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Return on Quality (ROQ): Making Service Quality Financially Accountable

Many companies have been disappointed by a lack of results from their quality efforts. The financial benefits of quality, which had been assumed as a matter of faith in the "religion of quality," are now being seriously questioned by cost-cutting executives, who cite the highly publicized financial failures of some companies prominent in the quality movement. In this increasingly results-oriented environment, managers must now justify their quality improvement efforts financially. The authors present the "return on quality" approach, which is based on the assumptions that (1) quality is an investment, (2) quality efforts must be financially accountable, (3) it is possible to spend too much on quality, and (4) not all quality expenditures are equally valid. The authors then provide a managerial framework that can be used to guide quality improvement efforts. This framework has several attractive features, including ensured managerial relevance and financial accountability.

The quality revolution has taken over the thinking of much of American industry (Dean and Evans 1994). American manufacturers, hard pressed by the standards of precision and durability of the products of their Japanese counterparts, have adopted "quality" as their new idol with a near-religious fervor (Greising 1994). The "quality revolution" has spread through manufacturing and service industries as customers have begun to demand more and better levels of performance, and managers have found that growing, highly competitive markets require that customers must be satisfied by their purchases or they will go elsewhere (Rice 1990). Signs of this fervor are evident in the management section of any bookstore. The late 1980s and early 1990s have seen an explosive growth in the number of titles espousing the way of quality—from anecdotes about how quality has saved companies to management guides on how to instill quality principles in one's own organization (e.g., Deming 1986; Heskett, Sasser, and Hart 1990; Juran and Gryna 1980).

However, the quality revolution is not without its casualties. For example, the fervor for quality circles as a panacea for management problems has died with the realization that they are not suited to all cultures (Arnold and Plas 1993). Many firms have attempted to adopt cosmetic

changes to imitate successful quality-driven companies without grasping the need to change the fundamental cultural underpinnings of the firm, with disastrous results (Grant, Shani, and Krishnan 1994). And firms that have been lauded for their quality orientation have run into financial difficulties, in part because they spent too lavishly on customer service.

For example, the Wallace Company won the Malcolm Baldrige National Quality Award in 1990. However the high levels of spending on quality that enabled them to win the Baldrige also produced unsustainable losses,¹ and within two years they were bankrupt (Hill 1993). Similarly, Florida Power & Light spent millions to compete for Japan's prestigious Deming Prize (Wiesendanger 1993). Inattention to rising costs caused a backlash by rate payers, resulting in its quality program being dismantled (*Training* 1991).

From the experiences of these companies, and common sense, it is clear that there are diminishing returns to expenditures on quality. Improving quality helps up to a point, but past that point further expenditures on quality are unprofitable. Of course, many quality improvements result in a reduction in costs that more than makes up for the quality expenditures (Bohan and Horney 1991; Carr 1992; Crosby 1979; Deming 1986). However, such improvements are more prevalent in manufacturing and the more standardized services (e.g., fast food restaurants) than they are in the highly customized, big-ticket services that constitute the growth industries of the information age (e.g., electronic information services) (Fornell, Huff, and Anderson 1994). This is because customization inhibits economies of scale and thus makes individual improvements less cost-effective (Anderson, Fornell, and Rust 1994).

¹Another factor leading to Wallace's collapse was a decline in demand for its products.

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Quality improvement in services thus increasingly implies spending on quality to improve revenues rather than reduce costs. How to make profitable decisions about quality expenditures is the key managerial problem. This involves justifying all quality improvement efforts financially, knowing where to spend and not to spend on quality improvement, and knowing when to reduce spending.

What is needed is a method to help managers decide where they are likely to get the greatest response for their limited resources. In general, expenditures on quality do not have obvious profit implications (Aaker and Jacobson 1994). They do not necessarily reduce costs and often increase them, at least in the short term (Griliches 1971). Many quality efforts deal not with tangible products, but with intangible aspects of service, such as the quality of personal interactions (Grant, Shani, and Krishnan 1994). And, unlike short-term sales promotions, the results are not immediately measurable in terms of sales. Nevertheless, the chain of effects from increased quality can be traced to the firm's profits.

The benefits of quality improvements come in two forms. One effect is the improved ability of the firm to attract new customers, due to word of mouth, as well as the firm's ability to advertise the quality of its offerings. This effect is in many ways analogous to product repositioning and is part of "offensive marketing"—those actions that seek to attract new customers.²

The second result is that when current customers are more satisfied with the products they buy, they become repeat customers. Small increases in retention rates can have a dramatic effect on the profits of a company (Dawkins and Reichheld 1990; Fornell and Wernerfelt 1987, 1988; Payne and Rickard 1993; Reichheld and Sasser 1990) for several reasons: Existing customers tend to purchase more than new customers (Rose 1990), the efficiencies in dealing with them is greater, and, compared with the cost of winning new customers, selling costs are much lower—said to be on average only 20% as much, according to a much-quoted study for the U.S. Department of Consumer Affairs (e.g., see Peters 1988). Retaining current customers through higher levels of satisfaction is called "defensive marketing" (Fornell and Wernerfelt 1987, 1988).

A New Quality Movement: Financial Accountability

In an era of cost cutting, quality expenditures must be made financially accountable. This managerial need has resulted in a new quality movement in the marketing literature, in which customer satisfaction and service quality are not only measured but also statistically related to customer retention and market share. Although analysis of the PIMS (Profit Impact of Market Strategy) database suggested some years ago that a link between quality and profitability might exist (Buzzell and Gale 1987), a veritable explosion of interest in this area has occurred since 1991. For example, Bolton and

Drew (1991a, b) demonstrate behavioral implications of the customer satisfaction of telephone customers. Fornell (1992) documents the aggregate financial implications of customer satisfaction across many industries in a huge Swedish study, and these results were later extended (Anderson, Fornell, and Lehmann 1994). Rust, Subramanian and Wells (1992) document the financial impact of complaint recovery systems. Nelson and colleagues (1992) find a statistical link between patient satisfaction and hospital profitability. Anderson and Sullivan (1993) and Boulding and colleagues (1993) explore the impact of service quality on repurchase intentions, Kordupleski, Rust, and Zahorik (1993) show the links between product quality, service quality, and market share, and Rust and Zahorik (1993) explore the diminishing returns and market share implications of quality expenditures. Hauser and colleagues (1994) analytically show the financial implications of using customer satisfaction in employee incentive systems. (For a review of the early literature in this area, see Zahorik and Rust 1992.)

These studies are unanimous in finding that customer satisfaction and service quality have a measurable impact on customer retention, market share, and profitability. These findings have been recently underscored by another interesting finding: Juran, in one of his last lectures, was asked why so many Baldrige award winners were financially unsuccessful. He said that he was sure that an investor investing in the Baldrige winners would beat the market. *Business Week* magazine followed up, and discovered that an investor putting money on the Baldrige winners the day they were announced in fact would have received an 89% return, versus 33% for the Standard & Poor 500 (*Business Week* 1993). Thus, a link between quality and financial return exists, and the challenge is to provide operational methods for measuring the link.

The ROQ Approach

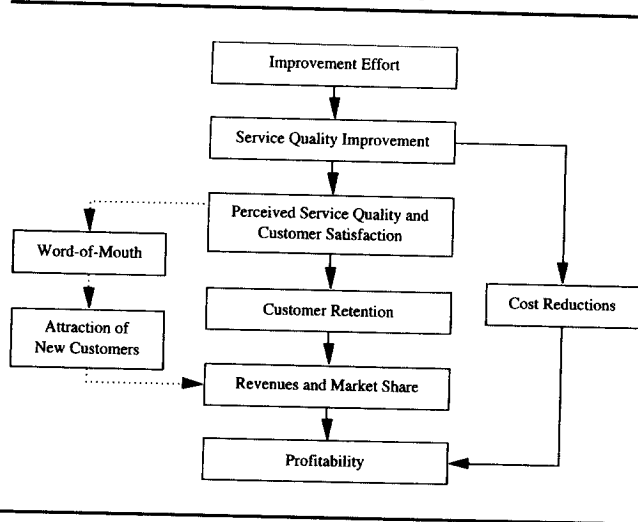
We describe an approach to making quality expenditures financially accountable. The return on quality (ROQ) approach is characterized by the following assumptions:

1. Quality is an investment,
2. Quality efforts must be financially accountable,
3. It is possible to spend too much on quality, and
4. Not all quality expenditures are equally valid.

