SIMULTANEITY IN THE RELATIONSHIP BETWEEN SALES PERFORMANCE AND COMPONENTS OF CUSTOMER SATISFACTION

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ABSTRACT

The widespread use of customer satisfaction metrics has prompted researchers to investigate the relationship between customer satisfaction and sales performance. Earlier studies, however, have ignored an important aspect of the relationship – the simultaneity between sales performance and some components of customer satisfaction. This article shows that the bias produced by ignoring simultaneity can significantly alter the conclusions drawn from the analysis. Results from a model that links sales performance with individual components of customer satisfaction, ignoring simultaneity, contradict intuition. Our results from a reformulated model provide evidence of the simultaneity between the components of customer satisfaction and sales performance. The results also document that estimating a model ignoring simultaneity produces estimates that are biased. The authors suggest the need to use simultaneous equation models for future studies that examine the role of customer satisfaction in determining sales performance. The implications of the study are also relevant for managers who use the results of such analyses in the formulation of marketing programs.

INTRODUCTION

Many firms are interested in using insights from customer satisfaction to enhance outcomes such as sales performance. This has led them to spend considerable amounts on tracking customer satisfaction through surveys. To understand the linkages between customer satisfaction and sales performance, though, it is imperative to correctly estimate the relationship between customer satisfaction and sales performance. Recent research directs attention to the need for minimizing errors made in such estimations that can lead to suboptimal managerial decisions (Gomez, McLaughlin, and Wittink 2004).

Firms measure customer satisfaction and use this information in formulating marketing strategy centered on the measure (Zeithaml, Berry and Parasuraman 1996). Implicit in this emphasis on customer satisfaction is the intuitive notion that increasing customer satisfaction engenders customer loyalty, resulting in higher sales revenue for the firm. But, like other marketing programs, it is important for managers to be able to quantify its effect on financial performance (Wiles 2007; Mittal et al. 2005; Kumar and Shah 2004; Rust and Zahorik 1993). With this aim, researchers have empirically examined the impact of customer satisfaction on sales revenue. While prior research has focused on the impact of customer satisfaction on sales revenue, increased traffic associated with higher sales revenue may also, in turn, impact some of the components of customer satisfaction. Most prior studies use recursive or single-equation models to describe the relationship between customer satisfaction and sales performance treating the relationship as uni-directional from customer satisfaction → sales performance. This methodology assumes implicitly that customer satisfaction is exogenous and tries to evaluate the response of sales performance to differences in customer satisfaction. If, in fact, a feedback

loop exists between customer satisfaction and sales performance, wherein customer satisfaction impacts sales performance and also where sales performance affects customer satisfaction, then the relationship between the two variables is non-recursive or simultaneous, and needs to be modeled appropriately. Ignoring the simultaneity is likely to lead to a downward bias in the estimated coefficient of customer satisfaction and inefficient allocation of resources by managers based on the modeled impact of customer satisfaction on sales performance.

Much of the earlier research on customer satisfaction has focused on fundamentally understanding the construct. But, as several authors have observed, it is important to understand what satisfaction levels of customers mean for the economic success of the enterprise. Some studies have, thus, focused on understanding the economic outcomes of customer satisfaction (Anderson, Fornell and Lehmann 1994; Anderson, Fornell and Rust 1997; Rust and Zahorik 1993). These studies present evidence that customer satisfaction has a positive impact on sales revenue, market share and intention to purchase behavior of customers.

In order to make the results of measuring customer satisfaction more meaningful to managers, it is important to determine what aspects of the service proposition impact customer satisfaction, so that managers can tailor marketing programs to affect the dimensions of customer satisfaction that have the maximum impact on sales revenue (Zeithaml 2000). Much of the literature on customer satisfaction, thus, focuses on developing scales that measure customer satisfaction on different dimensions that would aid managers in identifying specific components of satisfaction that have a positive impact on sales performance.

But, while specific dimensions of customer satisfaction, such as customer service, may impact sales revenue, it is also likely that higher sales revenue affects these dimensions. For instance, in a department store higher sales revenue implies more traffic in the store. Thus, for a given level of staffing and physical resources, higher traffic may imply fewer resources available per customer, leading to greater congestion and longer wait times, and hence lower customer satisfaction (Grewal, Baker, Levy & Voss 2003; Kumar 2005). Therefore, when estimating the importance of the different components of customer satisfaction and sales revenue, it is essential to account for the simultaneity in the relationship which, if ignored, could bias the results (Haavelmo 1943).

In this article, we examine the relationship between different components of customer satisfaction and sales performance utilizing data obtained from a national department store chain. In doing so, we show that the insights provided by the empirical results change materially if simultaneity in the relationship is taken into account in the empirical model. This article also contributes to the literature in understanding what drives different components of customer satisfaction. In our empirical models we aim to include measures that explain and control for different characteristics that affect the sales performance and customer satisfaction of individual stores. The results from our empirical models provide insights into the drivers and correlates of satisfaction that are useful both for practitioners involved in implementing satisfaction programs as well as researchers interested in building more accurate models explaining customer behavior.

