

The Strategic Cost of Quality

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Quality!?

How many times we hear of this word and the related concepts and standards needed to be met in order to be certified as an ISO 9000 (and following...) organization.

But are we sure about the meaning of Quality?

Are we sure about its strategic importance for a company to be profitable?

The former question involves some considerations about how we are accustomed to perceiving quality.

Most of us take it as a concept strictly linked to the high performance of making products and delivering services with reference to the processes to make and deliver them.

It looks like only the business pursuing a Differentiation strategy would embrace the quality concept.

It isn't always this way.

Quality is the ability of an organization to arrange all of its internal processes and to make all of its products/services to meet (at a minimum) the expectations of its customers.

That means that even a firm adopting a low-cost strategy can also embed the quality concept into its processes and products/services.

Last but not least, the firms nowadays are being affected by aggressive competitors to increase the quality standards of their products/services and lower their costs, thus adopting as a result a mixed strategy.

That means that it's even more insightful how this subject is "across-the-board".

The second question about the Profitability?

We will highlight how the costs incurred to ensure the quality of the processes and outputs sustain and grow profitability of firms and how important the financial measurement of those costs is to the businesses.

The best way to proceed is in my opinion through examples that are able to clear all the doubts.

Take the case of a manufacturing company that invests a lot of time to select its suppliers and spend money on research, travel, preliminary tests of the materials to be purchased.

When the right choice of a supplier is made, here are some examples of the direct advantages that result from it and that mean lower costs:

- 1) Reduced travels and time to select other suppliers.
- 2) Lower scrap.
- 3) Lower raw material inspections.
- 4) Reduced level of inventory.
- 5) Reduced downtime.
- 6) Reduced reworks.
- 7) Lower abnormal spoilage.

These are just, as we wrote in the lines above the list, the immediate advantages, but if you want to go beyond these and have an in-depth view of other benefits a business may have, have a look at the following resulting from the “contact with the customers:

- 1) Lower number of Sales Returns.
- 2) Lower Warranty and Repair costs.
- 3) Lower Recall costs.
- 4) High perceived valued embedded into the product.
- 5) Higher number of sales per customer and largest market share.
- 6) As a consequence of point 4, potential increase in Price.

This means further reduced costs and increased revenues that result in higher profitability from the side of “good” suppliers, let alone all the other aspects of the value chain of a company.

Do you remember the classical notion of Value Chain?

Here you can find an example of the Value Chain of a manufacturing company with a brief list of the main activities performed by its departments.

Table 1 - Value Chain of a Manufacturing Company.

MacroActivities	Main Activities
Design	Research and Engineering of the Product and Processes
Procurement	Research of Suppliers, Purchasing
Material Warehousing	Receiving, Stocking, Handling
Production	Sorting, Converting, Assembling, Finishing and Testing
Product Warehousing and Distribution	Handling, Moving products to External Warehouses and Retailers
Sales	Sales to the Customer
After-Sales Service	Returns, Assistance and Complaint Management

ARE YOU CONVINCED NOW ABOUT THE STRATEGIC IMPORTANCE OF THE QUALITY AND ITS COSTS?

DO YOU AGREE THAT THE BEST POSSIBLE WAY TO MEASURE THESE COSTS IS NEEDED TO PLAN AND ACHIEVE THE PROFITABILITY YOU ARE SEEKING?

If you are still not convinced about what we explained, the remainder of this article will be more in-depth.

Segmentation of Cost of Quality (COQ)

Sometimes the Costs of Quality (COQ) are visible in the traditional accounting reporting like factory overheads, such as product testing, abnormal spoilage, and material Inspections. But most of time these expenses are hidden. They are included with other kinds of expenses. As examples, the travel expenses due to visits to suppliers to resolve problems and the legal advice for managing customer complaints. These are not visible, but they can be made visible with COQ reporting.

With that said, for out-of-pocket costs we should also take into account the opportunity costs.

The Cost of Quality, in particular for decision-making purposes, also consists of what opportunity is lost when a quality-related issue comes up.

A good example is lost profit contribution margin due to lost sales.

It should now be clear which direction a COQ measurement method should take. However, a segmentation of the COQ into its more specific categories is more helpful for these purposes and to appreciate the importance of this subject.

The first COQ category consists of all the expenses incurred for preventing quality issues from occurring by reducing the risk of creating defects in the products and processes.

Its name is **Prevention Costs**.

Here are the main examples:

- First of all, “quality circles”. These are expenses related to groups of people trusted with spotting and solve problems of quality.
- Costs for setting the technical product standards.
- Planning costs for a potential new job order including expenses for testing new models and processes.
- All the costs incurred to ensure the quality of the material purchased to be consistent with the desired standards. For example, the costs for supplier assessment, selection and training fall into this category.
- Costs related to the product traceability.
- Marketing costs needed to understand customer expectations.
- Employee training costs for the manufacturing, delivery and other services to customers to meet a target quality level.
- Costs incurred to validate the quality records.

