COST OF QUALITY: WHY MORE ORGANIZATIONS DO NOT USE IT EFFECTIVELY

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SUMMARY

This study examines the reasons why fewer than half of US business organizations systematically track quality costs. Data for this study were collected using a survey of a sample of members of the Quality Management Division of the American Society for Quality. The most frequently cited reason was lack of management support. Approaches to dealing with each of the cited reasons are discussed.

BACKGROUND

While its roots go back to Walter Shewart and others in the 1930’s, the modern quality cost system was developed out of the work of Joseph Juran (1951), Armand Feigenbaum (1957), and Harold Freeman (1960). In the 1960’s the American Society for Quality’s (ASQ) Quality Cost Committee refined the technique and promoted its use (Bottorff, 1997). In the 1970’s and 1980’s Philip Crosby’s work helped popularize the cost of quality (COQ) concept beyond the quality profession (Beecroft, 2001).

According to Crosby, “The only performance measurement is the cost of quality, which is the expense of nonconformance.” (Crosby, 1979). According to Crosby, quality is free. What costs money is failure to do things right the first time. Juran (1951) agrees in his definition of quality costs as “the sum of all costs that would disappear if there were no quality problems.” Juran and Crosby were also leaders in the movement to report quality information in dollar terms in order to attract the attention of top management.

The COQ system which developed has been formalized into four categories of costs (Campanella, 1990):

- **Prevention costs** are “the costs of all activities specifically designed to prevent poor quality in products and services” (p. 22).
- **Appraisal costs** are “the costs associated with measuring, evaluating, or auditing products or services to assure conformance to quality standards and performance requirements” (p. 23).
- **Internal failure costs** are “the costs resulting from products or services not conforming to requirements or customer/user needs (which) occur prior to delivery or shipment…to the customer” (p. 23).
- **External failure costs** are “the costs resulting from products or services not conforming to requirements or customer/user needs (which) occur after delivery or shipment of the product, and during or after furnishing of a service to the customer” (p. 23).

Confusion sometimes occurs about the difference between total COQ and the cost of poor quality. Drawing on Crosby and Juran, there is no difference. Prevention costs and part of appraisal costs can be viewed as an investment, or an input, while part of appraisal costs and all of internal and external failure costs can be viewed as the cost of poor quality, or an output (Fargher and Morse, 1998). However Crosby and Juran would argue that the investment in prevention and appraisal would be unnecessary if the system was designed properly to eliminate quality problems. Therefore all four categories of quality costs would be deemed to be costs of poor quality. This argument provides justification for tracking all quality costs rather than just failure costs.

One reason for tracking COQ is to translate the “language of things” that quality professionals use (e.g. defects, units) to the “language of dollars” that managers use (e.g. costs, financial performance). The use of dollars instead of defect rates also makes it easier to aggregate performance measures across departments or divisions and to compare to other dollar measures (Evans and Lindsay, 2002). Tracking COQ also makes it easier to use quality information in the budgeting process and cost control activities. Simply identifying the parts of the process that
generate quality costs provides the basis for beginning the process of identifying areas for improvement. Measuring and reporting these costs in a meaningful way makes it possible to track performance over time and to measure the effectiveness of improvement activities. One experimental study (Viger and Anandarajan, 1999) has shown that managers who have access to quality cost data make different decisions than managers who do not have quality cost data available. This provides some empirical justification for making the effort to present quality data in ways that managers find meaningful and understandable. When quality costs are not visible, managers are unable to use this quality information in their decision making processes.

A COQ system can enable organizations to calculate measures of the impact of their quality systems on business performance. Return on investment (ROI) can be calculated by comparing the costs spent on prevention and those appraisal activities considered to be investments (e.g. appraisal activities associated with process capability studies) to cost savings in internal and external failure and those appraisal activities considered to be costs (e.g. inspection of incoming materials, work in process, and finished goods). Return on quality (ROQ) is a relatively new concept which measures increases in revenues associated with increases in customer satisfaction against costs associated with the quality efforts to obtain those improvements (Rust, Zahoric, and Keiningham, 1995).

Another important use of COQ systems is to identify “cost drivers—those activities that cause the incurrence of costs.” (Morse and Roth, 1987). Like activity based costing (ABC), COQ systems are part of the move from cost accounting to cost management. Cost accounting emphasizes the determination of product costs for external reporting while cost management focuses on developing cost data for the primary purpose of managing costs.