The remainder of this article is structured as follows. The next section discusses the related literature in detail which is used to motivate the research hypotheses. The section following that describes the data and the research site. The next section examines the relationship between the components of customer satisfaction and sales performance. The section following that describes the results recognizing the simultaneity in the relationship. Then a wrap

up section concludes with a discussion of the main findings of the study.

LITERATURE REVIEW AND RESEARCH HYPOTHESES

With marketing programs being increasingly designed based on the measurement of customer satisfaction, researchers have examined the economic consequences of customer satisfaction (Anderson and Sullivan 1993; Zeithaml, Berry and Parasuraman 1996; Bolton 1998, Kamakura et al. 2002). Using customer satisfaction data from Swedish firms, Anderson, Fornell and Lehmann (1994) find that customer satisfaction leads to improved financial performance. But Anderson, Fornell and Rust (1997) find that while customer satisfaction leads to improved productivity for manufacturing firms, there is a tradeoff between satisfaction and productivity for service firms. Niraj et al. (2003) examine the relationship between individual customer level satisfaction and profitability at a beverage distribution company and find that increased customer satisfaction does not necessarily translate to increased net profitability of customers when all allocated costs are factored in.

In establishing links between customer satisfaction and sales performance, analysis of specific components that drive sales provides greater insight for the purpose of directing resources for specific marketing programs. One stream of the literature has focused on identifying these components of service quality and customer satisfaction. Using customer surveys of subjects that had shopped at a department store, Westbrook (1981) measures customers' satisfaction with specific retailer-related experiences. Using factor analysis of customers' evaluative responses he finds that they load on eight factors. In order to determine the most influential components in determining overall customer satisfaction, he regresses the overall satisfaction measure on factor scores. Wolfinbarger and Gilly (2003) develop scales for the measurement of service quality for online retailing. Similarly, Srinivisan, Anderson, and Ponnavolu (2002) identify different factors that impact e-loyalty and develop scales to measure these factors. A widely discussed scale for measuring service quality is SERVQUAL, a scale designed to measure five dimensions of service quality: tangibles, reliability, responsiveness, assurance and empathy (Parasuraman, Zeithaml and Berry 1988). These scales have been validated by others in the field by analyzing identifiable components of customer satisfaction or service quality through factor analysis, and examining the fit with the proposed scale structure (Finn and Lamb 1991; Cronin and Taylor 1992).

Researchers have observed that the purpose of measuring service quality and customer satisfaction is to provide information that can guide managerial actions to enhance customer loyalty and improve overall financial performance of the firm (Oliver 1981, 1997; Rust, Zahorik and Keiningham 1994). The first step in establishing a reliable customer measurement system is to link these constructs to objective measures of performance. Some studies have examined the relationship between these components of customer satisfaction and various outcome variables. Dabholkar, Thorpe and Rentz (1996) examine the predictive ability of different dimensions of a retail service quality scale by studying their correlations with 'intention to shop' and 'intention to recommend'. In a study based in the retail environment, Hurley and Estelami (1998) examine the efficacy of various service quality indexes by studying their relationship with sales revenue and store customer counts as performance measures that should be related to service quality.

Surveying the literature dealing with the economic consequences of customer satisfaction, Zeithaml (2000) observes that we still do not know much about the key drivers of customer satisfaction, customer retention

and sales revenue. An essential step towards understanding these links, is to examine the relationship between different components of customer satisfaction and sales revenue. Rust and Zahorik (1993) provide a mathematical framework to determine which customer satisfaction components have the greatest impact on business outcome measures. To illustrate this framework, they use a pilot study of retail banking and find that customer responses load on three factors. Also, they investigate the link between customer satisfaction components identified in the factor analysis, and customer retention using logistic regression analysis. They find that only one of the components is significant in explaining customer retention. Using the results from the mathematical model they estimate the impact of the individual customer satisfaction components on market share and contribution.

Recent research has begun to address some of the issues that need to be addressed while understanding the linkages between customer satisfaction and sales performance such as asymmetries and nonlinearities in the links (Anderson and Mittal 2000; Mittal and Kamakura 2001; Gomez, McLaughlin and Wittink 2004). A critical element, though, that has been overlooked in the literature is the simultaneous relationship between customer satisfaction components and sales performance. While some authors have hinted at the possibility (Rust and Zahorik 1993; Bolton and Drew 1994), to our knowledge no study has tested this premise.

The setting of our study is a chain of department stores. We focus on three components of customer satisfaction that are likely to be important in a retail setting based on prior research: (a) satisfaction with customer service (b) satisfaction with quality and availability of merchandise, and (c) satisfaction with physical characteristics of individual stores. We examine the simultaneity in the relationship between these individual components of customer satisfaction, and sales performance.

