

A MULTI-STAGE MODEL OF CUSTOMERS' ASSESSMENTS
OF SERVICE QUALITY AND VALUE

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Abstract

This paper develops a model of how customers, endowed with prior experiences and expectations, assess service performance levels, overall service quality, and service value. The model is applied to residential customers' assessments of local telephone service. It is estimated with two stage least squares using survey data. Residential customers' assessments of quality and value are primarily a function of disconfirmation arising from discrepancies between anticipated and perceived performance levels. However, perceived performance levels also have an important direct effect.

In recent years, companies have become convinced of the strategic benefits of quality (Phillips, Chang and Buzzell 1983). As a result, many large companies have created quality measurement programs which attempt to relate product/service attributes to customer evaluations of quality (Zeithaml, Parasuraman and Berry 1990; Hauser and Clausing 1988). In many service industries, companies have created programs which incorporate a survey that elicits customers' assessments of service quality, plus a feedback loop through which service changes are implemented and then evaluated with subsequent survey data.

Parallel with recent managerial interest in service quality measurement programs, researchers have become interested in the identification and measurement of service quality dimensions. In their well-known article, Parasuraman, Zeithaml and Berry (1985) suggest that customers evaluate overall service quality on five underlying dimensions: tangibles, reliability, responsiveness, assurance and empathy. In subsequent research, they developed an instrument, called SERVQUAL, that measures customers' perceptions of service quality (Parasuraman, Zeithaml and Berry 1988).

This study explores how customers integrate their perceptions of a service to form an overall evaluation of a service. It differs from prior research concerning service quality in two ways. First, it develops a multi-stage model of the determinants of perceived service quality and service value. Second, it describes how customers' expectations, perceptions of current performance, and disconfirmation experiences affect their satisfaction/dissatisfaction with a service -- and consequently affect their assessment of service quality and value.

The paper is organized in the following way. The following section discusses the constructs of customer satisfaction, perceived service quality and service value and integrates these constructs in a multi-stage model of residential customers' perceptions of service performance, service quality and service value for local telephone service. The next two sections describe how the model is operationalized as a multiple equation system and estimated by a two stage least squares procedure

using data from surveys of telephone customers. The last two sections discuss the empirical findings and their implications.

BACKGROUND

This section reviews the literature concerning customer satisfaction, service quality and service value. The relationships among these three constructs and their antecedents are described in Figure 1.

--- Figure 1 here ---

Customer Satisfaction

Market researchers distinguish between a customer's satisfaction with respect to a specific transaction and his/her global evaluation of a service (Olshavsky 1985; Holbrook and Corfman 1985). Oliver (1981) argues that satisfaction is characterized by the surprise a customer experiences after a purchase (i.e., a service encounter), and that the surprise eventually becomes an input to a less dynamic attitude. Consequently, satisfaction can be considered to influence the customer's evaluation of service quality, his/her purchase intentions and behavior (e.g., LaBarbera and Mazursky 1983).

Customer satisfaction/dissatisfaction (CS/D) is a function of disconfirmation arising from discrepancies between prior expectations and actual performance (Cardozo 1965; Olshavsky and Miller 1972; Olson and Dover 1976; Oliver 1980). The CS/D literature demonstrates that expectations and perceptions of performance levels affect customer satisfaction directly, as well as indirectly via disconfirmation. For example, Tse and Wilton's (1988) experiment finds that perceived performance exerts direct influence on CS/D in addition to the influences from disconfirmation or expectations. The theoretical linkages identified in the customer satisfaction literature are illustrated by the thin, solid lines in Figure 1.

Expectations, performance evaluations and disconfirmation do not necessarily have independent, additive effects for every product/service. Churchill and Surprenant (1982) found that

CS/D with a non-durable good is a function of all three constructs; whereas CS/D with a durable good is only a function of performance evaluations. Consequently, expectations, performance evaluations and disconfirmation are potential antecedents of customer satisfaction with a service. For example, in his discussion of modes of satisfaction, Oliver (1989) proposed that customer responses concerning continuously provided services or long lasting durables are characterized by passive expectations, and that disconfirmation will not operate unless performance is outside the range of experience based norms. Hence, customers assessments of continuously provided services, such as public utilities or cable television, may depend only on performance evaluations.

Service Quality

Recent research in marketing about customers attitudes about services has focused on perceived service quality. Perceived service quality is described in terms of the customer's assessment of the overall excellence or superiority of the service (Zeithaml 1988). Parasuraman, Zeithaml and Berry (1985; 1988) consider that a customer's assessment of overall service quality depends on the gap between expectations and perceptions of actual performance levels. They propose that overall service quality is evaluated on five underlying dimensions: tangibles, reliability, responsiveness, assurance and empathy. They propose that each quality dimension can be quantified by obtaining measures of expectations and perceptions of performance levels for relevant service process attributes, calculating the difference between expectations and perceptions of performance levels, and averaging across the measures. They also suggest that expectations should be influenced by personal needs, word-of-mouth communication and past experiences. The determinants of perceptions are not discussed in their model, but they are presumably influenced by attributes of the service delivery process. The theoretical linkages proposed by Parasuraman, Zeithaml and Berry (1985) are illustrated by the double lines in Figure 1.

Both customer satisfaction and perceived service quality are postulated to be influenced by the gap between expectations and perceptions of performance, hereafter termed disconfirmation.

