A COMPARISON OF STRUCTURAL EQUATIONS MODELS OF SERVICE SATISFACTION

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Introduction

Service operations literature identifies service quality as the output of the delivery system especially in the case of pure service systems. Service quality defined as meeting or surpassing customer expectations regarding various service dimensions is linked to consumer satisfaction. Although there is disagreement about the direction of causality we will assume that service quality leads to satisfied customers (Reidenback and Sandifer-Smallwood 1990; Woodside, Rey and Daly 1989). What is not included in the discussion of service quality and customer satisfaction is the customer's general pre-existing sense of well being. When customers leave a restaurant or hotel, they are asked if they were satisfied with the service they received. If they answer "no", we assume the service was poor. Customers mood or general sense of well being is never questioned. However, it is likely that any waitress will state that at times their best service efforts have been criticized soundly because the customer's perception of the service was clouded by "being in a bad mood" or "having a disagreement with someone just before they arrived at the restaurant".

The purpose of this study is to see if factors related to customer satisfaction with a service are modeled better by including the customer's overall sense of well being along with their judgment of service quality dimensions. The long term health care is the context for the study since its institutional nature makes service quality a critical issue; i.e., the service experience constitutes the person's milieu, not merely a transitory experience which can be left behind.

Background    "Beyond the contemporary definitions of service quality (a measure of excellence) and the need for continuous improvement, it is obvious that understanding customer expectations and meeting customer needs is the single most critical issue and determinant of service quality" (Langevin, 1988, 4). Parasuraman, Zeithaml and Berry (1988) agree that expectations are
important but add that it is actually the difference between perceptions of a service and expectations for that service which should be used as the measure of service quality. This line of reasoning follows the disconfirmation of expectation paradigm proposed by Oliver (1980). Parasuraman et al. developed the SERVQUAL instrument to measure perceived service quality in terms of the gaps between customer expectations and actual judgment of performance along five dimensions of service quality. The five dimensions, which were identified from empirical studies, are:

1) Tangibles - physical facilities, equipment, and appearance of employees.
2) Reliability - ability to perform the required service dependable and accurately.
3) Responsiveness - willingness to help customers and provide prompt service.
4) Assurance - knowledge and courtesy of employees and their ability to inspire trust and confidence.
5) Empathy - caring and individual attention provided by the staff.

Even critics of SERVQUAL acknowledge that SERVQUAL is "currently the most popular measure of service quality" (Brown, Churchill, and Peter, 1993, 127). (Criticisms of SERVQUAL are outlined and countered in Parasuraman, Zeithaml, and Berry, 1994).

Customer satisfaction (also referred to in the present study as resident satisfaction) is a global construct which refers to how much the consumer likes or dislikes the service after it is experienced. According to Woodside, Frey and Daly (1989, 6), "Overall customer satisfaction with the service is a function of overall service quality."

Well-being or satisfaction-with-life in general refers to the positive/negative affective dimension of contentment with one's life. It is measured in terms of health, social and psychological factors. A great deal of research has been done on individual life satisfaction factors, particularly in the elderly (Larson, 1978). This work was integrated in a multidimensional measure by Conte and Salamon (1982). The eight factors in their Life Satisfaction in the Elderly Scale (LSES) are:

1) Pleasure in daily activities--satisfaction with unspecified daily activities.
2) Meaningfulness of life--attitude toward life as a result of feeling useful, or having purpose.
3) Goals--Goodness of fit between desired and achieved goals.
4) Mood--degree of happiness or optimism, nonspecific to a particular environmental or social situation.
5) Self-concept--degree of personal self-regard and positive self-appraisal.
6) Perceived Health--self-assessment of overall physical well-being.
7) Financial security--satisfaction with present and recent financial situation.
8) Social contact--level of satisfaction with the number and quality of usual social contacts.

This study examines two competing hypothetical models describing the relationship between service quality, life satisfaction, and resident satisfaction with the facility. Model 1 (Figure 1) assumes that resident satisfaction is separately influenced by service quality and life satisfaction. Model 2 (Figure 2) considers that perceived service quality is the only predictor of resident satisfaction and that life satisfaction does not relate to resident satisfaction.

