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A National Customer Satisfaction Barometer: The Swedish Experience

Many individual companies and some industries monitor customer satisfaction on a continual basis, but Sweden is the first country to do so on a national level. The annual Customer Satisfaction Barometer (CSB) measures customer satisfaction in more than 30 industries and for more than 100 corporations. The new index is intended to be complementary to productivity measures. Whereas productivity basically reflects quantity of output, CSB measures quality of output (as experienced by the buyer). The author reports the results of a large-scale Swedish effort to measure quality of the total consumption process as customer satisfaction. The significance of customer satisfaction and its place within the overall strategy of the firm are discussed. An implication from examining the relationship between market share and customer satisfaction by a location model is that satisfaction should be lower in industries where supply is homogeneous and demand heterogeneous. Satisfaction should be higher when the heterogeneity/homogeneity of demand is matched by the supply. Empirical support is found for that proposition in monopolies as well as in competitive market structures. Likewise, industries in general are found to have a high level of customer satisfaction if they are highly dependent on satisfaction for repeat business. The opposite is found for industries in which companies have more captive markets. For Sweden, the 1991 results show a slight increase in CSB, which should have a positive effect on the general economic climate.

IN an effort to promote quality and make its industry more competitive and market oriented, Sweden has become the first country to establish a national economic indicator reflecting customer satisfaction. The extent to which the business firm is able to satisfy its customers is an indication of its general health and prospects for the future. The Customer Satisfaction Barometer (CSB) is an index based on annual survey data from customers of about 100 leading companies in some 30 industries. It is a weighted composite that rates the level of customer satisfaction in the included industries and companies. In addition, the relationship of CSB to customer loyalty as well as product (service) performance is estimated.

Because customer satisfaction has a direct impact on the primary source of *future* revenue streams for most companies, the new index is expected to be an important complement to traditional measures of economic performance, providing useful information not only to the firms themselves, but also to shareholders and investors, government regulators, and buyers. Not surprisingly, efforts to measure customer satisfaction on a nationwide basis are now underway in several other countries. For example, the United States is establishing a national quality index very similar to the Swedish model. Efforts are also underway in Japan, Singapore, and the EC countries.[1]

Claes Fornell is the Donald C. Cook Professor of Business Administration and Director of the Office for Customer Satisfaction Research, School of Business Administration, University of Michigan. The Swedish Post Office sponsors the Customer Satisfaction Barometer. Its financial support is gratefully acknowledged. The author thanks Gene Anderson, Rajeev Batra, Fred Bookstein, Jaesung Cha, Rabikar Chatterjee, Mike Guolla, Dan Horne, Lenard Huff, Mike Johnson, Don Lehmann, Paul McCracken, Bill Robinson, Mike Ryan, Karl-Erik Wärneryd, Claes-Robert Julander, and Youjae Yi for their input and comments.

[1]The U.S. index is the result of a joint venture between the American Quality Foundation and the University of Michigan Business

Journal of Marketing
Vol. 56 (January 1992), 6–21

This article reports the CSB development and industry results from the first three years in Sweden. Background and a brief description of some of the macroeconomic issues involved are followed by a discussion of how customer satisfaction relates to the overall strategy of the firm. That is the context within which the validity of CSB is examined.

Though the notion is controversial, substantial literature suggests that market share leads to profitability (see Buzzell and Gale 1987 for a review). Customer satisfaction also is believed to lead to profitability (Business International 1990). However, it is far from certain that market share and customer satisfaction themselves are positively correlated. In fact, the opposite could well be the case. The circumstances under which there is a *negative* relationship between the two is discussed as the basis for a proposition about the levels of CSB in different industries.

The impact of customer satisfaction for repeat business and customer loyalty is not the same for all industries. Loyal customers are not necessarily satisfied customers, but satisfied customers tend to be loyal customers. Aside from satisfaction, there are other means of customer retention. Customer switching barriers comprise a host of factors that also bring about retention. Hence, all companies are not equally affected by customer satisfaction, but virtually all companies depend on repeat business.

To understand the meaning of CSB as an economic indicator and its significance for the individual business firm, let us first examine the macro concerns, the relationship between satisfaction and market share, and the impact of customer switching barriers. After a discussion of those issues, the objectives, method, and results of CSB are presented.

Background

The Macro Level

As in other Western economies, many industries in Sweden face the combined difficulties of increasing international competition, slower growth rates, and mature markets. As a result, fewer new customers are being pursued by an increasing number of suppliers. Under those circumstances, a large share of the firm's resources must be devoted to the present customer base. How can that base be maintained? How can it be protected from (foreign and domestic) competition? Another effect of an increasingly competitive environment is rising pressure on price. The cost structure in most Swedish industries is such that price is not the most effective competitive weapon. Means of competition that *reduce* price elasticities among *repeat* buyers are therefore becoming increasingly important. A high level of customer satisfaction may be such a means.

The annual CSB is a nationwide gauge of how well companies (and industries as a whole) satisfy their customers. Similar to a productivity index, it measures economic performance. The difference is that productivity refers to quantity (output per factor), whereas CSB refers to quality (from the customer perspective). Obviously, any nation would like increases in both. However, if quality is costly (say, in terms of the manpower factor), a gain in one may imply a loss in the other. It is too early to speculate on the nature of that tradeoff, but it seems reasonable to assume that a weak growth in productivity is not necessarily detrimental if it is offset by increases in quality. According to the OECD Productivity Index, both Japan and (West) Germany are below the average productivity level for developed countries. Nevertheless, they are countries with a positive balance of trade, strong economy, and reputation for quality products. High quality leads to high levels of customer retention (for a review, see Steenkamp 1989), which in turn are strongly related to profitability (Reichheld and Sasser 1990).

Consider the effects of changes in the currency exchange rates as an example. Increases in the yen do not seem to have as strong a negative effect for Japanese products as an equivalent price increase for, say, American products. A nation whose industry generates high levels of customer satisfaction is probably better protected against cost increases as well as foreign competition.

The Micro Level

Figure 1 is an overview of the micro context of CSB in terms of the sources of revenue. Here, overall business strategy is composed of two parts, the offense and the defense. Virtually all firms employ some combination of offensive and defensive strategy—the offense for customer acquisition and the defense to protect the present customer base (Fornell and Wernerfelt 1987, 1988). Traditionally, much more effort is devoted to acquiring customers than to their retention. The annual expenditure on advertising and sales promotion in the U.S. alone is well over one trillion dollars. Though much of the advertising portion is directed to present customers, most such expenditures are for the offense. In the face of slow growth and highly competitive markets, however, a good defense is critical. When company growth is accomplished at the expense of competing firms (i.e., by capturing market share), firms with weak defenses are the first to suffer. In many cases the attention paid to the de-

School. In Japan, preliminary work is underway. Again, the Swedish model is the prototype. The Norwegian project is coordinated by the Norwegian School of Management with Johan Roos and Fred Selnes as program directors. For a feasibility study that reviews various approaches to developing a national index, see NERA (1991). Business International (1990) also includes a description of the Swedish model.

FIGURE 1
Sources of Revenue

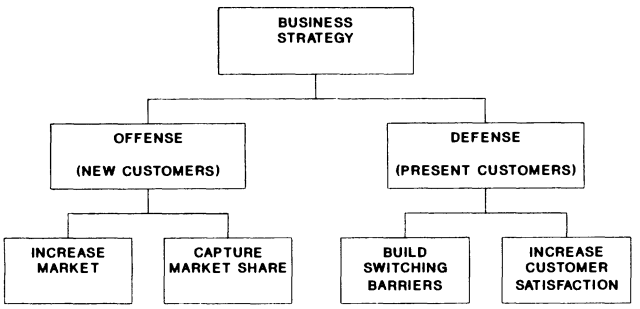


TABLE 1
Market Share Versus Customer Satisfaction

	Market Share	Customer Satisfaction
Typically employed in	Low growth or saturated markets	Low growth or saturated markets
Strategy type	Offense	Defense
Focal point	Competition	Customers
Measure of success	Share of market relative to competition	Customer retention rate
Behavioral objective	Buyer switching	Buyer loyalty

fense has been too slow or insufficient. The result is typically an erosion of the customer base. Witness what has happened in banking and the steel industry, and to companies that make automobiles, cameras, television sets, food products, machine tools, radial tires, computer chips, and medical equipment.

