



Measuring the cost of quality in a hotel restaurant operation

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Abstract

Purpose – The objective of this research is to apply the cost of quality (COQ) concepts in a hotel restaurant environment using the PAF (prevention, appraisal, and failure costs) model. Then use the percentage of sales approach to evaluate the significance of the COQ measures in the PAF model.

Design/methodology/approach – This research involved reviewing available literature on the COQ framework. Then through the process of interviews and secondary data collection, an analysis of the COQ measures in the PAF model was accomplished.

Findings – While researchers suggested that the COQ should be 2 to 4 percent of sales, the actual findings were 12 to 16 percent over a two-year period. These findings help the restaurant quality management team to reevaluate the quality of food and services, and provide justification for more investment in prevention activities.

Practical implications – The practical implication from this study was that an investment in prevention activities in the PAF model for the restaurant did lead to reduction in failure costs (internal and external) and appraisal costs.

Originality/value – This study demonstrates that the COQ measures used in the PAF model can improve the quality of food and services provided to the restaurant customers, and therefore, result in improvement in overall profitability.

Keywords Hotels, Restaurants, Quality costs, Prevention costs, Internal failure costs, Customer satisfaction

Paper type Conceptual paper

Introduction

The cost of quality (COQ) can be explained in terms of the combination of conformance and non-conformance costs. The costs of conformance are the prices paid for prevention and appraisal of poor quality activities, while the costs of non-conformance are the costs of poor quality caused from products and services due to internal or external failure activities (Schiffauerova and Thomson, 2006). In other words, the COQ is the total of all resources spent by an organization to ensure that the quality standards established are consistently achieve or exceed standards (Bamford and Land, 2006).

The COQ model that was used in this study was the prevention, appraisal, and failure (PAF) model. In this model failure represent internal and external failure. The PAF model was initially developed by Feigenbaum (1956) and modified by Crosby (1979). Therefore,



the PAF model is also called the Crosby model. The PAF model was selected because prior research on COQ in the hospitality industry found this model to be very effective in measuring the COQ (Bohan and Horney, 1991; Weisinger *et al.*, 2006).

Hotel operations management advocated that the quality of service is essential in creating customer value and achieving competitive advantage (Bohan and Horney, 1991). The desire to improve the quality of service must be taken into account with the corresponding COQ associated with continuous improvements necessary for customer satisfaction (Kandampully *et al.*, 2001). This can be accomplished by identifying the costs that impact the value of service quality. For hotel managers measuring and reporting the COQ is imperative (Bohan and Horney, 1991; Yavas and Yasin, 1995; Luchars and Hinkin, 1996).

Many hotels are now realizing the enormous financial losses that result from poor quality food and services in their restaurants. The high COQ in hotel restaurants suggests that hotel management should establish measurements in order to manage and control these costs (Luchars and Hinkin, 1996). This article discussed the COQ associated with a hotel-in-house restaurant. The hotel and restaurant is managed by a management company located in South Florida in the USA.

The executives of the hotel management company obtained a five-year management contract in 2004 on a 300 room hotel. The hotel is located in South Florida. It is 20 minutes from the international airport and five minutes from the beach. The room revenues for the hotel are approximately \$7.2 million. It has an occupancy level of 86 percent and an average daily rate of \$76.00. The hotel primary market on weekdays is from mid to upper level corporate travelers, and on weekends are middle and upper income families.

Inside the hotel is a 160 seats restaurant that looks and feels like a stand-alone independent restaurant. There is also a courtyard next to restaurant of approximately 10,000 square feet. The restaurant has a comfortable and casual atmosphere offering excellent quality food at affordable prices. The restaurant served breakfast, lunch, and dinner. Lunch and dinner were receiving favorable responses from both the hotel guests and walk-in-businesses. However, reviews for breakfast were unfavorable. The management company engaged the services of the researcher to measure the COQ associated with their breakfast and provide recommendations and how to improve the profitability of their breakfast operation. The PAF model was used to measure the significance of the COQ expressed as a percentage of breakfast sales. The next section will examine the COQ associated with breakfast sales in the restaurant.