However, the CS/D literature suggests a more elaborate model in which disconfirmation, expectations and actual performance levels affect customer satisfaction -- which becomes an input to customers' perceptions of service quality. As Figure 1 illustrates, this notion implies that customers' perceptions of service quality are directly affected by disconfirmation, and indirectly affected by disconfirmation, expectations and actual performance levels (via CS/D).

Service Value

Based on a review of previous research and on an exploratory study, Zeithaml (1988) suggests that "perceived value is the customer's overall assessment of the utility of a product based on perceptions of what is received and what is given." If perceived service value is analogous to the concept of perceived product value, then Zeithaml's paper suggests that service value can be considered to involve a trade-off between a customer's evaluation of the benefits of using a service and his sacrifice. Customers' assessment of service value are hypothesized to influence purchase intentions and behavior.

A customer's assessment of value depends on sacrifice, i.e., the monetary and non-monetary costs associated with utilizing the service, and the customer's frame of reference (Zeithaml 1988). Thus, there should be differences in customers' assessments of service value due to differences in monetary costs, non-monetary costs, customer tastes, and customer characteristics. The theoretical linkages among service value, intentions, behavior, and these aforementioned constructs are illustrated by the broken lines in Figure 1.

A Multi-Stage Model of Service Quality and Value

The preceding paragraphs provide a conceptual framework for a model of customers' assessments of service quality and value. A customer's global assessment of a service can be decomposed into a series of interrelated stages: assessments of performance, service quality and value. These three stages are specified algebraically as a multi-stage model, in the tradition of the perception-preference-choice model (Urban and Hauser 1980), the lens model (Brunswick 1952)

and information integration theory (Anderson 1974).

Most services are bundles of core, facilitating and supporting services (Gronroos 1987), and these services are multi-dimensional. For example, airline service includes a core service, transportation, plus check-in service, in-flight meal service and so forth. Following the tradition of multi-attribute modeling, the model considers a customer to form a perception of current performance of a service ($PERFORM_k$) based on his assessment of its performance on particular attributes/dimensions (e.g., reliability). That is,

$$(1) \quad PERFORM_k = p_k (\underline{SA}_k)$$

where:

\underline{SA}_k = a vector of perceptual ratings of attributes/dimensions that describe service k.

As discussed earlier, a customer's disconfirmation experiences, expectations and perceived performance levels affect CS/D with a specific service transaction. CS/D, in turn, influences the customer's global evaluation of service quality. Thus, a reduced form model describing customers' assessments of service quality (QUALITY) is the following:¹

$$(2) \quad QUALITY = q (\underline{PERFORM}, \underline{EXPECT}, \underline{DISCONFIRM})$$

where:

\underline{EXPECT} = a vector describing prior expectations about the performance of the component services ($k = 1, \dots, K$); and,

$\underline{DISCONFIRM}$ = a vector describing perceptions of the discrepancy between performance and expectations concerning the component services ($k = 1, \dots, K$).

Then, the customer assesses service value (VALUE) by trading off the quality of service versus its costs in a given situation. That is,

$$(3A) \quad VALUE = v_0 (\underline{QUALITY}, \underline{SACRIFICE}, \underline{CHAR})$$

where:

$\underline{SACRIFICE}$ = a vector of variables describing the monetary and non-monetary

costs associated with customer's utilization of the service; and,

CHAR = a vector of customer characteristics.

As illustrated in Figure 1, prior research has implicitly assumed that a customer's assessment of service value depends directly on his assessment of service quality. However, this paper hypothesizes that a customer may weigh the underlying components of service quality (PERFORM, EXPECT and DISCONFIRM) differently in assessing service value.ⁱⁱ This notion can be reflected in the service value equation in the following way.

(3B) VALUE = v_1 (QUALITY, SACRIFICE, CHAR, PERFORM, EXPECT, DISCONFIRM)

The hypothesis that customers weigh service quality components differently in assessing service quality than in assessing service value is testable by constraining equation (3B) to equal (3A).

A MODEL OF CUSTOMERS ASSESSMENTS OF TELEPHONE SERVICE

This section describes a multi-stage model of customers' assessments of a continuously provided service, namely telephone service. The following paragraphs describe three stages: the formation of customer perceptions of service performance, service quality and value.

Performance Evaluations

Local telephone service is actually a bundle of services including local call provision, long distance access, operator services, customer services (e.g., installation and changes), and billing services. Hence, performance evaluation ($PERFORM_k$) was modeled for three component services: BILLING, LOCAL and LONG distance service. The explanatory variables in these three equations are primarily extrinsic cues related to reliability, responsiveness, assurance and empathy dimensions. In addition, customer perceptions of BILLING, LOCAL and LONG distance services also postulated to depend on past experiences at different operating companies (LOC-SUPPLY) -- which differ in plant and equipment, operating procedures, climate and geography.