The assumption that quality is an investment is a conscious attempt to place quality improvement expenditures on an equal basis with other investment decisions. The alternative is for quality expenditures to be made because of consistency with a quality culture or because eventual returns are taken on faith. Quality expenditures generally have not been treated as an investment by most companies, because there has been no solid basis for assessing financial impact (Spitzer 1993). We provide a framework that can be used to evaluate the financial impact of quality improvement efforts; thus enabling quality to be considered an investment. The second assumption, that quality efforts must be financially accountable, can thus be seen as synergistic with the assumption that quality is an investment.

²Conjoint analysis methods can be used to determine the "pull" that upgraded quality might have for customers of other brands (DeSarbo et al. 1994; Green and Srinivasan 1978, 1990; Wind et al. 1989).

FIGURE 1
A Model of Service Quality Improvement and Profitability



If quality is an investment and improvement efforts are financially accountable, then it is inevitable that some efforts will be evaluated as being ineffective, either because too much is to be spent (diminishing returns) or the improvement money is spent for the wrong things (inefficient use of funds). The assumptions that it is possible to spend too much on quality and that not all quality expenditures are equally valid thus are seen to be completely consistent with the first two assumptions.

In the next section, we provide an overview of the theoretical framework of ROQ and the submodels that constitute the ROQ approach. We also develop the equations necessary to project market share, net present value of quality improvement effort, and return on investment of a quality improvement effort (ROQ). In the third section, we discuss issues in implementing the ROQ approach, including measurement alternatives and the ROQ quality improvement process. In the fourth section, we present an example application, and, in the final section, summarize the approach and provide directions for further research.

Evaluating Financial Impact

Overview

We model the relationship between service quality improvement efforts and profitability as a chain of effects (see Figure 1).³ The improvement effort, if successful, results in an improvement in service quality. Improved service quality results in increased perceived quality and customer satisfaction and perhaps reduced costs. Increased customer satisfaction in turn leads to higher levels of customer retention, and also positive word-of-mouth. Revenues and market share go up, driven by higher customer retention levels and new customers attracted by the positive word-of-mouth. The increased revenues, combined with the decreased costs, lead

³Another conceptual framework that shows the sources of profitability arising from quality is that of Garvin (1984).

to greater profitability. The effect of word-of-mouth is very difficult to measure in a practical business situation; thus we use dotted lines in Figure 1 to indicate links that we do not formally model. We can see immediately that our projections of service quality effects will be conservative, in that they will ignore the positive benefits that might arise from word-of-mouth.

The conceptual logic of Figure 1 can be converted into general equations that model this chain of effects. If X is an indicator variable (1 if the improvement is made, and 0 if it is not) and AQ represents "actual" (objective) service quality,⁴ then

$$(1) \quad AQ = f_1(X) + \varepsilon_1$$

where ε_1 is a random error term reflecting all other nonsystematic influences on service quality. Let S be a vector of measurements of consumer attitudes, emotions, and perceptions (not all of these will typically be measured in any one application), including variables such as perceived service quality, disconfirmation, and customer satisfaction. Then

$$(2) \quad S = f_2(AQ, E) + \varepsilon_2$$

where E is a vector containing customer expectations and all other systematic influences on S other than actual quality, and ε_2 includes all non-systematic influences. Also if CR is the cost reductions realized, then

$$(3) \quad CR = f_3(AQ) + \varepsilon_3$$

where ε_3 is a random error term. Note that the way this function is defined, if we assumed that the expectation of the error term was 0, then $E[f_3(\text{current } AQ)] = 0$. That is, if we effect no improvement, then we do not expect any cost reduction.

Customer retention, R , then results from customer attitudes and perceptions by

$$(4) \quad R = f_4(S) + \varepsilon_4$$

where ε_4 is a random error term reflecting other factors affecting retention. If MS is a vector reflecting business performance variables such as revenues and market share, MV is a vector of all other systematic company- and market-specific variables affecting market share, and $PROFIT$ is some measure of profits, then

$$(5) \quad MS = f_5(R, MV) + \varepsilon_5$$

$$(6) \quad PROFIT = f_6(MS, CR) + \varepsilon_6$$

where the error terms reflect the realization that revenue per customer is a random variable, which makes equation 5 stochastic and adds variability to equation 6.

In subsequent sections, we show how this simple model can be operationalized within a particular firm, taking into account the specific measurement practices of that company. First, however, we show how equations 5 and 6 can be expanded and operationalized to determine the profitability

⁴We are not arguing that objective quality is in any way more important than perceived quality. The distinction between actual and perceived service quality is necessary to permit the possibility that cost reductions may result from quality improvements that are transparent to (or irrelevant to) the customer.

implications of change in customer retention, and ultimately to project the ROQ.

Drivers of Market Share

Customer retention has a major impact on market share, but it is not the only factor. Market growth rate, market “churn” (customers entering or leaving the market, even given a stable market size), competitors’ retention rates, and the effectiveness of offensive marketing efforts (e.g., advertising, price, convenience) all play a role in determining market share. Given estimates of these other factors, which are generally available from either internal company data, competitive analyses, or customer surveys, we can estimate the effect of our customer retention rate on market share. We treat the market as a duopoly, in which all other competitors are lumped into one. We thus conduct an “us versus them” analysis, for two reasons: First, it reduces the amount of data to be collected, and second, we do not need to determine the effect of retention for the competitors individually. Given this approach, we define the following:

- N_t = market size at period t ,
- M_t = market share at period t ,
- C = churn, operationalized as the percent of customers leaving the market,
- R = our retention rate,
- R' = competitors’ retention rate (defined as $1 - \text{Pr}(\text{switch to us or leave the market})$), and
- A = percentage of new customers who choose us.

Then our number of customers in period $t-1$ is $M_{t-1}N_{t-1}$, and the competitors had $(1 - M_{t-1})N_{t-1}$ customers. The number of new customers in period t is the sum of churn (CN_{t-1}) and market growth⁵ ($N_t - N_{t-1}$).

Operationally, if we assume that churn is the same across all competitors, C can be estimated from the percentage of one’s own customers who leave the market, obtained from exit surveys. R' can be estimated by taking one minus the ratio of the number of new customers who have switched from competitors, divided by the number of competitors’ customers in the previous period. This can be obtained from a survey of new customers. A can be estimated as the number of new customers divided by the number of total new customers, for the period preceding the analysis or perhaps obtained from several periods of data.

Number of customers in time t is the sum of the customers retained, plus the number of customers who switch to us, plus the number of new customers. We can obtain the sizes of these subgroups from the inputs listed previously, as follows:

- (7) customers retained = $RM_{t-1}N_{t-1}$
- (8) customers switching to us = $(1 - R' - C)(1 - M_{t-1})N_{t-1}$
- (9) new customers = $A[CN_{t-1} + N_t - N_{t-1}]$
 $= A[N_t - (1 - C)N_{t-1}]$.

⁵Note that “growth” can be positive, zero, or negative.

Our market share for period t is then estimated to be the sum of equations 7, 8, and 9, divided by N_t .

Taken collectively, equations 1 through 9 give us the means to evaluate the market share impact of improving perceived service quality or customer satisfaction. Because effecting these shifts typically involves spending for quality improvement, we must determine whether the return on investment (ROQ) is adequate.