Defensive strategy involves *reducing* customer exit and switching. The objective of defensive strategy is to minimize customer turnover (maximize customer retention), given certain cost constraints (see Fornell and Wernerfelt 1987, 1988 for an analytical treatment), by protecting products and markets from competitive inroads. One way of accomplishing that objective is to have highly satisfied customers. To understand CSB in a micro context, let us return to Figure 1 to examine a major approach of the offense—building market share—and discuss how it relates to a major approach for the defense—customer satisfaction.

Market Share and Customer Satisfaction

Beginning in the 1970s and spurred by two very influential publications (one by the Boston Consulting Group 1972; the other by Buzzell, Gale, and Sultan 1975), the pursuit of market share became a key part of management strategy. In popular simplifications, the maximization of market share was held to be a way to maximize profits. So widespread was the practice that a majority of the leading U.S. firms employed some form of market share strategy in the belief that it would lead to greater profitability (Haspeslagh 1982). Market share maximization was claimed not only to serve the individual firm, but also to improve a country's economy in terms of productive efficiency (Henderson 1979).

In Table 1, the fundamentals of a market share strategy are outlined in relation to a customer satisfaction strategy. Both strategies often are used under the same market conditions, low growth or saturated markets—that is, when there is little prospect for company growth without taking business away from competitors.

Capturing market share is an offensive strategy; creating customer satisfaction is defensive. Success and failure in market share are evaluated in relation to competitors. For customer satisfaction, success and failure are evaluated primarily by changes in customer retention. In other words, the behavioral objective for the offense is patronage switching; for the defense it is loyalty. Costs, as a result, are typically higher for the offense, because more effort is necessary to create change (switching) than to maintain status quo. Clearly, a successful defense makes competitors' offense even more costly.

Several of the major consulting firms that prescribed some form of market share strategy a few years ago are now promoting strategies for customer satisfaction (*Business Week* 1990). The argument is that customer satisfaction leads to profitability—the same argument that was used for market share. However, as indicated in Table 1, the two strategies are drastically different. If they both lead to increased profitability, what is the relationship between market share and customer satisfaction? Understanding that relationship is critical for firms that now change their overall strategy, as well as for understanding the role of CSB as an index.

Paradoxically, one can show that the relationship between market share and customer satisfaction can be negative. That will be the case when market demand is heterogeneous and supply homogeneous (standardized). Theoretically, the relationship can be demonstrated with a location (address, ideal-point) model. That type of model commonly is used in analyses of utility and choice. It also brings new insights into the study of customer satisfaction.

Consider a distribution of customers with different

tastes. For simplicity, let us assume that the tastes are normally distributed, there are two competitors, and taste can be represented on a single scale. That scenario is illustrated in Figure 2, where the taste dimension is a combination of price and quality. Some customers are willing to pay a high price for high quality; others prefer a lower price and are less concerned about quality.

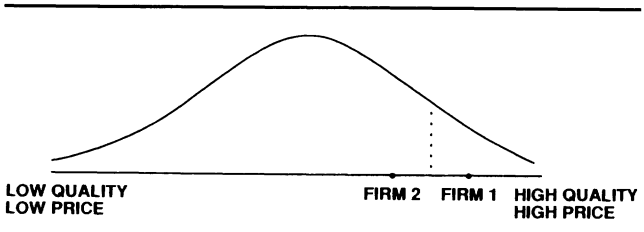
For the purposes of the illustration, it is not necessary to explore the equilibrium positions of the firms (that aspect is analyzed by Rhee et al. 1991) or to go beyond the duopoly. According to Figure 2, firm 1 offers a high quality product at a high price. It is thus positioned toward the right tail of the taste distribution. Firm 2 is positioned slightly to the left of firm 1.

The implications in terms of market share and customer satisfaction are as follows. Buyers on the left of the dotted vertical line will buy from firm 2 because it offers the product closest to their desires. That area represents about 80% of the distribution. Consequently, firm 1 has a market share of about 20%; firm 2 has a share of 80%.

On average, however, firm 1 has higher levels of customer satisfaction. The distance between a customer's "ideal" (in terms of a certain price/quality combination) and the firm's offering represents a facet of that customer's "dissatisfaction." Firm 2 has many more customers that are far from their ideal than does firm 1. That is, the mean distance between customer ideal and product offering is much greater for firm 2. Accordingly, customers of firm 2 are less satisfied than customers of firm 1 (on average).

That reasoning does not mean the pursuit of customer satisfaction *leads* to lower market share. In fact, high levels of customer satisfaction should produce favorable word of mouth, which in turn has a positive effect on market share. However, market share gains that imply an increase in the heterogeneity of the customer base and/or are not commensurate with an increase in resources for servicing a larger number of customers could lead to problems with customer dissatisfaction. It is more *difficult* for a firm with a large market share to also have a high average level of customer satisfaction, especially if customer tastes are heterogeneous. Consider the market share leaders and the customer satisfaction leaders in the U.S. automobile market. They are not the same companies. It is also obvious from Figure 2 that the large-market-share firm is more vulnerable to new entry under such circumstances.

FIGURE 2
Heterogeneous Customer Preferences



The ideal-point conceptualization as one (but not the only) aspect of customer satisfaction suggests a new hypothesis about market structure and customer satisfaction. The contention is that the monopoly will have a lower score on CSB than competing firms *if* it faces a heterogeneous demand. Low customer satisfaction is not only a result of insulation from competition (and thereby also from customer switching) and its possible manifestations in higher prices and lower quality, but also a reflection of the difficulty in serving a heterogeneous market with a limited variety of offerings.

However, all monopolies need not have lower satisfaction scores. Satisfaction will be low when customer preferences are heterogeneous and the supply standardized. That notion is the logical consequence of interpreting satisfaction/dissatisfaction in terms of an ideal-point model. It is not an empirical issue. The extent to which such a situation exists is an empirical question, however. Industries in Sweden that are characterized by a high level of heterogeneity that might not be matched by an equivalent diversity in supply include television broadcasting, the police force, telephone services, postal services, and the alcoholic beverage distribution outlets, as well as the retailers of furniture and clothing because they cater primarily to mass markets. Another industry in that category is the insurance industry, in which competition has been restricted and regulated. To a lesser extent, the degree of variety in supply is probably lower than buyer heterogeneity calls for in supermarkets, oil companies (gas stations), and department stores, although there is some differentiation due to variances in local customer tastes. A better match is found in the automobile market, where both demand and supply are heterogeneous. Food processing also has a better match—sometimes, as in the case of staples (milk, sugar, yeast), not because of greater heterogeneity in supply but because of a high degree of homogeneity in demand.

From the preceding discussion, we would expect industries characterized by a good fit between the levels of demand and supply heterogeneity (homogeneity) to have higher CSB values than those with a poor fit. Industries, including monopoly organizations, that supply a high quality homogeneous product to a homogeneous market should have high satisfaction. That notion might be somewhat contradictory to traditional economic theory and the Structural Antitrust Doctrine (Thorelli 1955), but is in line with previous empirical findings showing no relationship between seller

concentration and customer satisfaction (Fornell and Robinson 1983) and recent work in welfare economics (Daughety 1990).

Customer Satisfaction and Switching Barriers

As suggested in Figure 1, offense has two basic forms, (1) gaining new customers from market expansion and (2) increasing market share at the expense of competing firms. In principle, defensive strategy also has two basic forms, (1) switching barriers and (2) customer satisfaction. To understand the differential impact of CSB in different industries, let us now introduce the role of switching barriers.