The customer's perception of BILLING service was hypothesized to be positively related to whether the customer had experienced no billing problems in the preceding 30 days (NO-

CONTACT), whether a problem had been satisfactorily resolved (SATISFY), and his perception of the COURTESY of telephone company personnel.ⁱⁱⁱ That is,

$$(4) \quad \text{BILLING} = f_1 (\text{NO-CONTACT, SATISFY, COURTESY, } \underline{\text{LOC-SUPPLY}})$$

The relevant attributes of LOCAL and LONG distance service are fairly well-defined: provision of a dial tone, a correctly established connection to the dialed number, a static-free line, and a complete call without premature disconnection. Hence, it was hypothesized that a customer's perceptions of local and long distance services would be negatively related to his perceptions of the frequency of trouble with these four service process attributes (FDIAL, FCONNECT, FSTATIC and FCUTOFF). It was also hypothesized the customer's perception of LONG distance service would also be positively related to the COURTESY of telephone company personnel. Furthermore, it should depend on the particular long distance carrier (AT&T, SPRINT and MCI) because each carrier uses somewhat different transmission technologies. These notions can be summarized algebraically as follows:

$$(5) \quad \text{LOCAL} = f_2 (\text{FSTATIC, FDIAL, FCONNECT, FCUTOFF, COURTESY, } \underline{\text{LOC-SUPPLY}})$$

$$(6) \quad \text{LONG} = f_3 (\text{FSTATIC, FDIAL, FCONNECT, FCUTOFF, COURTESY, } \underline{\text{LOC-SUPPLY}}, \underline{\text{LD-SUPPLY}}).$$

Perceived Quality

As discussed in the preceding section, a customer's assessment of service quality is postulated to depend on his satisfaction/dissatisfaction with current service, where CS/D depends on the perceived performance of service components, prior expectations about performance, and perceptions of the discrepancy between performance and expectations. However, Oliver (1989) has argued that customers' assessments of continuously provided services may depend only on performance, and not on expectations and disconfirmation. In this study, customers' assessments of local telephone services are hypothesized to depend on performance and disconfirmation for the following reasons.

Exploratory research confirmed that customer expectations about telephone service are not actively processed. Verbal protocols collected during in-depth interviews with 50 telephone company customers yielded very few speech segments about their expectations (1%). However, the deregulation of the telecommunications industry is altering the nature and level of service so that residential customers may experience disconfirmation. For example, unfavorable disconfirmation occurs when the company drops free telephone repair or charges for inside wire repair. Hence, customers' assessments of telephone service quality are postulated to be a function of performance and disconfirmation, but not expectations.

Consequently, the quality equation (2) was operationalized in the following way. Favorable or unfavorable disconfirmation should arise from discrepancies between anticipated service based on prior telephone experiences and actual service. Rather than measuring disconfirmation for every service quality dimension, the residential survey measured disconfirmation by two questions about current telephone service compared with prior telephone experiences, using a better/same/worse scale (Oliver 1981).^{iv} Specifically, QUALITY was hypothesized to depend on whether the customer's local telephone service had always been provided by the current provider (NO-CHANGE), the customer's assessment of the current provider relative to a prior local telephone service supplier (COMPARE), and the customer's assessment of the extent of improvement in service compared to a year ago (IMPROVE).^v Since positive disconfirmation should lead to higher assessments of overall service quality, the effects of these three variables were hypothesized to be positive. In addition, it was hypothesized that a customer who is a heavy user of local or long distance service (#LOCAL, #LONG) may perceive overall service to be higher or lower than other customers because he may have more opportunities for (positive or negative) disconfirmation.

In addition, a customer was considered to assess the overall QUALITY of all services provided by the local telephone company by forming intermediate perceptions of the performance levels of component services, and then weighing them. Perceptions of higher levels of performance

were hypothesized to be associated with higher assessments of overall quality. QUALITY was modeled as a function of the customer's assessments of the performance of seven services: BILLING service, LOCAL telephone service, LONG distance telephone service, directory assistance service (DIRECT), operator assistance (OPER), installation service (INSTALL), and REPAIR service. Not all customers utilize all services, especially repair or installation services, during a given period. In this study, if a customer did not have experience with one of the component services (e.g., repair), his/her perceptions of that service were not elicited and the relevant ratings variable (e.g., REPAIR) was assigned the value zero. Consequently, indicator variables were used to represent the absence/presence of experience with a specific service component (NO-DIRECT, NO-OPER, NO-INSTALL, and NO-REPAIR). These eleven variables are extrinsic cues of reliability, responsiveness, assurance, empathy and tangibles.

The equation for overall quality can be summarized as follows.

$$(7) \quad \text{QUALITY} = f_4 (\text{BILLING, LOCAL, LONG, DIRECT, NO-DIRECT, OPER, NO-OPER, INSTALL, NO-INSTALL, REPAIR, NO-REPAIR, NO-CHANGE, COMPARE, IMPROVE, \#LOCAL, \#LONG}).$$

Perceived Value

The VALUE equation, equation (3B), was operationalized in the following way. A residential customer's assessment of the value of telephone services will chiefly depend on his assessment of the overall QUALITY of telephone services. However, disconfirmation and performance may be weighed differently in assessing value than in assessing overall quality. Hence, it is hypothesized that aforementioned three key services -- BILLING, LOCAL, and LONG distance services -- and disconfirmation (NO-CHANGE, COMPARE, IMPROVE, #LOCAL, #LONG) will be weighed more heavily in assessing VALUE than assessing QUALITY. In other words, these variables are hypothesized to have a positive effect on VALUE, in addition to the positive effect of QUALITY.

Local telephone service is usually regulated, so that prices are not free to fluctuate, and the

service has no direct competitor in franchised areas. Also, since the large majority of customers use the same telephone company for long periods of time, they are unable to compare their company's service with another company's service unless they have experienced service in another franchised area. Consequently, a change in price, rather than relative price (vis-a-vis competitors), is more likely to affect value. However, price changes are relatively infrequent and none occurred at the time of this study. However, non-monetary costs may still be important. In addition, billing policies may affect value judgments, such as when a customer does not meet a telephone company's payment schedule and service is abruptly terminated. Note that other continuously provided services -- e.g., utilities -- are likely to be characterized by similar customer responses.