A number of COQ systems are ineffective because they provide little more than a vague estimate of the amount of scrap produced in the short term (Chase, 1998). However, there are examples of extraordinary success with COQ systems. Xerox reported a savings of $53 million in the first year of its COQ program followed by savings of $77 million, $60 million, and $20 million in the next three years (Carr, 1995). Xerox credits several key factors as being responsible for the program’s success: (1) using COQ as a tool to help line managers better serve their customers rather than as a financial or accounting measure; (2) Clearly communicating that the COQ measures would not be used to judge individual performance or to eliminate jobs; (3) Measures were based on rough numbers, not exact calculations. (Carr, 1992).

It should be remembered that quality systems not COQ systems create improvement. But without some systematic approach to tracking COQ it is more difficult to identify potential areas for improvement and to track improvement results (See Figure 1). A COQ system did not generate the $53 million first year savings at Xerox (Carr, 1995) or the cumulative $1.5 billion savings at Dow Chemical (Dow, 1999). It was the quality systems in these companies that were responsible for these savings.

![Figure 1. COQ System as Translator or Overlay](image-url)
PREVIOUS RESEARCH

The importance of tracking quality costs is accepted within the quality and accounting disciplines (Chase, 1998; Wheldon & Ross, 1998, Viger & Anandarajan, 1999). Despite its acceptance, previous research has found that most business organizations have not instituted the systematic tracking of quality costs. Viger & Anandarajan (1999) found that only about half of the companies they studied calculated quality costs. Gupta and Campbell (1995) cite two surveys that found only 33 – 40% of companies tracked quality costs. Baatz (1992) found that only 5 of 22 (23%) of the 1991 Malcolm Baldrige National Quality Award finalists measure COQ.

Bottorff (1997) suggests that implementing “COQ programs is one of the most difficult and critical undertakings in the quality journey.” His experience suggests two primary reasons for COQ failures: (1) Relying on an individual rather than a team; and (2) The culture of the organization does not support teamwork. Citing Crosby and Juran he suggests that the effort pays off in savings of as much as 10% savings in COQ per year.

Pursglove and Dale (1996) suggest three primary reasons for not tracking COQ: (1) A lack of understanding of the concept and principles of QC among the management team; (2) Lack of information and data; (3) The profitable nature of the business making it hard to convince management of the need to track COQ. Wheldon and Ross (1998) echo Pursglove and Dale but add many firm’s tendency to compartmentalize quality under the quality manager who tends to lack accounting knowledge.

Munro (2003, p. 53) finds that “‘cost of poor quality,’ ‘quality cost’ or ‘return on quality’…(is a ) proven tool…that is still not widely used in…any business sectors.” He suggests that while it is given lip service, most accounting groups do not like to collect and report the numbers. The reason he suggests for COQ’s lack of use is “why bother if the U.S. government does not require such reporting.”

While interesting and informative, most of these studies are not based on a systematic collection of data. To better understand why COQ systems are so rare, it is necessary to obtain information from those organizations that have elected not to use them. This study addresses the following research question by surveying a sample of those organizations.

Research Question: Why do relatively few companies systematically track quality costs?

METHODOLOGY

The research reported in this paper is part of a larger project (Sower, Quarles, and Broussard, 2002) investigating COQ in business organizations. The population of interest is quality and accounting professionals working in manufacturing organizations based in the United States. The Quality Management Division (QMD) of the American Society for Quality (ASQ) agreed to co-sponsor the project by providing access to its membership list. The study participants were quality and cost accounting professionals randomly selected from the over 22,000 members of the QMD of the ASQ.

The larger project (Sower, et al., 2002) primarily addressed the organizations which employ a COQ system. This study focuses on those respondents whose organizations do not systematically track COQ.

Sample

Approximately 3200 randomly selected members of the Quality Management Division (QMD) of ASQ were contacted in three waves by mail and e-mail to request their participation in this project. Due to incorrect mailing and e-mail addresses 2507 actual contacts were made. The subjects were asked if they systematically tracked quality costs. Those who responded no were asked for the reasons why they do not track COQ. Those who responded yes were invited to participate in the larger study. 393 total usable responses were obtained for a 15.7% response rate which is typical for studies of this type (Mabert, et al., 2000, Dusharme, 2001). The respondents represent at least 29 states (13 respondents could not be identified by state) and at least 40 industries (3 respondents did not list industry type).

