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A Framework for Monitoring Customer Satisfaction:

An Empirical Illustration

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This article presents an empirical illustration of a framework for monitoring customer satisfaction over time. Three years of data from a customer satisfaction program of a large Fortune 500 firm is used to illustrate the framework and the associated methodologies. The framework provides management with important insights into monitoring and improving customer satisfaction. Any firm desiring to develop a program for systematically monitoring customer satisfaction easily can adapt the framework.

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INTRODUCTION

Monitoring customer satisfaction is one of the most important goals of a firm as research studies suggest that customer dissatisfaction is the overwhelming reason why customers leave a company [1]. Furthermore, customer satisfaction has been shown to increase loyalty, increase repeat purchase intentions, generate positive word-of-mouth, and generate less complaint behavior [2]. In contrast, customer dissatisfaction increases switching behavior, generates negative word-of-mouth, and increases complaint behavior [3]. Thus, customer satisfaction has an impact on revenue generation and cost of doing business.

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The mechanism by which customer satisfaction increases revenue is twofold. First, increased customer satisfaction generates positive word-of-mouth and brings in new customers for the firm. Furthermore, satisfied customers are more likely to view the firm as less risky and thus are more likely to adopt other products from the same firm [3, 4]. Second, customer satisfaction has a positive impact on customer retention, which increases repeat sales. Compared to new customers, loyal customers are likely to increase volume and frequency of purchase with the company and are more likely to fulfill their needs with products of the favored company rather than splitting their spending budget among competing firms. For example, British Airways found that every pound spent on customer satisfaction and recovery effort generated two pounds of additional revenue [1]. In addition, loyal customers have lower price elasticities [6] and compared to other customers are more likely to purchase at full prices rather than at discount prices [5].

There are four main reasons why customer satisfaction decreases costs. First, it is less costly to retain existing customers than to acquire new customers [6, 3]. It has been estimated that on average the cost of attracting new customers is almost five times that of retaining existing customers [5]. Second, increasing customer satisfaction reduces costs of complaint handling, which in turn reduces operating costs. Third, existing customers provide the company opportunities to reduce transaction costs. This is particularly true for high volume customers who provide opportunities for economies of scale in areas such as distribution, billing, and maintenance. Finally, having satisfied customers increases employee productivity, which in turn reduces costs [1].

To summarize, customer satisfaction is related to loyalty, which in turn leads to increased profitability, market share, and growth. Given the importance of customer satisfaction to a firm's long-term business survival and growth, monitoring customer satisfaction cannot be ignored and should be an important activity of the firm. Systematically monitoring customer satisfaction over time can provide useful diagnostic information to managers on a periodic basis. This information can be used to identify areas of improvement that would increase customer satisfaction, develop long-term relationships between the firm and its customers, and improve profitability. Thus, the purpose of this article is to illustrate the use of a framework for monitoring customer satisfaction. Furthermore, an illustration of how the framework can be used to develop actionable strategies is provided. The organization of the article is as follows. First, we present a conceptual definition of customer satisfaction as operationalized in this study. Second, we present and discuss the framework used in this study for monitoring customer satisfaction. Third, using three consecutive years of customer satisfaction data from a Fortune 500 firm that sells large computer systems to business customers, we provide an empirical illustration of the methodology used to implement the framework. Finally, we discuss how the framework can be used to monitor customer satisfaction and if necessary develop strategic responses to improve or maintain acceptable levels of customer satisfaction.

CONCEPTUALIZATION OF CUSTOMER SATISFACTION

The time horizon concept of the consumption experience has resulted in two different conceptualizations of customer satisfaction: transaction specific satisfaction and cumulative satisfaction [6–9]. The traditional view of satisfaction has its roots in the satisfaction/dissatisfaction paradigm, in which satisfaction is event specific and typically is defined as the postconsumption evaluative judgment of a particular transaction [10, 11]. The cumulative view of customer satisfaction, on the other hand, is more recent and is viewed as the cumulative satisfaction with all previous consumption experiences over time [6, 7, 12, 13]. That is, cumulative satisfaction represents the outcome of a learning process in which the consumer learns or remembers his/her satisfaction with all the previous transactions. In fact, firms practicing the relationship-marketing concept would be more interested in the cumulative view of customer satisfaction. Consequently, in this study, we adopt the cumulative view of customer satisfaction, and henceforth the term satisfaction will be

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Systematically monitoring satisfaction over time can provide useful diagnostic information to managers.

used to represent cumulative satisfaction with the firm's product or services.