Customer Service and Sales Performance

There is ample empirical research that supports the linkage between customer satisfaction and greater repurchase intentions (Anderson 1994; Anderson and Mittal 2000; Zeithaml, Berry, and Parasuraman 1996) as well as to actual repurchase behavior (cf. Bolton 1998). Studies have also shown that overall customer satisfaction is a function of performance on various attributes that are important to customers. In the retail setting, customer service has been found to be one such attribute (Babakus, Bienstock, and Van Scotter 2004). Thus, we should find that satisfaction with customer service has a positive effect on sales performance. In a retail setting, higher sales performance is associated with greater traffic and more transactions. All else remaining equal, higher traffic will result in fewer resources, such as customer service personnel, being available per transaction. This can lead to longer wait times for customers to obtain service. Several studies have shown that waiting for service in a retail store can lead to consumer dissatisfaction (Grewal, Baker, Levy and Voss 2003; Davis and Heineke 1998; Katz, Larson, and Larson 1991). This is even more critical for a department store since customers need service not just for executing the actual transaction but during the entire shopping process. Also, higher customer density (or crowding) in the store affects customer perceptions of store atmosphere and hence, can negatively affect customer satisfaction (Eroglu and Machleit 1990; Grewal, et al. 2003). Thus, while we expect satisfaction with customer service to result in higher sales for a store, presence of a feedback loop would suggest that higher sales, in return, will affect customer satisfaction with service negatively. This leads to our first set of research hypotheses related to the links between customer satisfaction with service and sales performance:

H1a: Customer satisfaction with the quality of customer service will have a positive effect on the sales revenue of a store.

H1b: Higher sales will result in lower customer satisfaction with the quality of customer service.

Merchandise and Sales Performance

Satisfaction with quality and availability of merchandise is another component of customer satisfaction that has been found to be important determinant of overall customer satisfaction in a retail setting (Ghosh 1990; Grewal et al. 1998). As with customer service, we expect that greater satisfaction with the merchandise will positively affect sales performance. If sales are higher, a store may be able to turn over its merchandise inventory more quickly, allowing the store to keep fresh stock and the newest and latest merchandise. It has been shown that perceived merchandise quality has a positive influence on customer satisfaction (Babakus, et al. 2004). In other settings, such as online auctions, job-search or match-making sites, if sales increase, customers may also benefit from network effects from a larger customer base. Thus, higher sales revenue may have a positive impact on customer satisfaction with merchandise. This leads us to our second set of research hypotheses that examines simultaneity in the relationship between sales performance and satisfaction with merchandise:

H2a: Customer satisfaction with the quality and availability of merchandise will have a positive effect on the sales revenue of a store.

H2b: Higher sales will result in a higher customer satisfaction with the quality and availability of merchandise.

Physical Characteristics and Sales Performance

Satisfaction with the physical characteristics of a store has been found to be another important determinant of overall customer satisfaction in a retail setting (Dabholkar, et al. 1996; Baker et al. 1994; Parasuraman et al. 1988). Hence, we expect that that satisfaction with physical aspects of the store will lead to higher sales revenue. All else being equal, greater traffic in the store is likely to negatively affect the appearance and cleanliness of the physical facilities. This, in turn, will result in lower customer satisfaction with physical characteristics of the store. Our third set of research hypotheses can thus be stated as follows:

H3a: Customer satisfaction with the physical characteristics of the store will have a positive effect on the sales revenue of the store.

H3b: Higher sales will result in lower customer satisfaction with the physical characteristics of the store.

The framework of our study, along with the hypothesized linkages, is presented in **Figure 1**. If the relationship between sales performance and the components of customer satisfaction is in fact simultaneous, and not uni-directional as has been implicit in the literature, ignoring this simultaneity is likely to bias the coefficients on the components of customer satisfaction when sales performance is the dependent variable (Greene 1997). The direction of bias in the coefficients estimated using single equation least-square methods is not always readily apparent. The direction of this bias would depend on the sign of the reverse relationship between sales and

FIGURE 1

Overview of Research Hypotheses

Customer Satisfaction Components

the customer satisfaction component, and the variance-covariance matrix of the error terms obtained from the system of equations that depict the "true" relationship between the variables (Greene 1997). Notably, the potential for downward bias in the estimation of coefficients measured using OLS techniques while ignoring simultaneity is a potential reason why some earlier studies may not have found significant relationships between customer satisfaction and sales performance. We proceed to analyze our research hypotheses using data from our research site which is described in the next section.