245 of the 393 usable responses stated that they do not track quality costs in a systematic way. Of these, 129 provided an explanation of why they do not track COQ. The remaining 148 respondents indicated that they did track quality costs and were sent a follow-up questionnaire by mail. Of the mail survey respondents, 14 organizations now reported that they do not track quality costs in the systematic way explained on the survey form making a total of 259 of the 393 participants (65.9%) who do not systematically track COQ.
One hundred and ninety six (196) respondents who did not track quality costs and for which we had an e-mail address were contacted and asked to respond to an open-ended question as to why their organization did not track such costs. One hundred and twenty nine individual responses (65.8% response rate) were obtained that cited reasons why no tracking occurred. In some cases respondents identified a single reason while in other cases they indicated a number of such reasons. The specific reasons were examined to determine if they exhibited some type of commonality or pattern as to the nature of the nature of “why” the costs of quality were not tracked.

- The most frequent reason given for not tracking cost of quality (32 responses) was a lack of management support or absence of management interest in tracking such costs. Specific explanations concerning this lack of support included lack of concern for how much and in what way quality does pay, management philosophy and company culture not supportive of quality costing, quality costing being “paperwork” that management does not perceive to have enough value, and management belief that there is no value in any efforts to fully measure costs of quality.
- The second most common response (27 responses) indicated that company economic conditions or status contributed to the lack of cost of quality tracking. The most often cited conditions were the company being a start-up company, a growing company with business practice behind the times, a lean company with little overhead, company is too small, and downsizing.
- Lack of knowledge of “how” to track the cost of quality and of the benefits of a COQ program was a common reason cited for not tracking (26 responses). Explanations included not knowing what elements to include in the cost of quality, lack of knowledge of quality principles from management on down, and lack of experienced manpower to accomplish the task.
- Another common reason given (24 responses) was the lack of adequate accounting and computer systems necessary to track cost of quality. Explanations in this regard dealt with a lack of tools to collect, organize, filter, and report quality costs, no accounting mechanism provided in financial reporting system to track quality costs, and the accounting system and resources being not adequate to perform standard COQ calculations common in the industry.
- Eighteen (18) respondents indicated that their organizations did not see the benefit of COQ or that they needed to focus on areas which they perceive to be more important.

Although this analysis of the responses does not provide measures of statistical significance, the reasons cited generally agree with previous suggestions and findings from both the quality and the accounting literature (Pursglove and Dale, 1996; Wheldon and Ross, 1998; Johnson, 1995).

DEALING WITH THE OBSTACLES

Lack of Management Interest/Support

Pursglove and Dale (1996) found that a lack of understanding of the concept and principles of quality costing among the management team and an acute lack of information and data were among the primary reasons for not tracking the cost of quality. Wheldon and Ross (1998) found that quality reporting was seen to be the realm of the quality manager, who focuses on non-financial measures of quality, and a view of quality managers as generally lacking accounting knowledge were obstacles to implementation of COQ tracking systems. These are some of the factors comprising resistance to change that make selling management on a COQ system an uphill battle.

Lewin’s (1951) force field theory of change shows that an organization will remain in its current state as long as the forces for change are balanced by the forces against change. As shown in position A in Figure 2, no change takes place in an organization that is in equilibrium—where the forces for change are perfectly balanced by resistance to change. Change occurs when the forces of change increase, the resistance to change decreases, or both (position B). With this theory in mind, why would top management lack interest in implementing a system of tracking COQ? More importantly, what would cause them to become interested in and support implementation of a COQ system?
Lewin (1951) proposed a three step change process consisting of unfreezing the current behavior, making the change, then refreezing the new behavior. This is illustrated in Figure 3. It is during the unfreezing step that the greatest resistance to change is encountered. It is a natural human behavior to become comfortable with what you know. Creating a motivation to abandon the comfortable behaviors is always a challenge.