If we assume a constant growth rate G , then market sizes can be projected out several periods. Then assuming that churn (C), attractiveness (A), competitors’ retention rate (R'), and new retention rate ($R[X]$, where retention rate is expressed as a function of expenditure level X) are constant over time, we can project market shares out several periods as well. Assuming that average price and contribution margin (Y) remain constant⁶ (we will not raise price to cover the costs of quality improvement) and given a financial discounting factor (I) that reflects the cost of capital, we can calculate the net present value of the profit flow over a time horizon of P periods:

$$(10) \quad NPV = \sum_{k=1}^P (1 + I)^{-k} [YM_{t+k}(1 + G)^k N_t - X_{t+k}].$$

To calculate the ROQ, let us now assume that there is an upfront expenditure of F' to initiate a quality improvement effort for a particular business process (or dimension of a process) and after that an annual maintenance expenditure of F (net of any cost reductions, which can be viewed as negative expenditures). Let F_0 indicate the current level of annual expenditure. Then the net present value of additional spending is

$$(11) \quad NPVAS = F' + \sum_{k=1}^P (F - F_0)(1 + I)^{-k} \\ = F' + (F - F_0)[(1 - (1 + I)^{-P}) / I].$$

Let NPV and NPV_0 be the net present values of the profit streams for the quality improvement effort and status quo, respectively. Then the ROQ is

$$(12) \quad ROQ = (NPV - NPV_0) / NPVAS.$$

This measure permits management to consider quality improvement as an investment, in terms of the financial return generated from the quality improvement expenditure.

Implementation Issues

Ensuring Managerial Relevance

It is important to recognize that the operational context of customer satisfaction/service quality measurement is quality improvement. Thus, the questionnaire structure must connect to managerial processes over which individual managers can claim ownership. From a managerial point of view, one of the most important goals of any

⁶This assumes (for simplicity of exposition) that we will not raise price to cover the costs of quality improvement and also that there is no net reduction in variable costs. If either of these assumptions is violated, it is easy to incorporate these into the model by adjusting the contribution margin accordingly.

satisfaction/quality measurement program is helping management pinpoint the managerial processes and subprocesses in which quality improvement efforts will have the greatest impact on customer retention.

One of the most common problems with customer satisfaction surveys is that the results are too often not managerially relevant (Kordupleski, Rust, and Zahorik 1993). To counteract this, the ROQ approach structures the customer satisfaction survey around business processes. The idea is that business processes (e.g., sales, billing, product) are how the business is organized. For example, there is likely to be a particular manager who is in charge of the billing process. If particular aspects of billing need to be improved, then there is no ambiguity about who should supervise the changes or take responsibility for the results.

The idea is to structure the questionnaire around the processes of the business and also to determine the questions to ask within the process on the basis of exploratory analysis with customers. These questions should be in the customers' language, using the words the customers use to talk about the relevant topics in focus groups. This approach guarantees both that the questionnaire covers topics which are relevant to customers in words that customers use and that the results of the survey will be relevant to specific business processes. We thus facilitate translating external customer information into internal process improvement information.

Figure 2 shows how the ROQ approach links customer retention to business processes to enable targeted quality improvement efforts. Measures of customer retention (or its surrogate, repurchase intention) are linked to overall satisfaction measures. These overall satisfaction measures, in turn, are linked to the business processes, and ultimately to dimensions or subprocesses within each process. The motivation for this structure is managerial: Quality improvement efforts must be targeted to the process and subprocess level to be actionable.

Measurement Alternatives

The ROQ approach does not require any particular measurement approach. There are several measurement alterna-

tives that have been proposed in the literature and could be used within the ROQ framework. In many cases, the choice of measure depends on not only theoretical considerations, but also corporate history. If a particular retention, quality, or satisfaction measure has been used for years, then the costs in terms of discontinuity might argue against change. For this reason, we now consider several of the major measurement alternatives.

Repurchase intention. Typically, we will have a repurchase intention measure rather than retention itself (e.g., Rust, Subramanian, and Wells 1992; Rust and Zahorik 1993). The categories on the repurchase intention question may vary from company to company, but it may be useful to have more than a "yes-no" question for repurchase intention. This is because in a very good company, the number of "no's" is small, leading to a loss of explanatory power and in turn resulting in a very large sample size requirement. After testing several alternative forms in parallel tests, we conclude that a repurchase intention scale of the form "0%, 20%, 40%, 60%, 80%, 100%" works well with respondents and produces an acceptable amount of variation.

Of course, we must recognize that the repurchase intention category may not reflect the true probability of repurchase. It is important to recognize that the intention to repurchase is not the same thing as actual repurchase. These categories must be calibrated by following up on samples of respondents to determine their actual repurchase probabilities (Kaarre 1994). However, once this calibration is done, the repurchase intention question may be used directly for some time, without further calibration. The probabilities in the scale are simply replaced by the calibrated probabilities (for example, only 95% of the "100%" category may repurchase, on average, which means that we simply treat the top category as .95 for analysis purposes).

Service quality. The direct measurement of perceived service quality has been proposed by many authors in the academic literature (e.g., Bolton and Drew 1991a, b; Cronin and Taylor 1992, 1994). This approach is also adopted by many practicing marketing researchers, who typically measure perceived service quality on something like a "Poor" to "Excellent" scale. Such researchers use a variety of numbers of scale points, including 3, 5, 7, and 10.

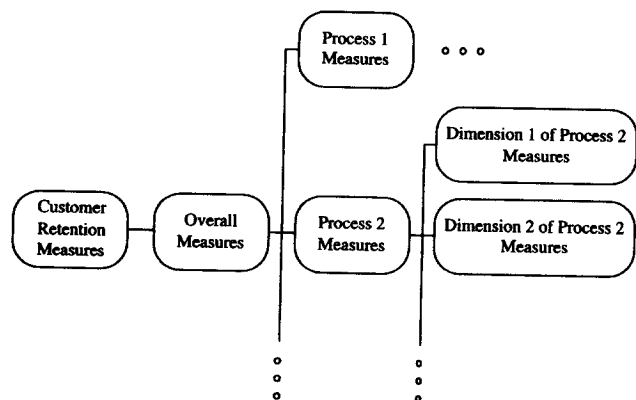
Given this measurement scheme, we would calibrate the impact of overall service quality (OQ) on retention (R) using the following equation:

$$(13) \quad R_i = b_0 + b_1 OQ_i + \varepsilon_i$$

where the i subscript refers to individual i , ε_i is a random normal disturbance term, and b_0 and b_1 are regression coefficients. Noting that R_i is a variable that ranges from 0 to 1, one might also use a logistic regression (Rust and Zahorik 1993), but that is probably not necessary, because potential quality shifts are usually small, which ensures that the retention shift will also usually be small, and the logistic relationship between the variables will thus be approximated well by a linear relationship.

Similarly, the overall service quality is linked to the perceived quality levels of the processes:

FIGURE 2
Drivers of Customer Satisfaction



$$(14) \quad OQ_i = PQ_i\beta_q + \gamma_i$$

where PQ_i is a vector of perceived quality levels for the processes, as perceived by individual i , β_q is the corresponding coefficient vector, and γ_i is a random error term. The process quality levels can then be linked to the subprocess quality levels using equations identical in form to equation 14. The number of levels of subprocesses is limited only by the length of the questionnaire and the fatigue of the respondents.

Estimation of equation 14 can be problematic because of potentially severe multicollinearity between the predictor variables (Peterson and Wilson 1992). Thus, we recommend using an estimation method that is robust to multicollinearity, such as ridge regression (Hoerl and Kennard 1970) or the equity estimator (Krishnamurthi and Rangaswamy 1987). The equity estimator, in particular, appears to perform better than ridge regression in the presence of multicollinearity (Rangaswamy and Krishnamurthi 1991). Recently, the equity estimator has been questioned on both theoretical and empirical grounds (Hill and Cartwright 1994), but the original authors convincingly defended themselves by demonstrating that the equity estimator is still generally more accurate when high levels of multicollinearity are present (which is usually the case with service quality/customer satisfaction data; Krishnamurthi and Rangaswamy 1994).

Customer satisfaction. Many researchers have explored the nature and effects of customer satisfaction (e.g., Cadotte, Woodruff, and Jenkins 1987; Churchill and Surprenant 1982; Erevelles and Leavitt 1992; Oliva, Oliver, and MacMillan 1992; Oliver 1980; Oliver and DeSarbo 1988; Oliver and Swan 1989; Tse and Wilton 1988). Customer satisfaction measures have also been linked to business performance (Anderson, Fornell, and Lehmann 1994; Anderson and Sullivan 1993; Fornell 1992; Rust and Zahorik 1993). Also, many companies routinely measure customer satisfaction rather than service quality (Devlin, Dong, and Brown 1993).