Switching barriers make it *costly for the customer* to switch to another supplier (vendor, store, etc.). Customer satisfaction, in contrast, makes it *costly for a competitor* to take away another firm's customers. That is, in the first case, the firm makes it difficult, expensive, or even illegal for customers to switch. The monopoly is one example, but a firm can erect switching barriers in many ways without becoming a monopoly.

Search costs, transaction costs, learning costs, loyal customer discounts, customer habit, emotional cost, and cognitive effort, coupled with financial, social, and psychological risks on the part of the buyer, all add up to switching barriers. Others are costs of retraining personnel, capital requirements for changeover, and costs of acquiring new ancillary equipment (Porter 1980). Those barriers tend to be more formidable in business-to-business markets, but they can play an important role in consumer markets as well. Basically, any pursuit by the firm to limit the scope of comparable buyer alternatives for repeat purchase is equivalent to a strategy of erecting customer switching barriers.

Even within a single industry, it is not unusual to find competing firms with different combinations of barriers and satisfaction. An example is the airline industry. American airlines (domestic and international) discourage passenger switching by raising barriers. Frequent flier programs are designed to enhance repeat business, not through superior service or passenger satisfaction, but by providing an economic incentive for the customer to remain loyal. European and Oriental airlines, in contrast, rely more on customer satisfaction to secure repeat business. If they have a frequent flier program at all, it is usually not emphasized or is a result of a joint effort with an American partner.

At a general level, it may not be possible to determine whether satisfaction is more effective than barriers to switching, but two immediate problems with barriers are not present in the satisfaction approach. The first is obvious. If the customer is aware of the barriers at the time of purchase, the barriers will be an impediment to the offense strategy. The presence of barriers makes the initial sales task more difficult. The opposite is true for customer satisfaction. Highly satisfied customers are an asset for the offense.

The second problem with barriers is that they might be eliminated by external forces. Frequent flier programs are easily imitated and monopolies can be broken. When that happens, the competitive weapon of the barrier can quickly become a liability. As illustrated in the airline industry, first-mover advantages (in the case of frequent flier programs) have dissipated (Kearney 1990). Previously insulated organizations become vulnerable, for they are seldom well prepared and have not made the investments in quality and customer satisfaction necessary to prevent customer exit.

Low barriers and weak customer satisfaction force the company to compete on price. Compare the use of sales promotions by U.S. and Japanese automobile manufacturers. American firms have come to rely on promotions. The Japanese employ such devices somewhat more sparingly. After all, sales promotions are (temporary) price cuts with a corresponding negative effect on gross margins. With high satisfaction, the effect on margins is the opposite, and there is less need for price promotions.

CSB: Purpose and Method

To recapitulate, the propositions that evolve from the ideal-point model and the switching-barrier effect suggest that customer satisfaction should be lower in industries where repeat buyers face high switching costs and where the industry offers a homogeneous product to a heterogeneous market.

If customer satisfaction is an indicator of a healthy company, CSB is a measure of performance that is oriented toward the future. Some writers (e.g., Kotler 1988) even consider customer satisfaction to be the best indicator of a company's future profits. Accordingly, CSB can be seen as a future-oriented complement to traditional measures of performance such as return on investment, market share, and profits. In comparison with many of the traditional performance measures, customer satisfaction is probably less sensitive to seasonal fluctuations, changes in costs, or changes in accounting practices (Kotler 1988). Consistent with the American effort (see NERA 1991), the Swedish CSB should help focus public attention on improving quality and customer satisfaction as a source of a higher standard of living. It also should complement the national accounting measures, which do not (other than through prices) take quality or customer satisfaction into account. In addition, CSB is designed to provide the following information.

1. *Industry comparisons.* The government typically assembles customer complaint data for information about quality problems in various industries. A satisfaction index complements that information. It also complements traditional economic output measures such as productivity. However, the possibility of making industry comparisons is an issue of some controversy. Despite several thousand studies on the related, but even broader, topic of "subjective well-being" (Andrews and Robinson 1988) in which people and (sometimes) nations are compared, comparisons of customer satisfaction among different industries are not without difficulty. Johnson and Fornell (1991) give a detailed account of the foundations for making those types of comparisons.

Though the comparison of industries may be the most important objective for CSB (and what is reported here), there are other objectives as well.

2. *Comparisons of individual firms with the industry average.* In general, one would expect higher margins and more repeat customers for firms with high satisfaction scores. Overall, one would also predict a brighter future for firms with higher levels of customer satisfaction.
3. *Comparisons over time.* CSB is dynamic and continual. It provides information about firm (industry) improvement (decline) as well as general trends. Over time, it will be interesting to see whether there is a relationship to productivity indices. If consumers *at large* can anticipate changes in the macro economy, as evidenced by the Index of Consumer Expetations from the University of Michigan (which shows very good predictive power), a satisfaction index based on *customer* consumption experience ought to be a useful indicator of repeat business at the micro level.
4. *Predictions of long-term performance.* Though empirical evidence is limited, increases in customer satisfaction are generally believed to (1) shift the demand curve upward and/or make the slope of the curve steeper (i.e., lower price elasticity, higher margins), (2) reduce marketing costs (customer acquisition requires more effort), (3) increase marketing costs for competitors (satisfied customers are more difficult for competitors to take away), (4) lower transaction costs (contract negotiations, order processing, bargaining, etc.), (5) reduce customer turnover (fewer lost customers to replace), (6) increase cross-selling (more products, larger accounts), (7) lower employee turnover (satisfied customers affect the satisfaction of front-line personnel), (8) enhance reputation (positive customer word of mouth), and (9) reduce failure costs (reduction in downtime, rework, warranty claims, etc.). As a result, satisfied customers can be viewed as an investment. Some accounting firms are now suggesting that the customer asset be included on the balanced sheet and in annual reports (Konrad 1989).
5. *Answers to specific questions* such as the sensitivity of various industries (and firms) to customer satisfaction, the effects of overall quality and price, the impact of customer expectations, the quality increase necessary to retain dissatisfied customers, price sensitivity, switching patterns, customer complaints, and effects of word of mouth.

Measures

The literature on customer satisfaction/dissatisfaction suggests that satisfaction is an overall postpurchase evaluation. There is no consensus on how to measure it, however. Hausknecht (1990) identifies more than 30 different measures that have been used in previous research. Among them, three different facets of satisfaction can be identified—CSB attempts to capture the degree of (1) general satisfaction (as in the studies by Moore and Shuptrine 1984; Oliver and Bearden 1983; Oliver and Westbrook 1982; Westbrook 1980, 1981), (2) confirmation of expectations (as in the studies by Oliver 1977; Swan, Trawick, and Carroll 1981), and (3) the distance from the customer's hypothetical ideal product (similar to the work of Tse and Wilton 1988; Sirgy 1984). In other words, customer satisfaction is *defined* as a function of three indicators that are allowed to be measured with error. An advantage over traditional approaches to satisfaction measurement is that causes of satisfaction are not confounded with the phenomenon itself. Other advantages are that the fallibility of measures is acknowledged and taken into account, and that the indicators defining customer satisfaction can be weighted such that their composite (i.e., CSB) has maximal impact on loyalty and customer retention (the estimation is discussed shortly).

Loyalty is measured by repurchase intention and price tolerance (for satisfied customers). The latter measure is similar to the "dollar-metric of loyalty" introduced by Pessemier (1959)—the price differential needed to make loyal customers switch. Dollar-metric measures have shown acceptable levels of reliability and validity in previous research (Olson and Jacoby 1971), and are often used in studies of brand loyalty (e.g., Raju, Srinivasan, and Lal 1990).

Presumably, customers take both price and quality into account as they form an overall evaluation about a product's performance. To avoid a confounding of the two, each was measured in light of the other—perceived performance is thus measured by price (given quality) and quality (given price).