FRAMEWORK FOR MONITORING CUSTOMER SATISFACTION

The framework used is based on the literature on control theory and is adapted from the framework used by Sharma and Achabal [14]. According to control theory, the primary objectives of control models are to identify changes in the performance criteria, determine its causes, and take the necessary corrective actions to bring the system back into control [15].[1] Control models can be classified as yes–no control models, postaction control models, and steering control models [16]. Of these three types of control models, the steering control model is consistent with the concept of monitoring satisfaction over time. The major objective of a steering control model is to develop a plan to *steer* the process to meet the set objectives. Figure 1 depicts the steering control model adapted from Sharma and Achabal [14] that will be used to monitor customer satisfaction.

As shown in Figure 1, the first step is for management to set clear objective(s) and the target satisfaction level they expect to achieve. Obviously, considerable effort needs to be spent in developing the objective(s), and it must be set by consensus of the various parties responsible for achieving the objective(s). Furthermore, the goals or the target satisfaction level should be realistic and achievable so as not to frustrate employees or overstrain the system. Setting an unrealistic target level could be detrimental to the survival of a firm. For example, high levels of spending on quality by Wallace Company, which won them the Malcolm Baldridge National Quality Award in 1990, was one of the reasons for their ultimate bankruptcy [9]. Second, a strategy for meeting the targeted satisfaction levels needs to be developed and executed.

Third, the management should be in a position to measure and compare the actual satisfaction level with the target satisfaction level. If the actual satisfaction level does not deviate *significantly* from the target level or shows a *significant trend*, then satisfaction is assumed to be under control. On the other hand, if there is a significant difference or a trend then satisfaction is considered to be out of control and corrective measures need to be taken to *steer* the process back in control. It should be noted that such a monitoring of customer satisfaction is similar in concept to that of monitoring quality levels in a production process or monitoring pollutant levels in a manufacturing plant.

Fourth, if the target satisfaction level is not met, then management needs to identify the causes for not meeting the set target level. Typically, in order to provide diagnostic information for identifying the causes of not meeting the target level or for improving satisfaction, the firm not only needs to measure satisfaction with the product or service but also satisfaction with the various features of the product or service. That is, knowledge of satisfaction with not only the core product but also with other components that form the augmented product is necessary [17]. For example, take the case of services provided by a hospital. A patient's *overall satisfaction* with the hospital will be a function of his/her satisfaction with such activities as admission procedures, appearance of waiting area, food, general appearance of the room, courteousness of staff, and the services provided by the medical staff (e.g., nurses and physicians).[2]

[1] See Sharma and Achabal [14] and the references therein for a detailed discussion of control theory.

[2] The term *overall satisfaction* is used to indicate that it is cumulative satisfaction with the augmented product and not just the core product.

A steering control model can be used to monitor customer satisfaction.

Fifth, having determined the causes for not meeting the target level, management must take corrective action. The corrective action could be a change in the objectives as it is quite possible that in setting the initial goals the management may have become overzealous resulting in the setting of an unrealistic target satisfaction level. On the other hand, it is quite possible that the target satisfaction level set is realistic but was not achieved. In such situations, management will have to develop a marketing plan for achieving the target satisfaction level.

Finally, the marketing plan is implemented, and the satisfaction level is measured again to assess the impact of the changes made. Monitoring customer satisfaction is achieved by periodically measuring customer satisfaction over time. The frequency of measurement obviously depends upon the product category. For example, some companies use an annual survey, while others use quarterly or monthly surveys.

EMPIRICAL ILLUSTRATION

The use of the framework presented in Figure 1, and the methodology for implementing it will be illustrated by employing data from the customer satisfaction program initiated by a large Fortune 500 firm. It should be noted that the operationalization of the framework and the measurement of customer satisfaction are consistent with the three-step process described by Perkins [18]: (1) determine the underlying dimensions effecting overall satisfaction; (2) asking