Since the role of monetary and non-monetary costs in customer's assessment of perceived service value is somewhat different in this industry, INCOME was chosen to represent the customers' relative sacrifice (i.e., budget constraints). As income increases, the cost of telephone service becomes a smaller proportion of the customer's total budget, so that the customer may perceive telephone service to be less valuable relative to available substitutes. For example, conversing over the telephone may seem a less valuable form of socialization compared with travel, trips to the theatre, and so forth. In addition, different types of customers may attach differential value to telephone service. Customers who use their residential telephone primarily for business purposes (BUSINESS) may value telephone service more highly than customers who primarily use the telephone for primarily social or other personal reasons. Also, older customers (AGE), heavy users (#LOCAL and #LONG), and members of larger households (#HOUSE) may value residential telephone service more highly due to their heavier reliance on telephone services. Similarly, customers who are employed outside the home (EMPLOYED) may value residential telephone service less highly since they may have access to telephone service at their place of employment. The equation for the value of residential telephone services can be expressed as follows.

$$(8) \quad \text{VALUE} = f_5 (\text{QUALITY, BILLING, LOCAL, LONG, NO-CHANGE, COMPARE,}$$

IMPROVE, #LOCAL, #LONG, #HOUSE, AGE, INCOME, BUSINESS, EMPLOYED).

The operationalized form of the multi-stage model of telephone service quality and value is summarized by equations (4) - (8).

THE DATA BASE

The study utilized survey data from a system-wide (i.e., national), probability sample of 1408 residential telephone subscribers in 1985. In the survey, the customer's recent telephone experiences were probed, their ratings of various service process attributes were reported, and overall service quality and value assessments were obtained. The survey elicited perceptual ratings of the service quality dimensions identified by Parasuraman, Zeithaml and Berry (1985, 1988) for component services -- using measures similar to, but not identical to, SERVQUAL. It focused heavily on reliability, responsiveness, assurance and empathy dimensions. For example, it asked directly about the courtesy of employees, as well as asking specifically about the attitudes and knowledgeableability of sales representatives and other employees, to obtain measures of assurance. It did not directly elicit ratings of the fifth dimension, tangibles, because customer contact with the telephone company almost invariably occurs over the telephone. Even repair and installation services do not necessarily require personal contact between telephone company personnel or equipment and customers.

There are two major differences between this survey and SERVQUAL. The items in this survey were framed specifically in terms of the telecommunications industry (rather than framed generically). They elicited ratings of intrinsic and extrinsic cues that signal service quality for telephone service. Second, this survey did not measure expectations concerning service quality dimensions. However, it does elicit direct measures of disconfirmation, whereas SERVQUAL does not.

Measures of Constructs

Table 1 summarizes the model specification, the hypotheses, and the measures of the

constructs. The model consists of five equations: three performance equations, a service quality equation and a service value equation. The hypothesized signs of the coefficients are shown in parentheses. The measures of the constructs are described with the phraseology used in the actual survey questionnaire. For example, overall quality question is "Thinking just about the past 30 days, how would you rate the overall quality of services provided by your local telephone company? Would you say it is: Poor, Fair, Good or Excellent?"

---- Table 1 here ----

MODEL ESTIMATION AND RESULTS

Estimation

The model of telephone service quality and value was postulated to be a linear additive, compensatory model.^{vi} In assessing service quality and service value, the customer is considered to weigh the various considerations associated with service quality, trading off lesser performance on some attributes of the service process for greater performance on other attributes. This specification assumes that the service is at least minimally satisfactory on all attributes (as required by Public Utilities Commissions.)

In the residential model, BILLING, LOCAL, LONG and QUALITY appear as dependent variables and predictor variables. The measurement errors in these equations may be correlated. (A positive correlation is likely because the dependent variables are measured on similar scales.) Hence, a two-stage least squares (2SLS) estimation procedure was used (Johnston 1972).^{vii}

Results

The results are displayed in Table 2. The model seems to be well supported by the data. The R^2 for the equations range from 0.25 to 0.43 -- which is reasonably good explanatory power for equations estimated with cross-sectional data. It also compares favorably with the explanatory power of Parasuraman, Zeithaml and Berry's (1988) OLS estimation of four overall quality equations as functions of indices representing the five service quality dimensions. In addition, the

effects of most variables are in the direction hypothesized and statistically significant (one-tailed tests, $p < 0.05$).

---- Table 2 here ----

Performance. The results for the three equations describing the BILLING, LOCAL and LONG distance services are remarkably similar. A customer's assessments of all three services are positively affected by the courtesy of personnel ($p < 0.005$). COURTESY explains between 5-9% of the variance in the dependent variable in each equation.^{viii} In Parasuraman, Zeithaml and Berry's (1988) work, courtesy is part of their assurance dimension, defined as "knowledge and courtesy of employees and their ability to inspire trust and confidence." Hence, this result suggests that any contact with telephone service personnel will have an important impact on a customer's assessment of assurance for all aspects of telephone service. A customer's assessments of all three services also differ across the seven operating companies participating in this study. The six indicator variables are jointly significant at $p < 0.05$, and explain about 1% of the variance in each dependent variable.