RESEARCH SITE AND DATA

The Research Site

Our research site is a department store chain (hereafter referred to as RETAILER). We collected data from more than 1000 stores of RETAILER (the actual number of stores is not disclosed to ensure that RETAILER's true identity is not revealed). The chain has positioned itself as a fair-priced department store catering to consumers who are looking for quality merchandise at affordable prices. This particular category of department stores has seen an increasing amount of competition from discounters as well as newer specialty stores. In order to track the attitudes of its customers more closely, it has begun a program of measuring customer satisfaction on an annual basis. The program consists of administering a customer survey through two sources – mailers sent to existing customers, and mall interceptions. RETAILER also has plans of using the customer satisfaction measures in the performance evaluation and compensation of store managers. In doing so, the management believes that the focus of the program should be on those components of customer satisfaction that are linked to the overall strategy of the firm, rather than an overall measure of customer satisfaction.

There are several ways in which customer satisfaction may impact sales.

Customers who are satisfied would be willing to pay a higher price for the same merchandise, buy in larger quantities and more frequently. Also, satisfaction leads to positive word-of-mouth which increases overall sales volume. But there are different dimensions that may lead to higher customer satisfaction. Customers may be satisfied with the quality of merchandise at the store or with the attentiveness and friendliness of the staff on the shop-floor. Customers may also be satisfied or dissatisfied with the physical characteristics of the store such as store layout and cleanliness. On the other hand, there are several ways in which higher sales may impact the different dimensions of customer satisfaction. Higher store traffic implies longer lines at the sales registers, less shopping space, and less attention paid to each customer by sales associates. Higher store traffic also means that the merchandise would have quicker turnover, implying more fresh updates in merchandise, thus leading to higher satisfaction with merchandise. Thus, the causal relationship between customer satisfaction and sales revenue may be bi-directional.

An increase in customer satisfaction may not have an immediate impact on sales. There may be a lag between an increase in customer satisfaction and its impact on sales, and also a lag in the impact of increased sales revenues on satisfaction. Since the relation-ship between customer satisfaction and sales in both directions develops over time, each one of them is an aggregation of a series of influences that have occurred over time. Estimating the relationship in two directions modeled as reciprocally related equations using cross-sectional data is likely to pick up the ongoing processes of change and influence (Maruyama and McGarvey 1980). Hence, we use contemporaneous annual data on sales and customer satisfaction.

Customer Satisfaction Data

We were provided access to RETAILER's customer survey data for one year covering all stores. An objective of this article is to model the links between the different components of customer satisfaction and sales performance. Since the sales performance data is only available at the store level, we aggregate the individual level customer satisfaction data to the store level for analysis. The surveys contain questions relating to satisfaction with the quality and value of merchandise, the level and quality of customer service, and the cleanliness of the store. All responses to the survey questions are on a 10-point scale. Our data consists of mean responses to each question for individual stores.

In the first stage of our analysis, we conduct factor analysis of responses to all questions to identify different components of satisfaction. Since this particular survey instrument has not been studied before in the literature, we performed exploratory factor analysis with varimax rotation which revealed three factors with eigenvalues greater than one. The individual items load on to three clearly interpretable factors of satisfaction: customer service (Factor 1), merchandise (Factor 2) and physical characteristics (Factor 3). The factors correspond to some of those found by Dabholkar, Thorpe and Rentz (1996) and Hurley and Estelami (1998).

The hypothesized model consisting of these three factors was then tested by confirmatory factor analysis using the Linear Equations (LINEQS) model developed by Bentler and Weeks (1980). Initial tests conducted by including all question responses suggested an over-fitted model due to the lack of parsimonious use of survey items. Accordingly, some items were dropped after a careful analysis performed using recommended Wald tests. The final measurement model chosen consists of 3 items measuring satisfaction with customer

service, 3 items measuring satisfaction with merchandise, and 2 items measuring satisfaction with the physical characteristics of stores. These survey questions are described in Table 1.

TABLE 1

Description of Items Used to Measure the Customer Satisfaction Factors

Scale/Item(a)	Cronbach's Alpha	Factor Loading(b)	Average Variance Extracted(c)
Customer Service	0.920		0.797
Thinking of the sales service in this RETAILER store, how satisfied are you on having salespeople who….			
• Provide you with useful fashion/product knowledge about the merchandise they sell		0.958	
• Allow you to make a purchase in a timely manner		0.890	
• Thank you by name for shopping RETAILER, whenever possible		0.826	
Merchandise	0.927		0.808
Thinking of the RETAILER store at which most frequently shop, please rate your satisfaction on….			
• Having the merchandise that you want in stock		0.886	
• Having good value merchandise for the price paid		0.845	
• Having the merchandise that is advertised		0.962	
Physical Characteristics	0.841		0.763
Thinking of customer service conveniences in this RETAILER store, how would you rate it on….			
• Having clean and well-maintained restrooms		0.725	
• Having an overall clean and well-maintained store		1.000(b)	

(a) All items are measured using a ten-point scale anchored by "very dissatisfied" (1) and "very satisfied" (10).
(b) All coefficients are significant at the 1% level.
(c) Parameter fixed at 1 for identification purpose

