



ECONOMIC CASE FOR QUALITY

Measuring the Cost of Quality For Management

by **Gary Cokins**

The quality movement has used the term cost of quality (COQ) for decades. But few organizations have actually adopted a reliable and repeatable method for measuring and reporting COQ and applied it to improve operations.

In 50 Words Or Less

- Although management prefers to have fact based data and reasonable estimates to evaluate decisions and prioritize spending, financial measurements generally aren't used to validate quality's impact on profitability and costs.
- Activity based cost/management systems are effective ways to account for the hidden costs of poor quality.

Is the administrative effort just not worth the benefits, or is there a deeper problem with the methodology for measuring COQ?

What COQ Should Do

At an operational level, quality management techniques effectively identify waste and accelerate problem solving for tactical issues related to process improvement. For many organizations, quality management initiatives have prevented financial losses from customer defections caused by quality problems or from waste and inefficiencies.

At a more strategic level, however, has quality management reached an adequate level of support from senior executives? Unfortunately, the avoidance of reduced profits from quality initiatives is not widely measured or reported by organizational financial accounting systems.

As a result, organizations cannot easily quantify the magnitude of benefits in financial terms—and the language of money is how most organizations operate. In short, there has been a disconnect between quality initiatives and bottom-line profits to validate any favorable impact on profitability and costs.

Why Traditional Accounting Fails

One of the obstacles affecting quality management and other initiatives has been the accounting field's traditional emphasis on external reporting. The initial financial data are captured in a format that does not lend itself to decision making.

It is always risky to invest in improving processes when true costs are not well established. This is because management lacks a valid cost base against which to compare the expected benefits from improving or reengineering the process. In *The Process-Centered Enterprise*, Gabe Pall says:

Historically, process management has always suffered from the lack of an obvious and reliable method of measurement that consistently indicates the level of resource consumption (expenses) by the business processes at any given time—an indicator which always interests executive management and is easily understood. The bottom line is that most businesses have no clue about the costs of their processes or their processes' various outputs.¹

When the costs of processes and their outputs can be measured adequately, two things can happen:

1. It can gain management's attention and give management confidence the accounting data are reliable business indicators.

2. Management can more reliably assess the different value of processes and how they contribute to the overall performance of the business.

The accountant's traditional general ledger is a wonderful instrument for what it is designed to do: post and summarize transactions into specific account balances. But the cost data in this format (salaries, supplies, depreciation) are structurally deficient for decision support, including measuring COQ. They disclose what was spent but not why or who or for what.

Expense data must be transformed into the costs of the processes that traverse across the departmental cost centers reported in a general ledger system—and ultimately transformed into the costs of products, services and customers that uniquely consume the costs of various processes.

Bring Facts, Not Hunches

To some people, it is obvious better management of quality ultimately leads to good performance, which in turn should lead to improved financial health of an organization. These people believe if you simply improve quality, good things, such as happier customers and higher profits, automatically will fall into place.

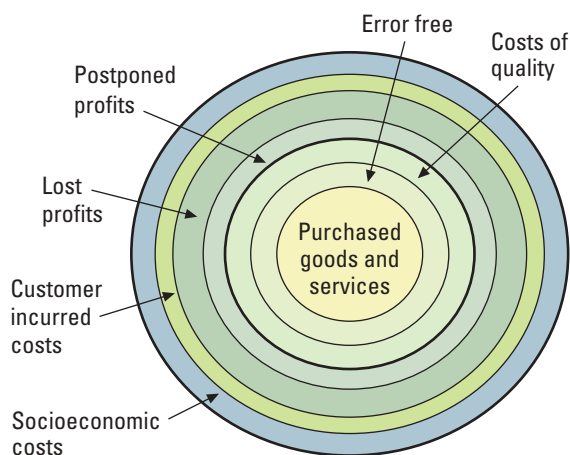
Other types prefer having fact based data and reasonable estimates for evaluating decisions and prioritizing spending. They do believe in quality programs, but in complex organizations with scarce idle resources, they prefer to be more certain of where it is best to spend discretionary money.

Some quality managers have become skeptical about measuring COQ. They have seen increasing regulations and standards, such as the ISO 9000 series, in which installing any form of COQ measurement is perceived as more of a documentation compliance exercise for certification to a standard rather than a benefit to improve performance.