A customer rates BILLING service substantially lower if he has experienced a billing problem ($p < 0.005$) -- and the effect of satisfactorily resolving the problem does not entirely offset this impact ($p < 0.005$). A customer's assessments of LOCAL and LONG distance service are negatively affected by the perceived frequency of static, connection, dial tone and cut-off service problems ($p < 0.005$). For both services, a customer attaches the most importance to a static-free line (explaining about 12-15% of the variance in the dependent variable). Together, these results suggest the importance of reliability (or trouble free service) and responsiveness (or "willingness to help customers"). The service provider cannot entirely regain customer goodwill even if the problem is rectified by courteous personnel. The effects of the long distance carrier variables on long distance service ratings are jointly, but not individually, statistically significant ($p < 0.05$). It is interesting to note that MCI customers rate long distance service lower than AT&T or Sprint. One explanation for this result is that -- at the time of the survey -- MCI predominantly relied on

microwave technology which can occasionally result in degraded transmission.

Quality. In the residential model, the primary determinants of overall telephone service QUALITY are the customer's assessments of (the reliability of) BILLING, LOCAL, and LONG distance services. Each variable has a positive, statistically significant effect on overall quality ($p < 0.005$). Local service is the most important of the three, explaining about 12% of the variance in QUALITY. Customers' assessments of installation service, operator assistance, repair service and directory assistance seem to be much less important in customers' assessments of overall quality.

Of these services, only the customer's assessment of repair service (REPAIR, NO-REPAIR) is statistically significant ($p < 0.005$), explaining about 3% of the variance in the dependent variable). One implication of this result concerns the net effect of a repair contact on customers' overall quality assessment. In the QUALITY equation, a repair contact decreases the QUALITY rating by 0.06. Since the REPAIR coefficient (0.17) multiplied by the highest rating (4) is 0.68, this "penalty" is more than offset by the highest level of repair service performance. Of course, not all customers give a repair contact the highest rating. One possible reason for the importance of repair service is that it is a relatively unambiguous signal of responsiveness.

If a residential customer has not had any experience with another telephone service provider, then his assessment of overall quality tends to be higher ($p < 0.005$) than if he had such experience. Otherwise, his assessment depends on his perceptions of current versus prior telephone service quality ($p < 0.005$). These two variables (NO-CHANGE, COMPARE) jointly explain about 22% of the variance in the overall telephone service quality. Overall quality also depends on whether the customer perceives telephone service to have improved in the past year (IMPROVE); this effect is very small, but statistically significant ($p < 0.005$). In addition, heavy users of local telephone service (#LOCAL) rate QUALITY higher ($p < 0.005$), and heavy users of long distance telephone service (#LONG) rate QUALITY lower ($p < 0.005$). These variables highlight the role of disconfirmation. Apparently, local service typically provides positive

disconfirmation, whereas long distance service provides negative disconfirmation.

Value. As expected, the most important determinant of perceived service VALUE is QUALITY ($p < 0.005$), explaining 4% of the variance in VALUE. In addition, a customer's perception of the performance levels of LOCAL service and LONG distance service affects VALUE directly ($p < 0.05$), as well as indirectly (through QUALITY), explaining an additional 4% of the variance in VALUE. As before, LOCAL is the most important component. In contrast, a customer's perception of BILLING service does not affect VALUE except through QUALITY. One explanation for this finding is that customers' consider local and long distance service -- but not billing service -- as core services or critical signals of service quality dimensions.

The second most important set of determinants of perceived service value are the customer's disconfirmation experiences. Residential customers' assessments of service value are positively affected by lack of experience with another service provider ($p < 0.005$), unfavorable experience with another service provider ($p < 0.05$), and improvements in service in the past year ($p < 0.005$). However, heavy users of local or long distance service do not systematically rate VALUE higher or lower ($p > 0.05$). Together, the disconfirmation variables account (NO-CHANGE, COMPARE, IMPROVE) for about 6% of the variance in customers' assessments of telephone service value. They also indirectly influence service value through the QUALITY variable.

These findings support the notion that the customer's perceptions of core, facilitating and supporting telephone services and his disconfirmation experiences are weighed differently in assessing value than in assessing overall quality. Local and long distance services (LOCAL, LONG) and disconfirmation experiences (NO-CHANGE, COMPARE, IMPROVE) are weighed more heavily in assessing service value.

A joint statistical test indicates that residential customer characteristics (#HOUSE, AGE, INCOME, BUSINESS, EMPLOYED) affect VALUE, but do not affect QUALITY. (Note that this hypothesis is implicit in Figure 1.) Separate statistical tests indicate that the effects of #HOUSE,

AGE and INCOME on VALUE are small, but statistically significant ($p < 0.005$). The effects of these three variables are in the directions hypothesized. For example, older customers value telephone service more highly.

DISCUSSION

The results of this study support several basic theoretical propositions. Consistent with prior exploratory research concerning service quality, a key determinant of overall service quality is the gap between performance and expectations, i.e., disconfirmation. For residential customers, perceived telephone service quality depended on disconfirmation triggered by perceived changes in existing service or changes in service providers.

A customer's assessment of overall service quality is also directly affected by his perceptions of performance levels. This finding is consistent with the CS/D literature, but it is a new finding for the service quality literature. It is interesting to note that disconfirmation explains a larger proportion of the variance in service quality than performance, whereas performance explain a larger proportion of the variance in customer satisfaction than disconfirmation in prior studies (Churchill and Surprenant 1982).