- Information system costs incurred for measuring, setting quality data, and for developing and meeting the related requirements from the business users.
- Manufacturing equipment maintenance costs that include inspection maintenance and repair expenses to ensure the highest level possible of equipment efficiency.
- Cost for the design of products and processes.

Another COQ category concerns all the measurement, analysis and monitoring operations for the output (i.e., products/services) and processes to be defect-free.

Its name is **Appraisal Costs**.

It concerns both the costs incurred for achieving the specifications of the outputs and the purchase and maintenance of the tools needed to carry out these related activities.

Here are some examples:

- Inspections and testing concerning materials and products including as well those held at the site of the customers.
- Data analysis and processing costs resulting from the point 1.
- Project reviews.
- Service assessment prior to the delivery to the customers.
- Purchase of and the maintenance costs of the inspection and testing equipment, such as machinery and software.
- Costs incurred for warehouse inspections in order to maintain appropriate inventory levels.
- Costs for the collection of key performance indicators (KPIs).

The CPQ categories next listed are referred to as **Conformance Costs**.

NonConformance Costs are segmented into 2 categories:

Internal Failure Costs and External Failure Costs.

When one detects some “noncompliance” either of the products or of the business processes, including special services requested by a customer, then activities are needed either to fix the defects or to make consequential actions.

These activities bring about some expenses or potential losses categorized as **Internal Failure Costs**.

Here some examples:

- Costs incurred to make repairs and reworks that include materials, overheads and labor costs.
- Scrap.
- Re-examination costs: the costs related to the resources needed to reinspect and retest the defective products and processes.
- Costs resulting from delays in payments.

- Costs of Redesign: expenses incurred to “think” of a new product or process.
- Downtime: unplanned time spent on equipment adjustments and repairs.
- Lost production: potential production corresponding to the time spent on detecting, waiting, repairing and reinspecting the defective products and processes (this is a cost opportunity).
- Costs related to the downgrade of the product (including the cost opportunity as a result of a new appropriate reduced price that decreases the profit contribution margin from the potential sales of the defect-free product).
- Costs related to excess levels of inventory.

The second group of NonConformance Costs consists of **External Failure Costs** that are all the expenses detected after that the products/services have been delivered to customers. They focus on maintaining a good relationship with the customers.

This category is the most cross-functional of the all Costs of Quality.

It concerns very clearly all of a business’ departments and also the overheads that vary according to different drivers.

The latter consideration makes the need more urgent for a cost recording reporting method as complement to the traditional standard cost accounting system. This is described further in this article.

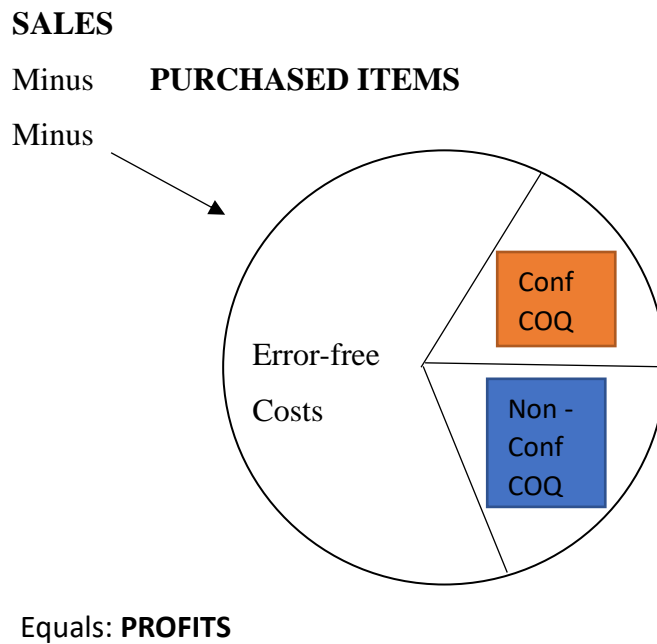
The main **External Failure Cost** examples follow:

- Analysis costs incurred to identify the causes of the “failures” (concerning various departments according to the kind of defects).
- Product return costs.
- Repair, replacement and other warranty costs.
- Legal costs for managing the legal actions of the customers.
- Product recall costs incurred as salaries and other administrative overheads to manage the recalls.
- Costs to handle the complaints from the customers, concerning both the Customer Service department and other ones.
- Future profit losses resulting from a decrease in market share with competitors, lost sales and canceled orders. The related profit loss is an opportunity cost.
- Brand-restoring costs: all the kind of costs of the marketing department incurred to reduce the reputation damages and for recovering the business image.