Adequacy of the three-factor measurement model was evaluated using the CFI (Comparative Fit Index), GFI (Goodness of Fit Index), NFI (Normed Fit Index), and

the Non-normed Fit Index (NNFI). Ideally, a statistically non-significant chi-square statistic is desirable. However, our sample size is not within the range recommended ($100 < n < 200$) for this statistic (Hair et al., 2006). Hence, the chi-square statistic is not an appropriate measure for testing our measurement model. The fit indices for the measurement model (CFI = 0.92; GFI = 0.90; NFI = 0.92; NNFI = 0.92) were all above the recommended thresholds for an adequate fit to the data (Hu and Bentler, 1999). Moreover, the t-values for each loading are statistically significant at $p < 0.01$. Accordingly, we use the survey item means to capture the three customer satisfaction scales. We will refer to these scales as **CUSTSERV, MERCHANDISE**, and **PHYSICAL,** respectively.

Following Gerbing and Anderson (1988), we carried out additional tests to evaluate the reliability and validity of the multi-item constructs. The coefficient alpha for all three constructs exceeded 0.7, the threshold typically proposed in the literature (Hair et al. 2006; Nunnally 1978). In addition, the average variance extracted for customer satisfaction scales exceeded the squared correlation between them. This indicates discriminant validity of the three customer satisfaction scales (Fornell and Larcker 1981). The results appear in **Table 1**.

Sales Performance Data

We measure the sales performance (**SALES**) of each individual store as annual sales revenue per square foot of store space. **SALES** revenue is measured net of discounts and markdowns. This measure of performance has been commonly used both in the research literature on retailing as well as in practice (Berry and Lusch 1996; Donthu and Yoo 1998). Also, scaling by store space controls for effect size in our empirical models.

Other Variables Used in Analysis

While the main contribution of this article perhaps is in examining the simultaneous relationship between components of customer satisfaction and sales performance, we believe that another significant contribution is in understanding the drivers and correlates of different components of customer satisfaction. This understanding can then be employed to control for exogenous factors that may impact the dependent variables in our empirical model, which is important since we rely on cross-sectional analysis. In this section, we describe the other variables that are used as control variables in our estimation models.

- **Employee turnover** (**TURNOVER**): We measure the employee turnover for each store as the proportion of regular employees leaving during a particular year. Employees in a retail store play a key role in providing valued service to customers and hence may impact customer perceptions of service. Employee retention can influence customer satisfaction because more experienced employees may have greater knowledge of customer goals (Schneider and Bowen 1985). In a similar vein, Ostroff (1992) reported a negative relationship between high school teacher turnover and students' satisfaction. This leads to the following research hypothesis:

  H4: Employee turnover has a negative association with satisfaction with customer service.

- **Relative wages (RELWAGE):** Several studies in psychology have found that there are strong links between employee attitudes and customer perceptions of service quality (Schneider and Bowen 1985). Also, these studies have established that a key determinant of employee attitudes is monetary compensation provided to them (Schmit and Allscheid 1995). Based on these findings we expect that if employees are paid higher wages, they would be more

motivated to provide a higher level of service, thus affecting customer perceptions. We measure RELWAGE as the mean level of wages for a store, scaled relative to the median income of the region in which the store is located. This leads to the following research hypothesis:

H5: Relative wages of store employees will have a positive association with satisfaction with customer service.

- **Average length of employment of sales associates (AVGEXPER):** The longer an employee has been working with a store, the more likely is it that she is knowledgeable about the store's products and in understanding what customers want. Dabholkar et al. (1996) emphasize the importance of personal interaction between the customer and service employees in customers' evaluation of service quality. In building their scales, they reference earlier studies that have tested the SERVQUAL dimensions of responsiveness and assurance. The rationale for using this construct is that service employees that inspire confidence and are helpful to customers will have a significant impact on service quality. This ability of employees is likely to be influenced by the level of experience that they have. This leads to the following research hypothesis:

H6: The average length of employment of sales associates will be positively related to satisfaction with customer service.

- **Average length of experience of supervisors (SUPEREXPER):** The managerial staff of the store has control over the ordering and management of merchandise inventory. Hence, their experience with the job may impact the availability of merchandise and customer perceptions thereof. This leads to the following research hypothesis:

H7: The average experience level of supervisors will have a positive association with customers' satisfaction with store merchandise.

- **Age of the store (LNAGE):** The age of a store is likely to influence sales revenue per square foot, since a store that has been in existence for a longer period would be known to a larger base of customers. Thus, the age of the store will have a positive association with sales performance. In addition, the age of the store is likely to affect customer perceptions of the physical characteristics of the store. Retail literature suggests that store appearance is important to retail customers (e.g. Baker et al. 1994). Thus, customer satisfaction is likely to be affected by the appearance of the physical facilities of a service business (Dabholkar et al. 1996). Since older stores are more likely to wear a more tired look than newer stores, we expect customers to be less satisfied with the physical aspects of the store for older stores. This leads to the following research hypothesis:

H8: The older the store, the higher will be the sales revenue per square foot, but the lower will be customers' satisfaction with physical characteristics of the store.