If customer satisfaction is measured instead of service quality, the resulting equations are identical to those listed previously, with the exception that satisfaction measures are substituted for the service quality measures.

Disconfirmation. The “expectancy disconfirmation” paradigm in the customer satisfaction literature posits that customer satisfaction results in large part from the disconfirmation of prior expectation (Day 1984; Oliver 1980; Olshavsky and Miller 1972; Olson and Dover 1976;). That is, if the performance of a service provider meets or exceeds expectations, then the customer is more likely to be satisfied. If the performance fails to meet expectations, then the customer is more likely to be dissatisfied.

A parallel research stream in service quality involves similar ideas. In that literature, dominated by the SERVQUAL approach (Parasuraman, Zeithaml, and Berry 1985, 1988; Zeithaml, Berry, and Parasuraman 1993), customers are asked for levels of agreement with statements involving perceived and ideal service performance. These levels of agreement are termed “perceptions” and “expectations,” respectively. Subtracting the “perception” minus the “expectation,” yields a gap, which is conceptually quite sim-

ilar to disconfirmation in the customer satisfaction literature, except for the standard of disconfirmation.

Recently, several studies have pointed out the pitfalls with using difference scores (Brown, Churchill, and Peter 1993; Carman 1990; Cronin and Taylor 1992; Peter, Churchill, and Brown 1993; Teas 1993). In particular, the reliability of a difference score is well known to be not as high as the reliability of the constituent measures (Lord 1958). This has led many authors to recommend the direct measurement of disconfirmation (Babakus and Boller 1992; Carman 1990; DeSarbo et al. 1994; Devlin, Dong, and Brown 1993; Oliver 1980). The direct measurement of disconfirmation results in a scale of the type “Much better than expected” to “Much worse than expected.”

Regardless of whether the disconfirmation measure is a service quality gap or a direct disconfirmation measure, the structure of the analysis remains essentially the same. The only difference is that the disconfirmation measure replaces the service quality measure in equations 1 and 2.

Customer delight. The importance of customer delight (or positive surprise), as opposed to mere satisfaction, has been previously noted by researchers and managerial theorists (Chandler 1989; Deming 1986; Oliver 1989; Westbrook and Oliver 1991; Whittaker 1991). Our approach is broad enough to accommodate delight as a driver of customer retention—one way is to specify three categories: delight, mere satisfaction, and dissatisfaction (DeSarbo et al. 1994). This can be done by either using a three-point measurement scale or dividing a larger scale into three groups. (For example, a five-point scale might convert 5 to “Delight,” 4 to “Satisfied,” and 1–3 to “Dissatisfied.”)

Retention (or repurchase intention) might then be related to satisfaction and delight by

$$(15) \quad R_i = b_0 + b_1OS_i + b_2OD_i + \varepsilon_i$$

where OS_i is a dummy variable reflecting overall satisfaction (1 if satisfied or delighted, 0 otherwise), OD_i is a dummy variable reflecting overall delight (1 if delighted, 0 otherwise), R_i and ε_i are defined as previously, and b_0 , b_1 , and b_2 are regression coefficients. We might then relate overall satisfaction to satisfaction with the processes and overall delight to delight with the processes, using the following:

$$(16) \quad OS_i = PS_i\beta_s + \gamma_i$$

$$(17) \quad OD_i = PD_i\beta_d + \delta_i$$

where PS_i is a vector of satisfaction dummy variables reflecting whether individual i was satisfied with each process, PD_i is a vector of delight dummy variables reflecting whether individual i was delighted with each process, β_s and β_d are vectors of regression coefficients, and γ_i and δ_i are random error terms, assumed normal for purposes of estimation. Again, one could substitute a logistic regression at this stage, but it is probably not necessary from a practical standpoint.⁷

⁷Note also that the coefficients obtained by this procedure will be equivalent, upon rescaling, to coefficients that would be obtained by two-group discriminant analysis.

Cumulative focus versus transaction focus. The company must decide whether its customer satisfaction/service quality questions will measure the general perception of the company's level of quality⁸ (cumulative focus) or the perception of the company's level of quality on the most recent transaction (transaction focus). An example of a cumulative question would be "Acme's billing quality is: Excellent, Good, Fair, or Poor." An example of a transaction question would be "On your most recent billing transaction with Acme, Acme's billing quality was: Excellent, Good, Fair, or Poor."

There are good reasons to select either option. Some researchers have found that cumulative questions correlate better with customer retention and other behavioral outcomes (Fornell 1992; Reichheld and Sasser 1990). This suggests that if the company's primary measurement objective is to predict behavior, then cumulative questions may be preferred. On the other hand, suppose the company's primary measurement objective is to monitor the progress of a quality improvement effort. In such a case, the cumulative measure may be a poor choice, because it reflects both current transactions and transactions that have taken place over time. A transaction measure, because it measures only the most recent transaction, reflects quality improvements faster and provides a more accurate picture of the current performance of the company in supplying quality to the customer (Bolton and Drew 1991a). The ROQ approach can be used with either option.

The ROQ Quality Improvement Process

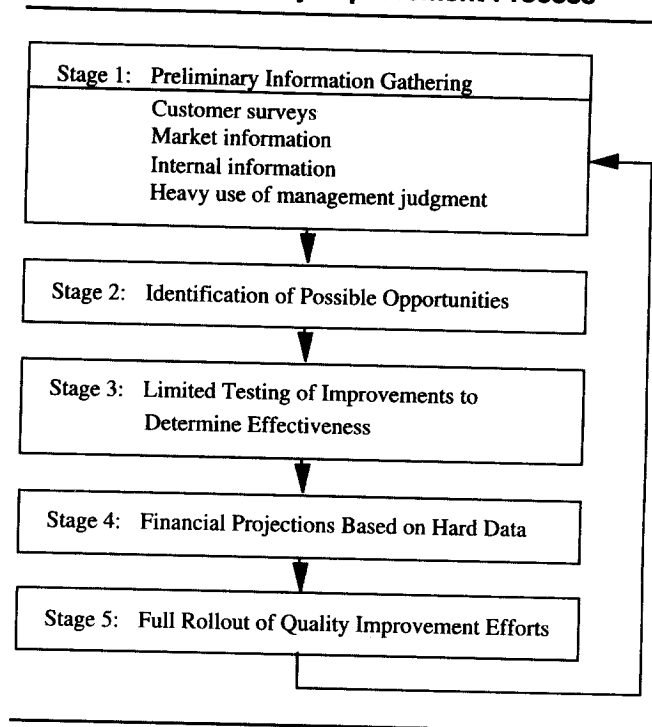
Few managers will take one run through this approach, guessing at inputs where needed, and then commit substantial sums of money to a particular quality improvement effort. Rather, information must be gathered to support the original managerial estimates, with financial resources committed only after management is convinced that the inputs to the system are sufficiently solid. Figure 3 shows how this process can be visualized as consisting of five distinct stages: (1) preliminary information gathering, (2) identification of possible opportunities, (3) limited testing of improvements, (4) financial projections based on hard data, and (5) full rollout of quality improvement efforts.

Stage 1: Preliminary information gathering. The first stage involves collecting customer survey data, information about the market, and whatever internal information is available and plugging information holes, wherever necessary, with managerial estimates (Griffin and Hauser 1993). In this stage, there is typically heavy use of managerial judgment, because there will inevitably be information gaps in even the most sophisticated companies (Little 1970).

Stage 2: Identification of possible opportunities. In the next stage, the manager identifies the best opportunity for profitable quality improvement. Using the inputs from stage 1, the financial implications of the opportunity (ROQ, NPV, and market share trajectory) are all estimated. It must be re-

⁸Quality is used here as an example. Obviously, the company might instead be measuring customer satisfaction or disconfirmation.

FIGURE 3
The ROQ Quality Improvement Process



alized at this point that these financial projections rely at least partially (and perhaps to a great degree) on "soft" managerial judgment rather than hard data. Thus, it is often advisable to verify the key assumptions before committing large amounts of money.

Stage 3: Limited testing of improvements. Then a limited-scale test of the proposed quality improvement effort is conducted. For example, if a hotel chain wants to test a particular quality improvement effort, then a random sample of the chain's hotels can be used in a test. Of particular interest is whether the costs are as anticipated and the extent to which the expected shift in percent satisfied or percent delight actually occurs. The numbers from the test provide estimates of the effectiveness of the quality improvement effort, based on hard data.