COQ analysis

The average breakfast check on weekdays was \$6.35 and on weekends \$4.65, while the food cost was 36 percent. The average check for lunch was \$18.00 and dinner \$37.00. The annual covers per year for breakfast were approximately 27,500. This was relatively low compared with lunch and dinner annual covers of 42,800 and 66,500 respectively. The COQ measures were used to evaluate the breakfast performance in the restaurant. Since the COQ measures are not listed in the chart of accounts, it was necessary to interview the controller, food and beverage director, executive chef and the restaurant manger to establish a formal system to record these costs. The following list summarizes the four COQ categories in the PAF model and lists specific examples of costs. These four major COQ categories were later integrated into the expense section of the chart of accounts, with 16 of the 32 examples show in the list.

- (1) *Prevention costs:*
 - recruiting;
 - quality audits;
 - design reviews;
 - quality training;
 - vendor evaluation;
 - marketing research;
 - quality engineering; and
 - equipment maintenance.
- (2) *Appraisal (detection) costs:*
 - quality audit;
 - product testing;
 - process acceptance;
 - product acceptance;
 - prototype inspection;
 - inspection of material;
 - inspection of production; and
 - continuous supplier verification.
- (3) *Internal failure costs:*
 - scrap;
 - rework;
 - retesting;
 - re-inspection;
 - design changes;
 - failure analysis;
 - downtime cause by defects; and
 - downgrading cause by defects.
- (4) *External failure costs:*
 - product recall;
 - customer service;
 - warranty adjustment;
 - complaint adjustment;
 - product liability claims;
 - discount due to defects;
 - goods returns/allowances; and
 - lost sales (performance related).

Table I shows the COQ information obtained for the breakfast period in the case study restaurant. The information presented came from the general ledger along with interviews from the controller, food and beverage director, executive chef, restaurant manager and purchasing manager. This approach was necessary because there was no formal established system using the chart of accounts to accumulate this type of information.

Some of the examples of the COQ activities listed were used to classify the cost presented in Table I into prevention costs, appraisal costs, internal failure costs, and external failure costs categories. The revenues for the period 2005 and 2004 were \$150,000 and \$120,000 respectively. The revenues were obtained from the income statement.

Table II shows the COQ analysis over a two year period (2005 and 2004). The COQ for each of the four categories was expressed as a percentage of sales for each period. Between 2004 and 2005, the restaurant's total COQ have declined from 16 percent of sales to 12 percent of sales. It was implied from the analysis that the significant increase in the prevention cost (from \$2,400 in 2004 to \$6,000 in 2005) led to the reduction in appraisal, internal, and external failure costs over the period.

The analysis of individual costs of quality categories indicates that the restaurant began allocating more resources to prevention activities such as menu design, preventive equipment maintenance, quality training issues and supplier evaluations in 2005 relative to 2004. Results showed that appraisal costs declined from 4 percent of sales to 2 percent, costs of internal failure fell from 4.5 percent of sales to 2.5 percent, and external failure costs decreased from 5.5 percent of sales to 3.5 percent. One major concern here is that, although the overall external failure costs have decreased, the cost of returned meals (from room service) has increased. The restaurant quality management team (controller, food and beverage director, executive chef, restaurant manager, and purchasing manager) was advised to investigate the reasons for this and

| | 2005 | 2004 |
|-------------------------------|-----------|-----------|
| Sales | \$150,000 | \$120,000 |
| Scrap (IF) | 1,950 | 2,640 |
| Training (P) | 2,640 | 900 |
| Design menu (P) | 1,680 | 840 |
| Rework costs (IF) | 1,275 | 1,800 |
| Product-testing (A) | 945 | 2,040 |
| Returned of meals (EF) | 1,650 | 840 |
| Customer service (EF) | 300 | 600 |
| Vendor evaluation (P) | 630 | 300 |
| Lost of sales (EF) | 2,250 | 3,000 |
| Inspection of products (A) | 600 | 300 |
| Equipment maintenance (P) | 1,050 | 360 |
| Discount due to defects (EF) | 1,050 | 2,160 |
| Breakdown maintenance (IF) | 525 | 960 |
| Inspection of production (A) | 975 | 1,080 |
| Product-testing equipment (A) | 840 | 1,380 |