A direct measure of switching barriers is very difficult to obtain. All costs (financial, psychological, learning, etc.) associated with deserting one supplier in favor of another constitute switching barriers. The nature of those barriers can be very different in different industries. Any attempt to measure all of them would be an overwhelming task. Instead, the assumption is made that causes of loyalty *other* than customer satisfaction, complaint management, and switching barriers are negligible. Accordingly, the effect of switching barriers can be represented by the intercept term in the loyalty equation, which would constitute the firm-specific switching barrier. In addition, there is a customer-specific barrier due to in-

dividual factors such as previous consumption experience, learning, propensity for risk taking, and so on. Some recent findings on switching barriers (with this database) are reported by Anderson and Sullivan (1990).

Model

Three fundamental principles guide the modeling effort. First, it is recognized that variables take on meaning depending on the context in which they are applied (Blalock 1982; Fornell 1982, 1989; Fornell and Yi 1992). Second, all survey variables are measured with some degree of error (Andrews 1984). Third, the construct "customer satisfaction" is not directly observable (Howard and Sheth 1969; Oliver 1981; Westbrook and Riley 1983).

The task is thus to specify a reasonably comprehensive system of postpurchase outcomes in which customer satisfaction is part. Accordingly, the index is specified as a composite latent variable in a system represented by multiple equations, where measurement error (i.e., noise) is accounted for. Each individual company is estimated separately in order to capture differences in relationships with respect to how the latent variables relate both to their indicators and to each other. A major difference between CSB and other customer satisfaction indices is that CSB is measured (and estimated) in the context of other interrelated variables (as represented in a model of structural equations). That approach leads not only to better reliability and validity (Fornell and Yi 1992), but also to improved ability to translate customer satisfaction changes into repurchase behavior. The typical approach, used by most companies today, is to measure satisfaction in isolation of the context in which it is to be applied (causes and consequences) and then retrospectively estimate the relationship to some criterion (such as loyalty, sales, or profit). The result is likely to show low reliabilitiy and strong bias in the estimated coefficients (because of misspecification). As a consequence, many firms fail to find a strong relationship between their satisfaction measures and economic performance. The approach described here should reduce bias and increase the quality of measurement. The full set of equations is given in Appendix A. The most important specifications follow.

In accord with the findings of Churchill and Surprenant (1982), Tse and Wilton (1988), and Oliver and DeSarbo (1988) and as discussed by Yi (1990) and Johnson and Fornell (1991), customer satisfaction is expressed as a function of prepurchase expectations and postpurchase perceived performance (of the respective product/service), both of which, in line with Rational Expectations Theory, are expected to have a positive effect:

Customer Satisfaction
= f(expectations, perceived performance).

Tse and Wilton (1988) provide theoretical and empirical support for including the direct effect of perceived performance on satisfaction and suggest that it may actually have a stronger influence than expectations in determining satisfaction. That does not mean the traditional view of satisfaction/dissatisfaction as the discrepancy between expectations and perceived performance is dismissed *a priori* in CSB. Recall that the discrepancy is a part of the definition of the latent satisfaction variable and is reflected in one of its indicators. However, the preceding specification allows for the possibility of *dissatisfaction* even when expectations are confirmed. For example, if low quality is expected but the product is purchased nevertheless (because of supply restrictions or price) and delivered, the expectations are confirmed. Clearly, the fact that expectations are confirmed is not sufficient for satisfaction.

The final endogenous variable is loyalty. As discussed previously, loyalty is caused by a combination of satisfaction and switching barriers. Hirschman (1970) identifies three basic consequences of changes in satisfaction/dissatisfaction—exit, voice (i.e., complaints), and loyalty. To capture the possibility that the firm's complaint handling might be able to turn a complaining customer into a loyal customer (a finding reported by TARP 1979), loyalty is also specified to be a function of voice:

Loyalty
= f(customer satisfaction, switching barriers, voice).

If the relationship between voice and loyalty is positive, the firm's complaint handling is functional and purposeful; it turns complainants into loyal customers. If it is negative, an increasing number of complaints makes the firm more resistant to customer grievances and complainants are more likely to seek other suppliers.

Data

In 1989, customers (in Sweden) of the largest companies in 28 industries were selected as the target population. In 1990, the number of industries was increased to 32. The objective was to include a sufficient number of companies in each industry that their combined sales would represent at least 70% of the market. For firms selling multiple products, the product with the highest sales (in Kronor) was chosen to represent the company. Annually, some 100,000 respondents are contacted on a random basis. After screening questions to determine whether the respondent is a customer of any of the selected companies, the total sample size amounts to about 25,000 respondents per

year who are subjected to an eight-minute telephone interview.[2] Except for a few industries (food and television broadcasting), each respondent was asked about a single company only. With a yearly sample size ranging from 250 for some monopolies to more than 4000 for industries in fragmented markets, the sampling error for CSB ranges from 1.5% to .6% at the 95% level.

Scales and Estimation

Virtually all customer satisfaction research is hampered by highly skewed distributions for the indicators of the satisfaction construct (see Hunt 1977; Michalos 1986; Oliver 1981; Westbrook 1980). For example, in studies of products ranging from shoes (Westbrook and Cote 1980) to medical care (Ware, Davies-Avery, and Stewart 1978) to department stores (Fitzgerald 1990) and clothing (Hughes 1977), more than 80% of the customers were satisfied.

Those findings are not particularly surprising. Even in less than perfect markets, as long as there are available alternatives and/or some elasticity of demand, the distribution of satisfaction scores should be negatively skewed. Only in captive markets might repeat buyers be dissatisfied in general.

Skewness is a problem, but it is a statistical one. Highly skewed variable distributions do not lend themselves to conventional tests of significance and, what is equally serious, lead to downward biases in correlational analysis, low reliability, and sometimes misleading arithmetic means. The implications are that it is very difficult to account properly for the variation in satisfaction ratings by use of other variables and that the results are unstable.

In CSB, the problem of skewness was handled by (1) extending the typical number (usually 5 or 7) of scale points to 10 (to allow respondents to make finer discriminations), (2) using a multiple-indicator approach (to achieve greater accuracy), and (3) estimating via a version of partial least squares (PLS).[3]

Though all the specified relationships might not be linear and PLS uses a nonlinear operator, the resulting relationships are linear. Nonlinear relationships could be estimated but require specific knowledge about exact functional forms. In the absence of such knowledge, linear approximations are assumed to be good enough within reasonanble ranges. Over time, however, it should be possible to examine differences in slopes and perhaps find the appropriate nonlinear expressions.

Results

The index results for 1989–1991 are reported in Table 2. A more detailed account is provided in Appendix B, where the highest scoring firm in each industry is also identified. Mean customer satisfaction scores (on a scale from 0 to 100) are shown for 28 industries in 1989 and an additional four industries (shipping of light goods, newspapers, pharmacy, mail order) in 1990 and 1991. Both consumer and business markets are represented. In some cases (postal services, telecommunication, banking, insurance), the industry serves both business buyers and consumers. Only business customers were surveyed for computer mainframes and personal computers. For business buyers, the respondents were individuals responsible for purchasing the product/service in question.

The statistics in Table 2 are the nonweighted means of 19 firms producing nondurable goods, 16 firms producing durable goods, 19 retailers, 5 monopolies (including postal and telephone services for both business buyers and the general public), and 34 service providers (including banks and insurance companies for both business buyers and the general public). Obviously, the categorization of industries is not without ambiguity, because some of the entries are overlapping. For example, all the monopolies in Table 2 are also service providers. Basic foods (among the nondurable goods) are local monopolies (supplying milk, yeast, and sugar).[4]

According to the reasoning presented previously, CSB should be higher (1) in differentiated industries if customer tastes are heterogeneous *and* (2) for standardized (undifferentiated) products if customer tastes are homogeneous. In contrast, CSB should be lower where customer tastes are heterogeneous and industry offerings undifferentiated. That is, if the heterogeneity in tastes is not met by differentiated supply, some

[2]For most industries surveyed, sample frames were not used unless they could be obtained from a neutral and independent source (e.g., the car registry). In no case were company customer lists used as sample frames. Hence data were costly but presumably more objective. Respondents were drawn via random digit dialing and screened about customer status. The average response rate was 95%.