A key to dealing with this resistance to change is to present the arguments for tracking COQ in a language that management understands—dollars. Fortunately, quality professionals do not have to begin at ground zero. Many companies have already implemented activity based costing (ABC) systems which focus attention on where costs are truly incurred. Many of the arguments for ABC systems apply to COQ systems. By removing quality costs from general overhead and separating them into appropriate categories we can better determine where the quality dollars are being spent. This provides information for better decision making. An example of this would be the collection of standard scrap, scrap variances, rework labor, unscheduled downtime due to quality problems, indirect time reported for direct labor employees due to quality problems into internal failure cost. For the first time management might have real insight into the impact of poor quality on operational efficiency and profitability. This could lead to better decisions about how to improve operations. A collaboration with the plant cost accountant could develop an initial estimate of internal failure cost which could be a compelling part of a presentation on COQ. In the words of Johnson and Kaplan (1987, p. 1) “Today’s management accounting information system…is too late, too aggregated, and too distorted to be relevant for managers’ planning and control decisions.” Like an ABC system (Cokins, 1996, p. vii) a COQ system is “not a replacement for the traditional general ledger accounting. Rather it is a translator or overlay…that lies between the cost accumulators…and the end users who apply cost data in decision making.”

Cotton (1995) suggests that management “is likely to be surprised by the magnitude of quality costs, so an effective way to gain its attention may be to make some preliminary estimates of quality costs” in the
four categories. He suggests that a team effort involving representatives from management accounting and quality is necessary to gain the support of management.

One argument that would be of questionable value in convincing management of the value of a COQ system is that “all our competitors are doing it.” Fiol & O’Conner (2003) argue that better decisions result from “enhanced decision structures (i.e. scanning and information-processing mechanisms that provide access to information and support the processing of that information).” They suggest that these enhanced decision structures will be “resisted if managers are mindlessly following a bandwagon.”

**Company Economic Conditions or Status**

Pursglove and Dale (1996) suggest that the profitable nature of the business can make it hard to convince management of the need to track COQ. As Figure 4 shows, both ends of the economic condition continuum can create conditions favorable or unfavorable to the implementation of a COQ system. When the company is operating well and profits are good, it is easy to become complacent and resist change. “If it ain’t broke, don’t fix it” is often heard during good times. Quality professionals realize the fallacy of this argument. If an organization does not strive to continually improve its operations, it will be overtaken by others in this increasingly competitive world.

When the company is in trouble, two things can happen—one potentially favorable; the other potentially unfavorable—which can affect the decision to track COQ. On the favorable side, organizations usually become more open to change when they are in crisis. What they have been doing is not working well, so what can be done differently that will turn things around becomes the question of the day. On the unfavorable side, organizations often make “knee-jerk” decisions in times of crisis which only exacerbate an already difficult situation. Unabated, this can lead to the death spiral of an organization.

<table>
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<tr>
<th>Favorable Aspects:</th>
<th>Unfavorable Aspects:</th>
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<tr>
<td>&gt; Resource availability</td>
<td>&gt; “Knee jerk” actions</td>
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<tr>
<td>&gt; Emphasis on continuous improvement</td>
<td>&gt; Scarcity of resources</td>
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**Figure 4. Economic Condition Continuum**

Both ends of the continuum can be addressed in similar ways. Focusing arguments for a COQ system on the benefits to the organization—better decisions resulting from better identification of costs, and ultimately lower costs—can be effective in organizations doing well and also in organizations in crisis.

**Lack of Knowledge**

A “lack of knowledge” explanation as the reason for not tracking cost of quality may represent possibly two diverse concerns. One concern, addressing what may be regarded as an issue of “principle,” is suggested from the comment regarding a “lack of knowledge of quality principles from management on down.” This directly suggests that quality principles may not be as widely or as thoroughly understood by the general business community as might be thought. Quality professionals, like other professionals, operate in a specialized field with elements, concepts, and language of its own. Such professionals sometimes do not realize that those who are not professionals in that field may not readily recognize, appreciate, understand, or converse in terms of those factors.
The logical premise is that before the costs of quality can be identified or tracked, the elements and principles of quality must be understood by those who would both order and benefit from that tracking. If there is no widespread understanding of quality principles within a firm, then there will be no support for tracking the costs of quality or any use of the information that would be provided by such tracking. The simple fact is that something must be understood before there can even be a discussion of “how to” track that thing. A lack of knowledge of quality principles may be correlated with the most frequent explanation given for not tracking the costs of quality (i.e., the lack of management support or absence of management interest in tracking such costs). Whether ignorance leads to lack of support or vice versa is a moot point. The important factor is, however, that the end result is an absence of knowledge as to quality principles.

The second concern suggested by the “lack of knowledge” explanation is inferred from the comments regarding (a) ignorance of what items to include in the cost of quality and (b) the lack of experience necessary to accomplish the task. These comments relate more to the processes involved in tracking the cost of quality as opposed to the lack knowledge as to the principles involved. The issue at hand, given these comments, is whether a system can be designed and its elements identified to allow the tracking of the cost of quality. An interesting additional inference from these comments is that there is an underlying assumption that quality costs are being incurred even if the accounting systems that track and report costs are not configured to identify those costs by a particular “nature” such as quality.