Veterans of quality management believe quality just for quality's sake—meaning conformance to a standard—is not sufficient. They say quality should be viewed as a condition in which value entitlement is realized for customers, suppliers, employees and shareholders in every aspect of a relationship.

There always will be debates among shareholders, customers, employees, taxpayers and environ-

FIGURE 1 Levels and Scope of Quality Costs





mentalists about trade-offs, but the methods of COQ measurement can help convert debates into agreements.²

Categorizing Quality Costs

Almost every organization realizes anything less than the highest quality is not an option. High quality is simply an entry ticket for the opportunity to compete or exist. Attaining high quality is a must. Anything less will lead to an organization's terminal collapse.

To some people, quality costs are quite visible and obvious. To others, quality costs are understated. These people believe many quality related costs are hidden and go unreported.

Figure 1 illustrates several levels of nonerror free quality costs. This article's scope is the figure's inner concentric circles—those costs cited in the organization's financial profit and loss reporting. Examples of these obvious hidden financial costs and lost income opportunities include rework, excess scrap material, warranties and field repairs.

These error related costs can be measured directly from the financial system. Spending amounts are recorded in the accountant's general ledger system using the chart of accounts, but other types cannot be measured directly from the financial system.

Sometimes the quality related costs include the expenses of an entire department, such as an inspection department that arguably is solely quality related. However, as organizations flatten and eliminate layers and as employees multitask more, it is rare for an entire department to focus exclusively on quality. COQ related work is thus part but not all of its work.

The hidden poor quality costs, represented in Figure 1's inner COQ concentric circles, are less obvious and more difficult to measure.

For example, a hidden cost would be those hours a few employees spend sorting through paperwork resulting from a billing error. Although these employees do not reside in a department dedicated to quality related activities, such as inspection or rework, that portion of their workday was definitely quality related.

These costs of correcting errors are not reflected in the chart of accounts of an accounting system—and are referred to as hidden costs.

Quantification Methods Exist

The lack of widespread tracking of COQ in practice is surprising because the tools, methods and technologies exist to do it.

A research study investigating the maturity of COQ revealed the major reason for not tracking COQ was management's belief it lacks sufficient value.³ Other major reasons are a lack of knowledge

A rule of thumb is that the nearer the failure is to the end-user, the more expensive it is to correct.

of how to track costs and benefits of COQ and a lack of adequate accounting and computer systems.

Given the advances in today's data collection, data warehousing, data mining and activity based cost/management (ABC/M) system implementations, these reasons begin to look like lame excuses. The technology is no longer the impediment for reporting COQ it once was.

ABC/M systems are typically implemented to accurately report costs of products, services, channels and customers by replacing broadly allocated indirect expenses with cost drivers having cause and effect relationships, such as the number of inspections. Hence, customer caused costs and the process costs they consume can be reported with an audit trail back to the resources those expenses came from.

Value of Data

Providing employee teams both obvious and hidden quality related costs is valuable for performance improvement. Using the data, employees can gain insight into causes of problems. These hidden and traditional quality related costs can be broadly categorized as:

- **Error free costs:** costs unrelated to planning,

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controlling, correcting or improving quality. These are the did-it-right-the-first-time costs.

- **COQ:** costs that could disappear if all processes were error free and all products and services were defect free.

COQ can be subcategorized further as:

- **Conformance:** costs related to prevention and appraisal to meet requirements.
- **Nonconformance:** costs related to internal or external failures, including detective appraisal work from not meeting requirements. There is a distinction between internal and external failure costs: Internal failure costs are detected prior to the shipment or receipt of service by the customer; customers usually discover errors that lead to external failure costs.

An oversimplified definition of COQ is the costs associated with avoiding, finding, making and repairing defects and errors—assuming all defects and errors are detected.

COQ represents the difference between the actual costs and what the reduced cost would be if there no substandard service levels, failures or defects.