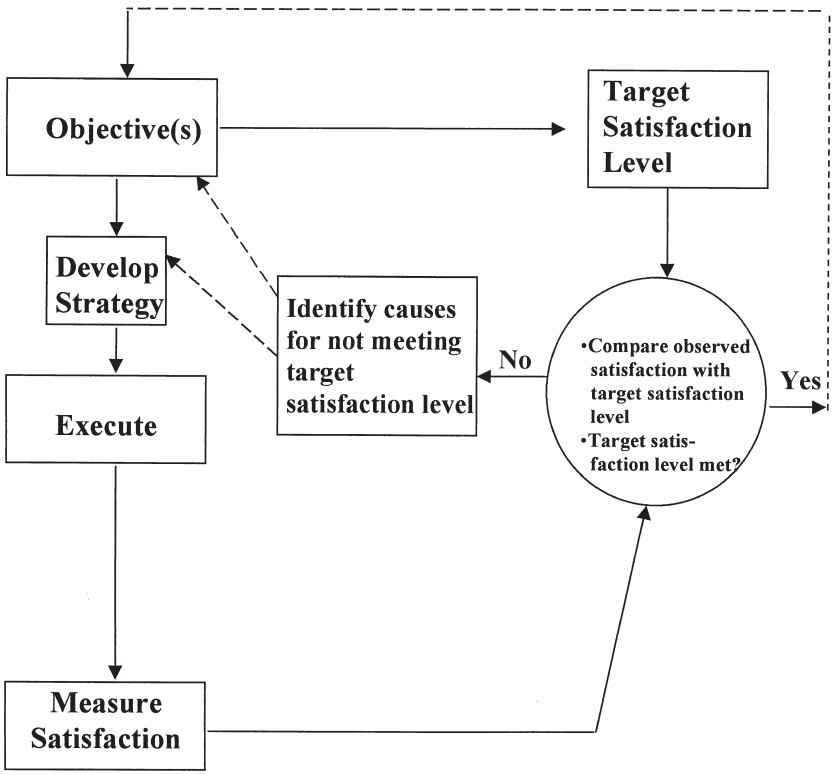

FIGURE 1. **Framework for monitoring satisfaction.**

It is important to identify the determinants, or drivers, of overall satisfaction with the company.

customers to rate their satisfaction along these dimensions; and (3) asking customers to rate their overall satisfaction with the company. The data used here pertains to a particular type of computer system, which is installed at customers' sites. In order to maintain confidentiality, the data, strategic decisions, and the resulting tactics are disguised without effecting the empirical illustration of the framework. A commercial market research firm collected these data.

Determinants of Overall Satisfaction

As previously mentioned, one objective of the framework is to identify the causes for not meeting the set objectives. That is, the study must identify areas where improvements can have the largest impact on satisfaction. Therefore, it is important to design satisfaction studies that help managers identify these areas. This can be achieved by structuring the satisfaction study around business functions and processes [9].

In the present case, the overall performance of computer systems installed by the firm depends upon a number of product-components or activities of the business (e.g., hardware, software, service, and installation). Performance of each of these product-components is very important to the customer. The customers' overall satisfaction with the company's products would obviously be a function of the customers' satisfaction with each of the salient product-components that form the augmented product. The salient product-components can be viewed as the determinants of overall satisfaction. Using in depth discussion with managers of the firm and its customers, the research team identified the following 10 determinants of overall satisfaction: (1) sales team leader; (2) business solution development; (3) delivery; (4) installation; (5) product; (6) hardware maintenance; (7) software and technical support; (8) education; (9) cost of ownership; and (10) invoice. Table 1 provides a brief description of each of these factors. Each one of these determinants is hypothesized to have a positive affect on overall satisfaction. Figure 2 presents the structural model depicting relationships between the 10 determinants of overall satisfaction and overall satisfaction.

Developing Measures of Overall Satisfaction and Its Determinants

A commercial market research firm developed multiple measures for overall satisfaction and its determinants.

TABLE 1
Description of Determinants of Overall Satisfaction

Determinants of Overall Satisfaction	Description
Sales team leader	The sales team leader is the primary contact between the company and the customer and leads a group of specialists that meets with the customer to assess their needs, identify solutions, and to close the sale.
Business solution development	An activity of the sales team, which includes helping the customer in identifying objectives, needs, and problems and suggesting solutions to address them.
Delivery	The activity of providing the promised goods and services on time to the customer.
Installation	The activity of putting into service the delivered product.
Product	The product consisting of hardware and the necessary software.
Hardware maintenance	The activity of timely replacement of failed parts, scheduled maintenance, and hardware upgrades.
Software and technical support	The activity of providing after sales services with respect to technical and software problems.
Education	The activity of conducting training courses to use the system and providing accurate and updated user manuals.
Cost of ownership	Actual cost of acquiring the product and operating costs.
Invoice	Invoicing procedures such as timeliness, clarity, accuracy, billing questions, and consistency of shipping documents.

Quantitative and qualitative analysis can be used to develop a strategy to improve customer satisfaction.

A two-stage process was used to develop these measures. First, in-depth literature review and in-depth interviews with managers and customers were used to develop a pool of items to measure overall satisfaction and its 10 determinants. Next, a group of managers from various departments of the firm and a sample of customers evaluated the items and, based on their suggestions, some of the items were deleted and/or modified, and if necessary

FIGURE 2. Structural model.

Monitoring customer satisfaction can be used to identify trends that serve as early warning signals.

additional items were generated to measure the respective construct (i.e., determinant of overall satisfaction).

