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Quality Cost in Saudi Arabia Plastic and Glass Industry

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Abstract

Quality costs are those resulting from producing, identifying, repairing, and avoiding defective products. Quality costs consist of the following four categories Internal costs, failure costs, external failure costs, and appraisal costs. A survey of several plastic and glass industries in Saudi Arabia is conducted. The survey includes a cross representation of manufacturing activities existing in the region. The survey is intended to assess the level of awareness and quantitative estimates of quality costs as related to the plastic and glass industries. The survey design and findings are presented along with analysis. Specific conclusions are drawn regarding quality costs studies and reduction/improvements programs as related to the surveyed industry category.

Keywords: Quality cost; Plastic and glass industry

Introduction

Quality costs are those resulting from producing, identifying, repairing, and avoiding defective products. The following four categories are used to define and quantify manufacturing quality costs.

A survey of plastic and glass industries in Saudi Arabia is conducted. The survey includes a cross representation of manufacturing activities existing in the region.

The survey is intended to assess the level of awareness and quantitative estimates of quality costs as related to the above four categories. The survey design and findings are presented along with analysis. Specific conclusions are drawn regarding quality costs studies and reduction/improvements programs as related to the surveyed industry categories.

Literature Review

In process improvement efforts, cost of quality is a means to quantify the total cost of quality-related efforts and deficiencies. It was first described by Feigenbaum in a 1956 Harvard Business Review article [1].

Prior to its introduction, the general perception was that higher quality requires higher costs, either by buying better materials or machines or by hiring more labor [2].

Furthermore, while cost accounting had evolved to categorize financial transactions into revenues, expenses, and changes in shareholder equity, it had not attempted to categorize costs relevant to quality, this is particularly important given that most people involved in manufacturing never set hands on the product [3]. By classifying quality-related entries from a company's general ledger, management and quality practitioners can evaluate investments in quality based on cost improvement and profit enhancement [4].

The central theme of quality improvement is that larger investment in prevention drive even larger savings in quality-related failures and appraisal efforts.

Feigenbaum's categorization allows the organization to verify this for itself [5]. When confronted with mounting numbers of defects, organizations typically react by introducing more and more people into inspection roles. But inspection is never completely effective, so appraisal costs stay high as long as the failure costs stay high. The only way out of the predicament is to establish the right amount of prevention.

Once categorized, quality costs can serve as a means to measure, analyze, budget, and predict [6].

Variants of the concept of quality costs include cost of poor quality and categorization based on account type, described by Joseph [7].

A paper titled "Hidden quality costs and the distinction between quality cost and quality loss" [8], propose that prevention, appraisal and failure costs are not the only quality costs. There are other hidden costs that include identified in this current study. The importance of the hidden costs that are the manufacturing loss and the design loss is stretched, as they are too large to overlook. Also, prevention, appraisal and failure are classified as quality costs and quality losses. So, it introduces the categories of prevention loss and appraisal loss.

Additionally, a difficulty facing companies today is the inadequacy of most cost- accounting systems in addressing quality costs and in supplying appropriate data in a suitable format that considers total cost. The main reason for this inadequacy is a lack of adequate methods for determining the financial consequences of poor quality associated with various quality activities. A paper titled "Improving the definition and quantification of quality costs" [9] presents a study that addresses these needs by first refining the traditional 'Prevention-Appraisal-Failure' categories of quality costs and hidden costs through the definition and addition of two new categories: 'extra resultant cost' and 'estimated hidden cost'. Using this new categorization, the study then provides a detailed classification of the items of quality costs in terms of an expanded list of quality activities along the product life-cycle. The study then demonstrates the calculation of several kinds of total costs using different formats of a 'cost of quality account matrix',

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including a calculation of the sharing of responsibility for these costs among relevant departments.

Chiadamrong in his paper titled "The development of an economic quality cost model" [10] indicates that the expression of the term "economics of quality' has gone beyond the widely used term of "quality cost'. Traditionally, every time work is redone or when an attempt is made to screen out defects, the cost of quality increases. However, the costs of handling such problems go beyond visible costs of activities like inspection and testing. Conventional cost accounting fails to provide manufacturers with reliable cost information due to the inability to count the invisible and, in particular, intangible costs, Thus there is inaccuracy in calculating overheads. His paper presents an empirical model of the economics of quality as a function of two main components: traditional prevention-appraisal-failure expenses and hidden- opportunity quality loss costs. This process-cost approach looks at costs for a process that allows tracking costs normally associated with production in addition to those traditionally associated with quality. Through this approach, it can help manufacturers to view a clearer picture of comprehensive quality costs. Also, a paper by Plunkett and Dale titled "Quality costs: a critique of some economic cost of quality models" [11] provides a review of the surveys of quality costs conducted in various countries. A few researchers conducted an exclusive survey on quality cost but most of the researchers covered quality cost in quality management and control survey under the broad heading of financial measure and evaluation of quality management practices. The first part of the paper discusses issues related to collecting, measuring, reporting and uses of quality cost data and the second part discusses issues related to empirical evidence of relationship between quality cost components.

