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Cost of quality in a contraceptive manufacturing company

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Abstract: Determining the quality cost is one of the best ways that can assist industrial or business organizations to know clearly the investment and return of their quality improvement efforts. The information provided by accurate quality cost calculation is also a significant tool that can assist the assessment of the effectiveness of quality management system, as well as identification of quality issues within the organization and creation of opportunities for improvement. This paper aims to present 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 (CoQ) methods. In this work, the Quality policy of the industry is improved by implementing a new CoQ policy in the industry, thus calculating the total cost associated with the industry without affecting the current quality. The process cost model is obtained as the best CoQ model for the particular company. The CoQ of the company analysed according to the process cost model methodology..

Key words: CoQ, quality cost, quality policy

1. INTRODUCTION

As far as contraceptive products are concerned, Quality is the most critical factor. In the present competitive market business organization should maintain optimum quality to their productsThe concept of Cost of Quality is applicable to each and every industry.There is a cost associated with all products and services quality. COQ helps organization to plan its quality activities to obtain best results. Many companies promote quality as the central customer value and consider it to be a critical success factor for achieving competitiveness. Any serious attempt to improve quality must take into account the costs associated with achieving quality since the objective of continuous improvement programs is not only to meet customer requirements, but also to do it at the lowest cost. This can only happen by reducing the costs needed to achieve quality, and the reduction of these costs is only possible if they are identified and measured. Therefore, measuring and reporting the Cost of Quality (CoQ) should be considered an important issue for managers. The CoQ analysis links improvement actions with associated costs and customer expectations, and this is seen as the coupling of reduced costs and increased benefits for quality improvement.A realistic estimate of CoQ and improvement benefits, which is the trade-off between the level of conformance and non-conformance costs, should be considered an essential element of any quality initiative, and thus, a crucial issue for any manager. There are two steps in CoQ reporting: classification and measurement. The classification of CoQ depends on the models developed, and measurement is resolved by traditional cost accounting vs. process cost methods. Measuring CoQ requires precise cost information records. However, traditional cost accounting systems fail to provide accurate cost information to management. Which in turn causes a distortion in the measurement of CoQ. One of the reasons for the deficiency of traditional cost accounting systems is that the cost/expense categorization does not fit well with CoQ classification models.Proper analyzing of the cost involved in the quality control process will help the organization to eliminate the un-necessary activities which involves cost.So by providing a suitable cost of quality analyzing tool an organization can develop a proper quality management strategy

2. LITERATURE REVIEW

The concept of cost of quality is first introduced by Joseph Juran as a cost of poor quality through his quality control handbook in 1951. Subsequently Feigenbaum has derived the classification called PAF (Prevention, Appraisal and Failure) model. In this model quality cost is divided in to Prevention, Appraisal and Failure cost . Crosby has redefine the cost of quality as the sum of price of conformance and price of non-conformance . Cotton suggested that quality cost can pose an element of surprise for managements, and making

preliminary estimates of quality costs in four categories can attract the attention of the management. He suggested the team effort involving representatives from management accounting and quality is necessary to gain the support of management.

Quality costs are the costs associated with preventing, finding, and correcting defective work. These costs are huge, running at 20% - 40% of sales. Many of these costs can be significantly reduced or completely avoided. One of the key functions of a Quality Engineer is the reduction of the total cost of quality associated with a product.

COQ has been in existence for about four decades and the highly competitive, globalised business environment of today has made COQ the lack of management support and the perception that the current accounting system used in organizations are adequate.

Definitions of COQ

The sum of costs incurred in maintaining acceptable quality levels and the cost of failure to maintain that level is known as cost of quality.

Cost of poor quality (COPQ) is the cost associated with providing poor quality products or services.

The widely accepted Feigenbaum's PAF Model classified cost of quality into three categories – Prevention cost, Appraisal cost and Failure cost Juran further divided the failure cost into external and internal failure cost, the PAF model is the most commonly used COQ model in the United States and Great Britain confirmed that American Society for Quality (ASQ) adopted the classification of COQ by four categories (where failure cost is divided into external and internal failure costs), based on PAF model.

b These costs are associated with the design, implementation and maintenance of the total quality management system. Prevention costs are planned and are incurred before actual operation. It include Quality training, Quality auditing, Inspection costs Tests cost ,process capability studies, Staff training, Requirements analysis, Early prototyping Fault-tolerant design, Defensive programming, Usability analysis, Clear specification, Accurate internal documentation, Evaluation of the reliability of development tools (before buying them) or of other potential components of the product.