Stage 4: Financial projections based on hard data. Then it is back to the financial impact equations, with the revised cost and effectiveness estimates now used as input. This results in more accurate estimates of the ultimate financial results, such as ROQ, NPV, optimal expenditure level, and market share trajectory, providing a final check of whether the proposed improvement effort is financially justified.

Stage 5: Full rollout of quality improvement efforts. Management can now roll out the quality improvement effort, confident that a strong financial return will result from the necessary expenditure. Equations 1 through 8 can then be used to approximate the actual ROQ, on the basis of the satisfaction improvements actually obtained.

Continual improvement then demands that management go back to stage 1 and reevaluate the business processes for further potential opportunities, on the basis of updated customer survey data.

Summary of Managerial Inputs

Estimating the ROQ requires active management participation. Specifically, there are many things that must be measured, estimated, or otherwise quantified to apply the ROQ approach. Although we have introduced these inputs throughout the article wherever appropriate, we now take stock and catalog exactly what information management must provide to operationalize the ROQ approach.

1. *The key management processes must be identified.* These processes are identified by management. Many companies have identified their key processes as part of TQM or reengineering programs; however we should point out that the processes identified in that way may not be exactly what are needed here. The ROQ approach is *customer focused* rather than externally focused, which means that only those processes that directly affect the customer should be included.
2. *Key dimensions of each process must be obtained.* Exploratory research is used to determine from customers, in the customers' own words, the most important aspects of each process.
3. *Customer retention (or repurchase intention) must be measured.* Ideally, customer retention behavior is obtained from a database, and then is matched with customer satisfaction surveys (Kaarre 1994). Because most organizations are not so fortunate to have such a database, it is often necessary to obtain a repurchase intention measure as part of the customer satisfaction survey.
4. *Customer satisfaction (or a suitable substitute) must be measured.* Almost all major companies already measure customer satisfaction, service quality, or disconfirmation on a routine basis. However, to apply the ROQ approach, the survey questions must be grouped into business processes, overall process satisfaction must be measured, and overall satisfaction must be measured as well. Thus, there typically must be minor additions to the typical survey to be able to apply the ROQ approach.
5. *Market size must be measured.* This involves defining the market in which the firm is competing and then determining the number of customers in the market.
6. *Current market share must be estimated.* Almost all companies already obtain good estimates of market share.
7. *Churn must be estimated.* Churn, the percentage of customers leaving the market altogether in a particular period, is often difficult to obtain directly. Approximate churn can be obtained from secondary sources, such as income tax records and census reports.
8. *The company's current retention rate must be estimated.* On the basis of internal company records (usually) or primary research (sometimes), the probability of a customer choosing this company on the next transaction (if choice is based on transactions, such as is true in hotel stays, for example), or stays with the company until the next period (if long-term relationships are involved, as in banking accounts, for example) must be obtained.
9. *The attraction percentage must be obtained.*⁹ This is the percentage of new (to the market) customers choosing this company (not the same thing as market share).
10. *The market growth rate must be estimated.* Most companies already project this.
11. *The contribution margin from an average customer must be estimated.* This is obtained either per transaction (in transaction businesses) or per period (in businesses entailing continuous relationships). This figure is obtained from internal accounting data.
12. *The cost of capital must be determined.* Companies typically use this number for financial planning.
13. *The time horizon must be specified.* This is the length of time in which an investment project must prove itself. Again, this is a common consideration in financial analysis.
14. *A specific quality improvement alternative must be identified.* Typically, the quality improvement possibility is chosen to improve an important process, as identified by the statistical analysis.
15. *The additional expenditures related to this improvement effort must be estimated.* These estimates may include an up-front expenditure to launch the effort, plus per-period maintenance costs.
16. *Cost savings must be estimated.* For some quality improvement efforts, a significant part of the gain is from cost savings. Although these are not easy to calculate, there has been considerable progress in recent years in quantifying cost savings from quality improvement efforts (Campanella 1990; Carr 1992; Gryna 1988; Nandakumar et al. 1993).
17. *The satisfaction shift must be estimated.* Until market test data are available, management must supply initial estimates of the effect of the improvement effort. The effect is expressed in a way that is compatible with the company's measurement scheme (e.g., shift in mean satisfaction or mean perceived quality, shift in percent satisfied or percent delighted).
18. *Market test data may be obtained.* (optional) Obtaining market test data can help by supplying objectively derived estimates of the satisfaction shifts.

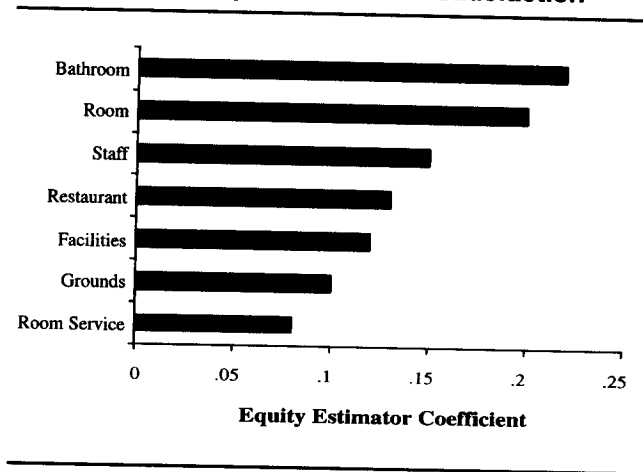
Other Issues

Successful implementation of the ROQ approach requires consideration of several practical issues. Among the most important are modification of existing satisfaction questionnaires, conversion of already existing satisfaction scales, and market segmentation.

Many companies that might want to adopt the ROQ approach may already have existing customer satisfaction surveys (Honovich 1993), and implementing too great a change in the existing survey can cause problems, both with monitoring satisfaction scores over time and in educating managers about what the scores mean. In general, it is advisable to modify the surveys as little as possible. Fortunately, it is usually possible to employ the ROQ approach with only minor modifications to the original survey. In particular, the questions most often missing from the typical customer satisfaction survey are overall satisfaction questions (American Productivity & Quality Center 1994). It is essential, in using the ROQ approach, that overall satisfaction questions be present for the service overall and for each of the processes overall (see Kordupleski, Rust, and Zahorik 1993). It is also necessary to make sure that each satisfaction question relates to a particular managerial process (e.g., installation, billing). This ensures "ownership" of the results by specific managers or teams and makes the survey results more actionable.

⁹We have also developed approximation equations for ROQ that do not require this input.

FIGURE 4
Process Impact on Overall Satisfaction



Segmentation is another issue about which the researcher must be careful. Heterogeneity in the population may mean that some customers respond well to some quality improvement efforts, whereas others respond less well (DeSarbo 1993). Thus, it is advisable to conduct preliminary analysis to see whether segments respond differently and then to conduct ROQ analysis on a segment basis, essentially considering each segment individually, perhaps addressing first the segment currently most important to the business's strategic plan.

An Illustrative Application

Thorough testing of the ROQ approach will require several years to complete. However, we have operationalized the ROQ approach in a PC-based decision support system and implemented the system at two companies that agreed to act as "beta test" sites. We report here some preliminary results from one of those applications. The results we present in this section are disguised to protect the proprietary interests of the company involved, but we have tried to preserve their general pattern.

A National Hotel Chain

Our example beta test site is a national hotel chain that has been tracking customer satisfaction data for several years. The firm sends mail surveys to a random sample of customers within several days after they check out. The questionnaire asks for ratings on seven different processes of the hotel service (e.g., the room, the grounds, the staff, the bathroom), with additional questions on as many as 15 dimensions of each of those processes. The survey also asks an overall satisfaction question, as well as a question on the likelihood of repurchase. The firm has a 30% response rate, and, through telephone follow-ups of nonrespondents, has determined that the answers of respondents appear very representative of the attitudes of nonrespondents. Our data consisted of 7882 individual responses spanning one year.

¹⁰We recognize that there may be some "5" respondents who are not truly delighted. Nevertheless the "5" response is the best proxy for delight that we have available on the survey.