The resulting questionnaire containing the items was pretested by the research firm using a sample of over 100 customers of the firm. The customers were queried with respect to each item's appropriateness to represent the respective construct (i.e., overall satisfaction and its determinants), its clarity, wording, and so on. Also, the data were subjected to exploratory factor analysis to determine if the items loaded on respective factors. Based on the results of factor results, some items were modified and/or deleted to obtain the final questionnaire.[3]

Data

A telephone survey was conducted to collect the data. The questionnaire was administered to a sample of the firm's customers by the market research firm. Seven-point Likert-type scales were used (e.g., very dissatisfied being 1 to very satisfied being 7). The total number of usable questionnaires was 2,183 for 1993, 1,913 for 1994, and 2,146 for 1995.

Measurement Model Results

OVERALL CONFIRMATORY FACTOR ANALYSIS. The properties of the measurement model were examined by confirmatory factor [20]. An 11-factor correlated model was fitted to the data by using LISREL, a software package for analyzing structural equation models [21].[4] The 11 factors were overall satisfaction and its 10 determinants (see Figure 2). Table 2 presents the results. All the χ^2 tests are significant ($P < .05$) suggesting that statistically the model does not fit the data. However, due to the sensitivity of the χ^2 test to sample size, other recommended goodness-of-fit indices such as TLI, RNI, and RMSEA were used to assess model fit [24, 25]. A model is said to have an acceptable fit if the value of these indices are close or above 0.90 for *TLI, RNI* and close or below .05 for *RMSEA*.[5] As can be seen from Table 2, values of all the fit indices are close or above (below for RMSEA) the recommended cutoff values, suggesting that model fits are adequate. All the factor loadings were statistically significant at $P < .05$ with the majority of the items (93.8%) having a loading of above .707 suggesting that each of these statement's shared variance with its respective construct was greater than .500. Table 3 gives the reliabilities for overall satisfaction and its 10 determinants computed using the procedure recommended by Werts et al. [26]. The reliabilities for all the constructs range from .729 to .961, which are considered acceptable [27].

UNIDIMENSIONALITY AND DISCRIMINANT VALIDITY. As previously mentioned, based on the goodness-of-fit indices the fit of the overall model was acceptable. The unidimensionality of each construct with more than three indictors was then examined by using confirmatory factor analysis for each construct. Based on the goodness-of-fit indices model, fits were acceptable, thus establishing support for the unidimensionality of each construct. The discriminant validity of all the determinants of overall satisfaction was examined using procedures suggested by Fornell and Larcker [28] and Bagozzi [29]. Both of these procedures lend support for the discriminant validity of the constructs.

[3] Essentially the research team followed the recommended procedures for developing reliable measurement scales [19].

[4] Structural equation models also can be analyzed using other software packages such as partial least squares (PLS) [22] and CALIS [23]. It should be noted that PLS is conceptually different from LISREL, and some researchers prefer PLS over LISREL as PLS does not make assumptions regarding distribution of the data. However, recent releases of LISREL and CALIS do give the user options of using distribution free estimation techniques.

[5] It should be noted that these cutoff values are purely arbitrary. Considerable debate is taking place in the structural equation modeling literature regarding the use of these arbitrary cutoff values for assessing model fit. Many researchers have advocated against the use of such arbitrary cutoff values for assessing model fit [24, 25].

TABLE 2
Overall Fit Statistics for Confirmatory Factor Analysis

	Fit Statistics						
Year	χ^2	df	TLI	RNI	GFI	RMR	RMSEA
1993	3,443	1,897	.875	.882	.809	.073	.040
1994	2,713	1,897	.882	.889	.826	.069	.033
1995	2,441	1,897	.893	.899	.831	.065	.027

Structural Model Results

The structural model presented in Figure 2, in which the overall satisfaction is posited as a function of its 10 determinants, was estimated using structural equation analysis program (e.g., LISREL). Since mathematically the structural model is equivalent to the correlated measurement model analyzed in the previous section, the fit indices of the structural model will be the same as those reported in Table 2. That is, the fit of the structural model is also acceptable. Table 4 presents the standardized structural coefficients (estimated using the maximum likelihood estimation technique in LISREL) and the R^2 values. All the R^2 values are high suggesting that indeed there is a strong relationship between the determinants and overall satisfaction. Note that some of the parameter estimates have a negative sign, which is counterintuitive as *a priori* each determinant is hypothesized to positively affect overall satisfaction. However, all of the parameters having negative signs are not statistically significant. The negative signs are probably due to multicollinearity among the independent constructs. Some of the other indicators for diagnosing multicollinearity are the variance inflation factors [30] and the collinearity index [31]. Values greater than 10 for these indices suggest the presence of severe multicollinearity. Table 4 also presents the variance inflation factors and the collinearity index. As can be seen, none of the indices are greater than 10. However, since the signs for some of the determinants are not as expected, it is suspected that multicollinearity is present because it is well known that in the presence of multicollinearity the parameter estimates are unstable and may have wrong or unexpected signs [30–32]. In order to mitigate the affects of multicollinearity on the parameter estimates, ridge regression, a biased estimation technique, was used [33].[6] The correlation matrix among the dependent and independent constructs from the structural model estimated by LISREL was used. It should be noted that the correlations among the exogenous and endogenous constructs reported by LISREL are attenuated for measurement errors. The ridge trace was used to identify the biasing constant, which usually ranges between 0 and 1 [30]. The ridge traces for all 3 years were very similar. A biasing constant of .6 was selected for all the 3 years as the parameter estimates stabilized and the variance inflation factors for all the determinants were less than 1 [30]. Table 4 also presents the standardized ridge regression estimates and model R^2. Note that all structural coefficients now have expected positive signs, and all but one are statistically significant at $P < 0.05$. Once again, the R^2 values suggest that the exogenous constructs have a substantial impact on overall satisfaction.