Notes: P= Prevention costs; A= Appraisal costs; IF = Internal failure costs; EF = External failure costs

Table I.
Restaurant breakfast
sales and costs of quality
measures

| Revenues | 2005 \$150,000 | Percentage of revenues (2) = (1) ÷ \$150,000 (%) | 2004 \$120,000 | Percentage of revenues (4) = (3) ÷ \$120,000 (%) |
|--------------------------------------|-------------------|---|-------------------|---|
| Costs of quality | Cost (1) | | Cost (3) | |
| <i>Prevention costs:</i> | | | | |
| Design menu | \$1,680 | | \$840 | |
| Equipment maintenance | 1,050 | | 360 | |
| Training | 2,640 | | 900 | |
| Vendor evaluation | 630 | | 300 | |
| Total prevention costs | 6,000 | 4.0 | 2,400 | 2.0 |
| <i>Appraisal costs:</i> | | | | |
| Inspection of production | 975 | | 1,080 | |
| Product-testing equipment | 840 | | 1,380 | |
| Incoming products inspection | 600 | | 300 | |
| Product-testing (labor and material) | 945 | | 2,040 | |
| Total appraisal costs | 3,000 | 2.0 | 4,800 | 4.0 |
| <i>Internal failure costs:</i> | | | | |
| Scrap | 1,950 | | 2,640 | |
| Rework | 1,275 | | 1,800 | |
| Breakdown maintenance | 525 | | 960 | |
| Total internal failure costs | 3,750 | 2.5 | 5,400 | 4.5 |
| <i>External failure costs:</i> | | | | |
| Returned meals (room service) | 1,650 | | 840 | |
| Customer support | 300 | | 600 | |
| Discount due to defects | 1,050 | | 2,160 | |
| Lost of sales | 2,250 | | 3,000 | |
| Total external failure cost | 5,250 | 3.5 | 6,600 | 5.5 |
| Total costs of quality | \$18,000 | 12.0 | 19,200 | 16.0 |

Table II.
Costs of quality analysis
for breakfast using the
percentage of sales

initiate corrective action. The goal of the COQ analysis report in Table II is to identify the root causes of the COQ problems and then take steps to correct them.

According to the data reported in Table II, the COQ represented 16 and 12 percent of sales for 2004 and 2005 respectively. However, quality experts suggested that the optimal COQ should be between 2 to 4 percent of sales (Crosby, 1979; Ostrenga, 1991; Hansen and Mowen, 2005). The high COQ findings help the restaurant quality management team to reevaluate the quality of food and services. Therefore, the quality management team decided that more investment in prevention and appraisal activities were necessary. They were optimistic that the changes made along with more investment will significantly reduce the failure costs (internal and external) and also the food cost from 36 percent to approximately 27 percent. They also anticipated that breakfast sales will increase and therefore, the overall COQ for the fiscal year 2006 will be 2 percent or less.

Additional insight concerning the relative benefits from measuring the COQ can be emphasized by constructing a COQ trend analysis. Table III shows the trend analysis (summary) of the COQ expressed as a percentage of sales for period 2004 to 2005. Prevention cost increased over the period while appraisal cost, internal failure cost, and

external failure cost decreased. Also the total cost of quality decrease (from 16 percent to 12 percent) over the same period.

Table II and Table III also showed additional benefits from an increased investment relating to prevention activities in 2005 did led to the reduction in failure costs (both internal and external) and appraisal costs. These findings support the results of prior researchers (Plunkett and Dale, 1987; Porter and Rayner, 1992). They found that an investment in prevention and appraisal activities led to reduction in failure costs, and any further investment in prevention activities did result in reduction of appraisal costs. Other derived benefits from measuring the COQ are illustrated in the next section showing profitability benefits from measuring the COQ.