The company's managers had already structured its questionnaire by business processes, so no major modifications were required. To examine nonlinear customer satisfaction effects, we converted their five-point satisfaction scale to a three-point scale. For convenience, we refer to respondents recording 5 as "delighted," 3 and 4 as "satisfied," and 1 and 2 as "dissatisfied."¹⁰

Analysis of repurchase intention as a function of overall satisfaction and delight showed that the disappointed group had only a 45% probability of returning, whereas the satisfied group had a 95% probability and the delighted group had a 97% probability. This indicates that the hotel chain's biggest benefits are derived from converting customers from dissatisfied to satisfied, which is likely accomplished by solving or avoiding problems. However, this must be traded off against the fact that only 9% of the chain's customers are dissatisfied, whereas 75% are merely satisfied. Thus, there is a greater benefit from shifting dissatisfied customers, but there are fewer of them to shift. In this case, it was decided that the huge jump in repurchase probability made trying to reduce the proportion of dissatisfied customers the top priority.

The managers then had to address the issue of where to improve satisfaction. They recognized the importance of focusing on a small number of potential improvements rather than generating a "laundry list" of problems and opportunities. To make sure their effort was focused, they decided to select one key area for improvement by using the ROQ approach to determine the relative impact of satisfaction on each of the processes on overall satisfaction. Figure 4 shows the result of the equity estimator regression coefficients using equation 16. From this we can see that satisfaction with the bathroom has the largest impact on overall satisfaction. Similarly, they investigated the dimensions within the bathroom (Figure 5) and determined that cleanliness was the most powerful variable.

At this point, it was necessary to consider how the improvement would be accomplished, and what it would cost.¹¹ There are various ways to improve bathroom cleanliness. These include instructing the cleaning staff to spend more time cleaning each bathroom, assigning additional personnel to clean bathrooms, or increasing the training on how to clean a bathroom. Ultimately, the managers decided that the appropriate method was to increase the amount of time the cleaning staff would spend on each bathroom. This costs money, because the number of rooms cleaned per day by each cleaning person is reduced.

Limited testing at a handful of hotels revealed the relationship between time spent cleaning each bathroom and satisfaction. The time spent is converted easily to cost, using average wage rates, resulting in the financial relationship shown in Figure 6. Managers estimated that the company was currently spending \$1 million annually on this process dimension. Application of the ROQ approach then calculated the implied NPV for several expenditure levels across a realistic range of possible expenditures (\$600,000 to \$3.6 million annually). An expenditure level of \$2.4 million an-

¹¹This section disguises some elements of the application to protect the proprietary interests of the participating firm.

nually is the best of the candidate expenditure levels, with respect to maximizing the net present values of profit flows over the planning horizon. In this case, the cleaning staff was instructed to spend almost two and a half times as long cleaning each bathroom, with appropriate detailed instructions about exactly how to use that time. Note that this analysis could just as easily have revealed that a reduction in spending was in order.

The ROQ approach also facilitates the estimation of the market share impact of the shift in satisfaction. Figure 7 shows the market share trajectories projected to result from various levels of expenditure. We can see that past \$2.4 million annually, there is very little impact on market share. Because of the dynamics of this particular market, long-term market shares are expected to decline for all spending levels eventually, but they will decline faster if a suboptimal amount is spent on quality.

Finally we can calculate the projected ROQ. Assuming a time horizon of three years, and a discount rate of 15%, the net present value of additional profits were (referring to Figure 6) \$177,121,000, an increase of \$1.641 million. The additional expenditure of \$1.4 million annually, discounted over three years, is \$3.676 million. Thus, the projected ROQ for this quality initiative is

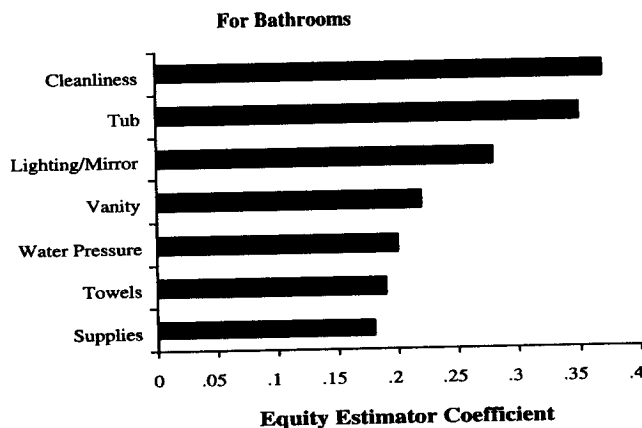
$$(18) \quad \text{ROQ} = \$1.641 / \$3.676 = 44.6\%.$$

A 44.6% return on investment is a very healthy return. This makes it possible for the investment in quality to be considered alongside other investments the firm might make, rather than merely being considered a cost, which could be cut when times are tough.

Discussion and Conclusions

The quality mania of the 1980s has yielded to more sober financial analysis in the 1990s. The result is that many quality initiatives are currently being forced to justify their existence on financial grounds. If a company is not able to specify the return on investment of its quality efforts (the ROQ), those quality efforts cannot compete with other investments

FIGURE 5
Impact of Process Dimension Satisfaction on Process Satisfaction



of the company and are inevitably considered discretionary costs, which can then be cut when times are tough.

To combat this trend, we have devised an approach that can quantify the market share implications, net present value of the resulting profit stream, and ROQ of a proposed quality expenditure. This approach can also reveal where spending for quality improvement may be appropriate and estimate the optimal expenditure level. This approach uses customer satisfaction survey data, internal company data, competitive market data, test market data, and managerial judgments to form its estimates.

We have applied the ROQ approach in two companies as beta tests. In the application described here, the company had a long history of customer satisfaction measurement and quality improvement efforts. The implementation issues there related to adapting the system to their culture and making do with some nonoptimal aspects of their survey process to maintain continuity in their customer satisfaction monitoring. We recommend that those implementing an ROQ system within an already sophisticated company pay special attention to making sure that the ROQ quality improvement

FIGURE 6
Impact of Quality Expenditures on Percent Disappointed

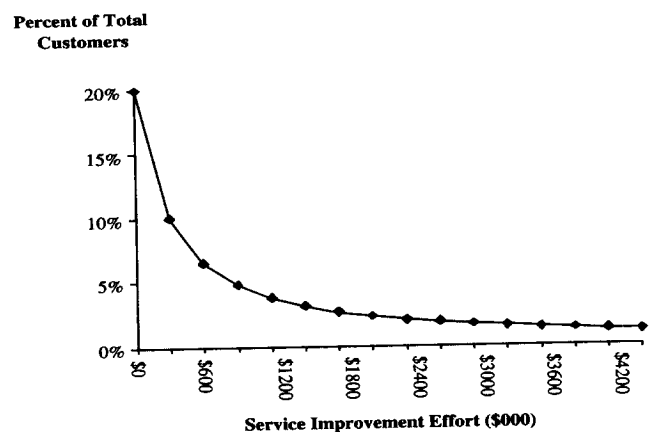
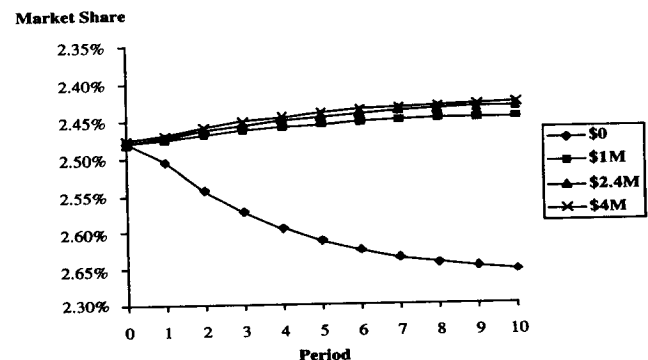


FIGURE 7
Projected Market Share Trajectories Resulting From Different Spending Levels



approach meshes closely with the existing quality improvement approach. Specifically, we recommend that each of the stages shown in Figure 3 be matched closely to, and bonded to existing quality improvement processes within the company. In other words, the system must be positioned as a tool for helping the company to do its existing work better, rather than as a new approach that will force management to work differently.

