of an organization's quality management system (Youngdahl, 1997). In other words, the cost committed to continuous improvement processes, cost of system, production and service failures, and non-value added activities and wastage in all its various forms (Pursglove and Dale, 1995).

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