

## **Cost of Quality, Quality Planning and The Bottom Line**

**By: G. Dennis Beecroft**

**G. Dennis Beecroft Inc.  
254 Brookview Crt.  
Ancaster, ON L9G 1J8 Canada**

**Tel. (905) 304-3313**

**Fax. (905) 304-4075**

**E-Mail. [dennis@g-dennis-beecroft.ca](mailto:dennis@g-dennis-beecroft.ca)**

**Web. <http://www.g-dennis-beecroft.ca>**

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### **Introduction:**

As organizations strive to increase their bottom line performance in this highly competitive environment they often forget to integrate two important planning activities, strategic and quality planning. This is likely due to a lack of understanding of the cause and effect relationship between strategy, quality, productivity, profitability and competitiveness. To maximize the profits of an organization it is necessary to align the objectives and priorities of the business and the quality improvement process.

### **Understanding Cause and Effect Relationship:**

Quality improvement projects should be selected that link to the strategic business objectives and goals. If the strategy is to increase market share, projects selected should focus on those areas that would have the greatest impact on future buying decisions of present customers and future customers. However, if the business strategy is to increase profit in a particular product, the projects selected should focus on reducing quality costs by reducing errors, eliminating non-value-added activities and waste. Another challenge to understanding this relationship is the definition of quality. Quality is meeting customer requirements, error free, at the lowest possible cost. There is still a perception that quality can be too good. Upon investigation, this is usually a case of exceeding the requirements, therefore a waste or "poor quality".

A byproduct of quality improvement is the improvement in productivity. By eliminating errors, non-value-added activities and waste, resource capacity becomes available. However this presents another challenge to management. If these resources are not deployed onto something else then there is no impact to the bottom line. Management has learned through bitter experience that if the resources are laid off or let go then the improvement process is destroyed. Increased quality also reduces the production cycle time. It also decreases the use of machinery and equipment due to less rework. This results in a reduction in asset investment. Less material are now required due to less scrap, rework and waste.

Improving quality and productivity increases the profitability of the organization. Margins are increased due to these lower costs. Increased sales result due to higher conformance to quality, better on time delivery and the opportunity to reduce selling price. White-collar operating costs are also reduced due to elimination of poor quality, waste and non-value added activities.

Competitiveness of the organization is increased. Customer satisfaction increases due to improvement conformance to requirements, better on time delivery and lower costs. Sales and market share will increase due to this improvement in customer satisfaction and increased perceived value. The organization will also be more competitive due to increased profitability.

## **Historical Approach:**

Historically organizations tend to treat strategic planning and quality improvement planning as two separate and isolated activities. Strategic planning is typically conducted on a regular basis, usually annually, using a formal structured approach. Quality improvement planning, on the other hand, tends to be very ad hoc. Most organizations do not schedule quality improvement planning at regular intervals. When they finish their current improvement projects they then identify new ones. In many cases improvement projects are added to the regular work of the individuals involved with the projects and tend to get worked on only when they have time. This approach results in projects not being completed in a timely fashion, if they are in fact ever completed.

While strategic planning is conducted on a regular and formal basis, many organizations do not communicate these plans throughout due to their confidential nature. However, the organization is expected to achieve these plans, even though they have not been communicated.

Improvement planning should likely be conducted as part of the strategic and business planning process. Improvement projects should focus on the needs of current and future customers and support the strategic and business goals of the organization. These improvement projects should be scheduled and resourced such that they can be completed before the next planning period.