Profitability benefits from measuring the COQ

Quantifying the COQ and expressing it in relationship to breakfast sales in Table II is extremely important to the hotel restaurant profitability. The assumption can be made that higher quality services will deliver higher profits, while lower quality services will result in lower profits (Atkinson *et al.*, 1994). Measuring the COQ as shown in Table II can be very important when the life time value of a customer is also taken into consideration (Chakrapani, 1998). For example, losing a customer who visits the hotel restaurant twice per month and spends approximately \$80 per visit may not seem to be a great loss. However, if the same customer visits the hotel restaurant 25 times per year for five years the business worth of this customer would be \$10,000. Lets further assume that this customer during the same period introduces ten other customers to the restaurant and they visit the restaurant for a similar time period (25 times per year for five years) with an average spending per visit of \$80. This would represent a substantial amount of business to the restaurant of \$100,000. Therefore, the lifetime value of a single customer can play a critical role in the long-term profitability of a restaurant. Bowen and Shoemaker (1998) found that repeated customers spend more on food and beverage than non-repeated customers. According to Chakrapani (1998), measuring service quality and customer satisfaction is critical to a service company profitability and competitive advantage.

Most hotel restaurants have a substantial amount of repeat businesses component (Bowen and Shoemaker, 1998). The hotel in this case study has significant amount of repeat businesses. Consequently, the business worth of a customer relative to the average dollar value of the restaurant check could be high if viewed from a cumulative perspective. In addition, a single customer can produce a steady flow of cash for a restaurant over an extended period of time (Chakrapani, 1998).

Service failure will cause customers not to return to a restaurant. A dissatisfied customer can also spread negative information about a restaurant. This can result in

| COQ categories | Percentages of sales 2005 | Percentages of sales 2004 |
|------------------------|---------------------------|---------------------------|
| Prevention costs | 4.0 | 2.0 |
| Appraisal costs | 2.0 | 4.0 |
| Internal failure costs | 2.5 | 4.5 |
| External failure costs | 3.5 | 5.5 |
| Total costs of quality | 12.0 | 16.0 |

Table III.
COQ trend analysis for
breakfast

increase costs of attracting new customers even higher. Therefore, when a restaurant does not deliver quality service it can lose customers. According to Chakrapani (1998) the cost of getting new customers is five times greater than the cost of retaining current customers. It is also important to take into consideration that a restaurant operation with chronic quality problems can create dissatisfied employees which can lead to high turnover and increase in service cost for training new employees. The initial establishment of a COQ program will increase the cost of doing business in the short run period, but in the long run period it will improve profitability (Feigenbaum, 1991).

While customer satisfaction is frequently used as an indicator of customer willingness to return to a restaurant, there is no guarantee that satisfied customer will return (Bowen and Chen, 2001). However, a dissatisfied customer may not return (Dube *et al.*, 1994). Therefore, hotel restaurant managers should find quality attributes that are essential for customers' return business that will contribute to the restaurant success and profitability (Ittner and Larcker, 1996).

According to Soriano (2002) the two most important attributes that are responsible for customers' return business are the quality of food and the quality of service. Brumback (1998) found that the quality of food is rated as the most important reason for customer retention by restaurants. It means therefore that an investment in prevention and appraisal activities could enhance the quality of food served to the customers. An important first step in evaluating the quality of food is the effectiveness of the menu designed (Bowen and Morris, 1995). Other factors that could affect food quality are technologies such as computer chips in refrigerators to regulator temperature and digital timer in fryers to control cooking time (Durocher, 2001).

With regard to service quality, an investment in training for waitpersons and food preparation employees with values of empowerment could better prepare them to provide higher quality services for their customers (Ursin, 1996; Frable, 1998). According to Juran (1962); Plunkett and Dale (1987); and Porter and Rayner (1992) investment in prevention and appraisal activities are intended to increase profitability and gain competitive advantages. The final section below presents the practical steps taken by the restaurant quality management team to measure and sustain the COQ in the PAF model.