[3]PLS is a family of estimation techniques originally developed by Wold (1973) and documented by Fornell (1982), Lohmöller (1989), and Helland (1988). Skewness was reduced from an average of −2.5 for the measured variables to an average of −.46 for the CSB index. There are other reasons for using PLS. It has proven effective in coping with noisy data (Stone and Brooks 1990), and robust under conditions of non-normality and collinearity (Höskuldsson 1988). It has also been very successful as a predictive method (Ketterlinus et al. 1990; Martens and Naes 1987). Among the drawbacks is the somewhat incomplete knowledge about the properties of its parameters. The implication is that empirically based methods (jackknifing and blindfolding) are used for significance testing.

[4]To make the results comparable across industries and time, the criterion for fitting the CSB function is the same for each company: the maximization of CSB impact on loyalty (subject to the constraint that CSB is a linear combination of the three indicators mentioned previously). The implication is that the composition (the pattern of loadings) of CSB may vary across firms and over time, but the following property of CSB is uniform: no other linear combination of the indicators will produce an index that has greater impact on customer loyalty.

TABLE 2
CSB Results 1989–1991

	1989	1990	1991
Nondurable Goods			
Basic foods[a]	77	79	78
Candy, coffee	75	79	80
Dairy, bread	68	69	69
Beer	66	67	68
Meat products	63	65	65
Canned/frozen foods	64	70	70
Group mean	**69**	**72**	**72**
Durable Goods			
Autos	77	76	78
PCs	70	66	67
Mainframes	68	64	64
Group mean	**72**	**69**	**70**
Retailers			
Supermarkets	66	68	65
Oil (gas stations)	67	68	70
Furniture	64	63	65
Department stores	62	63	61
Clothing	63	62	63
Group mean	**64**	**65**	**65**
Monopolies			
Pharmacy	na	76	73
Postal, business	59	62	65
Postal, public	65	61	67
Alcoholic beverages	59	59	65
Telecom.—public	55	59	61
Telecom.—business	54	57	57
Police	56	55	58
Group mean	**58**	**61**	**64**
Services			
Banks, public	69	69	67
Banks, business	70	66	64
Charter travel	68	67	68
Life insurance	65	65	63
Property insurance	65	63	66
Insurance, business	64	62	64
Mail order	na	64	63
Transportation[b]	59	63	63
TV broadcasting	44	43	48
Shipping[c]	na	65	69
Newspapers	na	60	64
Group mean	**63**	**62**	**64**

[a]Milk, yeast, sugar.
[b]Airlines and long distance railroads.
[c]Excluding the parcel service of the post office.

customers would give their chosen products low marks on satisfaction. The extreme category here would be the type of state monopoly for which the public at large is the customer and in which there is little variation in the supply despite a heterogeneous demand.

The results seem to fit that reasoning. Overall, CSB scores are significantly higher in industries where heterogeneity/homogeneity in demand is matched by the supply. The mean score for basic foods, candy/coffee, dairy products, beer, and automobiles is 74 for all three years. The grand mean for all industries is 64 in 1989 and 1990 and 65 in 1991.

Staple foods and automobiles score at the top of CSB; the railroad, the police force, and television broadcasting are at the bottom. Though the staples (yeast, milk, sugar) have no direct competition, they also face a homogeneous demand. Hence, there is no need for differentiation. That situation is in contrast to the market structure for automobiles—automobile makes are differentiated, as is their demand.

For television broadcasting, viewer tastes vary considerably and most people in Sweden did not (until very recently) have access to more than two state-owned channels. As a result, the program alternatives are very limited (at any given time). Achieving higher levels of customer satisfaction would probably necessitate offering more narrow and specialized programming to distinct segments of the viewer population. With the advent of cable television and more channels in Sweden, that now seems possible and should lead to higher CSB scores for the broadcasting industry and to a narrowing gap in scores across the broadcasting companies.

Overall, it is noteworthy that services score lower than products, both among monopolies and among competing firms. One monopoly that does not seem to fit the general pattern is the Pharmacy Organization—a state-owned enterprise that distributes pharmaceuticals and information to the general public. It has a very high CSB value. Apparently, the organization either adapts well to different customer needs or faces a relatively homogeneous type of demand.

Among the service providers, consumer banking and charter travel companies were a notch above the rest in 1989–1990. That finding should give concern to the insurance industry, as the Swedish government is about to eliminate the barriers between the banking and insurance businesses. However, business banking had a significant decline in CSB for 1991, whereas the insurance industry edged upward.

The changes from 1989 to 1990 were mainly negative, with more industries showing a decline than an improvement in CSB. That pattern has been reversed for 1991, suggesting that the prospects for more repeat business (with a resulting improved economic performance) for Swedish companies are somewhat better now than they were a year ago. Yet, the grand mean (65) does not seem overwhelmingly high. Obviously, giving a precise interpretation to that statistic is difficult in the absence of a longer data series or comparable data from other nations, but one should keep in mind that the respondents are all *customers* (not the general public or consumers in general) of the firm they evaluate. In other words, it is the preferred

choices (given prices, incomes, etc.) of the respondents that are rated. The unweighted grand mean CSB is probably a fairly crude indicator[5] of how well a nation's industry is satisfying its customers and, in the case of Sweden, that mean is pulled down by a few state monopolies and by the television broadcasting industry. For 1990, it is (slightly) "biased" upward because of the addition of some high scoring companies and industries. The most significant overall pattern is the improvement of most of the monopolies and the decline of the banks.

Against the backdrop of recent developments in the European Community and Sweden's pending EC membership, firms with low levels of customer satisfaction will either have to improve or design new types of switching barriers (because the increased level of competition will probably eliminate many of the present ones). Certainly, markets with low levels of customer satisfaction will become tempting targets for foreign firms.

Reliability and Validity

As mentioned previously, no measurement is without error. To what extent do the results reported have satisfactory levels of reliability and validity? Table 3 gives the measurement results for the latent variables.

The average variance extracted should (at least) be higher than 50% (Fornell and Larcker 1981) to avoid a situation of more error in measurement than valid variance. All models meet that criterion—the loadings of the indicators are high and error variance is small. In other words, the correlation between the indicators and the construct they are supposed to measure is high.

Reliability over time appears solid. For the satisfaction construct (i.e., CSB), the slight decline for 1990 in average variance extracted is due to the addition of the ideal-point measurement scale.[6] The slight reduction in convergent validity is compensated for by the higher level of nomological validity (i.e., the 1990 model fits the data somewhat better).

A clearer picture of nomological validity is obtained by examining the coefficients in the structural equations, reported in Table 4.

In view of the fact that CSB is expressed as a function of no more than two variables, the R^2s are high. The mean R^2 increases from .44 in 1989 to .52 in 1990 and 1991. Overall, the results are consistent in terms of the relative impact of performance and expectations. In no industry did expectations have a greater effect than performance on satisfaction. Thus, the arguments advanced by Tse and Wilton (1988) and Johnson and Fornell (1991) are supported.

Further evidence in favor of the validity of the index is found in the signs and magnitude of the estimated coefficients. All coefficients relating performance to satisfaction, expectation to satisfaction, and satisfaction to loyalty have the expected positive sign. All but a few are significant. Discriminant validity is also evidenced by the fact that the correlations between CSB and its indicators are higher than correlations between CSB and any other variable in the system.