**Methodology**  **Subjects.** Two hundred and seven nursing home residents were included in the study. They represented over 90% of the cognitively able resident population of ten nursing homes.
Figure 1
Model 1

Service Quality → Customer Satisfaction

Well Being (Life Satisfaction)
Figure 2
Model 2

Service Quality -> Customer Satisfaction
Measures. Service quality was measured using SERVQUAL consisting of 44 items rated on a 1-7 Likert scale with 7 representing the highest level of agreement with the statement and 1, disagreement with the statement. Twenty-two items divided into five subscales corresponding to the five dimensions previously described were judgements of what nursing homes should be (expectations). Another twenty-two items were the same in content as the first 22 except they were judgments about the actual service delivered. Service quality was determined as an average gap score (of the five subscale gap scores). The gap score is the difference between perception and expectation scores. Measurement of overall customer satisfaction with the service used the customary Likert scaled one item: degree to which the resident was satisfied living in the nursing home. Well being was measured as the total score of the 40 items using Likert (5 point) scaling on the LSES. There were five questions for each of the 8 subscales previously described.

Procedure. Residents were administered the questions individually or in small groups in a private place within the nursing home. Two research assistants with training in gerontology read the questions and recorded the answers for the residents.

Analysis. Cronbach alphas were computed to evaluate the reliability of the instruments. Univariate and correlation analyses were completed on the data. Structural equation modeling was used to test the two competing hypotheses (models) using LISREL 7 (Joreskog & Sorbom 1989). Structural equation modeling utilizes maximum-likelihood statistical theory to estimate the unknown coefficients in a set of linear structural equations.

The alternative LISREL models posited in this research each consist of three equations. First the relationships among the latent variables are specified by the structural equation models. Model 1 (Figure 3) shows resident satisfaction is separately and directly influenced by perceived service quality and life satisfaction. Model 2 (Figure 4) considers that even in the presence of life satisfaction perceived service quality is the only predictor of resident satisfaction. That is, life satisfaction does not relate to resident satisfaction.

Underlying the structural equation models are two measurement models and these are the same for both Models 1 and 2 (See Figures 3 and 4). One measurement model specifies how
exogenous (independent) latent variables—perceived service quality and life satisfaction—are measured in terms of observed variables. Perceived service quality is composed of the five scales of the modified SERVQUAL questionnaire and life satisfaction is made up of the eight scales of LSES. The other measurement model specifies how endogenous (dependent) latent variables are measured in terms of observed variables. Resident satisfaction is measured using a single scale, as is common practice.

The LISREL program was used in the current research to assess the adequacy of the two models. The evaluation of the models was accomplished using several measures to assess the overall goodness-of-fit of the model. These included chi-squares with associated degrees of freedom, the goodness-of-fit index (GFI), the adjusted goodness-of-fit index (AGFI), and the coefficient of determination.

Comparison of the two structural models, Model 1 and Model 2 was accomplished using a comparison of the fit indices. Also, the contribution of life satisfaction as a predictor of resident satisfaction was assessed with a construct (chi-square difference test) between the nested structural models (Bentler & Bonett, 1980). One model is said to be nested within another model when its set of freely estimated parameters is a subset of those estimated in the other model (Anderson & Gerbing, 1988). In the present case, Model 2 nests within Model 1: both models are the same except that one path, the relationship of life satisfaction to resident satisfaction, is fixed at zero. The model test allows the identification of which of the models best accounts for the co-variances observed between the latent constructs.
Figure 3
Model 1

Service Quality

Customer Satisfaction

Well Being (Life Satisfaction)

$X_1$ = Tangible
$X_2$ = Reliability
$X_3$ = Responsiveness
$X_4$ = Assurance
$X_5$ = Empathy
$X_6$ = Activeness
$X_7$ = Meaning
$X_8$ = Goals
$X_9$ = Mood
$X_{10}$ = Self-concept
$X_{11}$ = Health
$X_{12}$ = Finances
$X_{13}$ = Social Contact

$Y_1$
Figure 4
Model 2

Service Quality

Customer Satisfaction

Well Being (Life Satisfaction)

$X_1 = $ Tangible
$X_2 = $ Reliability
$X_3 = $ Responsiveness
$X_4 = $ Assurance
$X_5 = $ Empathy
$X_6 = $ Activeness
$X_7 = $ Meaning
$X_8 = $ Goals
$X_9 = $ Mood
$X_{10} = $ Self-concept
$X_{11} = $ Health
$X_{12} = $ Finances
$X_{13} = $ Social Contact
Results

Preliminary analysis of the data indicated that these respondents were representative of the general nursing home population. The average age of the respondents was 79; the average years in the nursing home was 2.4 years. The percentage of women was 77%. The high Cronbach alphas for the SERVQUAL (.95); and the LSES (.92) support the reliability of the instruments.