Sustaining strategic benefits from measuring the COQ

The strategic benefits that are derived from measuring and sustaining the COQ using the PAF model can be summarized into three major categories. First, are the strategic benefits from prevention or proactive approaches that seek to identify potential problems before they occur. Second, strategic benefits obtained from appraisal activities to ensure that quality food and services meet specific standards that will satisfy the customers' requirements. Third, strategic benefits from identifying serving failures that will enable the restaurant to assess overall food and service quality. These three major strategic benefits are presented below in a more details.

(1) Prevention of food and service costs:

- Forecasting and managing customers demand for breakfast using multiple regression analysis are used to improve the accuracy of meals and staffing forecast.

- By forecasting breakfast covers and using the average breakfast check, the restaurant was able to establish stronger internal control over cash collection and reduction in errors.
- Employees who are directly involved in food and service experience with the customers are encouraged to identify problems before they occur.
- Extensive training of employees both at the front and back of the restaurant was done to enhance the entire customer experience.
- Managers used simulations and role plays to help employees take a more proactive approach to identify all types of food service failures along with effective recovery strategies.
- The advance quality planning team consisting of the controller, food and beverage director, executive chef, restaurant managers and purchasing manager established action plans to ensure that failure does not materialized.

(2) *Appraisal of performance standard:*

- The restaurant employees used self inspection to ensure that the meals are prepared to meet the order specification of the customers.
- Employees also used successive inspection in which the next person in the service delivery chain verifies the quality and accuracy of the previous employee work to ensure customer satisfaction.
- Employees do source inspection to uncover potential mistakes and fixed them before they become food and service failures.
- Poka-yoke methods (mistake proofing or fool-proofing) were used with checklists to prevent employees from making mistakes that could negatively affect the customer experience.

(3) *Failures (internal and external):*

- Empowering employees both front and back of the restaurant help to reduce failure costs.
- Training kitchen employees to use the equipment properly reduced scraps and defects before the meal is delivered to the customers.
- Because the servers were empowered to fulfill their responsibilities, they try to meet or exceed them. The benefits to the restaurant are that service quality improved, servers increase productivity which leads to fewer servers needed and more tip per server. The customers are satisfied because servers are more alert in identifying potential failure points before they occur.
- Once external service failure occurs, the employee basic recovery goal is to act immediately on the customers' complaints. This restaurant strives for on-the-spot service recovery. The following are some of the benefits from quick reactions: It reduces the overall expense of retaining the customers; it is more likely that the restaurant will have repeat businesses from customers; and, the customers will be more incline to recommend the restaurant to their friends.

- Employees are encouraged through an incentive program to inform their managers about any external failure even if they initiate successful recovery procedures. The benefit from this is stopping the problem from reoccurring and pass the information on to other employees. The end result is to take tragic moments of external failures and create unforgettable positive customer experience.

This study extended the COQ framework by using the PAF model in a hotel restaurant serving breakfast. Findings suggested that investment in prevention activities led to a reduction in failure costs (both internal and external) and appraisal costs. Hence, the most profitable investment within the PAF model is on prevention activities because they influence the reduction in failure costs and prevention costs. Therefore, restaurant managers with limited resources should first invest in prevention activities. The effect of an investment in prevention activities is to improve the quality of food and services that will eventually leads to an increase in customers' satisfaction and ultimately the restaurant profitability and competitive advantages.