Customers' assessments of service value are positively related to their assessments of service quality. However, service quality and value are not identical constructs. For example, disconfirmation experiences were more important in assessing telephone service value than in assessing telephone service quality because disconfirmation affects service value directly as well as indirectly (through service quality). In addition, customers weigh their perceptions of the performance levels of component services differently in assessing service quality and service value.

For example, billing, local service and long distance service were weighed more heavily in assessing service value than in assessing service quality. Lastly, customers' personal characteristics are important in assessing value, but not quality. Thus, perceived service value seems to be a "richer," more comprehensive measure of customers' overall assessment of a service than service

quality.

Most authors have viewed value as the outcome of a trade-off between a single "overall quality" construct and sacrifice. However, these results suggest that the customer's value function is more complex. Hence, this study rebuts the simplistic notion underlying many quality measurement programs, namely that the service provider should focus on maximizing average customer ratings of service quality while minimizing costs (i.e., price). Our research suggests that service providers must offer "flexible" services that satisfy the different tastes and expectations of each market segment. It also shows that managers can operationalize a model of customers' assessments of service quality and value with survey data. However, it is clear that the specification and operationalization of the model must be carefully tailored to the service context. This effort will be rewarded by the many managerial implications that can be derived from estimation results.

Further research is needed to further explore the antecedents of customer satisfaction, service quality and service value. First, there are many measurement and scaling issues to be addressed with respect to these constructs. The present study employs single measures of each model construct, whereas multiple measures would be more appropriate. Second, either experimental or econometric research could be used to further explore the linkages among these constructs. The theoretical linkages described in Figure 1 are considerably more complex than those represented by equations (1), (2) and (3B). For example, a structural equation for customer satisfaction can be integrated into the multi-stage model. Third, the model should be applied in other contexts (e.g., financial services, retailing, air transportation) to establish its generalizability.

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Table 1

DEFINITIONS OF VARIABLES IN THE RESIDENTIAL MODEL^a

Endogenous Variables

BILLING	Rating of the billing job (e.g., "How would you rate . . .?").
LOCAL	Rating of local calls.
LONG	Rating of long distance calls.
QUALITY	Rating of the overall quality of services provided by the local telephone company.
VALUE	Overall value of services provided by the local telephone company, considering the amount paid for services received. Scale: "very poor value" (1) . . . "very good value" (5).

Predictor Variables

BILLING Equation

NO-CONTACT (+)	No billing problem in the past 30 days (yes/no).
SATISFY (+)	Satisfactory resolution of a billing problem (yes/no).
COURTESY (+)	Rating of the courtesy of telephone company personnel.
<u>LOC-SUPPLY</u> (?)	A vector of six indicator variables representing six of the seven geographic areas.

LOCAL and LONG Equations^b

FSTATIC (-)	Frequency of transmission problems (e.g., "How often did . . . occur in the past 30 days?").
FDIAL (-)	Frequency of dial tone problems.
FCONNECT (-)	Frequency of connection problems.
FCUTOFF (-)	Frequency of disconnection problems.
COURTESY (+)	As defined for the BILLING equation.
<u>LOC-SUPPLY</u> (?)	As defined for the BILLING equation.
<u>LDSUPPLY</u> (?)	A vector of three indicator variables representing the three major long distance carriers: AT&T, SPRINT and MCI.

^aItalics indicate exact phrasing of some questions. Rating variables are coded on a four point scale (poor/fair/good/excellent). Frequency variables are coded on a four point scale (seldom/sometimes/often/almost always). Other scales are as indicated above. The sign in parentheses indicates the hypothesized positive (+) or negative (-) effect on the dependent variable.

^bExogenous variables are postulated to be identical in both local and long distance equations, with the exception of LDSUPPLY which appears only in the long distance equation. The actual questions measure perceptions of local or long distance service as appropriate.

Table 1 (continued)QUALITY Equation^c

NO-CHANGE (+) Local telephone service has always been provided by current provider (yes/no).

COMPARE (+) If the respondent has ever subscribed to local service from another supplier, a comparison of the current provider with the prior provider is elicited. Scale is: "much worse" (1) . . . "much better" (5). If not, COMPARE is coded zero.

IMPROVE (+) Extent of improvement in telephone service compared to a year ago. Scale: "much worse" (1) . . . "much better" (5).

#LOCAL (?) Frequency of local calls.

#LONG (?) Frequency of long distance calls.

DIRECT (+) Rating of directory assistance service.^e

NO-DIRECT (+) Did not use directory assistance service in the past 30 days (yes/no).

OPER (+) Rating of toll/assistance operator service.^e

NO-OPER (+) Did not use toll/assistance operator in the past 30 days (yes/no).

INSTALL (+) Rating of service associated with a connection or change.^e

NO-INSTALL (+) Did not use installation service in the past 30 days (yes/no).

REPAIR (+) Rating of repair service.

NO-REPAIR (+) Did not use repair service in the past 30 days (yes/no).^e

VALUE Equation^d

NO-CHANGE (+) As defined for the QUALITY equation.

COMPARE (+) As defined for the QUALITY equation.

IMPROVE (+) As defined for the QUALITY equation.

#LOCAL (?) As defined for the QUALITY equation.

#LONG (?) As defined for the QUALITY equation.

#HOUSE (+) Number of persons in the household.

AGE (+) Age category of respondent (7 point scale).

INCOME (-) Household income category (7 point scale).