TABLE 3
Construct Reliabilities

	Number of Indicators	Year		
		1993	1994	1995
Overall satisfaction	3	.760	.729	.755
Installation	2	.878	.836	.876
Sales team leader	10	.952	.950	.956
Product	13	.934	.936	.940
Delivery	5	.931	.942	.936
Hardware maintenance	5	.932	.926	.938
Software and technical support	6	.961	.955	.954
Business solution development	9	.953	.957	.957
Education	4	.883	.901	.920
Cost of ownership	3	.906	.927	.953
Invoice	4	.939	.940	.943

MONITORING CUSTOMER SATISFACTION

Is the Target Satisfaction Level Met?

As per the framework in Figure 1, the actual overall satisfaction level is compared with the target satisfaction level to determine if the actual overall satisfaction meets the set target. Table 4 also presents the mean satisfaction scores for overall satisfaction and its determinants. Suppose we assume that management has set a target of achieving a score of 5.60 for overall satisfaction.[7] The value of 5.32 for mean satisfaction score in 1993 was significantly different from 5.6 ($t = -9.00$; $P < 0.05$) and hence overall satisfaction was well below the set target. That is, the target satisfaction level was not met.

[6] Theoretically, biased estimation techniques result in estimates that are biased but have smaller variances. It should be noted that some researchers do not prefer to use biased estimation techniques as the direction of bias is not known and in practice these estimates may not have smaller variance [31, 32]. These researchers prefer to use the unbiased maximum likelihood estimates in lieu of biased estimates.

[7] We would like to emphasize once again that this is not the actual goal as the data are disguised.

TABLE 4
Structural Model Results

	Standardized Structural Coefficients								
	LISREL Estimates			Ridge Regression Estimates			Mean Satisfaction Scores		
	Year			Year			Year		
Construct	1993	1994	1995	1993	1994	1995	1993	1994	1995
Overall satisfaction	–	–	–	–	–	–	5.32	5.59	5.70
Sales team leader	.475 (2.008)*	.391 (2.201)	.359 (2.126)	.287	.256	.245	5.44	5.73	5.78
Business solution development	.164 (2.804)	.248 (3.467)	.374 (3.047)	.177	.208	.244	4.70	5.11	5.28
Delivery	.064‡ (1.683)	.070‡ (1.739)	.009‡ (1.551)	.072	.080	.054	5.33	5.51	5.60
Installation	.015‡ (2.033)	.064‡ (2.230)	.043‡ (1.892)	.068	.096	.084	5.65	5.87	5.92
Product	.095 (2.215)	.120 (2.496)	.138 (2.605)	.105	.132	.144	5.25	5.46	5.62
Hardware maintenance	.215 (1.626)	.154 (1.725)	.231 (1.669)	.147	.124	.157	5.41	5.53	5.54
Software and technical support	.108 (2.082)	.163 (2.089)	.084‡ (2.120)	.117	.134	.120	4.87	5.26	5.40
Education	−.004‡ (1.482)	−.035‡ (1.456)	−.064‡ (1.316)	.042	.025	.004‡	5.13	5.33	5.45
Cost of ownership	.229 (1.601)	.182 (1.611)	.133 (1.638)	.157	.136	.118	4.66	5.00	5.09
Invoice	−.002‡ (1.324)	.037‡ (1.399)	.031‡ (1.348)	.033	.059	.054	5.22	5.48	5.53
Collinearity index	4.376	4.903	4.285	–	–	–	–	–	–
R^2	.860	.926	.945	.828	.902	.915	–	–	–

* Numbers in parentheses are variance inflation factors.
‡ indicates not significant at $P < .05$.