If we still have not convinced you of the value of COQ reporting breaking it into its four categories, then here is a more direct way to do it by showing this simple equation displayed in Figure 1:

Profit = Sales – Error-free costs - COQ categories - Purchased material costs.

Figure 1 – Profit Equation



Financial Measurement

Once we have understood the importance of COQ, this creates the need for a way to measure COQ.

Traditional cost accounting methods have the advantage to see the distribution of COQ among the different business cost centers, but they present some limits as to the COQ measurement accuracy.

The accountant's traditional general ledger financial reporting is an effective instrument for what it is designed to do: post and summarize transactions into specific account balances.

But the cost data in this format (e.g., salaries, supplies, depreciation) are structurally deficient for decision support, including measuring COQ. They disclose what was spent but not why or for what or for who.

Expense data must be transformed into the costs of the processes that traverse across the departmental cost centers reported in a general ledger accounting system – and ultimately transformed into the costs of products, services, distribution channels, and customers that uniquely consume the costs of the various end-to-end business processes.

This is where **Activity Based Costing (ABC) principles, methods, and systems** come in and provide the mechanism to measure and report COQ.

Furthermore, ABC can identify the **hidden costs** that account for a great part of the COQ.

A well-known interesting technique that is worth mentioning in this regard helps estimate the total loss or cost following a rejection of the product/service unit by the customer. It is the Taguchi Quality Loss Function (TQLF). It embraces all the COQ categories that were described.

TQLF determines how much a given deviation from the target of a technical specification of the product/service costs to the firm. It takes into account both direct costs (such as repair, rework or additional customer service working hours, etc..) and also hidden costs (e.g., additional inventory, additional engineering costs and some opportunity costs resulting for instance from decrease in market share, loss of future orders and other losses).

An explanation of the Taguchi Function is beyond the core of our dissertation that focuses on making the importance of COQ and its management understood. That is why we will now continue writing about the strategic path to achieve the dissertation goals.

Let's return to discussing ABC.

To some people, quality costs are visible and obvious but they do not care to or make the effort to measure them. To others, quality costs should be measured, and they believe without measuring COQ the true quality costs are understated. These people believe many quality related costs are hidden and go unreported.

Examples of these obvious hidden financial costs and lost income opportunities include rework, excess scrap material, warranties and field repairs.

These types of 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 of COQ cannot be reported from the general ledger expense accounts.

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, 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 general ledger chart of accounts and are referred to as hidden costs.

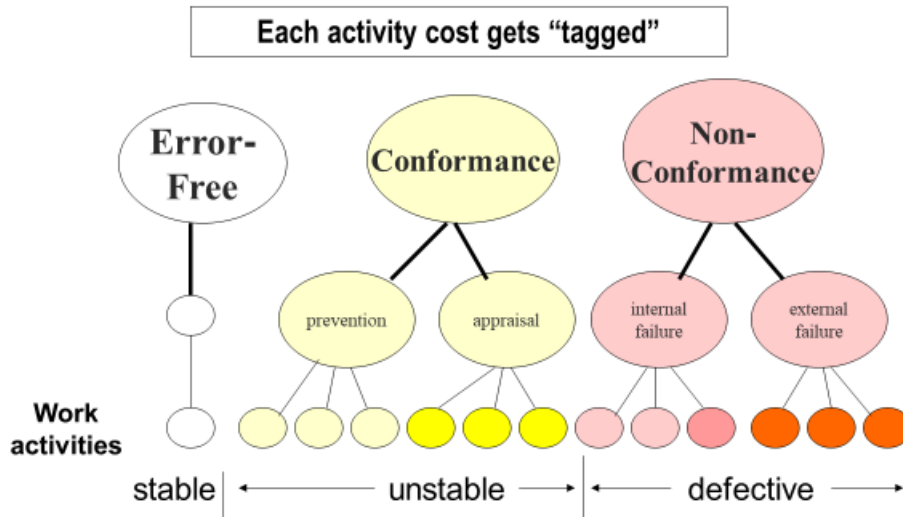
The lack of widespread tracking of COQ in practice is surprising because the tools, methods and technologies exist to do it.

Given the advances in today's data collection, data warehousing, data mining and activity based cost (ABC) system implementations, the technology is no longer the impediment for reporting COQ that it once was in the past.

ABC systems are typically implemented to accurately report costs of products, services, channels and customers by replacing broadly allocated indirect expenses with cost drivers that have 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 and consumed.

Figure 2 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 ABC's individual work activities belonging to various processes that already have been costed using ABC. So, think of ABC's attributes as an additional dimension of costs. They are like "the color of money".

Figure 2 – ABC’s Attributes Score and Tag Each Activity Cost



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. Invasive time sheets are not required for ABC systems. The attribute groupings and summary rollups also are automatically costed.

It's clear, without going into more in-depth analysis, how ABC is an appropriate way to capture all the benefits from the COQ measurement to support providing insights and decision making.