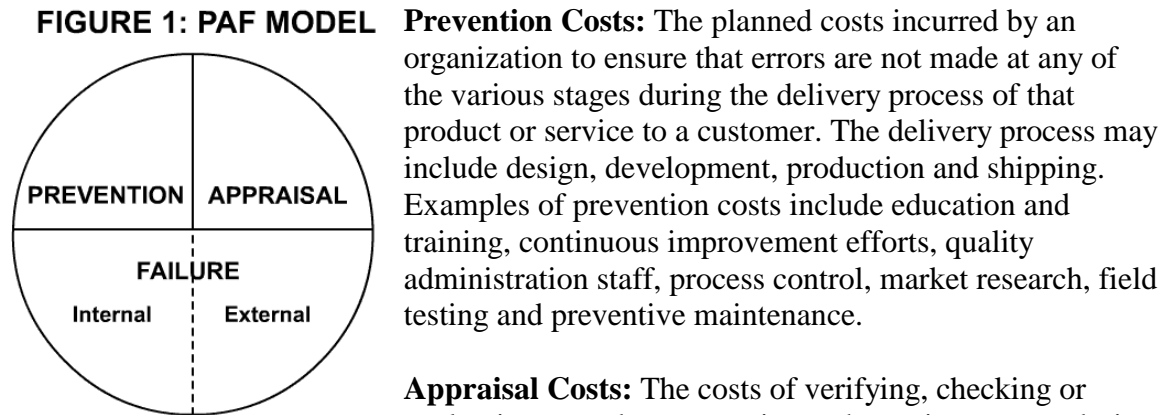
## **Cost of Quality:**

The concept of Cost of Quality (COQ) has been around for many years. Dr. Joseph M. Juran in 1951 in his Quality Control Handbook included a section on COQ. The Quality Cost Committee under the Quality Management Division was established by the American Society for Quality (ASQ) in 1961. However it was Philip B. Crosby who popularized the use of COQ because of his book Quality is Free in 1979. Several current quality system standards, ISO 9000, QS-9000, AS-9000, reference the use of COQ for quality improvement.

The concept of Cost of Quality is confusing. What is being referenced are the costs due to the lack of quality or costs to ensure quality is produced. Adding to this confusion is the fact that some authors refer to these costs as “Cost of Poor Quality”. Sometimes poor quality costs refer only to the “failure” costs. Crosby refers to the COQ costs as the “price of conformance” – the prevention and appraisal costs and the “price of nonconformance” – the failure costs.

Cost of Quality (COQ) is the sum of the costs incurred by a company in preventing poor quality, the costs incurred to ensure and evaluate that the quality requirements are being met, and any other costs incurred as a result of poor quality being produced. Poor quality is defined as non-value added activities, waste, errors or failure to meet customer needs

and requirements. These COQ costs can be broken down into the three categories of prevention, appraisal and failure costs. The COQ model is often referred to as the PAF model after these three categories. See figure 1.



**Prevention Costs:** The planned costs incurred by an organization to ensure that errors are not made at any of the various stages during the delivery process of that product or service to a customer. The delivery process may include design, development, production and shipping. Examples of prevention costs include education and training, continuous improvement efforts, quality administration staff, process control, market research, field testing and preventive maintenance.

**Appraisal Costs:** The costs of verifying, checking or evaluating a product or service at the various stages during the delivery process of that product or service to the customer. Examples of appraisal costs include receiving or incoming inspection, internal product audit, inspection activities, inventory counts, quality administration salaries, supplier evaluation and audit reports.

**Failure Costs:** The costs incurred by a company because the product or service did not meet the requirements and the product had to be fixed or replaced or the service had to be repeated. These failure costs can be further subdivided into two groups – internal or external failures.

Internal failures include all the costs resulting from the failures that are found before the product or service reaches the customer. Examples include scrap, rework, extra inventory, repair stations, re-design, salvage, corrective action reports and overtime due to nonconforming product or service.

External failures are all the costs incurred by the company resulting when the customer finds the failure. These external failure costs do not include any of the customer's personal costs. Examples of these costs include warranty, customer complaint administration, replacement product, recalls, shipping costs, analysis of warranty data, customer follow-up and field service departments.