- **Sales potential per square foot (POTENTIAL)**: RETAILER calculates the total sales potential for each store using demographic data including total household expenditure on selected categories of goods sold by RETAILER. Household expenditure data is collected for the primary trade area of the store, which consists of zip codes accounting for the highest percentage of sales of the given store. The sales potential per square foot, POTENTIAL, thus, is

intended to capture differences in demographics across store locations believed to be relevant in explaining variations in sales per square foot between stores. Since this is a proprietary measure used by RETAILER we were not provided further details on how it was measured. To validate that this measure is based on demographic differences across store locations, we regress POTENTIAL on variables measuring the population in the primary trade area and the median income of this population. We find that 81% of the variation in POTENTIAL is captured by these two variables. The coefficients on both the variables are positive and significant. The result confirms that POTENTIAL does in fact capture differences in demographics across store locations. Ceteris paribus, the sales per square foot of a store in a location with higher POTENTIAL is posited to be higher. Thus, we use the POTENTIAL measure as a control variable in the sales performance model. This leads to the following research hypothesis:

H9: The higher the sales potential of a store, the higher will be sales per square foot achieved by the store.

- **Soft-line (SOFTLINE)**: RETAILER owns two categories of department stores. One category of stores (soft-line) carries only soft merchandise such as apparel, accessories and cosmetics, while the other category (hard-line) includes durables like furniture and household appliances in addition to the soft merchandise. Since customer perceptions of the quality and value of the different categories of merchandise may vary, we introduce a dummy variable to capture the type of store: SOFTLINE is 0 for hard-line and 1 for soft-line stores. Nearly half of all stores are hard-line, while the remaining are soft-line. We introduce this variable as a control in the model explaining customer satisfaction with store merchandise, but we do not have any directional expectation for the relationship between the control variable and the component of satisfaction.

- **Store location (MALL):** While most of the stores (93%) are situated in malls, the rest are stand-alone stores. Since customers' perception of store cleanliness and physical facilities is likely to be influenced the general appearance of the mall, we introduce a dummy variable to control for store location without any expectation on the sign: MALL is 0 if store is stand-alone and 1 if it is situated in a mall.

REGRESSION OF SALES PERFORMANCE ON CUSTOMER SATISFACTION COMPONENTS

Model Specification

To examine the importance of the three components of satisfaction in terms of their impact on sales, we regress sales performance on customer satisfaction components. This is similar to other studies in the literature that have followed the same procedure (e.g. Dabholkar, Thorpe and Rentz 1996; Hurley and Estelami 1998). We add POTENTIAL and LNAGE as control variables that may have an impact on sales of individual stores. Here is the model:

$$Sales_1 = \Omega_0 + \Omega_1 CUSTSERV_1 + \Omega_2 MERCHANDISE_1 + \Omega_3 PHYSICAL_1 + \Omega_4 POTENTIAL_1 + \Omega_5 LNAGE_1 + \xi \quad (1)$$

If the relationship between sales revenue and the individual satisfaction components involves simultaneity, this would suggest that the estimated coefficients of the satisfaction components in equation (1) may be biased.

TABLE 2

Results of OLS Regressions Examining the Relationship between Sales Revenue and Components of Customer Satisfaction (t-statistics in parentheses)

Model: $Sales_1 = \Omega_0 + \Omega_1 CUSTSERV_1 + \Omega_2 MERCHANDISE_1 + \Omega_3 PHYSICAL_1 + \Omega_4 POTENTIAL_1 + \Omega_5 LNAGE_1 + \xi$

Dependent Variable: SALES

Intercept	37.1944 (0.95)	13.8294 (0.33)
CUSTSERV	-22.3696*** (-4.98)	-35.1598*** (-7.29)
MERCHANDISE	32.1207*** (7.43)	33.7860*** (6.28)
PHYSICAL	1.0490 (0.26)	4.3983 (1.12)
POTENTIAL	4.6355*** (8.94)	6.4153*** (12.02)
LNAGE	11.1157*** (5.97)	9.7415*** (4.90)
TURNOVER		-0.0590 (-1.28)
RELWAGE		8.8405*** (9.92)
AVGEXPER		-1.2528 (-1.16)
SOFTLINE		-4.5208 (-1.25)
SUPEREXPER		-0.1816 (-0.87)
MALL		11.5066* (1.83)
Adj. R-square	**0.2089**	**0.2759**

***,** and *** indicate statistical significance at 10%, 5% and 1% levels (two-tail) respectively**.

Econometric Considerations

To address potential heteroscedasticity in the estimation of (1), the dependent variable SALES is appropriately scaled using square footage of the store. After this transformation, we used White's (1980) test to confirm that the homoscedasticity assumption is not violated in the estimation model. We used the Belsley, Kuh and Welsch's (1980) criteria to identify influential observations that may drive the results. No

such observations were found. Since the three components of customer satisfaction were obtained using an orthogonal transformation, collinearity is not of concern in the estimation. Examination of Belsley et al. (1980) condition indices confirmed that multicollinearity was not a problem.