If a firm is producing quality products or services, that firm is carrying on quality driven activities and incurring their associated costs. Quality products mean that quality tasks and activities are present and, given that such events involve expenses and costs tracked by even the most basic accounting systems, the costs of the quality-related activities are being captured. The problem is, nonetheless, that the costs of performing quality related activities are not clearly and specifically identified either in principle or in the cost reporting process in the firm’s accounting system.

In principle, individuals who are performing quality driven activities may or may not be aware that quality is the driving factor behind those activities. Many readily identified activities such as inspections and rework may be generally considered to be quality driven, but many other activities may not be recognized as such. Even if these tasks and activities are recognized in principle, their cumulative effect across departments, divisions, cost centers, products, product lines, distribution channels, etc. may not be recorded and reported in the accounting cost accumulation process. In omnipresent general ledger, external-reporting-directed accounting systems, the costs of quality activities are not specifically or clearly identified as driven by quality related activities. Accounting systems developed to produce external reports track costs by “accounts” such as wages, salaries, material usage, scrap, depreciation, etc. but do not delineate such costs as to their nature or the factors that are driving their incurrence. Even in an extensive management control configured cost reporting system, quality costs may not be specifically or clearly identified. These systems may provide data regarding variances from standards or other items of management concern, but unless such systems are configured to specifically address the costs of quality and to accumulate that cost by different cost objects, the costs of quality that are indeed being incurred are not visible to decision makers.

The explanations provided by the quality professionals who participated in this study regarding a lack of knowledge of “how to” track the cost of quality clearly suggest shortcomings in both principle (lack of knowledge of quality principles) and process (not knowing what elements to include and lack of experienced manpower to do so). Expanding the base of knowledge of quality principles is the necessary task of quality professionals in organizations. A major factor that may be used to motivate management and others “on down” to develop this understanding is to address the benefits of quality activities in terms of dollars. As suggested previously in this paper, quality professionals may benefit by using the “language of dollars” – a language understood by management - to address and expand the base of knowledge regarding issues such as the principles of quality.

The problem of determining what items should be included in the costs of quality and overcoming the lack of experienced manpower to do so (the process issue) may be addressed by bringing together (1) individuals who have knowledge of just what are the costs of quality that can generally be incurred in a given process and (2) individuals who know what activities are being performed in the processes of the firm, regardless of the nature of those activities. It then becomes a matter of the quality-knowledgeable individuals identifying which of the activities being performed (as identified by the activity-knowledgeable individuals). In simplified terms, the quality professionals must ask operating personnel what they “do” in their jobs and identify which of those things are quality-driven. Within the operating units of an organization, there is no absence of people who know what activities are being carried out in unit
operations. Bringing those people together with quality professionals who can help identify activities and
tasks that are quality-driven permits identification of what activities should be included in the cost of
quality. This may address the issues related to the lack of understand of the principles of quality at all
levels in the organization. This activity will also serve as the basis for addressing the process issues
involved with designing and implementing accounting systems that can identify, track, and report the costs
of quality in the operations of the firm. The concepts of Activity Based Costing and the use of software
such as enterprise resource planning (ERP)systems (as discussed in the subsequent paragraphs) provide the
conceptual framework and the detailed systems to use to allow a firm to address the process issues related
to tracking and reporting the cost of quality in its operations.

Lack of Adequate Accounting and Computer Systems

A number of respondents in this study cite the lack of adequate accounting and computer systems as
the reason that their firms do not track the cost of quality. This is a readily understandable condition. As
indicated by Viger and Anandarajan (1999, p. 1) “quality costs are absorbed into other overhead and
camouflaged so effectively that managers working in an environment with traditional accounting systems
hardly know they exist.”