Appraisal costs: These costs are associated with the supplier's and customer's evaluation of purchased materials, processes, intermediates, products and services to assure conformance with the specified requirements. It include Design review, Code inspection, Glass box testing, Black box testing, Training testers, Beta testing, Test automation, Usability testing, Pre-release out-of-box testing by customer,service staff vendor assurance, continuous improvement program, customer satisfaction surveys work fail to reach designed quality standards and are detected before transfer to customer takes place. It include scrap, rework, retest, re-inspection, re-design, downtime, corrective action, downgrading.

External failure costs: These costs occur when products or services fail to reach design quality standards but are not detected until after transfer to the customer. It include warranty claims, replacements, customer returns, product recall and customer return analysis.

Process cost

The total costs of cost of conformance (COC) and cost of nonconformance (CONC) for a particular process

Cost of conformance (COC)

The intrinsic cost of providing products or services to declared standards by a given, specified process in a fully effective manner

Cost of nonconformance (CONC)

The cost of wasted time, materials and resources associated with a process in the receipt, production, dispatch and correction of unsatisfactory goods and services

The process cost model contains different steps
Identification of process
Defining the process and its boundaries
Flowcharting the process
Identification of inputs, outputs, controls and resources
Identification of the process cost elements and calculation of the quality costs
Constructing a 'process cost report'

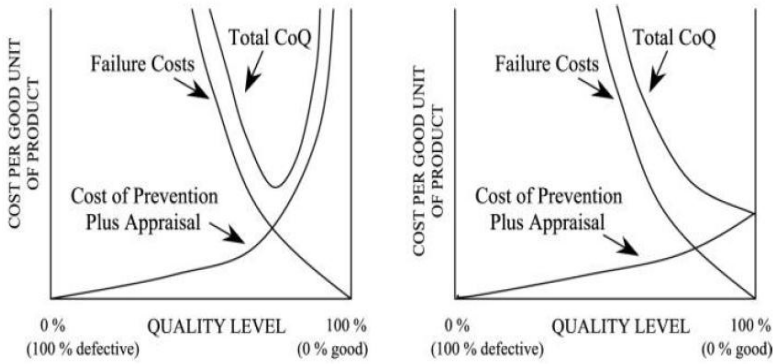

Fig1 : Juran's classical and modern view of Quality costing

The Process Cost Model

The process cost model can be developed for any process within an organization. It will identify all the activities and parameters within the process to be monitored by flowcharting the process. Then, the flowcharted activities are allocated as Cost of Conformance (CoC) or Cost of Non Conformance (CoNC), and the cost of quality at each stage (i.e. CoC +CoNC) are calculated or estimated. Finally, key areas for process improvement are identified and improved by investing in prevention activities and process redesign to reduce the CoNC and the excessive CoC respectively. It is believed that this will help to extend the concept of quality costing to all functions of an enterprise and to non-manufacturing organizations, and that it also gets people to consider in more detail the processes being carried out within the organization

Crosby's Model

Crosby sees quality as "conformance to requirements" and therefore, defines the CoQ as the sum of price of conformance (PoC) and price of non-conformance (PoNC). The price of conformance is the cost involved in making certain that things are done right the first time, which includes actual prevention and appraisal costs, and the price of non-conformance is the money wasted when work fails to conform to customer requirements, usually calculated by quantifying the cost of correcting, reworking or scrapping, which corresponds to actual failure costs.

3. METHODOLOGY

This study was conducted at HLL Lifecare Ltd, Peroorkada factory. To calculate the total cost of quality of the company. Primary data were collected by direct observation,discussion with managers,supervisors and workers and secondary data were collected from annual report, company manual and website.the FMEA method is used for data analysis.frrom that RPN can be calculated using RAM Commander software.after finding the highest failure certain suggestions are taken for reducing the cost.

4. ANALYSIS AND FINDINGS

Failure Mode Effect Analysis

The steps involved in FMECA are

- Identify the equipments
- Determine the failure mode
- Rank severity,occurrence and detection
- Calcute RPN
- Develop actions to reduce the failures
- Also calculate additional cost incurred to implement recommended actions

FMEA analysis was done with direct observation, interviewing engineers and previous machine break down records. Here the FMEA shows maximum RPN for nipple leak problems.

The effect of severity is ranked in a 10 point scale based on effect .The detection is also ranked in a 10 point sacle. The occurrence is similarly rank in a 10 point scale.

Thus RPN, Risk Priority Number of all the failure modes are calculated using RAM Commander. Certain actions are recommended to reduce failures.

5. CONCLUSION

The study is conducted in a contraceptive manufacturing company.This report is a brief description of a thesis work which is underway at this moment and has a purpose of implementing a COQ model for a contraceptive manufacturing industry.