A limitation of the model is the assumption that the same basic specification governs the process of customer satisfaction across very different industries. To some extent, that restriction is offset by allowing CSB to be reflected by several indicators to different degrees. Nevertheless, if the overriding objective had been to account for the variation in customer satisfaction for each firm (or industry), a less general model would have been preferable. That is most evident in categories where there are clear product-specific attributes. Automobiles, personal computers, and mainframe computers are examples. As shown in Table 4, those are also the industries in which the model accounts for less variance in CSB.

A Note on Customer Complaints

The results in Table 3 also provide insights into how industries are able to handle customer complaints. An objective of complaint handling is to turn a dissatisfied customer into a loyal customer. That can be done in many ways (see Fornell and Wernerfelt 1988), and some evidence indicates that it can be done (TARP 1979, 1986). However, the parameter estimates relating voice (complaints) to loyalty are small and in many cases negative.

A negative coefficient implies that an increasing number of complaints makes customers more prone to desert the firm. Significant negative coefficients were obtained for automobiles, banks, the postal service, the police, and the pharmacies. That finding is consistent with "the vicious circle of complaints" originally observed by Fornell and Westbrook (1984), whereby the more complaints a firm receives, the less responsive it becomes. Instead of making use of customer complaints, the firm behaves dysfunctionally.

Significant positive coefficients are found for personal computers, clothing, computer mainframes (1990), newspapers, department stores (1991), the railroad, and supermarkets. Hence, firms in those industries appear to be more successful in turning complainants into loyal customers.

[5]Research is now underway to determine an appropriate weighting scheme in order to develop a single index that better reflects the level of economic activity.

[6]An examination of the covariance structure of the errors in measurement indicates that we are still working with a one-dimensional construct.

TABLE 3
Measurement Results

	Average Variance Extracted								
	Performance			Satisfaction (CSB)			Loyalty		
Industry	1989	1990	1991	1989	1990	1991	1989	1990	1991
Airlines	.63	.73	.54	.74	.63	.61	.67	.7	.67
Automobiles	.65	.6	.58	.79	.6	.59	.64	.65	.63
Banks, public	.66	.64	.67	.77	.67	.7	.6	.57	.57
Banks, business	.68	.63	.61	.82	.73	.71	.57	.54	.54
Charter travel	.74	.63	.68	.82	.7	.72	.7	.69	.68
Clothing, retail	.61	.63	.59	.75	.59	.63	.62	.62	.61
Computer mainframes	.68	.65	.64	.78	.65	.62	.63	.59	.67
Department stores	.66	.58	.61	.74	.6	.67	.62	.69	.67
Food processing	.65	.66	.65	.78	.68	.67	.61	.65	.64
Furniture	.63	.54	.64	.79	.61	.67	.66	.72	.7
Insurance, business	.63	.6	.63	.82	.72	.74	.65	.55	.63
Insurance, property	.62	.68	.66	.8	.72	.74	.64	.69	.67
Life insurance, public	.62	.6	.63	.8	.63	.7	.64	.64	.58
Mail order	na	.65	.61	na	.7	.66	na	.67	.67
Newspapers	na	.59	.6	na	.69	.68	na	.66	.64
Oil companies	.61	.54	.53	.74	.63	.62	.66	.58	.59
Personal computers	.7	.62	.58	.74	.62	.63	.76	.71	.7
Pharmacy	na	.59	.6	na	.65	.66	na	.7	.82
Police	.76	.67	.71	.72	.61	.66	.69	.71	.59
Postal service, business	.67	.64	.6	.82	.59	.75	.68	.66	.72
Postal service, public	.61	.62	.67	.71	.65	.73	.78	.59	.65
Railroad	.61	.64	.61	.74	.66	.66	.71	.73	.76
Shipping	na	.62	.61	na	.71	.7	na	.61	.61
Supermarkets	.69	.69	.67	.76	.61	.67	.66	.61	.64
Telecommunications, business	.71	.68	.72	.82	.7	.73	.74	.73	.77
Telecommunications, public	.77	.63	.78	.76	.63	.73	.76	.64	.72
Television broadcasting	.67	.68	.63	.84	.74	.73	na	na	na

The Effect on Loyalty

Just as price elasticity varies among firms and industries, so does "customer satisfaction elasticity." Clearly, it is very important to determine how sensitive the present customer base is to satisfaction. In view of the current business emphasis on quality, one may well get the impression that quality and customer satisfaction are equally important for all firms. That is not the case. Customer satisfaction is more important (for loyalty) in some industries than in others.

Figure 3 depicts the effect of CSB on customer loyalty. The vertical axis measures CSB for 1990; the horizontal axis measures the unstandardized coefficient[7] that relates CSB to loyalty. With one exception (television broadcasting), the industries seem to be "rationally structured" in the sense that those highly affected by customer satisfaction also have high CSB scores. Personal computers, food products, automobiles, charter travel, and mail order are all very sensitive to satisfaction. Not surprisingly, the police force is much less dependent on how it treats its "customers" (citizens reporting a crime) to "secure repeat business." Most of the other monopolies are also less sensitive to customer satisfaction than industries in competitive market structures.

In view of the possibility of competition for the telephone company in the near future, respondents were asked about the hypothetical case of having alternatives available today. As a result, the coefficients for that industry are exaggerated if interpreted for the monopoly case. The same holds for the pharmacies, which also may face competition in the future.

Interestingly, the industries with low elasticities are those in which one would suspect switching costs to be high (police, postal services, telephone services, and business insurance). In contrast, switching barriers for automobiles, food, charter travel, and personal computers are probably less powerful. Companies in those industries are highly dependent on customer satisfaction for repeat business.

Summary

To sustain and improve the welfare of their citizens, all nations depend on international trade. For small countries, without an abundance of natural resources,

[7]As in covariance structure analysis, the metric of the latent variable is indeterminate. PLS standardizes to a mean of zero and a variance of one. To make comparisons across industries and time, unstandardized coefficients were obtained by multiplying the structural coefficient (for the combined sample 1989 and 1990) by the ratio of the mean standard deviations for the relevant variables.

TABLE 4
Parameter Estimates[a]

	P → S			E → S			S → L			V → L			SAT. R^2		
Industry	**1989**	**1990**	**1991**	**1989**	**1990**	**1991**	**1989**	**1990**	**1991**	**1989**	**1990**	**1991**	**1989**	**1990**	**1991**
Airlines	.67	.63	.51	.11	.18	.22	.23	.38	.28	.01	.1	.01	.49	.48	.39
Automobiles	.48	.51	.51	.23	.18	.19	.51	.47	.49	−.05	−.04	−.04	.36	.34	.36
Banks, business	.7	.76	.7	.1	.04	.1	.39	.41	.36	−.13	.09	−.06	.54	.59	.54
Banks, public	.68	.68	.69	.05	.08	.06	.53	.52	.59	−.05	−.04	−.01	.49	.5	.51
Charter travel	.75	.73	.76	.03	.09	.06	.54	.53	.52	.03	.03	−.002	.57	.58	.61
Clothing, retail	.59	.47	.58	.19	.28	.45	.45	.38	.42	−.02	.08	.06	.48	.42	.48
Computer mainframes	.51	.65	.57	.11	.07	.11	.37	.43	.37	.01	.14	.03	.31	.45	.37
Department stores	.5	.49	.59	.34	.22	.24	.17	.35	.36	.02	.02	.13	.48	.38	.53
Food processing	.72	.71	.68	na	na	na	.59	.57	.58	.03	.01	.02	.52	.5	.46
Furniture	.49	.56	.64	.26	.16	.18	.32	.5	.56	.01	.04	.04	.4	.42	.54
Gas companies	.43	.52	.49	.37	.24	.3	.38	.38	.29	.05	.06	.03	.45	.44	.43
Insurance, business	.72	.75	.72	.08	.08	.12	.37	.32	.4	−.1	−.19	−.08	.57	.61	.58
Insurance, property	.7	.79	.78	0	.03	.05	.42	.54	.45	.01	−.06	−.03	.49	.63	.62
Life Insurance, public	.7	.68	.75	0	.13	.08	.42	.38	.35	.01	−.06	−.04	.49	.55	.61
Mail order	na	.66	.71	na	.09	.04	na	.53	.48	na	−.04	.06	na	.48	.52
Newspapers	na	.5	.55	na	.31	.26	na	.41	.28	na	−.01	.02	na	.52	.52
Personal computers	.64	.61	.55	.05	.12	.22	.48	.46	.46	.09	.12	.15	.42	.42	.43
Pharmacy	na	.62	.54	na	.22	.23	na	.3	.2	na	−.08	−.05	na	.57	.48
Police	.52	.67	.77	.3	.04	.03	.13	.15	.27	−.13	−.22	−.03	.45	.47	.61
Postal service, business	.64	.75	.69	.06	.07	.12	.32	.31	.4	−.1	−.13	.04	.43	.59	.55
Postal service, public	.59	.61	.72	.13	.19	.11	.2	.17	.19	−.17	−.05	−.29	.4	.53	.59
Railroad	.61	.7	.6	.02	.13	.19	.5	.42	.39	.02	.14	.16	.38	.56	.5
Shipping	na	.73	.69	na	.08	.13	na	.47	.37	na	−.03	−.01	na	.57	.55
Supermarkets	.57	.64	.57	.3	.19	.27	.38	.44	.52	.08	.07	.15	.53	.55	.52
Telecommunications, business	.74	.74	.72	.07	.09	.08	.32	.29	.37	−.17	−.01	−.03	.58	.61	.56
Telecommunications, public	.59	.64	.67	.14	.17	.2	.38	.27	.38	−.1	−.12	−.07	.41	.53	.59
Television broadcasting	.6	.74	.63	.31	.14	.21	.63	.66	.48	na	na	−.02	.65	.68	.55