The only “required” accounting system in a business organization is the system designed to accomplish
external financial reporting (and to a lesser extent tax reporting). Such a system, driven by generally
accepted accounting principles (GAAP), bases its categorizations of transactions in terms of how they
affect external financial reports. Costs under such systems are identified, recorded, and reported as to how
they impact financial reporting accounts rather than how they are related to operational factors and events.
In addition, the “books must balance” and everything must be “in its place” under this system. In
manufacturing firms, the primary concern of this system is to ensure that all factory costs are “absorbed”
into product cost for inventory and cost of good valuation purposes (primarily at year-end). While this
simple system can capably track materials and direct labor costs to products, it is generally inadequate in
both relating overhead to products and “not relating” overhead to products ( i.e., there are costs that are
forced into product costs for GAAP purposes that are better served to be stand-alone costs for management
purposes). In defense of such systems, however, they are designed by financial accountants with the
objective of meeting external reporting requirements dictated by financial and tax interests. These systems,
therefore, do what they are designed to do. However, in identifying matters of concern for operational and
internal managerial decision making (such as quality costs), this type of financial accounting reporting
system is, as indicated by the respondents, lacking.

In order to develop accounting systems capable of reporting operational concerns, such as the cost of
quality, “the ultimate solution lies in the development of systems of cost analysis which shall be separate
from the formal books of account, though based on the same data.” (Clark, 1923, p. 68) As interesting as
this eighty-year-old idea is, however, any such “separate” cost analysis system must have an underlying
framework or conceptual basis in order to be internally consistent. In the case of a system designed for
external financial reporting purposes, there is primarily one major conceptual objective – the matching of
revenues and expenses – as its basis. Apparently this basis does not serve well for analysis of costs for
internal reporting and decision making. Modern management has recognized that internal customers exist
that have differing requirements than do external customers of the firm. Therefore, it is reasonable to
assume that internal cost accounting information “customers” have differing requirements than do the
external users of accounting information. This dictates that a framework other than one designed under
GAAP rules and expectations is necessary for internal cost analysis and management.

Activity Based Costing (ABC) is an alternative to a GAAP driven accounting framework. ABC
addresses the issue of the relationships between the resources being used or consumed by activities being
carried out by operations and the linkages between those activities and the products or services being
created or produced. The ABC approach to cost analysis has been described as a method of cost analysis that

- measures the cost and performance of process-related activities and cost objects,
- assigns cost to activities based on their use of resources and assigns cost to cost objects, such
  as products or customers, based on their use of activities, and
- recognizes the causal relationships of cost drivers to activities. (Cokins, Stratton, and Helbing,
  1992)
The primary element of concern under this approach is, therefore, the activities rather than the accounts (i.e., revenues and expenses) and their related cost drivers (i.e., causes). The concepts of ABC provide for recognition that some factory-related costs (forcibly allocated to units of product under GAAP) are separate and apart from unit costs and relate more to facility-sustaining or product-line sustaining with little or no direct relationship to the cost of a particular unit of product. Under the ABC framework, management can make the determination if quality costs are to be tracked at unit, facility, product line, customer, or other levels as necessary for decision making.

Even if management determines that quality costs are to be tracked at the unit of product level, organizational level, or any other level that is deemed desirable, if traditional GAAP based systems are used for that tracking, the result may be a distortion of the quality costs tied to a particular object. Under GAAP-based systems, quality related costs are generally treated as elements of factory overhead or burden. In these systems overhead is assigned to organizational elements and/or products generally through non-causal allocations based on sometimes arbitrary bases. For example, the costs incurred in inspection of a raw material is an element of factory overhead that may be allocated to products as part of an overhead allocation rate such as the quantity of raw materials in each product. Such an allocation fails to recognize the differences that may exist in the complexities of the products and the processes used to create them. Additional inspections or inspections of a different nature may be required during the production process of one of the products while no further inspections are necessary for the other. If inspection costs are being charged to each product based on the amount of raw material in each, that allocation may result in the misstatement of inspection costs for each product. Given that most, if not all, quality costs are considered as elements of overhead in traditional accounting systems, the result of these arbitrary allocations may produce highly distorted cumulative product costs. The use of an ABC cost analysis process recognizes the differences in complexities among products and processes and assigns cost based on the cost drivers (i.e., causes) that are created due to those complexities.

Quality activities can be viewed as one of the process-related activities that, using the ABC framework, can be (a) identified and measured, (b) related to resource consumption, and (c) assigned to cost objects such as processes, products, or customers. This concept is embodied in as basic an element of quality cost as the COQ system that, for example, defines prevention costs as “the costs of all activities specifically designed to prevent poor quality in products and services” [emphasis added]. (Campanella, 1990, p. 22) If one wishes to measure the costs of the activities designed to prevent poor quality in products and services, then one must have a framework that relates resource consumption (the generation of costs) to those quality driven activities based on causal relationships. ABC provides a framework that can be used to establish those linkages and relationships.