Identify Causes for Not Meeting the Target

The next step in the framework is to identify the causes the target satisfaction level is not met. This is accomplished by first identifying the determinants of overall satisfaction that might be responsible for the low satisfaction, which when improved would lead to an increase in satisfaction with these determinants and with the overall satisfaction. The obvious candidates are determinants having low satisfaction levels and high relative importance. Standardized ridge regression coefficients are used as measures of relative importance of the determinants of overall satisfaction.[8] Figure 3 presents "Quadrant Map" results for 1993 [34]. A visual examination of the quadrant map suggests three clusters. The three-cluster solution was confirmed by using hierarchical and nonhierarchical cluster analysis. Based on the three-cluster solution, software and technical support, cost of ownership, and business solution development were identified as the main causes for not meeting the target level. Clearly these determinants were identified because they are important and have the lowest satisfaction scores.

[8]We also employed standardized LISREL estimates, which are maximum likelihood estimates, as measures of relative importance. The results and conclusions do not change.

Next, a qualitative analysis was conducted. Specifically, discussions with senior and midlevel managers, examination of the statements used to measure the determinants, verbal comments provided during data collection, and follow-up interviews with a sample of key customers were used to identify the causes of low satisfaction. From these discussions it became quite apparent that the satisfaction level with business solution development was being affected by the feeling that the company's sales team did not adequately address the customers' business needs and did not provide adequate solutions to their problems. Although the sales team leader did provide help in this matter, the customers felt that they did not know whom in the organization they should turn to in case they had problems or needed help. This perception led to a feeling that enough sales and software and technical support were not being provided for running the system. These problems, in turn reflected in a low evaluation of the cost of ownership.

Developing the Strategy to Improve Satisfaction

The above quantitative and qualitative analyses were used to develop a strategy to improve overall satisfaction. First, the management felt that a major reorganization of the sales team was needed that would not only help the

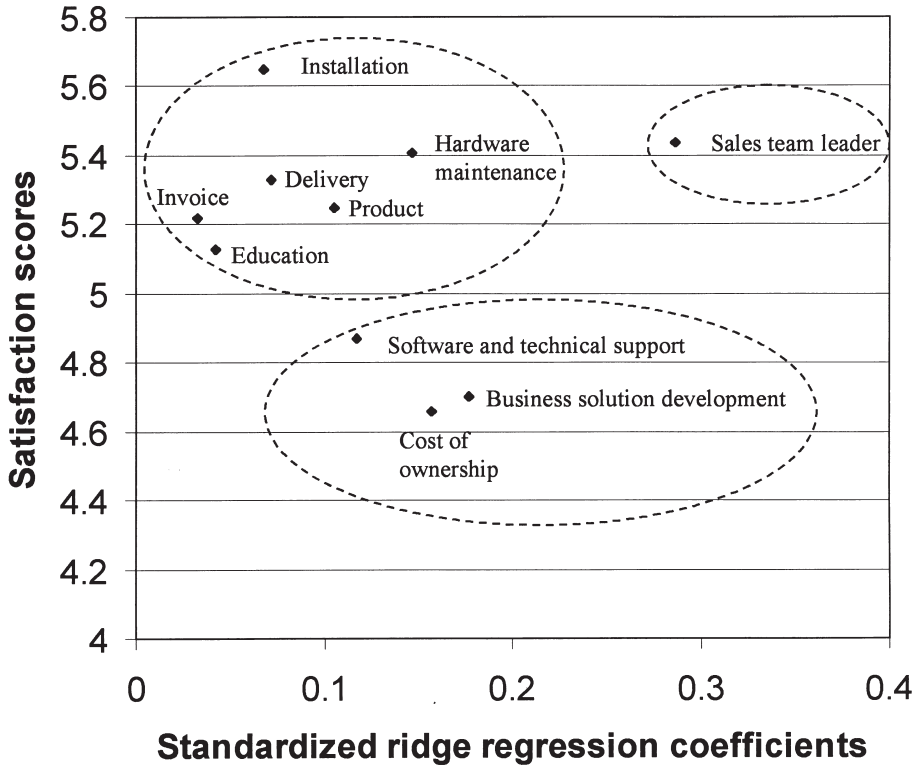

FIGURE 3. Quadrant map for 1993.

customer identify the product needed to address their needs, but also would improve the low perception of the cost of owning the product. The sales teams were reorganized to form what came to be ultimately known as "customer-focused teams." Although the size of the customer-focused team varied with the type of customer, it generally included specialists on order management, system configuration, and personnel to address various aspects of customer expectations such as help in identifying needs and developing appropriate business solutions. The customer-focused teams were also responsible for communicating customers' concerns to the appropriate personnel in the firm for quick resolutions of all customer problems.