[a]P = performance, S = satisfaction (i.e., CSB), E = expectations, L = loyalty, V = voice (i.e., complaints).

it is even more critical to do well in foreign markets and to defend domestic markets. Obviously, developed countries must increasingly rely on knowledge-intensive industry and cannot compete well on price or labor costs (Lindbeck 1988). Nevertheless, most analysts agree that high levels of productivity are essential.

However, many industrial nations do not expect great improvements in productivity. Instead, they must concentrate more on quality production. When quality is recognized by the buyer, it is reflected in customer satisfaction. That is why a national index of customer satisfaction is not only a complement to productivity indices at the macro level, but also a complement to traditional measures of business performance at the micro level. Products and services that provide high customer satisfaction are less vulnerable to competition. They have a higher proportion of repeat business and higher gross margins.

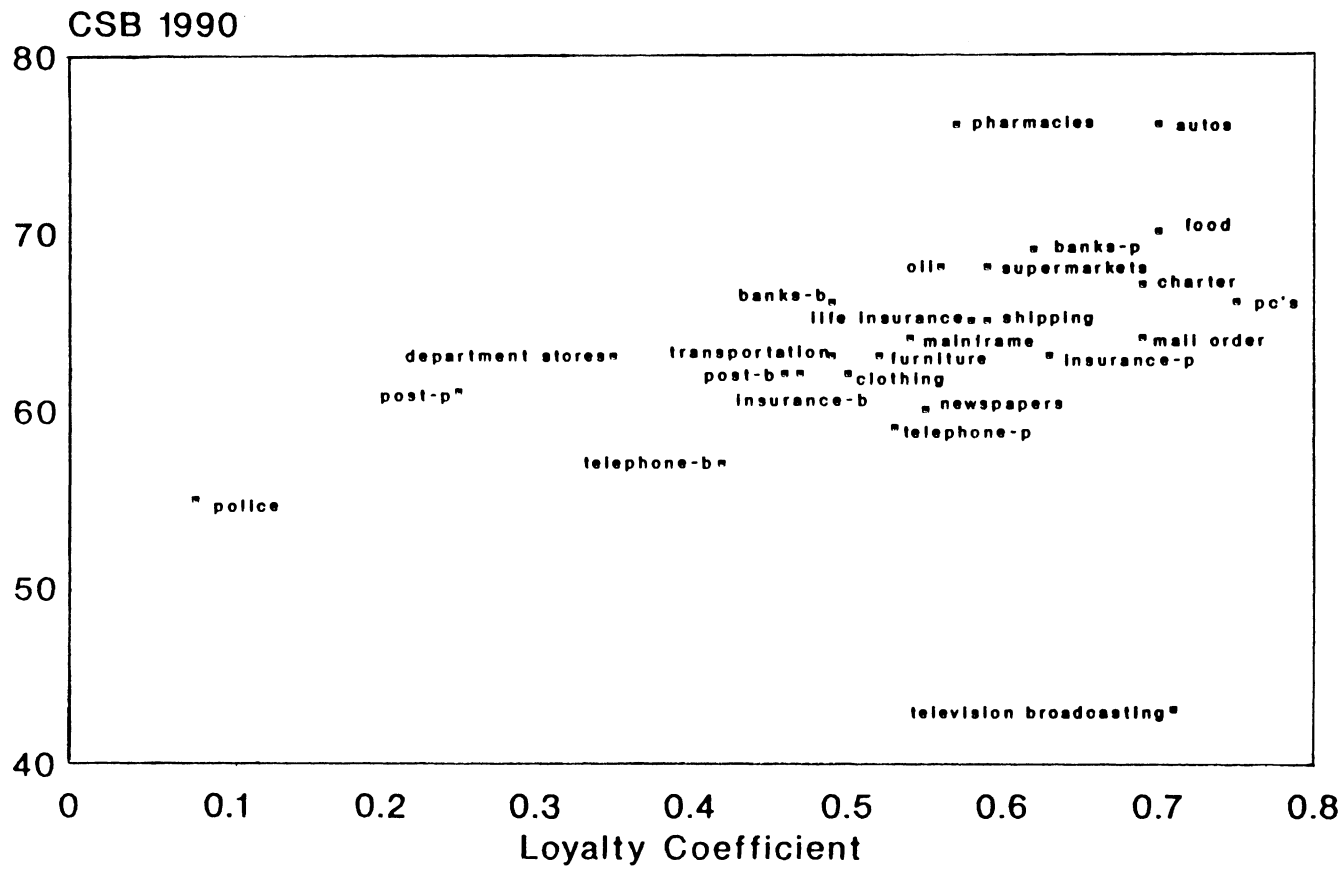
After Japan, Sweden had the fastest GDP growth per capita in the world during 1870–1960. Since 1970, the country has slipped in relation to other nations. In an effort to promote quality and increase customer orientation within its industries, Sweden has developed a new economic indicator, the Customer Satisfaction Barometer. This article reports on the first three years of its application.

CSB estimates levels of customer satisfaction for about 100 firms in more than 30 industries from annual survey data that are used as input into a multiple-equation system. High levels of validity and reliability are demonstrated. In a micro context, the impact of (1) customer switching barriers and (2) the relationship between customer satisfaction and company market share leads to a proposition about the levels of CSB in different industries. Specifically, the contention is that heterogeneity/homogeneity of demand and supply is largely responsible for major differences in CSB across industries. The results indicate that industries selling homogeneous products to a homogeneous market or differentiated products (services) to a heterogeneous market typically had higher CSB than other industries.

With the caveat that absolute numbers are somewhat difficult to interpret in the absence of a longer data series and comparisons with other countries, the results suggest that customers in Sweden are not overly satisfied with many of their products and services. However, the recent trend appears to be slightly upward—especially for some of the state monopolies (which seem to gear up to meet possible deregulation).