The COQ system defines appraisal costs are “the costs associated with measuring, evaluating, or auditing products or services to assure conformance to quality standards and performance requirements” (Campanella, 1990, p. 23). Measuring, evaluating, and auditing are activities that consume resources based on drivers such as frequency of occurrence, physical attributes of the product, nature and complexity of the process, etc. The costs involved in these three events are the costs of the resources (people, equipment, supplies, etc.) consumed in performance of the activity for a particular product or process. Because the degrees and extents of measuring, evaluating, and auditing differ for different products and processes, their costs will differ from product to product or process to process based on the particular situation. Recognition of these types of relationships and concepts are a critical element of the ABC framework.

The ABC framework can be utilized not only to measure costs but, as suggested by Cokins, et al. (1992), facilitate root-cause analysis or process-value analysis. These authors also suggest that ABC (and its related concept of Activity Based Management) can provide support for TQM. As they indicate, cost-of-quality metrics in TQM are potentially controversial given that users may uncontrollably reclassify costs, including or excluding different cost types at each measuring point. However, ABC introduces a closed system that substantiates final cost-of-quality reports with detailed listing of activities. The identification of the various resource, activity, and cost object elements of ABC allow, as these authors suggest, managers to examine their cost by quality category, activity, department, cycle, and/or cost object.

An additional concept related to the ABC framework may be applicable to the issues involved in the identification and tracking of the cost of quality through accounting systems. This ABC-related concept is also applicable to the suggestion by the respondents to this study regarding difficulties in determining just what elements to include in the costs of quality to be identified and tracked. This element of the ABC framework is the recognition or the fallacy of precision that suggests an accuracy that is absent. Traditional
Enterprise resource planning (ERP) systems are large, complex, real-time computer systems that integrate systems that involve far greater capabilities than just relating data to more than one view or consideration. Although these systems sometimes involve variables that are carried to six or eight decimal places as indications of their power and preciseness. However, in the development and implementation of ABC cost analysis systems, these traditional analyses have been found many times to be highly inaccurate. The ABC framework embraces the concept that it is better to be approximately correct rather than precisely irrelevant. The ABC framework recognizes that “imprecise inputs do not automatically mean inaccurate outputs, and precision is not always synonymous with accuracy” (Cokins, 1999, p. 4). This is consistent with the findings at Xerox identified previously in this paper (Chase, 1998) that measures based on rough numbers, rather than exact calculations, were credited, in part, for the success of the Xerox COQ program. If useable results involve orders of magnitude rather than six decimal place pseudo-accuracy, then the purpose is served. Order of magnitude information may be considered superior to precise data that is not relevant to the particular decisions that are of concern. The ABC approach embraces the concept that the best approach is to address the large issues rather than lose time and expend resources on minute, irrelevant details. A recognized danger in implementing ABC systems is the effect of an excessive desire for precision that results in a model that is too massive, overdesigned, and exceedingly invasive on employees’ time and emotions (Cokins, 1999). This concept of approximate accuracy in lieu of precise irrelevance can also be applied to the issue of which detailed elements should be identified and tracked as the costs of quality.

As suggested in the ABC framework, in designing quality cost analysis systems, quality professionals should be aware of the potential problems involved in the pursuit of preciseness and the potential overdesign that such a pursuit may generate. Extended searches for the definitive list of what items are to be considered in determining the cost of quality is a search with no end. Time spent trying to determine precisely whether a given cost should be considered a prevention cost or an appraisal cost (when the solution is not readily obvious) may be time wasted if the solution would produce no better information for decision making. The objective should be to identify to the extent possible those costs that are quality driven so that the appropriate management action can be taken to maximize their benefit rather than precisely determine a particular category or classification. The act of pursuing overly precise determinations may result in missing major material considerations that might be of far greater importance.