We were able to tell managers where additional investment might be worthwhile and where it would not be recommended. We were also able to get an idea of the financial implications of potential quality expenditures.

Researchers in the future should validate this approach over time by adopting the quality improvement expenditures the system recommends and then tracking whether the outcomes are as predicted (e.g., see Fudge and Lodish 1977). The system should be applied across several industries to confirm that the approach is sufficiently generalizable. By its nature, this follow-up research will take years to complete, but it is a necessary next step.

To summarize, we have presented a financial approach to quality improvement, which we term the "return on quality (ROQ)" approach. This approach treats quality improvement efforts as investments and assumes that these efforts must be made financially accountable. We note that it is possible to spend too much on quality and that not all quality expenditures are equally valid. The ROQ approach enables managers to determine *where* to spend on service quality, *how much* to spend, and the likely *financial impact* from service expenditures, in terms of revenues, profits, and return on investments in quality improvement—the "return on quality."

REFERENCES

- Aaker, David A. and Robert Jacobson (1994), "The Financial Information Content of Perceived Quality," *Journal of Marketing Research*, 31 (May), 191-201.
- American Productivity & Quality Center (1994), "A Compilation of Customer Satisfaction Surveys and Process Flows." Houston: American Productivity & Quality Center.
- Anderson, Eugene W., Claes Fornell, and Donald R. Lehmann (1994), "Customer Satisfaction, Market Share, and Profitability," *Journal of Marketing*, 58 (July), 53-66.
- _____, _____ and Roland T. Rust (1994), "Customer Satisfaction, Productivity, and Profitability: Differences Between Goods and Services," working paper, University of Michigan.
- _____, _____ and Mary W. Sullivan (1993), "The Antecedents and Consequences of Customer Satisfaction for Firms," *Marketing Science*, 12 (Spring), 125-43.
- Arnold, William W. and Jeanne M. Plas (1993), *The Human Touch*. New York: John Wiley & Sons.
- Babakus, Emin and Gregory W. Boller (1992), "An Empirical Assessment of the SERVQUAL Scale," *Journal of Business Research*, 24, 253-68.
- Bohan, George P. and Nicholas F. Horney (1991), "Pinpointing the Real Cost of Quality in a Service Company," *National Productivity Review* (Summer), 309-17.
- Bolton, Ruth and James Drew (1991a), "A Longitudinal Analysis of the Impact of Service Changes on Customer Attitudes," *Journal of Marketing*, 55 (January), 1-9.
- _____, _____ and _____ (1991b), "A Multistage Model of Customers' Assessment of Service Quality and Value," *Journal of Consumer Research*, 17 (March), 375-84.
- Boulding, William, Ajay Kalra, Richard Staelin, and Valarie A. Zeithaml (1993), "A Dynamic Process Model of Service Quality," *Journal of Marketing Research*, 30 (February), 7-27.
- Brown, Tom J., Gilbert A. Churchill, Jr., and J. Paul Peter (1993), "Improving the Measurement of Service Quality," *Journal of Retailing*, 69 (Spring), 127-39.
- _____, _____ and _____ (1993), "Betting to Win On the Baldie Winners" (October 18), 8.
- Buzzell, Richard and Brad Gale (1987), *The PIMS Principles: Linking Strategy to Performance*. New York: The Free Press.
- Cadotte, Ernest R., Robert B. Woodruff, and Roger L. Jenkins (1987), "Expectations and Norms in Models of Customer Satisfaction," *Journal of Marketing Research*, 24 (August), 353-64.
- Campanella, Jack (1990), *Principles of Quality Costs*, 2nd ed. Milwaukee: ASQC Quality Press.
- Carman, J. (1990), "Consumer Perceptions of Service Quality: An Assessment of SERVQUAL Dimensions," *Journal of Retailing*, 66 (Spring), 33-55.
- Carr, Lawrence P. (1992), "Applying Cost of Quality to a Service Business," *Sloan Management Review*, (Summer), 72-77.
- Chandler, Colby H. (1989), "Quality: Beyond Customer Satisfaction," *Quality Progress*, 22 (February), 30-32.
- Churchill, Gilbert A., Jr. and Carol Surprenant (1982), "An Investigation Into the Determinants of Customer Satisfaction," *Journal of Marketing Research*, 19 (November), 491-504.
- Cronin, J. Joseph and Steven A. Taylor (1992), "Measuring Service Quality: A Reexamination and Extension," *Journal of Marketing*, 56 (July), 55-68.
- _____, _____ and _____ (1994), "SERVPERF Versus SERVQUAL: Reconciling Performance-Based and Perception-Minus-Expectations Measurement of Service Quality," *Journal of Marketing*, 58 (January), 125-31.
- Crosby, Philip B. (1979), *Quality is Free*. New York: McGraw Hill.
- Dawkins, Peter and Frederick F. Reichheld (1990), "Customer Retention as a Competitive Weapon," *Directors and Boards*, 14 (Summer), 41-47.
- Day, Ralph S. (1984), "Toward a Process Model of Consumer Satisfaction," in *Conceptualization and Measurement of Consumer Satisfaction and Dissatisfaction*, H. Hunt, ed. Cambridge, MA: Marketing Science Institute.
- Dean, James W., Jr. and James R. Evans (1994), *Total Quality Management, Organization, and Strategy*. Minneapolis: West Publishing Company.
- Deming, W. Edwards (1986), *Out of the Crisis*. Boston: MIT Center for Advanced Engineering Study.
- DeSarbo, Wayne (1993), "Consumer Heterogeneity in Service Quality Perception and Attribute Importance," presented at the AMA Frontiers in Services Conference, Nashville, TN.
- _____, Leonard Huff, Marcello M. Rolandelli, and Jungwhan Choi (1994), "On Measurement of Perceived Service Quality: A Conjoint Measurement Approach," in *Service Quality*, R.T. Rust and R.W. Oliver, eds. Thousand Oaks, CA: Sage Press, 199-220.
- Devlin, Susan J., H.K. Dong, and Marbue Brown (1993), "Selecting a Scale for Measuring Quality," *Marketing Research*, 5 (3), 12-17.
- Erevelles, S. and Clark Leavitt (1992), "A Comparison of Current Models of Consumer Satisfaction/Dissatisfaction," *Journal of Consumer Satisfaction, Dissatisfaction, and Complaining Behavior*, 5, 104-14.
- Fornell, Claes (1992), "A National Customer Satisfaction Barometer: The Swedish Experience," *Journal of Marketing*, 56 (January), 6-21.
- _____, Leonard Huff, and Eugene W. Anderson (1994), "Are There Trade-offs Between Productivity and Quality?" working