Simple examples of these categories for a cus-

FIGURE 2 Sales - Costs = Profits

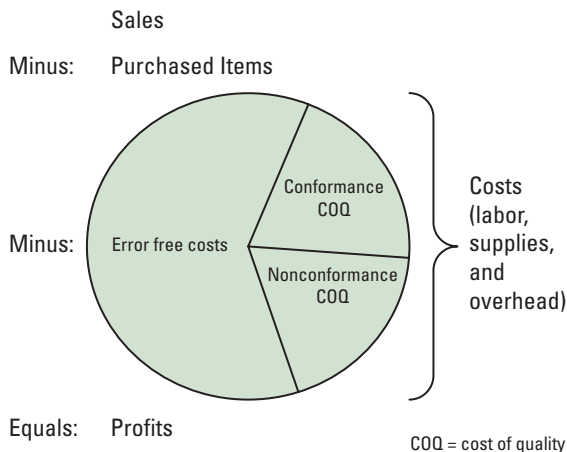
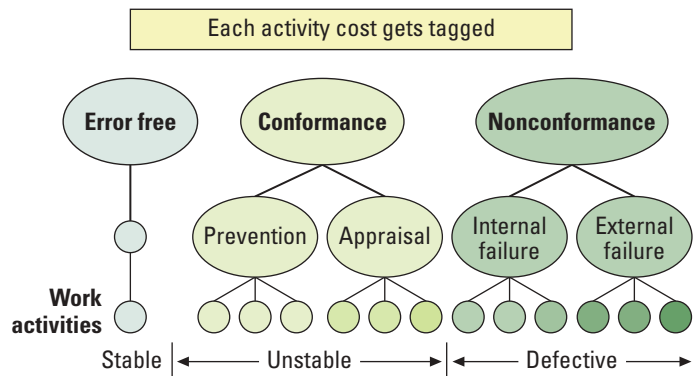


FIGURE 3 Cost of Quality Subcategories



tomers invoicing process might be as follows:

- **Error free:** first time through work without a flaw.
- **Prevention:** training courses for the invoicing department; programming error checking in the invoicing software.
- **Appraisal:** reviews of invoices by supervisors.
- **Internal failure:** wrong prices or customer quantities posted; correction of typographical errors.
- **External failure:** rework resulting from a customer dispute of an invoice.

Figure 2 portrays, in financial terms, how an organization's sales, profits, purchased materials and COQ expenses might exist. In principle, as the COQ expenses are reduced, they can be converted into higher bottom-line profits.

Using ABC/M Systems

Figure 3 illustrates how quality attributes for COQ categories can be tagged or scored into increasingly finer segments of the error free and COQ subcategories. Attributes are tagged to individual work activities belonging to various processes that already have been costed using ABC/M.

Each of the categories can be further subdivided. Figure 4 shows examples of subcategories for work activities one additional level below the four major categories of COQ.

For example, value stream mapping is an essential tool of the lean management movement. By tagging work activity costs with these subcategories,



more robust information can be provided than by simply classifying a cost as value added and nonvalue added. Subcategorization of COQ provides far greater and reliable visibility of costs without the great effort required by traditional cost accounting methods.

Because all the resource expenses can be assigned to the activity costs, 100% of the activities can be tagged with one of the COQ attributes. This is because it is feasible to measure the costs of work activities, typically with estimates, using the principles of ABC/M. Invasive time sheets are not required for ABC/M systems. The attribute groupings and summary rollups also are automatically coded.

Life would be nice in an error free world, and an organization's overall costs would be substantially lower relative to where they are today. But all organizations will always make mistakes—the goal is to manage mistakes and their impact.

COQ reporting communicates fact based data—in terms of money—to enable focusing and prioritizing to manage mistakes. Organizations that hide their complete COQ continue to risk deceiving themselves with the illusion of effective management.

It may be easier to think of the sum total of all of the cost categories—error free and COQ—equaling total expenditures during a time period less purchased material costs.