The structural equations models, the focus of this study, will be discussed after a brief examination of the measurement model which gives a picture of the observed measures' relationships to their underlying constructs. Since resident satisfaction had only one measure, the relationship was fixed at 1.000 and no measurement model was needed. Perceived service quality and life satisfaction are multi-measure constructs with free parameters and their relationships with their observed measures were assessed using LISREL. Tables 1 and 2 show that the relationship between each of these indicator variables and its respective latent variable was statistically significant (p < .05, all t values > 3.4). The squared multiple correlation (R²) for each observed variable reveals the strength of its linear relationship to the related latent variable and shows how well observed variables serve as measurement for the latent variables. The indicators of perceived service quality had adequate R² values: TANGIBLE, .53; RELIABLE, .74; RESPONSE, .77; ASSURE,
### Table 1. Measurement Model for Independent Variables (Model 1)

<table>
<thead>
<tr>
<th>Measurement Variable</th>
<th>Scaled Coefficients</th>
<th>Standardized Coefficients</th>
<th>t-values</th>
</tr>
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<tbody>
<tr>
<td><strong>Perceived Service Quality</strong></td>
<td></td>
<td></td>
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<tr>
<td>TANGIBLE (fixed)</td>
<td>2.71</td>
<td>0.73</td>
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<tr>
<td>RELIABLE</td>
<td>4.42</td>
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<td>RESPONSE</td>
<td>4.09</td>
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<td>11.75*</td>
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<tr>
<td>ASSURE</td>
<td>2.76</td>
<td>0.75</td>
<td>9.01*</td>
</tr>
<tr>
<td>EMPATHY</td>
<td>4.01</td>
<td>0.78</td>
<td>9.53*</td>
</tr>
<tr>
<td><strong>Life Satisfaction</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACTIV (fixed)</td>
<td>2.42</td>
<td>0.78</td>
<td>---</td>
</tr>
<tr>
<td>MEANING</td>
<td>3.02</td>
<td>0.94</td>
<td>14.44*</td>
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<tr>
<td>GOALS</td>
<td>1.59</td>
<td>0.69</td>
<td>8.12*</td>
</tr>
<tr>
<td>MOOD</td>
<td>2.47</td>
<td>0.85</td>
<td>11.55*</td>
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<tr>
<td>SELF_CON</td>
<td>2.21</td>
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<td>8.85*</td>
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<tr>
<td>HEALTH</td>
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<td>3.36*</td>
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<tr>
<td>FINANC</td>
<td>2.15</td>
<td>0.56</td>
<td>6.03*</td>
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<tr>
<td>SOC_CONT</td>
<td>1.50</td>
<td>0.40</td>
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</table>

*statistically significant at .05

### Table 2. Measurement Model for Independent Variables (Model 2)

<table>
<thead>
<tr>
<th>Measurement Variable</th>
<th>Scaled Coefficients</th>
<th>Standardized Coefficients</th>
<th>t-values</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Perceived Service Quality</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TANGIBLE (fixed)</td>
<td>2.71</td>
<td>0.73</td>
<td>---</td>
</tr>
<tr>
<td>RELIABLE</td>
<td>4.12</td>
<td>0.86</td>
<td>11.49*</td>
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<tr>
<td>RESPONSE</td>
<td>4.13</td>
<td>0.88</td>
<td>11.95*</td>
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<tr>
<td>ASSURE</td>
<td>2.74</td>
<td>0.74</td>
<td>8.90*</td>
</tr>
<tr>
<td>EMPATHY</td>
<td>4.01</td>
<td>0.78</td>
<td>9.52*</td>
</tr>
<tr>
<td><strong>Life Satisfaction</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACTIV (fixed)</td>
<td>2.42</td>
<td>0.78</td>
<td>---</td>
</tr>
<tr>
<td>MEANING</td>
<td>3.02</td>
<td>0.94</td>
<td>14.37*</td>
</tr>
<tr>
<td>GOALS</td>
<td>1.59</td>
<td>0.69</td>
<td>8.12*</td>
</tr>
<tr>
<td>MOOD</td>
<td>2.48</td>
<td>0.85</td>
<td>11.57*</td>
</tr>
<tr>
<td>SELF_CON</td>
<td>2.22</td>
<td>0.73</td>
<td>8.91*</td>
</tr>
<tr>
<td>HEALTH</td>
<td>1.05</td>
<td>0.34</td>
<td>3.35*</td>
</tr>
<tr>
<td>FINANC</td>
<td>2.14</td>
<td>0.55</td>
<td>5.98*</td>
</tr>
<tr>
<td>SOC_CONT</td>
<td>1.52</td>
<td>0.41</td>
<td>4.14*</td>
</tr>
</tbody>
</table>