- paper, National Quality Research Center, University of Michigan.
- _____ and Birger Wernerfelt (1987), "Defensive Marketing Strategy by Customer Complaint Management: A Theoretical Analysis," *Journal of Marketing Research*, 24 (November), 337-46.
- _____ and _____ (1988), "A Model for Customer Complaint Management," *Marketing Science*, 7 (Summer), 271-86.
- Fudge, W.K. and Leonard M. Lodish (1977), "Evaluation of the Effectiveness of a Model-Based Salesman's Planning System by Field Experimentation," *Interfaces*, 8, Part 2 (November), 97-106.
- Garvin, David A. (1984), "What Does 'Product Quality' Really Mean?" *Sloan Management Review* (Fall), 25-48.
- Grant, Robert W., Rami Shani, and R. Krishnan (1994), "TQM's Challenge to Management Theory and Practice," *Sloan Management Review* (Winter), 25-35.
- Green, Paul and V. Srinivasan (1978), "Conjoint Analysis in Consumer Research: Issues and Outlook," *Journal of Consumer Research*, 5 (September), 103-23.
- _____ and _____ (1990), "Consumer Research in Marketing: New Developments with Implications for Research and Practice," *Journal of Marketing*, 54 (October), 3-19.
- Greising, David (1994), "Quality: How to Make It Pay," *Business Week* (August 8), 54-59.
- Griffin, Abbie and John R. Hauser (1993), "The Voice of the Customer," *Marketing Science*, 12 (Winter), 1-25.
- Griliches, Ziv (1971), *Price Indices and Quality Change*. Cambridge, MA: Harvard University Press.
- Gryna, Frank M. (1988), "Quality Costs," in *Quality Control Handbook*, 4th ed. New York: McGraw-Hill, 4.1-4.30.
- Hauser, John R., Duncan I. Simester, and Birger Wernerfelt (1994), "Customer Satisfaction Incentives," *Marketing Science*, 13 (Fall), 327-50.
- Heskett, James L., W. Earl Sasser, Jr., and Christopher W. L. Hart (1990), *Service Breakthroughs*. New York: The Free Press.
- Hill, R. Carter and P.A. Cartwright (1994), "The Statistical Properties of the Equity Estimator," *Journal of Business and Economic Statistics*, 12 (April), 141-47.
- Hill, Robert C. (1993), "When the Going Gets Rough: A Baldrige Award Winner On the Line," *Academy of Management Executive*, 7 (August), 75-79.
- Hoerl, A.E. and R.W. Kennard (1970), "Ridge Regression: Biased Estimation for Non-Orthogonal Problems," *Technometrics*, 12, 55-67.
- Honomichl, Jack (1993), "Spending on Satisfaction Measurement Continues to Rise," *Marketing News* (April 12), 17-18.
- Juran, J.M. and Frank M. Gryna, Jr. (1980), *Quality Planning and Analysis: From Product Development Through Use*. New York: McGraw-Hill.
- Kaarre, Jim (1994), "Perceived Value, Customer Satisfaction, and Profitability: An Actionable Perspective," presentation at the Third Annual AMA Frontiers in Services Conference, Nashville, TN.
- Kordupleski, Ray, Roland T. Rust, and Anthony J. Zahorik (1993), "Why Improving Quality Doesn't Improve Quality," *California Management Review*, 35 (Spring), 82-95.
- Krishnamurthi, Lakshman and Arvind Rangaswamy (1987), "The Equity Estimator for Marketing Research," *Marketing Science*, 6 (Fall), 336-57.
- _____ and _____ (1994), "The Statistical Properties of the Equity Estimator: A Reply," *Journal of Business and Economic Statistics*, 12 (April), 149-53.
- Little, John D.C. (1970), "Models and Managers: The Concept of a Decision Calculus," *Management Science*, 16 (April), B466-85.
- Lord, Frederick M. (1958), "The Utilization of Unreliable Difference Scores," *Journal of Educational Psychology*, 19 (3), 150-52.
- Nandakumar, P., S.M. Datar, and R. Akella (1993), "Models for Measuring and Accounting for Cost of Conformance Quality," *Management Science*, 39 (January), 1-16.
- Nelson, Eugene, Roland T. Rust, Anthony Zahorik, Robin L. Rose, Paul Batalden, and Beth A. Siemanski (1992), "Do Patient Perceptions of Quality Relate to Hospital Financial Performance?" *Journal of Health Care Marketing*, 13 (December), 1-13.
- Oliva, Terence A., Richard L. Oliver, and Ian C. MacMillan (1992), "A Catastrophe Model for Developing Service Satisfaction Strategies," *Journal of Marketing*, 56 (July), 83-95.
- Oliver, Richard L. (1980), "A Cognitive Model of the Antecedents and Consequences of Satisfaction Decisions," *Journal of Marketing Research*, 42 (November), 460-69.
- _____ (1989), "Processing of the Satisfaction Response in Consumption: A Suggested Framework and Research Propositions," *Journal of Consumer Satisfaction, Dissatisfaction, and Complaining Behavior*, 2, 1-16.
- _____ (1993), "A Conceptual Model of Service Quality and Service Satisfaction: Compatible Goals, Different Concepts," in *Advances in Services Marketing and Management: Research and Practice*, Teresa A. Swartz, David E. Bowen, and Stephen W. Brown, eds., 2, 65-85.
- _____ and Wayne DeSarbo (1988), "Response Determinants in Satisfaction Judgments," *Journal of Consumer Research*, 14 (March), 495-507.
- _____ and John Swan (1989), "Equity and Disconfirmation Perceptions as Influences on Merchant and Product Dissatisfaction," *Journal of Consumer Research*, 16 (December), 372-83.
- Olshavsky, R. and J. Miller (1972), "Consumer Expectations, Product Performance and Perceived Product Quality," *Journal of Marketing Research*, 9 (February), 19-21.
- Olson, Jerry C. and Philip Dover (1976), "Disconfirmation of Consumer Expectations Through Product Trial," *Journal of Applied Psychology*, 64 (April), 179-89.
- Parasuraman, A., Valarie A. Zeithaml, and Leonard Berry (1985), "A Conceptual Model of Service Quality and its Implications for Further Research," *Journal of Marketing*, 48 (Fall), 41-50.
- _____, _____, and _____ (1988), "SERVQUAL: A Multiple-Item Scale for Measuring Consumer Perceptions of Service Quality," *Journal of Retailing*, 64 (1), 12-40.
- Payne, Adrian and John Rickard (1993), "Relationship Marketing, Customer Retention and Service Firm Profitability," working paper, Cranfield University.
- Peter, J. Paul, Gilbert A. Churchill, Jr., and Tom H. Brown (1993), "Caution in the Use of Difference Scores in Consumer Research," *Journal of Consumer Research*, 19 (March), 655-62.
- Peters, Thomas J. (1988), *Thriving on Chaos*. New York: Alfred A. Knopf.
- Peterson, Robert A. and William R. Wilson (1992), "Measuring Customer Satisfaction: Fact and Artifact," *Journal of the Academy of Marketing Science*, 10 (Winter), 61-71.
- Rangaswamy, Arvind and Lakshman Krishnamurthi (1991), "Response Function Estimation Using the Equity Estimator," *Journal of Marketing Research*, 28 (February), 72-83.
- Reichheld, Frederick F. and W. Earl Sasser (1990), "Zero Defections: Quality Comes to Service," *Harvard Business Review*, (September-October), 105-11.
- Rice, Faye (1990), "How to Deal With Tougher Customers," *Fortune* (December 3), 38-48.
- Rose, S. (1990), "The Coming Revolution in Credit Cards," *Journal of Retail Banking*, 12 (Summer), 17-19.
- Rust, Roland T., Bala Subramanian, and Mark Wells (1992), "Making Complaints a Management Tool," *Marketing Management*, 3, 40-45.

- _____ and Anthony J. Zahorik (1993), "Customer Satisfaction, Customer Retention and Market Share," *Journal of Retailing*, 69 (Summer), 193-215.
- Spitzer, Richard D. (1993), "Valuing TQM Through Rigorous Financial Analysis," *Quality Progress* (July), 49-54.
- Teas, R. Kenneth (1993), "Expectations, Performance Evaluation, and Consumer Perceptions of Quality," *Journal of Marketing*, 57 (October), 18-34.
- Tse, David K. and Peter C. Wilton (1988), "Models of Consumer Satisfaction Formation: An Extension," *Journal of Marketing Research*, 25 (May), 204-12.
- Training (1991), "The Post-Deming Diet: Dismantling a Quality Bureaucracy," 28 (February), 41-43.
- Westbrook, Robert A. and Richard L. Oliver (1991), "The Dimensionality of Consumption Emotion Patterns and Consumer Satisfaction," *Journal of Consumer Research*, 18 (June), 84-91.
- Whittaker, Barrie (1991), "The Path to Excellence," *Canadian Business Review* (Winter), 18-21.
- Wiesendanger, Betsy (1993), "Deming's Luster Dims at Florida Power & Light," *Journal of Business Strategy*, 14 (September-October), 60-61.
- Wind, Jerry, Paul E. Green, Douglas Shifflet, and Marsha Scarbrough (1989), "Courtyard by Marriott: Designing A Hotel Facility with Consumer-Based Marketing Models," *Interfaces*, 19 (January-February), 25-47.
- Zahorik, Anthony J. and Roland T. Rust (1992), "Modeling the Impact of Service Quality on Profitability: A Review," in *Advances in Service Marketing and Management*, T. Swartz, ed. Greenwich, CT: JAI Press, 247-76.
- Zeithaml, Valarie A., Leonard Berry, and A. Parasuraman (1993), "The Nature and Determinants of Customer Expectations of Service," *Journal of the Academy of Marketing Science*, 21 (Winter), 1-12.

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