The fact that the respondents in this study linked the inadequacy of both accounting systems and computer systems is not surprising. Before the advent of computerized accounting systems, the necessity of external financial reporting and the degree of human effort required to accomplish that task deterred extended cost analyses based on non-financial accounting concepts. However, as suggested by Cokins et al. (1992) the introduction of the computer and the development of relational databases and fourth generation languages allow the rapid reorganization of data necessary to allow different types of analyses of the same accounting data. Through the use of the computer, traditional accounting systems have become highly successful in capturing, recording, and reporting financial accounting information. However, if the computerized accounting system involved has only the capacity for financial reporting, the only non-financial cost analysis possible would be through human effort in restructuring the financial data. Relational database systems, however, harness the power of the computer to establish relationships between financial transaction data and cost analysis requirements. For example, the salary of a quality inspector is generally charged to a cost center and then allocated to products as a part of overhead for external reporting. However, using relational database systems, that individual’s salary may be tied or “related” to a number of differing cost collection elements such as to a particular production order, product line, geographical region, or customer. Other quality-related overhead costs in other accounts and cost centers can be “related” in a similar manner to these cost objects. Reports can then be generated that indicate the costs of quality inspections and other quality related costs by production order, product line, geographical area, and/or particular customers. This would allow identification of differing levels of quality related costs not simply by product but also by product, customer, or any desired object.

Extensions and expansions of relational database systems have produced more complex computer systems that involve far greater capabilities that just relating data to more than one view or consideration. Enterprise resource planning (ERP) systems are large, complex, real-time computer systems that integrate all of the computer systems in an enterprise together through a database that is shared by all application programs. For example, customer data in a sales module can be related to a production planning module to allow customization of the production process for the particular customer’s needs or specifications. These two modules interact with the accounting module to allow specific, real-time product costing for a given order from that particular customer. ERP systems allow management to establish tracking processes for all
data in the organization and relate that data to any specified object or activity. For example, if the objectives were to accumulate, track, and report data regarding internal-failures, then such systems can be configured to track, in real time, that data in total, by plant, by product, by customer, by geographical area, by product line, or by any other categorization that management can define.

ERP systems include SAP R/3, PeopleSoft, Oracle, Baan, J. D. Edwards, and other commercial systems. All of these systems have as their objective the integration of enterprise wide data into a shared database that allows linking of data to data to create information for different needs and uses. In some cases, these systems have developed modules that specifically track the costs of quality. For example, SAP R/3 contains a Quality Management module that tracks appraisal costs and nonconformity costs (the costs of internal or external nonconformities associated with a product or service) while prevention costs are tracked through other modules in the system such as production planning, materials management, human resources, and controlling. In other cases these systems have implemented “bridges” that interlink ERP systems such as the SAP R/3 to specialized analysis systems such as Oros® for ABC cost analysis.

Do Not See the Benefit of COQ

Organizations which do not see the benefit of a COQ system may be postulated to fall into the following general categories: those which do not understand COQ and those which have what they consider to be good cost systems in place and which do or do not understand COQ. For those organizations which do not understand COQ, there are many opportunities for self-education through the ASQ Quality Cost Committee.

Organizations which have a cost system in place that is considered to be adequate may be missing an opportunity to benefit from a COQ system. Six-Sigma companies generally have a highly structured project cost system in place to assess the gains from Black Belt projects. This system, however, provides little information about the opportunities available for improvement activities which a COQ system provides. There is an opportunity for a synergistic combination of a COQ system and a Six-Sigma project cost system. If such organizations lack an understanding of COQ, then education is the first step to creating this synergistic combination. For organizations which understand COQ but are not using it, then a reexamination of their performance system is in order.

According to research by Lingle and Schiemann (1996), the performance of organizations which use balanced performance systems for management exceeds those which use less balanced or complete measures. A performance measurement has a number of constituent parts. The system must “enable informed decisions to be made and actions to be taken because it quantifies the efficiency and effectiveness of past actions through acquisition…interpretation, and dissemination of appropriate data” (Kennerley & Neely, 2002, p. 145). COQ is a methodology which focuses on the measurement of a specific performance issue. Properly integrated into a comprehensive and multi-dimensional measurement system, COQ can enable the organization to make better decisions and track the results of those decisions (Neely & Adams, 2001).

CONCLUSION

This study found that only about one third of organizations in the sample systematically track quality costs. The principle reasons for not tracking COQ were identified and suggestions made about how to address. Key aspects of these suggestions include the need for education in quality principles throughout the organization, knowledge of change management processes by quality professionals, the need to translate the language of quality into the language of business, and recognition of the power of modern information systems—particularly ERP and ABC systems—in facilitating tracking of COQ. Perhaps most important is the recognition that better results result when better information is available. Even approximately accurate COQ data can facilitate better decisions, so the fact that some quality costs (e.g. external failure costs) can only be estimated should not deter an organization from implementing a COQ system.

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