Second, management formed "customer care centers" and "global support centers" to promptly resolve software and technical support issues that could not be resolved by the local field service offices. Third, procedures were put in place to track and monitor repair and response time to customer problems. Fourth, premium service plans were introduced to insure minimal disruption for customers with extremely high downtime costs. Finally, the management incorporated a policy to provide account managers with an improved report of the survey results to obtain their insights into identifying actionable data and to better understand the customers. New processes were also put in place to insure that these insights were used to generate proper and implementable actions by the company.

It was expected that the above strategy, when properly executed, would improve satisfaction with business solution development, cost of ownership, and software and technical support, which in turn would lead to an improvement in overall satisfaction.

Monitoring Results of the Strategy

An important use of the framework, presented in Figure 1, is to monitor satisfaction. Obviously, the effect of the changes made based on 1993 survey results would be realized in subsequent years (e.g., 1994 and 1995).[9] Table 4 also gives the mean satisfaction scores for 1994 and 1995, and Figure 4 presents a plot of the average scores

[9] In this case, data were collected annually. However, data collection frequency is company specific.

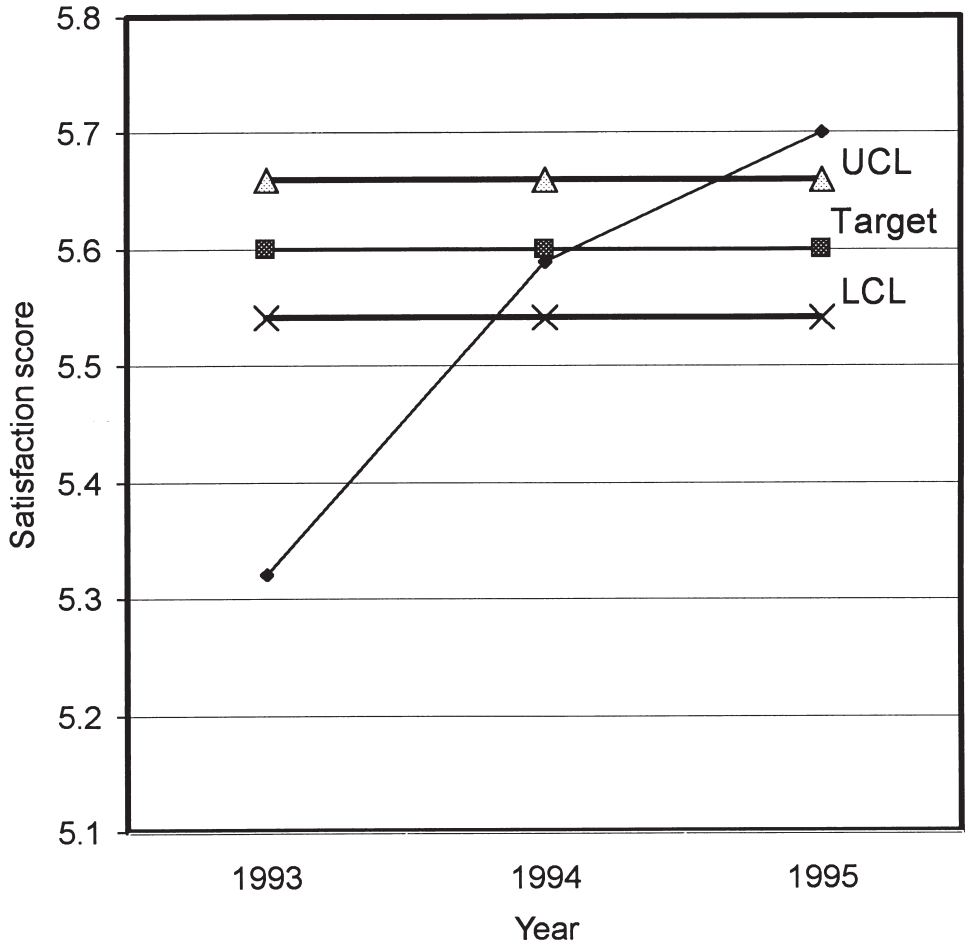

FIGURE 4. Control chart.

of overall satisfaction for the 3 years. Figure 4 is very similar to the chart used in quality control [35–37]. A typical control chart consists of an upper control limit (UCL) and a lower control limit (LCL), also labeled as action limits.[10] The process is considered in control as long as it lies within the two control limits and is considered out of control if it lies outside the control limits. The use of control chart for monitoring satisfaction is tantamount to testing the following two hypotheses [38].

H1: Satisfaction meets the objectives, and any deviation from the target index is due to a rare chance event or sampling error.

H2: Satisfaction does not meet the objectives, and any deviation from the target index is due to assignable causes(s).

[10] Typically, the control limits are 3-sigma limits and are obtained by multiplying the standard error by three.