Investment Justification Of Quality Initiatives

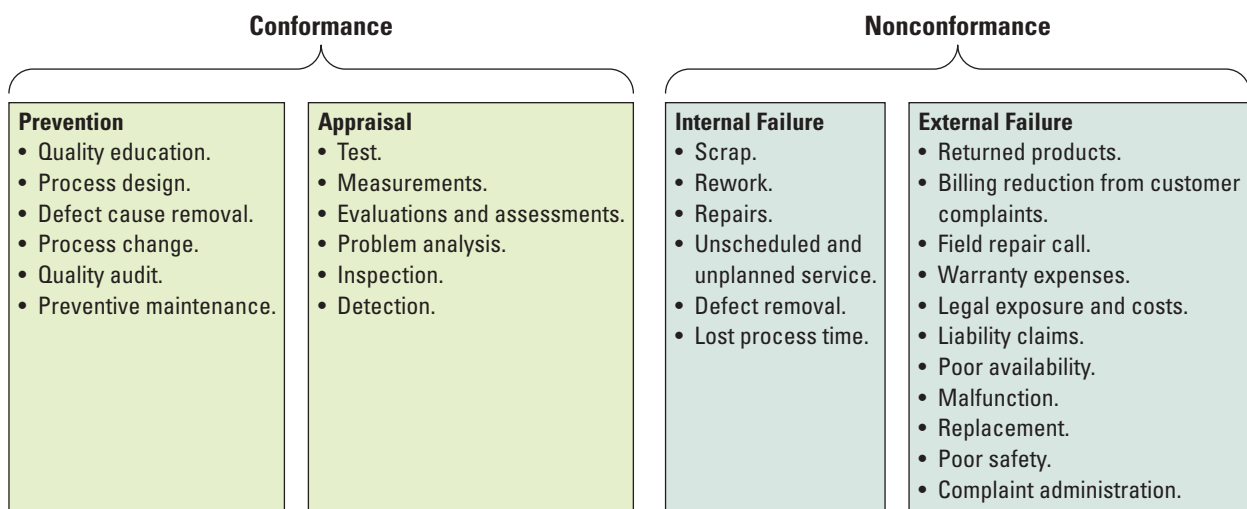
Using before and after histograms, Figure 5 (p. 50) illustrates how to manage quality related costs. Ideally, all four COQ cost categories should be reduced, but the cost of prevention initially might have to be increased prudently to dramatically decrease the costs of and reduced penalties paid for nonconformance COQ categories. This makes COQ more than just an accounting scheme—it becomes a financial investment justification tool.

It is widely believed that as failures are revealed—for example via complaints from customers—the root causes should be eliminated with corrective actions. A rule of thumb is that the nearer the failure is to the end user, the more expensive it is to correct. The flip side is that it becomes less expensive—overall—to fix problems earlier in the business process. As failure costs are reduced, appraisal efforts also can be reduced rationally.

Figure 5 demonstrates this overall improvement. Not only are nonconformance COQs significantly reduced, but the level of prevention and inspection costs, which some classify as nonvalue added, are also reduced.

The \$20,000 of COQ from the before case in Figure 5 (p. 50) has been reduced to \$11,000 in the after case. This good work can result in more

FIGURE 4 Examples of Cost of Quality Components



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requests for orders and higher sales without any changes in the staffing level. The original “before” error free costs have remained the same, at \$80,000, hence a \$9,000 savings.

Benefits of Including Total Expenditures

Starting a COQ measurement by assuming a 100% inclusion of the total incurred expenditures of Figure 1’s (p. 46) inner concentric circles (not the opportunity costs) and then subsequently segmenting those expenses between the error free costs and COQ provides three benefits: It reduces debate, increases employee focus and integrates COQ with the same financial reporting data used in the boardroom.

Reduces debate: With traditional COQ measures, people can endlessly debate whether a borderline activity, such as expected scrap produced during product development, is a true COQ. Including such a cost as COQ may reduce a measure that is of high interest.

By excluding that expense, it becomes hidden among all the other total expenditures of the organization. By starting with the 100% expenditure pool, every expense reported in the general ledger accounting system will fall into some category and always be visible.

Increases employee focus: By defining cate-

gories into which all costs can be slotted, it is hoped organizations will focus much less on their methods of measurement and more on their organizations’ problems and how to overcome them.

Integrates COQs with the same financial report data used in the boardroom: When traditional and obvious COQ information is used, only portions of the total expenditures are selected for inclusion and some portions are not reported. This invites debate about arbitrariness or ambiguity.

However, when 100% of expenditures are included, the COQ plus error free costs reconcile exactly with the same data used by executive management and the board of directors. Executives like to see managerial accounting data reconciled and balanced with their financial accounting reports.

There is no longer any suspicion some COQ has been left out or the COQ data are not anchored in reality. By starting with 100% expenditures, the only debate can be about misclassification—not omission.

