Cost of Quality Measurement and Reporting

By Ray Harkins

In 1956, Harvard Business Review published a landmark article by economist and business leader Armand Feigenbaum titled "Total Quality Control" that summarized the quality control system he developed during his long tenure at General Electric and gave prominence to many concepts still used in quality management today. One of those concepts was cost of quality measurement.

The goal of a cost of quality measurement system is to provide manufacturing leaders with a tool that can help drive process improvements. By understanding the magnitude and sources of their quality costs, manufacturing executives, managers, engineers, and technicians can more effectively direct their efforts, improvement strategies, and capital budgets toward reducing them.

In his article, Feigenbaum defined the four categories into which all quality costs fall: prevention, appraisal, internal failure, and external failure.

Prevention costs include training, administrative costs to develop sampling and process control plans, supplier assessment audits and other costs invested to avoid defects.

Appraisal costs include wages for in-process inspections, the cost of supplier evaluations and other costs associated with ensuring conformance to product requirements.

Internal failure costs include all costs related to defective material identified prior to shipping including scrap material, internal sorting and rework labor, and the cost to evaluate such material.

External failure costs include all costs tied to product failures identified by customers, including defect investigation trips, on-site sorting, returned product freight, warranty claims, and field service costs.

In most organizations, the leading quality professional, with input from their accounting group, implements such a system. Successfully developing a cost of quality system involves the following three steps:

1. Identifying all organizational quality costs.
2. Grouping the costs into one of the above four categories.
3. Summarize the results in a usable format.

Two keys to identifying and organizing an organization's quality costs are consensus and consistency.

Most quality costs like customer returns, internal defects, and inspectors' wages are easily identified. Whereas other costs like expedited freight of replacement product, administrative costs associated with corrective action requests, and defect investigation trips to customers are less obvious. Also, when developing a cost of quality report, leaders often identify certain costs that don't clearly align with quality, such as the wages of an engineer who serves both quality and engineering functions.

Furthermore, some quality costs such as a lab technician's salary may not fit neatly within a single cost category. For example, a technician may spend roughly half her time performing grain flow and microstructure analyses for new product launches (prevention costs) and the other half of her time performing failure analyses for customer returns (external defect costs). In cases like these, costs are usually apportioned according to their approximate contribution to each category.

Some thoughtful discussion between managers and accounting professionals usually resolves these issues.

More importantly, however, is the consistent identification of these costs over time. If an organization defines lab technician wages as a quality cost, for example, it should remain a quality cost over time. This is the only way an organization can accurately compare its performance to past periods.

The last step to developing a useful cost of quality report is to summarize the data in a readable and easily understood format. Concise cost of quality reports allow any interested party to review it quickly. And effective reports typically include a cover page that clearly shows the cost breakdown into each of the four major cost categories. See Figure 1.

Other tools such as Pareto analysis may also be integrated into the body of the report to show individual customer returns or internally scrapped parts ranked by their magnitude of sales loss, for example.

A cost of quality report can better serve as a strong indicator of organizational performance if it is published frequently (at least quarterly but preferably monthly), tied to other business metrics (cost of quality as a percentage of sales, for example), and used to analyze performance improvement projects, product families and individual departments.

For an organization's quality function to relevantly serve its organization, it must have established, and repeatable metrics tied to its financial goals. After all, money is the language of business. And a well-designed cost of quality reporting system using fair and consistently applied principles will do just that.

Quality Costs Summary, July 2023

		Cost, $	% of Sales
Prevention			
Gaging & Calibration		4,115	0.074
CMM Calibration/Repair		1,255	0.022
Metallurgical Supplies / Services		250	0.004
Training / Auditing		1,981	0.035
IM&T Labor (50%)		3,204	0.057
Admin & Engineering (25%)		8,008	0.143
Sub-Total		**18,814**	**0.337**
Appraisal			
Visual Inspection =	**84.3%**	63,585	1.138
IM&T Labor (50%)		3,204	0.057
Admin & Engineering (25%)		8,008	0.143
Sub-Total		**74,797**	**1.338**
Internal			
Visual Rejects, Lost Sales		58,082	1.039
Line Rejects, Lost Sales		7,976	0.143
Scrap Credit		11,465	0.205
Nondestructive Testing		1,441	0.026
NDT Freight		1,405	0.025
Outside Rework/Service		120	0.002
Supplier Credits		(3,505)	(0.063)
Visual Sorting =	**15.7%**	13,404	0.240
Admin & Engineering (25%)		8,008	0.143
Sub-Total		**98,396**	**1.760**
External			
Customer Reject Lost Sales		3,890	0.070
Returned Product Freight		1,100	0.020
Defect Investigation Trips		500	0.009
Onsite Inspection		1,371	0.025
Admin & Engineering (25%)		8,008	0.143
Sub-Total		**14,869**	**0.266**
Total			
Total Cost of Quality, $		206,876	
Total Sales, $		$5,589,105	
COQ, % of Sales		**3.701%**	

Figure 1.

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