A survey study of Quality tools used in the plastic and glass industry in Saudi Arabia was conducted. Its findings were presented by the paper published by Alsaleh [12]. The plastic and glass industry in Saudi Arabia is continually challenged by fierce competition from giant international plastic and glass firms. In spite of that, it constantly shows signs of growth as reflected in its exports. The competition is propagated after joining the World Trade Organization. This investigation identified the readiness and quality status of the Saudi plastic and glass industry to endure the new challenge and survive the free trade market. The paper examined the application of the quality tools in the production setups of this industry and explored signs of TQM to evaluate its competitiveness.

A sample drawn from the Saudi plastic and glass industry was exposed to an empirical survey supported by structured interviews to measure the quality standing of the industry. The survey results were statistically analyzed and presented. Its findings reveal that some evidence of the adoption of quality tools and an interest to exploit even more advanced quality measures indicate an encouraging future for the plastic and glass industry in Saudi Arabia. Moreover, findings reflected enthusiasm of the sector to attain internationally recognized quality awards.

A review of research on cost of quality models and best practices was presented by Schiffauerova and Thomson [13]. In their paper, they presented a survey of published literature about various quality costing approaches and reports of their success in order to provide a better understanding of cost of quality methods. The paper's reviews and discusses the issues surrounding quality costing approaches. Their finding indicates that although the literature review shows an interest by the academic community, a cost of quality approach is not utilized in most quality management programs. The evidence presented shows that companies that do adopt such methods are successful in reducing quality costs and improving quality for their customers.

The survey shows that the method most commonly implemented is the classical prevention-appraisal-failure model; however, other quality cost models are used with success as well.

In this research, a survey study was conducted to measure the cost of poor quality in Saudi Arabia plastics and glass industry. This study targeted 48 affiliations, where 19 affiliations responded, five of them were excluded due to the incomplete/erroneous responses.

Research Methodology

The objective of this study is to assess the status of poor quality in Saudi plastic and glass industries. In order to achieve this goal, a questionnaire was designed and conducted online to related people. Data of this questionnaire covered the following aspects:

Internal failure

Costs refer to these costs incurred prior to the product delivery to the customer. They include costs resulting from scrap, rework, retest, downtime, yield losses or disposition.

External failure

Costs refer to these costs occurring after the products are delivered to the customer. They include categories such as complaint adjustment, returned products, warranty charges, and liability or allowances concessions.

Appraisal cost

Appraisal costs are those resulting from measuring, evaluating, and auditing of material and products to determine their condition and conformance to specifications. They include costs of inspection and testing of incoming material and through production, associated material and services consumed, and instruments and testing equipment calibration.

Preventive costs

Preventive costs are these associated with activities aimed at reducing appraisal and failure costs. They include costs of quality planning and design, new products review, process control, training, quality data acquisition, analysis and reporting, and improvement projects.

Cost of poor quality is measured as the sum of all costs such as inspection cost, training cost, cost of scrap, cost of rework, and cost of return. Results show that the annual average cost of poor quality is 7.0145% and is categorized as in Figure 1.

Providing a high level of quality products is not costly. In fact, in many cases, it is less expensive. In addition, when applying quality concepts and methodologies, cost and scheduling problem will be reduced. Executive officers have to take more considerations on putting quality first in every decision.

Cost of poor quality varies from one affiliation to the next. This variation depends on many factors such as Product complexity, technology used, how customers use the product, elements of quality costs included, and the level of refinement of the quality system [14].

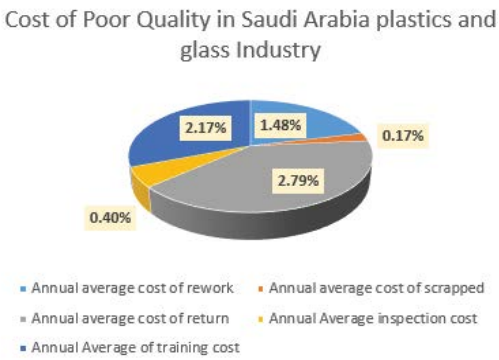

Figure 1: Average annual cost of poor quality.

Conclusion

Through the previous discussion of the questionnaire, plastic and glass industry faces real problem related to the cost of poor quality, this study has found that the annual average cost of rework is 1.48%, annual average cost of scrapped is 0.17, annual average cost of return has the highest percentage of 2.79%, annual average of inspection cost is 0.4%, and the annual average of training cost is 2.17%. These costs resulted be the lack of quality knowledge aspects in this industry. Technicians have to have more training on how to reduce waste and increase productivity. These companies have to keeping periodic maintenance tables and machine breakdown records.

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