BUSINESS (+) Telephone primarily used for business purposes (yes/no).

EMPLOYED (-) Respondent employed outside the home (yes/no).

^c The QUALITY equation also includes the endogenous variables BILLING (+), LOCAL (+), and LONG (+) as predictor variables.

^d The VALUE equation also includes the endogenous variables QUALITY (+), BILLING (+), LOCAL (+) and LONG (+) as predictor variables.

° If the respondent did not use this service in the past 30 days, the variable is coded zero.

Table 2
2SLS ESTIMATES FOR THE RESIDENTIAL MODEL

<u>Variable</u> ^e	<u>Estimated Coefficient</u> ^d		
	<u>BILLING</u> <u>Equation</u>	<u>LOCAL</u> <u>Equation</u>	<u>LONG</u> <u>Equation</u>
COURTESY	0.3112 ^a	0.2678 ^a	0.2242 ^a
NO-CONTACT	0.7682 ^a	NA	NA
SATISFY	0.3749 ^a	NA	NA
FSTATIC	NA	-0.2079 ^a	-0.2414 ^a
FCONNECT	NA	-0.0909 ^a	-0.1223 ^a
FDIAL	NA	-0.0865 ^a	-0.0514 ^b
FCUTOFF	NA	-0.1382 ^a	-0.1737 ^a
AT&T	NA	NA	0.0460
MCI	NA	NA	-0.1841
SPRINT	NA	NA	0.1157
INTERCEPT	0.7843	2.4679	2.5722
F-Statistic	50.83 ^a	89.02 ^a	73.63 ^a
R ²	0.25	0.41	0.43
Adjusted R ²	0.24	0.41	0.42

^a One tailed test, $p < 0.005$.

^b One tailed test, $p < 0.01$.

^c One tailed test, $p < 0.05$.

^d The coefficients of the six geographic dummy variables are estimated but not reported.

^e Variables refer to local or long distance service as applicable. (e.g., column two shows the coefficient of the variable "static on local calls" and column three shows the coefficient of the variable "static on long distance calls.")

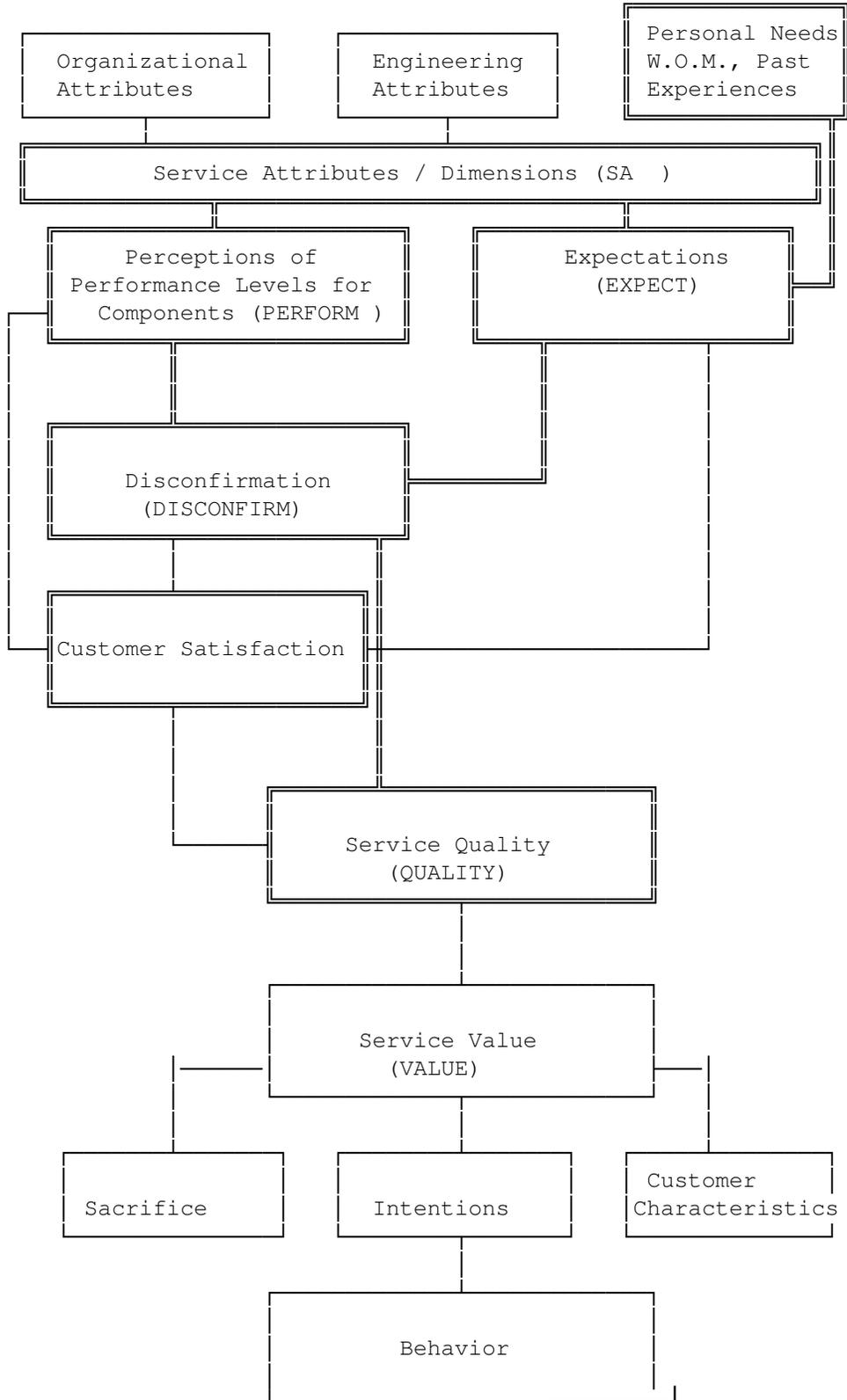
NA Not applicable. (Variable does not appear in this equation.)