The null hypothesis will be rejected if satisfaction lies outside the control limits and is not rejected if it falls within the control limits. It should be noted that satisfaction falling outside the UCL may or may not be desirable. In this case, management might be interested in identifying causes for excellent performance so that it can mimic these in the future, or management might determine that satisfaction above the UCL is not necessary and may be overstraining the firm's resources.

It can be clearly seen in Figure 4 that in 1993 the overall satisfaction was below LCL, and therefore it did not meet the objective, a conclusion arrived at previously. In 1994, the overall satisfaction has improved and is within the control limits. That is, it is not significantly different from the target satisfaction level of 5.6. What is interesting, however, is that there is a positive linear trend in overall satisfaction. In 1995, overall satisfaction is well above the UCL suggesting that it has exceeded the target satisfaction level.

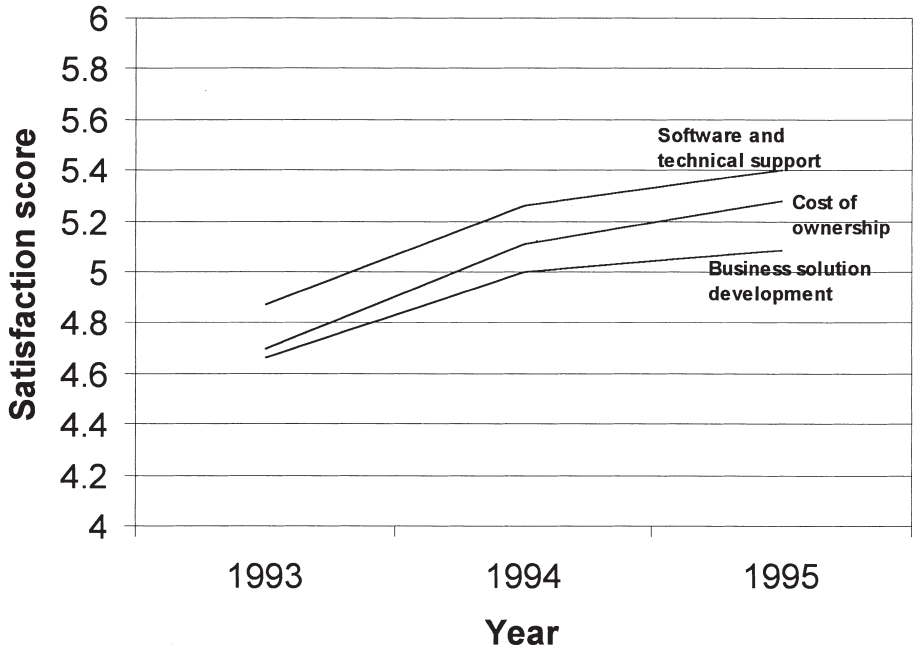

FIGURE 5. Mean satisfaction scores.

Trend analysis using ANOVA indicates that the linear trend for overall satisfaction depicted in Figure 4 was statistically significant ($F_{overll} = 99.066$; $F_{linear\ trend} = 186.969$; $P < 0.01$). It is fair to conclude therefore that the formulation and execution of the strategy to improve satisfaction were successful. Figure 5 presents a plot of the satisfaction scores for business solution development, software and technical support, and cost of ownership (see Table 4). All of them show improvement, and the linear trends of all of them are statistically significant ($P < 0.05$).

In should be noted that the use of control charts for monitoring performance is not limited to determining whether targeted satisfaction levels are achieved or not. They can also be used to identify trends and serve as early warning signals. For example, a downward trend, even if the satisfaction levels are within limits, could suggest that something has gone wrong, and it is quite possible that in the near future overall satisfaction will not meet the set target levels.

SUMMARY

The objective of this article was to illustrate the use of a framework to monitor customer satisfaction and the methodology for implementing the framework. Based on a literature review of customer satisfaction, two different conceptualizations of customer satisfaction were presented—transaction-specific and cumulative satisfaction. In the present study, satisfaction was conceptualized as cumulative satisfaction rather than a transaction specific satisfaction. LISREL, a structural equation modeling software, was used to estimate the parameters of the model.

The use of the framework was illustrated using 3 years of customer satisfaction data from a large Fortune 500 firm. The framework provided management with important insights into how to prioritize areas needing attention for meeting the set objectives. Based on this information, management developed a strategy for achieving these objectives and was able to determine the effectiveness of the strategy in meeting the set objectives. The framework also can be used to apply the concept of a quality control chart to monitor customer satisfaction and determine if customer satisfaction is out of control or might go out of control. Such an approach can provide an early warning signal to management with respect to whether there is an impending danger of not meeting the set objectives. Management can then intervene to determine the causes and "steer" the process back in control before it actually goes out of control. Finally, we would like to stress that although the framework was illustrated by using data from a single company, the framework itself is general

and can be easily adapted by other companies to monitor customer satisfaction over time.

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