*statistically significant at .05
.55; and EMPATHY, .60. The life satisfaction had good but uneven $R^2$ values: ACTIV, .60; MEANING, .88; GOALS, .48; MOOD, .72; SELF_CON, .54; HEALTH, .11; FINANC, .31 and SOC CONT, .16. The completed structural models appear in Figures 5 and 6. The coefficients adjacent to the arrows between resident satisfaction, service quality and life satisfaction, and from these latent variables to observed variables indicate the magnitude of change in one variable that would be associated with the unit change in the other, with all other variables left in their original values. For example, in Model 1 (Figure 5) a one unit change in service quality would result in a .669 unit change in resident satisfaction, assuming there was no change in life satisfaction. As shown in Table 3 all path coefficients are significant.

Model Assessment. LISREL evaluates a model to determine how well the theoretical structure fits the observed data. Table 3 presents relevant fit indices and the coefficient of determination for Models 1 and 2. The chi-square for Model 1 is 87.13 (df=77, p=.20) and for Model 2 is 98.17 (df=78, p=.06). Smaller chi-square values indicate a better fitting model and a non-significant chi-square is desirable (Hayduk, 1987). Model 1 would be clearly classified as a good model under this criteria but Model 2 only marginally so. The goodness of fit measures, GFI and AGFI, for Model 1 are .89 and .85, respectively, and for Model 2 are, .87 and .83, respectively. Generally GFI values around .90 indicate a good fit (Mathieu, 1991). Both models are
Figure 5
Model 1

Service Quality

\[ X_1 \rightarrow 0.728 \]
\[ X_2 \rightarrow 0.867 \]
\[ X_3 \rightarrow 0.871 \]
\[ X_4 \rightarrow 0.751 \]
\[ X_5 \rightarrow 0.776 \]

Customer Satisfaction

\[ \rightarrow 0.669 \]
\[ Y_1 \rightarrow 1.00^* \]

Well Being (Life Satisfaction)

\[ X_6 \rightarrow 0.777 \]
\[ X_7 \rightarrow 0.934 \]
\[ X_8 \rightarrow 0.691 \]
\[ X_9 \rightarrow 0.846 \]
\[ X_{10} \rightarrow 0.730 \]
\[ X_{11} \rightarrow 0.338 \]
\[ X_{12} \rightarrow 0.557 \]
\[ X_{13} \rightarrow 0.402 \]

\[ \rightarrow 0.497 \]

\[ X_1 = \text{Tangible} \]
\[ X_2 = \text{Reliability} \]
\[ X_3 = \text{Responsiveness} \]
\[ X_4 = \text{Assurance} \]
\[ X_5 = \text{Empathy} \]
\[ X_6 = \text{Activeness} \]
\[ X_7 = \text{Meaning} \]
\[ X_8 = \text{Goals} \]
\[ X_9 = \text{Mood} \]
\[ X_{10} = \text{Self-concept} \]
\[ X_{11} = \text{Health} \]
\[ X_{12} = \text{Finances} \]
\[ X_{13} = \text{Social Contact} \]

* = Fixed Parameter
Figure 6
Model 2

Service Quality

Customer Satisfaction

Well Being (Life Satisfaction)

\(X_1\) = Tangible
\(X_2\) = Reliability
\(X_3\) = Responsiveness
\(X_4\) = Assurance
\(X_5\) = Empathy
\(X_6\) = Activeness
\(X_7\) = Meaning
\(X_8\) = Goals
\(X_9\) = Mood
\(X_{10}\) = Self-concept
\(X_{11}\) = Health
\(X_{12}\) = Finances
\(X_{13}\) = Social Contact

* = Fixed Parameter
close but not within this cut off. The coefficient of determination, the proportion of the variance accounted for by the overall model, is .45 for Model 1 and .38 for Model 2. Taken together the fit indices present a mixed picture of the strength of the individual theoretical models. However, they are adequate as a basis for assessing the contribution that life satisfaction makes to resident satisfaction.