How to manage the Cost-of Quality “initiative”?

After dissertating on the centrality of COQ and about how it can be measured, we may be wondering what the direction of Quality Initiatives should be like.

Ideally, all four COQ cost categories should be reduced, but the cost of prevention initially may have to be increased prudently to dramatically decrease the costs of and reduced penalties paid for the 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 3 displays a vertical histogram of the distribution of an organizations cost *before* actions and initiatives are taken to reduce the COQ.

Figure 4 displays the same diagram but *after* actions and initiatives are taken. The figure demonstrates the reduction of the COQ. Not only are nonconformance COQs significantly reduced, but the level of prevention and inspection costs, which some classify as nonvalue added costs, are also reduced.

The \$20,000 of COQ from the before case in **Figure 3** has been reduced by \$9,000 in **Figure 4**, to \$11,000 in the after case. The reward for this good work can result in more requests for orders and higher sales without any changes in the staffing level. The error free costs have risen by the same \$9,000, from \$80,000 to \$89,000.

Figure 3 - Before Quality Initiative

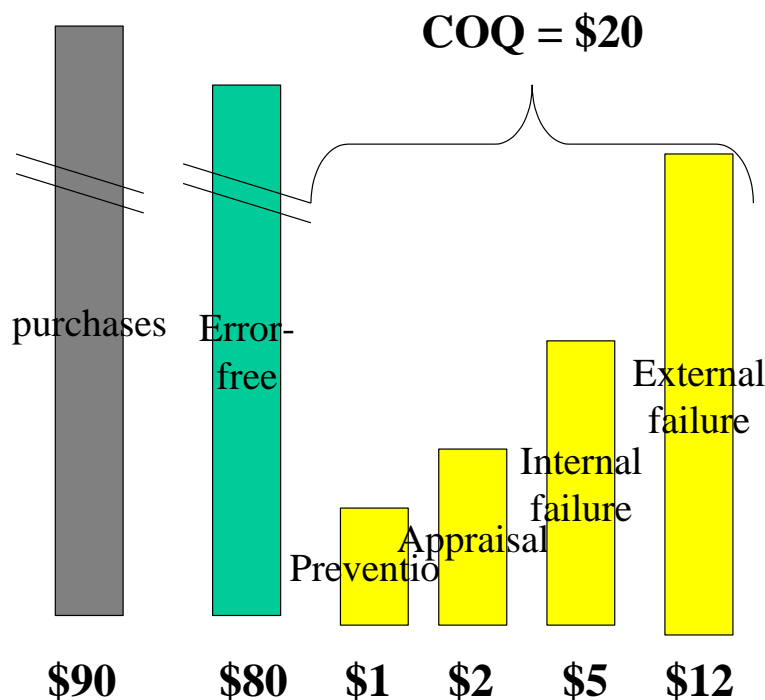
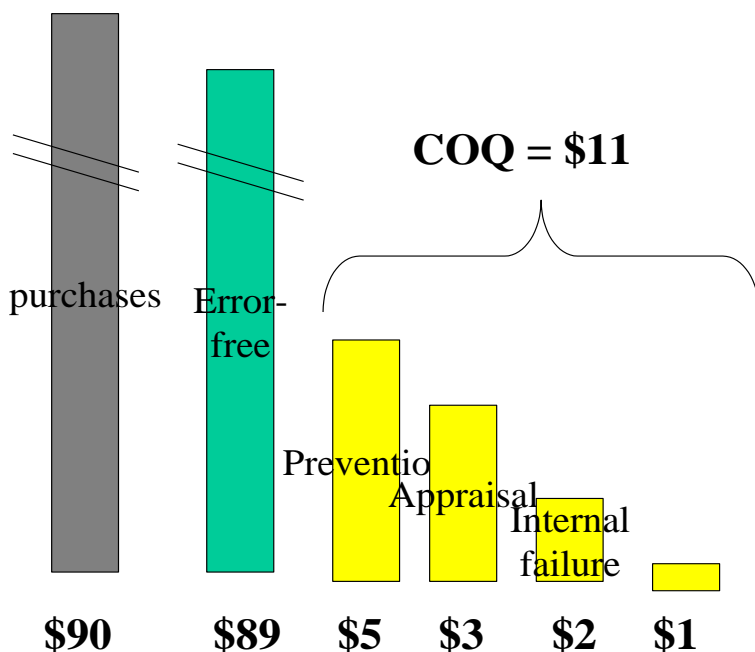


Figure 4 – After Quality Initiative



Conclusion

The quality movement has been a loud advocate for measuring things rather than relying on opinions. It would make sense for measuring the financial implications of quality to become an increasingly larger part of the quality management domain and to contribute to achieving the strategy formulated by an organization's executives.

The addition of valid costing data leveraging ABC provides 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." There needs to be increased coordination among the quality, management accounting and operations systems.

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