Table 2 (continued)

<u>QUALITY Equation</u>		<u>VALUE Equation</u>	
<u>Variable</u>	<u>Estimated Coefficient</u>	<u>Variable</u>	<u>Estimated Coefficient</u>
BILLING	0.1678 ^a	BILLING	0.0052
LOCAL	0.5312 ^a	LOCAL	0.3175 ^a
LONG	0.1463 ^a	LONG	0.1478 ^b
		QUALITY	0.3654 ^c
NO-CHANGE	0.5049 ^a	NO-CHANGE	0.3367 ^a
COMPARE	0.1796 ^a	COMPARE	0.0714 ^c
IMPROVE	0.1064 ^a	IMPROVE	0.1545 ^a
#LOCAL	0.0598 ^a	#LOCAL	0.0115
#LONG	-0.0398 ^a	#LONG	-0.0332
DIRECT	0.1476		
NO-DIRECT	0.1745		
OPER	-0.0216		
NO-OPER	-0.0007	#HOUSE	0.0535 ^a
INSTALL	-0.1780	AGE	0.0643 ^a
NO-INSTALL	-0.6143	INCOME	-0.0370 ^a
REPAIR	0.1651 ^a	BUSINESS	0.0433
NO-REPAIR	0.0611 _a	EMPLOYED	-0.0627
INTERCEPT	-0.5814	INTERCEPT	-0.1215
F-Statistic	51.91 ^a		46.57 ^a
R ²	0.37		0.32
Adjusted R ²	0.37		0.31

Figure 1

A MULTI-STAGE MODEL OF CUSTOMERS' ASSESSMENTS
OF SERVICE QUALITY AND VALUE



FOOTNOTES

i. Based on Figure 1, we have the following structural equations:

(i) $QUALITY = q_0 (CS/D, DISCONFIRM)$; and,

(ii) $CS/D = c (DISCONFIRM, EXPECT, PERFORM)$.

Substituting equation (ii) in equation (i), we obtain the reduced form equation (2) shown in the text.

This paper focuses on customers' (relatively stable) attitudes about service quality and value; it does not model (relatively transitory) evaluations of CS/D.

ii. For example, the role of disconfirmation may be similar to the role of perceived gains and losses in Thaler's (1985) model of consumer choice. In his model, a consumer value function is defined over differences relative to a reference point (i.e., perceived gains and losses), rather than absolute levels in a purchase situation. He postulates that people will be more sensitive to losses than gains, suggesting that the customer may weigh negative disconfirmation more heavily than other factors in assessing service value. This theory is consistent with the notion that the customer may weigh perceptions of performance levels, expectations and disconfirmation differently in assessing quality than assessing value.

iii. Preliminary analyses had indicated that specific attributes of the bill (e.g., the level of detail) did not affect assessments of billing service.

iv. In contrast, Parasuraman, Zeithaml and Berry (1988) measure disconfirmation as the difference between separate measures of expectations and perceptions. Similarly, early approaches to measuring disconfirmation in the customer satisfaction literature elicited separate measures of pre-performance judgments (i.e., expectations) and post performance judgments -- creating an artificial negative correlation between expectation and disconfirmation. Oliver (1981) points out that a better- and worse-than expected scale is more meaningful to respondents, and that it has consistently been to correlate highly with satisfaction across a large number of different settings. He also points out that these studies indicate that this scale is independent of expectation levels -- which is important in multivariate analyses.

v. Customers' ability to compare service from alternative telephone companies is an additional source of disconfirmation. NO-CHANGE is a surrogate variable for this source of disconfirmation. Prior research indicated that customers that have only had services from one telecommunications provider are less discriminating (i.e., rate services more favorably).

vi. In the QUALITY equation, the coefficients of the variables describing service contacts (i.e., DIRECT, NO-DIRECT, OPER, NO-OPER, INSTALL, NO-INSTALL, REPAIR, NO-REPAIR) are interpreted in the following way. If a service contact took place (e.g., repair), the customer provides a rating of the service (e.g., REPAIR) and the coefficient of that variable represents the influence of his perception of the service on his assessment of overall quality. If a service contact did not take place, the customer does not provide a rating of the service (e.g., REPAIR is assigned the value zero) and, consequently, the influence of his rating of the service on overall quality is not

estimated. However, the relevant dummy variable (e.g., NO-REPAIR) takes on the value "one" and the coefficient of that variable represents the increase/decrease in the customer's assessment of overall quality due to the absence of a particular service contact. (In other words, there is a shift in intercept between users and non-users, plus a slope effect for users only.)

vii. Preliminary analyses estimated these same equations as binary logit models (which do not require interval scale properties for the dependent variable). Since the results were similar to the results in this paper, our assumption that the scales have interval properties does not appear to affect the results.

viii. The percentage of variance explained is calculated as the square of the standardized coefficient (not reported). Since the predictor variables are not independent, this calculation is only an approximation.