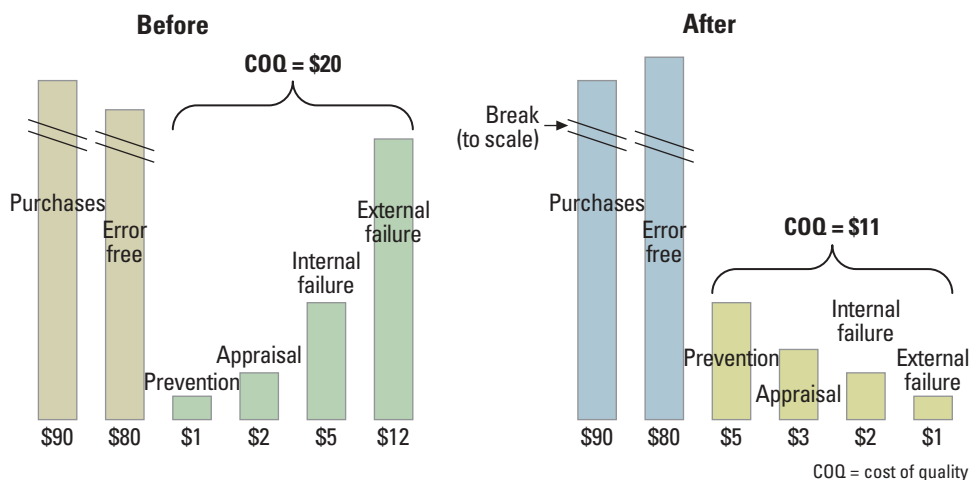
Quantification

A formal COQ measurement system provides continuous results. In contrast to a one-time assessment, it requires involvement by employees who participate in the business processes. More important, these employees must be motivated to spend the energy and time, apart from their regular responsibilities, to submit and use the data.

For such a COQ system to be sustained longer term, the system requires the support and interest of senior management as well as genuinely perceived utility by those using the data to solve problems.

Regardless of the collection system selected, it is imperative to focus analytical and corrective time and energy on the area of failure costs. As Joseph Juran discussed in his popular article “Gold

FIGURE 5 Conformance Related Cost of Quality





in the Mine," much mining still can be performed.⁴

This mining should be considered a long-term investment because failure costs when starting a quality management program usually constitute 65 to 70% of an organization's quality costs. Appraisal costs are normally 20 to 25%, and prevention costs are 5%.

Continuous Improvement

Tagging attributes against COQ categories is obviously a secondary purpose for measuring costs. The primary purpose of costing is to simply learn what something costs.

Costing data are for measuring profit margins, focusing on where the larger costs are that may be impacted or estimating future costs to justify future spending decisions (for example, return on investment).

In short, managerial accounting transforms expenses collected in the general ledger into calculated costs. Expenses are purchases of resources. In contrast, costs are the uses of that spending and are always calculated.

Many organizations arbitrarily base allocation of indirect expenses on broadly averaged volume factors (direct hours to make a product), but the proper rule is to trace and assign indirect expenses based on a one-to-one cause and effect relationship.

When an organization has good cost accounting, it then can use calculated costs, such as the cost per processed invoice, as a basis for comparison. In short, the unit cost per each output of work is computed, and then these data are usable for external and internal benchmarking.

In benchmarking studies, there often can be a bad case of apples-to-Oreos comparison. That is, consistency is lacking or unrecognized regarding which work activities or outputs should be included in the study.

Integrating Quality Costs With Operations

An ABC/M methodology and system introduces rigor and is sufficiently codified and leveled for relevancy to remove this nagging shortcoming of benchmarking.

The quality movement has been a loud advocate for measuring things rather than relying on opin-

ions. It would make sense for measuring the financial implications of quality to become an increasingly larger part of the quality management domain.

The addition of valid costing data will give the quality movement more legitimacy. *ANSI/ISO/ASQ Q9004-2000* suggests financial measurement as an appropriate way to assess "the organization's performance in order to determine whether planned objectives have been achieved."⁵ I hope there will be increased coordination among the quality, managerial accounting and operations systems.

REFERENCES

1. Gabe Pall, *The Process-Centered Enterprise*, St. Lucie Press, 2000, p. 40.
2. Mickel J. Harry, "A New Definition Aims to Connect Quality With Financial Performance," *Quality Progress*, January 2000, p. 65.
3. Victor E. Sower and Ross Quarles, "Cost of Quality Usage and Its Relationship to Quality Systems Maturity," working paper series, Center for Business and Economic Development, Sam Houston State University; November 2002, pp. 10-12.
4. J.M. Juran and Frank M. Gryna, *Juran's Quality Handbook*, fourth edition, McGraw-Hill Book Co., 1951.
5. *ANSI/ISO/ASQ 9004-2000, Quality Management Systems—Guidelines for Performance Improvement*, ASQ Quality Press, 2000.

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