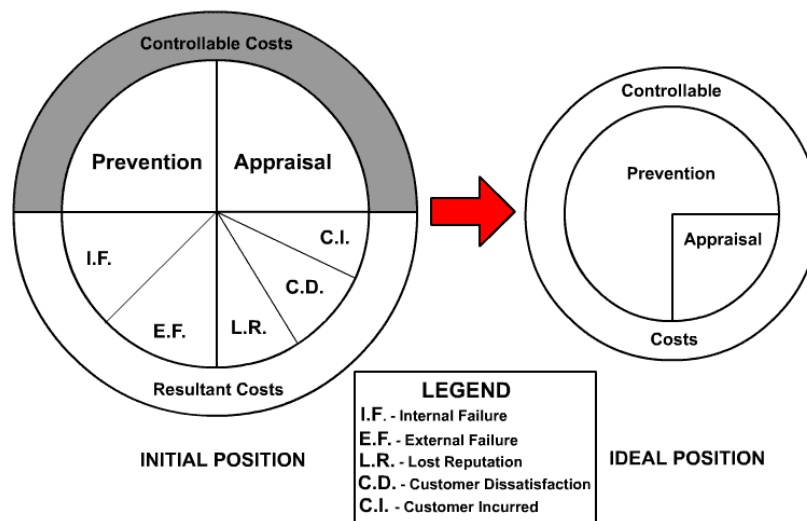
Many of the COQ costs are hidden and very difficult to identify by formal COQ measurement systems. Many of these costs, if identified, would be considered as the cost of doing business. Three major groups of hidden costs that are not considered in most COQ systems include customer incurred costs, lost reputation costs and customer dissatisfaction costs. While these costs are not captured by normal COQ systems they are most important. Future purchasing decisions by both current and future customers are very dependent on these costs. If external failures are eliminated all of these costs are also eliminated. This puts a higher priority on elimination of the external failure costs.

## Improvement Strategy Using COQ Data:

COQ data is useful as a measurement tool. This data can be used very effectively to identify and prioritize improvement opportunities and then, once a change is made, track the impact of the change. The strategy for using COQ data for improvement is to attack the failure costs and drive them to zero. Implementing this strategy result in problem solving and improving or changing the processes that produce the product or service. The money spent to investigate and correct the problems that result in the failure costs are prevention dollars. By capturing these dollars the organization can determine the bottom line benefit of eliminating the failure cost.

Appraisal costs activities should be minimized, as they are non-valued added. They are defined as non-value added as they do not change the quality of the product or service being evaluated. The more inspections or verifications conducted the less likely poor quality will be shipped to the customer, however these activities do not prevent the poor quality from being produced. By spending more money on prevention activities, appraisal activities can be reduced and this should also lead to lower failure costs. A Cost of Quality Model is shown in Figure 2.

**FIGURE 2: COST OF QUALITY MODEL**



The initial position is shown on the left and the ideal position is shown on the right. The initial COQ model consists of both controllable costs – prevention and appraisal and resultant costs – internal and external failure, customer incurred, customer dissatisfaction and lost reputation costs. An ideal model has zero failure costs. By eliminating the failure costs the customer incurred, customer dissatisfaction and lost reputation costs would also be zero. All the costs would now be controllable – prevention and appraisal with prevention being larger than appraisal. The ratio of prevention to appraisal would be very dependent on the type of business involved.

## **Using COQ to Impact Bottom Line:**

Not all failures have the same financial impact on an organization. As stated earlier the external failures have a higher priority as they cause additional costs to your customers, which will impact their future buying decisions. Potential future customers will also be impacted because customers tell other companies about their problems and some of the companies they tell will not buy as a result of that problem. By determining a standard or average cost for each type of failure, it is possible to select and prioritize failures to best support the strategic business goals. The first step to establishing a standard cost is to list all the activities necessary as a result of the failure such as getting the defective product back from the customer, producing a replacement product and then getting it to the customer. There are many other activities required however they are too numerous to list but should be part of the cost calculation. Once all activities have been identified a cost of each activity is added and all the costs are then totaled. This cost multiplied by the frequency of the particular failure equals the total annual cost.

In conclusion, the projects selected for improvement should link to the broader business goals. The business goals might be lower costs, improved profitability or increased market share. The external failures that have the biggest impact on the business goals should be selected for improvement. Problem solving activities must be completed to determine the root causes of the failure. A solution must then be selected and implemented. Verification of the bottom line impact can be determined by COQ data collection.

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October 20, 2000

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