In the first phase of thesis work the problem is clearly defined by utilizing the data collected from the company. And various problems faced by the company was analysed. According to the literature review process cost method is suitable for calculating cost of quality. The quality cost elements are identified. Prevention cost elements identified are total cost in HPQA and total cost in ETD online. The inspection cost elements identified are inspection and testing cost. The total cost for quality is about 13% of sale. The cost can be reduced by accepting proper suggestions described below.

FINDINGS

- Proper monitoring and controlling system is maintained.
- Fault in one process will results in damage of condoms.
- Un-identification of visual defect during QA inspection will results in reaching failed product in the hand of customers which will create dissatisfaction on them.
- Most of the employees are satisfied with the working condition of HLL.
- The unskilled operators in production will generate lot of waste in production. This will generate loss.
- Dust/dirt in the naked condom will create damage to the condoms.
- Better co-ordination among employees will helps to reduce the costs.
- Quality Assurance performance make the product process more valuable. The company using manual as well as electronic quality checking method.
- All the employees and the trainees are working effectively and efficiently for achieving the organizational goal.

SUGGESTIONS

- Use advanced technologies.
- 100% accuracy for Electronic testing department can helps to avoid ETD Online testing and helps to reduce the number of samples.
- Each and every department should have to work for quality.
- Eliminate the period of 3 years for trainees because they are more efficient than new trainees
- Post experienced trainees. This will reduce the training period.
- Evaluation of performance effectiveness of systems and employees.
- Give motivational training to the employees. They have to rectify that they also got benefits.
- Post an experienced permanent employee as a group leader for each shift to solve doubts of the trainees.
- Form a committee by taking one permanent employee from all departments for continuous improvement.
- Eliminate the defective products from the each stage of the production.
- Increase employees and trainees awareness about the needs of quality and the quality tests and also about to reduce the quality costs.
- Provide cash incentive programs or awards for the concept that will save the organization money and increase efficiency and quality control.
- Trainees must trained properly because their small negligence will make big issues in condom manufacturing company.
- If any problem arises, solve the problem completely that will leads to continuous improvement.
- Put suggestion boxes in quality department that will helps to identify the suggestions of the employees and trainees.

REFERENCES

[1]. Raymond T. Aoieong , S. L. Tang & Syed M. Ahmed (2012) A process approach in measuring quality costs of construction projects: model development,Construction Management and Economics, 20:2, 179-192
[2]. Juran, J.M. , Quality Control Handbook, 1st ed., McGraw-Hill, New York, NY,1951
[3]. Crosby, P. B. . "Quality is free: The art of making quality certain." New York.1979
[4]. Feigenbaum A.V. “Quality control”, McGraw-Hill, 1951
[5]. Gryna, F. M. “Quality Costs” in Juran, J.M. & Gryna, F. M. (1988, 4th Ed.), Juran’s Quality Control Handbook, McGraw-Hill, page 4.2.
[6]. Campanella, J. (Ed.) (1990), Principles of Quality Costs, ASQC Quality Press,

[7]. Setijono, D. and Dahlgaard, J.J. (2008). The value of quality improvements. International Journal of Quality & Reliability Management, 25(3), 298-312.
[8]. Arvaiova, M., Aspinwall, M.E., Walker, S.D. (2009). An initial survey on cost of quality programmes in telecommunications. The TQM Journal, 21(1), 59-71.
[9]. Ramudhin,A., Alzaman, C. and Bulgak, A.A.(2013). Incorporating the Cost of Quality in Supply Chain. Journal of Quality in Maintenance Engineering, 19(4), 71-86.
[10]. Rapley, C.W., Prickett, T.W., & Elliott, M.P. (2014). Quality costing: A study of manufacturing organizations. Part 1: Case study and survey. Total Quality Management, 10(1), 85–93.
[11]. Rodchua, S. (2015), Comparative Analysis of Quality Costs and Organizations Sizes in the Manufacturing Environment, The Quality Management Journal, 2, 23, 34-42.
[12]. Roden, S. and Dale, G.B. (2011). Quality costing in a small engineering company: issues and difficulties. The TQM Magazine, 13(6), 388-399.
[13]. Wen-Hsien Tsai, (2012),"Quality cost measurement under activity-based costing", International Journal of Quality & Reliability Management, Vol. 15 Iss 7 pp. 719 – 752.
[14]. Raymond T. Aoieong , S. L. Tang & Syed M. Ahmed (2013) A process approach in measuring quality costs of construction projects: model development, Construction Management and Economics, 20:2, 179-192,
[15]. Dale, B.G. and Plunkett, J.J., Quality Costing, 2nd ed., Chapman and Hall, London, 1995.
[16]. Andrea Chiarini, "Effect of ISO 9001 non-conformity process on cost of poor quality in capital intensives sectors", International Journal of Quality & Reliability Management 32:2, 144-155, 2015.