Results

The results from estimating equation (1) are presented in Table 2. As can be seen, one of the components of customer satisfaction, MERCHANDISE, is estimated to have a positive and significant relationship with SALES (coefficient = 33.7860, t = 6.28). But another component of satisfaction, customer service, is estimated to have a significantly negative relationship with sales performance (coefficient = -35.1598, t = -7.29). The estimated impact of the physical component is insignificant (coefficient = 4.3983, t = 1.12). A naïve interpretation of these results would suggest that the quality and value of merchandise is the only component of customer satisfaction that is important in influencing customers' purchase decisions. Better customer service appears to lead to lower customer satisfaction. Since we do not expect negative signs on any component of customer satisfaction, the results suggest that the likelihood that the estimated coefficient we obtained is biased downward because we have ignored the simultaneity between the components of satisfaction and sales in the simple regression model in (1).

SIMULTANEITY BETWEEN CUSTOMER SATISFACTION AND SALES

Model Specification

In this section, we examine the simultaneity between components of customer satisfaction and sales performance. We re-estimate model (1) after taking into account the possibility of simultaneity in the relationship. To do so, we need to formulate instruments for each of the components of satisfaction. Since each of the components of customer satisfaction may have an impact on sales revenue, and sales revenue may, in turn, impact each of the components, our model consists of a system of four equations – one equation in which sales revenue is determined by the three components of customer satisfaction, and one equation each for the individual customer satisfaction components that are influenced by sales revenue. The new model is specified at the top of **Table 3** on the next page. Note that this simultaneous model is identified.

Econometric Considerations

The two-stage least squares method can be used to obtain consistent and efficient estimators of a system of simultaneous equations if the error terms across the equations are uncorrelated (Theil 1971). In this case, though, the error terms across equations are likely to be correlated since they refer to the same set of stores. In fact, the correlations between the error terms range from -0.47 to 0.74 and are significant at the 5% level. The magnitude of these correlations exceeds the cut-off of 0.33 for using two-stage estimation suggested by Kennedy (1987). To obtain a more efficient estimator of the parameters in the model when the error terms are correlated, Zellner and Theil (1962) suggest using three-stage least squares (3SLS) to estimate the parameters. We conduct the Hausman (1978) test to compare 2SLS with 3SLS methods of estimation for the system of equations. The test procedure compares the estimators produced by 2SLS and 3SLS under the null hypothesis that both estimators are consistent but only the 2SLS estimator is asymptotically efficient and under the alternative hypothesis that only the 3SLS estimator is consistent. The results of the test indicate we can reject the null hypothesis (χ_2 = 139.1, df = 18, $p < 0.0001$). Thus, the 3SLS estimation method is better than the 2SLS method.

TABLE 3

Results of Three-stage Least Squares Regression Examining the Relationship between Sales Performance and Components of Customer Satisfaction (t-statistics in parentheses)

The New Model:

$$SALES_i = \phi_0 + \phi_1 CUSTSERV_i + \phi_2 MERCHANDISE_i + \phi_3 PHYSICAL_i + \phi_4 POTENTIAL_i + \phi_5 LNAGE_i + \varepsilon_i$$

$$CUSTSERV_i = \alpha_0 + \alpha_1 SALES_i + \alpha_2 TURNOVER_i + \alpha_3 RELWAGE_i + \alpha_4 AVGEXPER_i + \varepsilon_i$$

$$MERCHANDISE_i = \beta_0 + \beta_1 SALES_i + \beta_2 SOFTLINE_i + \beta_3 SUPEREXPER_i + \varepsilon_i$$

$$PHYSICAL_i = \gamma_0 + \gamma_1 SALES_i + \gamma_2 MALL_i + \gamma_3 LNAGE_i + \varepsilon_i$$

System R-square = 0.3464

Dependent Variable

Independent Variable	SALES	CUSTSERV	MERCHANDISE	PHYSICAL
Intercept	-597.8800*** (-2.77)	7.0020*** (79.66)	7.2927*** (94.71)	8.8551*** (88.81)
SALES		-0.0013*** (-3.00)	0.0026*** (6.89)	-0.0035*** (-6.46)
CUSTSERV	32.9130*** (2.69)			
MERCHANDISE	56.7207*** (6.72)			
PHYSICAL	6.6390 (0.26)			
POTENTIAL	5.3464*** (7.31)			
LNAGE	8.7065 (1.32)			-0.1865*** (-12.45)
TURNOVER		-0.0006* (-1.94)		
RELWAGE		0.0637*** (13.08)		
AVGEXPER		0.0164*** (2.64)		
SOFTLINE			-0.3347*** (-19.03)	
SUPEREXPER			0.0017 (1.55)	
MALL				0.1312*** (2.60)