To be competitive in world markets, a company must invest in productivity as well as in the quality of what is produced. Before quality can be improved, it must be measured. Measurement is a prerequisite

FIGURE 3
Effect on Loyalty



for incorporating quality into the National Accounting Systems and thereby explicitly recognizing that the quality of what is delivered by the economy is an important source of improvement in the standard of living. At the micro level, there is a place for customer satisfaction measures in accounting as well. Satisfied customers are an asset to the firm. Changes in satisfaction are consequences of past decisions *and* predictors of future performance. The ultimate judgment of quality is with the customer. Quality improvements that are not recognized by the customer are questionable investments. Accordingly, the most meaningful measurement of quality is how it affects customer satisfaction. By taking the first step to systematically measure it, Swedish industry has, at the very least, a benchmark from which to improve.

Appendix A
The CSB Equations

The systematic part of the predictor relationships is the conditional expectation of predictands for given values of predictors. The general equation is thus specified as stochastic:

$$E(\boldsymbol{\eta}|\boldsymbol{\eta},\boldsymbol{\xi}) = \boldsymbol{\beta}^*\boldsymbol{\eta} + \boldsymbol{\Gamma}\boldsymbol{\xi}$$

where $\boldsymbol{\eta} = (\eta_1,\eta_2 \ldots \eta_m)$ and $\boldsymbol{\xi} = (\xi_1,\xi_2 \ldots \xi_n)$ are vectors of unobserved endogenous and exogenous variables, respectively, $\boldsymbol{\beta}^*(m \times m)$ is a matrix of coefficient parameters for $\boldsymbol{\eta}$, and $\boldsymbol{\Gamma}$ $(m \times n)$ is a matrix of coefficient parameters for $\boldsymbol{\xi}$. This implies that $E(\boldsymbol{\eta}\boldsymbol{\zeta}') = E(\boldsymbol{\xi}\boldsymbol{\zeta}') = E(\boldsymbol{\zeta}) = 0$, where $\boldsymbol{\zeta} = \boldsymbol{\eta} - E(\boldsymbol{\eta})$.

The corresponding equation that relates the latent variables in CSB is:

$$\begin{bmatrix}\eta_1\\ \eta_2\\ \eta_3\\ \eta_4\end{bmatrix} = \begin{bmatrix}0 & 0 & 0 & 0\\ \beta_{2,1} & 0 & 0 & 0\\ 0 & \beta_{3,2} & 0 & 0\\ 0 & \beta_{4,2} & \beta_{4,3} & 0\end{bmatrix}\begin{bmatrix}\eta_1\\ \eta_2\\ \eta_3\\ \eta_4\end{bmatrix} + \begin{bmatrix}\gamma_{1,1}\\ \gamma_{2,1}\\ 0\\ 0\end{bmatrix}[\xi] + \begin{bmatrix}\zeta_1\\ \zeta_2\\ \zeta_3\\ \zeta_4\end{bmatrix}$$

where:

η_1 = performance,
η_2 = customer satisfaction (i.e., CSB),
η_3 = voice, and
η_4 = loyalty.

The general equations for relating the latent variables to empirical variables are

$$\mathbf{y} = \boldsymbol{\Lambda}_y\boldsymbol{\eta} + \boldsymbol{\epsilon}$$

$$\mathbf{x} = \boldsymbol{\Lambda}_x\boldsymbol{\xi} + \boldsymbol{\delta}$$

where $\mathbf{y} = (y_1,y_2, \ldots y_p)$ and $\mathbf{x} = (x_1,x_2, \ldots x_q)$ are the measured endogenous and exogenous variables, respectively. $\boldsymbol{\Lambda}_y(p$

$\times$ m) and Λ_x(q $\times$ n) are the corresponding regression matrices; ϵ and δ are residual vectors. By implication from PLS estimation (Fornell and Bookstein 1982), we have $E(\epsilon) = E(\delta) = E(\mathbf{y}\epsilon') = E(\mathbf{x}\delta') = 0$. The corresponding equation in CSB is:

$$\begin{bmatrix} y_1 \\ y_2 \\ y_3 \\ y_4 \\ y_5 \\ y_6 \\ y_7 \\ 7_8 \\ y_9 \end{bmatrix} = \begin{bmatrix} \lambda_{1,1} & 0 & 0 & 0 \\ \lambda_{2,1} & 0 & 0 & 0 \\ 0 & \lambda_{3,2} & 0 & 0 \\ 0 & \lambda_{4,2} & 0 & 0 \\ 0 & \lambda_{5,2} & 0 & 0 \\ 0 & 0 & \lambda_{6,3} & 0 \\ 0 & 0 & \lambda_{7,3} & 0 \\ 0 & 0 & 0 & \lambda_{8,4} \\ 0 & 0 & 0 & \lambda_{9,4} \end{bmatrix} \begin{bmatrix} \eta_1 \\ \eta_2 \\ \eta_3 \\ \eta_4 \end{bmatrix} + \begin{bmatrix} \epsilon_1 \\ \epsilon_2 \\ \epsilon_3 \\ \epsilon_4 \\ \epsilon_5 \\ \epsilon_6 \\ \epsilon_7 \\ \epsilon_8 \\ \epsilon_9 \end{bmatrix}$$

where:

y_1 = quality (given price),
y_2 = price (given quality),
y_3 = overall satisfaction,
y_4 = confirmation of expectations,
y_5 = distance from ideal product (service),
y_6 = complaints to personnel,
y_7 = complaints to management,
y_8 = price increase tolerance, and
y_9 = repurchase intention,

and

$$x = \xi$$

where:

x = expectations.

Appendix B
CSB Results 1989 to 1991

	CSB			Leading Firms		
Industry	**1989**	**1990**	**1991**	**1989**	**1990**	**1991**
Automobiles	77	76	78	Toyota (87)	Mazda (81)	Mazda (85)
Basic foods	77	79	78	Jästbolaget (82)	Jästbolaget (83)	Jästbolaget (84)
Pharmacy	na	76	73	na		
Food processors	67	70	70	Marabou (78)	Marabou (79)	Marabou (80)
Oil (gas stations)	67	68	70	Statoil (70)	Statoil (70)	BP (71)
Shipping	na	64	69	na	JetPak (70)	JetPak (73)
Airlines	67	67	68	SAS (67)	SAS (69)	SAS (69)
Charter travel	68	67	68	Spies (69)	Ving (70)	Atlas (69)
Banking, public	69	69	67	SHB (75)	SHB (73)	SHB (72)
Postal service, public	65	61	67	Letter (69)	Letter (62)	Letter (68)
Personal computers, business	70	66	67	Apple (76)	Apple (69)	Apple (73)
Insurance, property	65	63	66	Trygg-Hansa (66)	Trygg-Hansa (64)	Länsfskr. (69)
Postal service, business	59	62	65	Letter (62)	Letter (63)	Letter (67)
Supermarkets	66	68	65	ICA (70)	Vivo (70)	ICA (70)
Furniture, retail	64	63	65	MIO (68)	MIO (66)	MIO (71)
Vin & SpritCentralen	59	59	65			
Banking, business	70	66	64	SHB (75)	SHB (72)	SHB (68)
Newspapers	na	60	64	na	SvD (67)	SvD (72)
Insurance, business	64	62	64	Skandia (66)	Trygg-Hansa (63)	Trygg-Hansa (67)
Mainframe computers	68	64	64	IBM (70)	HP (70)	HP (70)
Mail order	na	64	63	na	Haléns (68)	HM&R (65)
Insurance, life	65	65	63	Trygg-Hansa (67)	Länsfskr. (69)	Länsfskr. (67)
Clothing, retail	63	62	62	Lindex (66)	Lindex (64)	Lindex (65)
Telecommunications, public	55	59	61			
Department stores	62	63	61	NK (68)	NK (68)	NK (64)
Police	56	55	58			
Telecommunications, business	54	57	57			
Railroad	45	55	54			
TV broadcasting	44	43	47	TV3 (57)	TV3 (52)	TV3 (53)
Mean, all industries	64	64	65			

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Reprint No. JM561102