References

- Atkinson, H., Hamburg, J. and Ittner, C. (1994), *Linking Quality to Profits: Quality-Based Cost Management*, Quality Press, Milwaukee, MN.
- Bamford, D.R. and Land, N. (2006), "The application and use of the PAF quality costing model within a footwear company", *The International Journal of Quality & Reliability Management*, Vol. 23 No. 3, pp. 265-78.
- Bowen, J.T. and Chen, S. (2001), "The relationship between customer loyalty and customer satisfaction", *International Journal of Contemporary Hospitality Management*, Vol. 13 Nos 4/5, pp. 213-7.
- Bohan, G.P. and Horney, N.F. (1991), "Pinpointing the real cost of quality in a service company", *National Productivity Review*, Vol. 10 No. 1, pp. 309-17.
- Bowen, J.T. and Morris, A.J. (1995), "Menu design: can menus sell?", *International Journal of Contemporary Hospitality Management*, Vol. 7 No. 4, pp. 4-9.
- Bowen, J.T. and Shoemaker, S. (1998), "Loyalty: a strategic commitment", *Cornell Hotel and Restaurant Administration Quarterly*, Vol. 39, pp. 12-25.
- Brumback, N. (1998), "Inn style", *Restaurant Business*, Vol. 97 No. 3, pp. 47-59.
- Chakrapani, C. (1998), *How to Measure Service Quality and Customer Satisfaction*, American Marketing Association, Chicago, IL.
- Crosby, P.B. (1979), *Quality is Free*, McGraw-Hill, New York, NY.
- Dube, L., Renaghan, L.M. and Miller, J.M. (1994), "Measuring customer satisfaction for strategic Management", *Cornell Hotel and Restaurant Administration Quarterly*, Vol. 35, pp. 39-47.
- Durocher, J. (2001), "Backstage pass", *Restaurant Business*, Vol. 100 No. 5, pp. 81-2.
- Frale, F. (1998), "Investing in quality tools/machines will help improve your operation's/productivity", *Nation's Restaurant News*, Vol. 32 No. 47, pp. 18-21.
- Feigenbaum, A.V. (1956), "Total quality control", *Harvard Business Review*, Vol. 34 No. 6, pp. 93-101.
- Feigenbaum, A.V. (1991), *Total Quality Control*, McGraw-Hill, New York, NY.

-
- Ittner, C.D. and Larcker, D.F. (1996), "Measuring the impact of quality initiatives on firm financial performance", *Advances in the Management of Organizational Quality*, Vol. 1 No. 1, pp. 1-37.
- Juran, J.M. (1962), *Quality Control Handbook*, 2nd ed., McGraw-Hill, New York, NY.
- Hansen, R.H. and Mowen, M.M. (2005), *Cost Management: Accounting and Control*, Thompson South-Western, Mason, OH.
- Kandampully, J., Mock, C. and Sparks, B. (2001), *Service Quality Management in Hospitality, Tourism, and Leisure*, The Haworth Hospitality Press, New York, NY.
- Luchars, J.Y. and Hinkin, T.R. (1996), "The service quality audit: a hotel case study", *Cornell Hotel and Restaurant Administration Quarterly*, Vol. 37 No. 1, pp. 34-42.
- Ostrenga, M.R. (1991), "Return on investment through the cost of quality", *Journal of Cost Management*, Vol. 6 No. 3, pp. 37-44.
- Plunkett, J.J. and Dale, B.G. (1987), "A review of the literature on quality-related costs", *International Journal of Quality & Reliability Management*, Vol. 4 No. 1, pp. 40-52.
- Porter, L.J. and Rayner, P. (1992), "Quality costing for total quality management", *International Journal of Production Economics*, Vol. 27 No. 1, pp. 69-81.
- Schiffauerova, A. and Thomson, V. (2006), "A review of research on cost of quality models and best practices", *International Journal of Quality & Reliability Management*, Vol. 23 No. 6, pp. 647-69.
- Soriano, D.R. (2002), "Customers' expectations factors in restaurants: the situation in Spain", *The International Journal of Quality & Reliability Management*, Vol. 19 Nos 8/9, pp. 1055-67.
- Ursin, C. (1996), "The art of service", *Restaurants USA Magazine*, Vol. 16 No. 10, pp. 36-7.
- Weisinger, J.Y., Daily, B.F. and Holman, N. (2006), "The application of manufacturing cost of quality elements to arts and cultural organizations: an exploratory study", *Journal of Managerial Issues*, Vol. 18 No. 1, pp. 129-47.
- Yavas, U. and Yasin, M.M. (1995), "Front and back stage strategies in service delivery in the hospitality industry: a conceptual framework", *Marketing Intelligence & Planning*, Vol. 13 No. 11, pp. 22-7.

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