***,** and *** indicate statistical significance at 10%, 5% and 1% levels (two-tail) respectively.**

Results

The results of estimating the model specified in equations (2) to (5) using 3SLS are presented in Table 3. As can be seen, the results change considerably from those obtained in Table 2. All three coefficients on the components of customer satisfaction in the sales equation have the expected positive signs, and two of them are significant: CUSTSERV (coefficient = 32.9130, t = 2.69) and MERCHANDISE (coefficient = 56.7207, t = 6.72). Thus, CUSTSERV, which was significantly negative when estimated using OLS, is now significantly positive. Note that the coefficient on PHYSICAL is insignificant (coefficient = 6.6390, t = 0.26). The PHYSICAL variable is constructed using two survey items that assess cleanliness of restrooms and stores but may not be comprehensive enough to capture the totality of the physical facilities in the stores. This could be a possible reason for the lack of significance. Also, it is evident from the results that sales does, in fact, have a significant impact on all three components of customer satisfaction. As expected, the impact of sales on satisfaction with customer service and on satisfaction with physical components is negative, while that on satisfaction with merchandise is positive.

The results are important for managers who rely on analysis of the relative importance of different components of customer satisfaction when formulating strategy. If the simultaneity were ignored in the case of RETAILER, for instance, the results would show that improving customer service would have a negative impact on sales performance. The strategic implication for the entire organization can be substantial – managers may focus only on improving the quality and value of merchandise in order to generate sales revenue while ignoring the importance of customer service and store cleanliness even though they may actually have a significantly positive impact on sales revenue. Our results indicate that when simultaneity is considered in the model, sales revenue has a significantly negative impact on customers' satisfaction with service and physical facilities. The implication for store management is that achieving higher sales traffic would have a negative impact on certain dimensions of customer satisfaction, making it essential to bolster resources allocated to improve customer satisfaction on those dimensions.

In addition to finding evidence for our main premise, the results also provide interesting insights on the drivers and correlates of different components of customer satisfaction. For instance, we find that sales potential is significantly (t-statistic = 7.31) related to the actual sales achieved by a store. Moreover, relative wages paid to sales associates and their average experience are both positively associated with the service dimension of customer satisfaction (t-statistics = 13.08 and 2.64 respectively). This finding supports the argument that more motivated and experienced employees are likely to provide better customer service leading to higher customer satisfaction. Also, customers seem more satisfied with hard-line stores that sell a broader line of merchandise (t-statistic = -19.03) which may enhance convenience for the shopper due to the wider assortment of goods carried by these stores. Finally, for the PHYSICAL component of customer satisfaction, we find evidence in line with our expectation that customers are less satisfied with older stores (t-statistic for LNAGE = -2.45) and more satisfied with stores in a mall rather than stand-alone stores (t-statistic for MALL = 2.60).

DISCUSSION

Our primary objective in this article has been to empirically document the simultaneous relationship between components of customer satisfaction and sales performance. The implications of the results

are useful to researchers as well as managers in gaining a more meaningful understanding of the relationships between these constructs. In examining the relationship between the components of customer satisfaction and sales performance, earlier studies had ignored the possibility of simultaneity between them. This may distort conclusions drawn from the results because the coefficients estimated from the misspecified model may be biased.

Using customer survey data more than 1000 stores of a department store chain, we examined the simultaneous relationship between the components of customer satisfaction and sales performance. We used factor analysis of customer responses to a satisfaction survey and found that the responses load on three factors, which could be identified as customer service, merchandise and physical characteristics. The results obtained from a model that ignored the simultaneity between the satisfaction components and sales performance contradicted intuition. Theory suggests that if, in fact, simultaneity does exist and is ignored, results of the estimation will be biased. We found evidence indicating the existence of simultaneity – while the components of customer satisfaction had a significant impact on sales performance, sales, in turn, had a significant impact on the satisfaction components. If simultaneity in the relationship is ignored, decisions based on biased coefficient estimates may lead to suboptimal allocation of resources by managers. The results of this study, thus, have important implications for future studies that model the relationship between customer satisfaction and sales performance, as well as for managers who base strategic decisions on the results of such analyses. In addition to providing support for our main argument in the article, the results also identify several important drivers and correlates of different components of customer satisfaction. While the addition of these variables enhances the robustness of our results by controlling for exogenous factors, they also provide managers and researchers insights into the different determinants of various components of customer satisfaction.

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