Model comparisons. LISREL allows two models to be compared by determining which theoretical structure better fits the observed data. This comparison can be made using the fit indices presented in Table 3. For Model 1, the coefficient of determinations .45 and the chi-square value is 87.13 (df=77, p=.20) For Model 2, the total coefficient of determination is .383 and the chi-square is 98.17 (df=78, p=.06). These measures, along with the other fit indices indicate that Model 1 fits the data slightly better than Model 2. Thus the preferable model includes life satisfaction (well-being) as predictor of resident satisfaction.

The results of the LISREL analysis of the nested structural models are based on the chi-squared values given in Table 3. The contrast between Model 1 and Model 2, measured using a chi-square difference test, was significant ($X^2 - X^2 = 11.04, df = 1, p < .001$) which indicated that Model 1, the less restrictive model,
### Table 3. Path Coefficients and Fit Indices of Structural Models

<table>
<thead>
<tr>
<th>Paths</th>
<th>Model 1</th>
<th>Model 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Per_Sv_Q -&gt; Res_Sat</td>
<td>.669*</td>
<td>.925*</td>
</tr>
<tr>
<td>Life_Sat -&gt; Res_Sat</td>
<td>.497*</td>
<td>0</td>
</tr>
</tbody>
</table>

**Fit Indices**

<table>
<thead>
<tr>
<th></th>
<th>Model 1</th>
<th>Model 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>df</td>
<td>77</td>
<td>78</td>
</tr>
<tr>
<td>Chi-square</td>
<td>87.13</td>
<td>98.17</td>
</tr>
<tr>
<td>p-value</td>
<td>.20</td>
<td>.06</td>
</tr>
<tr>
<td>GFI</td>
<td>.89</td>
<td>.87</td>
</tr>
<tr>
<td>AGFI</td>
<td>.85</td>
<td>.83</td>
</tr>
<tr>
<td>Coefficient of Determination</td>
<td>.45</td>
<td>.38</td>
</tr>
</tbody>
</table>

*statistically significant at .05

0 = path set equal to zero
was accepted as the better model. This result supports the contribution of the life satisfaction (well-being) variable, fixed at zero in Model 2, as a predictor of resident satisfaction.

**Discussion**

The idea of modeling customer satisfaction solely as a function of service quality is not supported by this study and does not appear to be entirely justified or fair to service providers. Service satisfaction is influenced not only by the quality of service but also by the consumer's overall sense of well being. In this study, resident satisfaction with the nursing home was shown to be influenced by how well the nursing home performance matched the resident's expectations (perceived quality). Moreover, resident satisfaction with the nursing home was influenced by the resident's sense of well being (life satisfaction). Life satisfaction was most affected by the resident's sense of meaning in their lives and their mood. We can conclude that residents who are generally happy and optimistic and who believe their lives have meaning tend to be more satisfied with the nursing home.

Since over 50% of the variance in resident satisfaction with the nursing home is unexplained by the two models, it is apparent that resident satisfaction with a facility is determined by factors beyond how residents feel about their lives or how good they judge the service to be. These findings point to a need to identify additional factors influencing consumer satisfaction, particularly in this context. This study defined service quality in terms primarily of the interpersonal nature of the service encounter. Four of the five service quality dimensions addressed staff behavior. Since staff behavior is only one of three domains included in conceptual frameworks of consumer satisfaction, the other two warrant study at a further point. The two addition domains are 1) atmospherics (comfort, convenience, appearance of facility) and 2) information available to consumers (Peyrot, Cooper and Schnaph 1993). Furthermore, the findings may indicate that the direction of the causality of service quality to customer satisfaction followed in this study is not correct.

The results of this study suggest that the current modelling of the service operations systems' outputs as quality leading to customer satisfaction is questionable at least and unclear at
best. Acquiring a better understanding of service outputs would seem to be a prerequisite for designing better service processes. For that reason further research in this area of service outputs becomes increasingly important to the field of service operations.
REFERENCES


