INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH & DEVELOPMENT

ISSN: 2278 – 0211 (Online)

Relative Importance of Service Quality Dimensions and Overall Satisfaction – Discriminant Analysis

Dr.R.Kavitha

Assistant Professor of Commerce, Padmavani Arts& Science College

Salem, Tamilnadu, India

Abstract:

Health care is a big concern in India, the land of nearly billion people and the second most popular country in the world. As the country is divided into several States, the State government has the onus to take care of the health of people in the State. The main aim of the study is to study the relative importance of the five dimensions and overall satisfaction based on SERVQUAL measurement model which was developed by Parasuraman etc. Two hospitals are purposively selected for this study, one is private hospital and another is public hospital. Data required for this study are both primary and secondary. Primary data are collected through interview schedule and secondary data relating to the hospitals are collected from the records of the select hospitals based on convenience sampling. The finding of the study is all the five dimensions and overall satisfaction, the group of patients between the two hospitals (Public and Private Hospitals) has been discriminated. The most important dimension that discriminates the patients between the two hospitals is Empathy that contributes 50% of the respondents.

Keywords: *Dimensions, Expectations, Hospitals, Service Quality, Tangibles*

Introduction

The healthcare industry in recent years has restructured its service delivery system in order to survive in an unforgiving environment resulting from maturation of the industry, reduced funding and increased competition. The restructuring has focused on finding effective ways to satisfy the needs and desires of the patients. Consumer satisfaction is a basic requirement for healthcare provider because, the satisfaction related to quality of healthcare is provided by hospitals. Satisfaction is important when patients themselves and institutional healthcare service buyers make selection decisions.In this section, an attempt is made to study the relative importance of the five dimensions and overall satisfaction. This study adopted the basic five dimensions of SERVQUAL instrument, developed by Parasuraman et, al.. The instrument includes 22 items; four items belong to Tangibles dimension; five items belong to Reliability dimension; four items belong to Responsiveness dimension; Assurance dimension has four items and Empathy dimension has five items. SERVQUAL instrument has been widely used in many service industries. It was specifically designed to measure service quality using both the gap concept and service quality dimensions (Parasuraman, 1985, 1988) . The SERVQUAL instrument has been empirically evaluated in the hospital environment, and has been shown to be a reliable and valid instrument in that setting (Babakus and Mangold, 1992).

Objectives Of The Study

The main objective of the study is to analyze the relative importance of the five dimensions and overall satisfaction of select hospitals.

Methodology And Tools

This study is an empirical research based on survey method. Data required for this study are both primary and secondary. Primary data relating to patients of the hospitals are collected through personal interview with the patients and secondary data relating to the hospitals are collected from the records of the select hospitals. The researcher had personal discussions with the patients of the hospitals, and they were personally contacted and interviewed to elicit relevant information.

Sampling Scheme

Two hospitals in Salem are purposively selected for the study, ie., one private hospital and another public hospital. The private hospital is Sri Gokulam hospital (P) Ltd., and the public hospital is Mohan Kumaramangalam Government Medical College Hospital. In these two hospitals, samples of 400 in-patients (each having 200 samples) are selected to measure the patients' perception of service quality. The sampling technique used in this study is non-probability sampling and the respondents are selected on the basis of convenience sampling.

Framework of Analysis

In this study Discriminant Function Analysis is attempted in 3 stages viz., 1.Construction of Discriminant Function, 2. Classification and 3. Interpretation to find out which of the dimensions such as Tangibles, Reliability, Responsiveness, Assurance and Empathy and overall satisfaction significantly differ among the two hospitals and what significantly discriminates the respondents of one group (Public Hospital) from the other group (Private Hospital). The relative importance of the all five dimensions along with overall satisfaction is found out by using the Discriminant Analysis.

Construction Of Discriminant Function

Discriminant Function attempts to construct a function to discriminate the dimensions so that respondents belonging to either of these two groups are differentiated at the maximum. The linear combination of the dimensions is known as Discriminant Function and its parameters are called Discriminant Function coefficients. A typical Discriminant Function is of the form,

$Z = a_0 + a_1X_1 + a_2X_2 + \ldots\ldots\ldots\ldots\ldots + a_n X_n$ where, a_0 - Constant

$a_1, a_2 \ldots\ldots\ldots\ldots a_n$ – Discriminant Function coefficients of the independent dimensions

$X_1, X_2, \ldots\ldots\ldots X_n$ respectively.

Variable Selection Method

In constructing the function all dimensions, which contribute to differentiate these two groups maximally, are examined. Among the several methods available for selection of variables, 'Mahalanobis Minimum D Square' method is employed for this study. The Mahalanobis procedure is based on the generalized squared Euclidean distance that adjusts for unequal variances in the variables. The major advantage of this procedure is

that it is computed in the original space of the predictor (independent) variables rather than as collapsed version, which is used in other methods. In general 'Mahalanobis Minimum D Square' is the preferred procedure since the researcher is interested in the maximum use of available information.

Stepwise Selection

In the process of constructing Discriminant Function, after deciding about Mahalanobis Min. D Square' method, the type of computation is also to be decided. One is Simultaneous Method and the other one is Stepwise Method. The Simultaneous Method involves computing the Discriminant Function so that all the independent dimensions are considered concurrently regardless of the discriminating power of each independent dimension.

The Stepwise Method is an alternative to the above discussed method. It involves entering the independent dimensions in the Discriminant Function one at a time on the basis of their discriminating power. The stepwise approach begins by choosing the single best discriminating variable. The initial dimension is then paired with each of the other independent dimensions one at a time and a second dimension is chosen. The second dimension is the one that is best able to improve the discriminating power of the Function in combination with the first dimension. The third and any subsequent dimensions are selected in a similar manner. As additional dimensions are included, some already selected dimensions may be removed if the information they contain about group differences is available in some combination of the other already included dimensions (Multicollinearity). Eventually either all independent dimensions will have been included in the function or the excluded dimensions will have been judged as not contributing significantly to further discrimination. By sequentially selecting the next best discriminating variable at each step variables that are not useful in discriminating between the groups are eliminated and a reduced set of variables is identified. The reduced set typically is almost as good as, and sometimes better than, the complete set of variables.

The table 1 examines the first stage of Discriminant Analysis. This table shows the group means and standard deviations for each of the independent variables identified for analysis based on the sample size of 400.

Dimensions	Public Hospital		Private Hospital		Total	
	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation
Tangibles	17.65	2.900	24.38	2.615	21.01	4.352
Reliability	22.30	3.368	30.18	2.594	26.24	4.957
Responsiveness	18.04	2.715	23.71	2.414	20.87	3.828
Assurance	17.86	2.831	21.63	2.891	19.74	3.424
Empathy	22.13	3.393	30.30	2.574	26.22	5.077
Overall satisfaction	41.64	2.169	46.95	3.001	44.29	3.727

Table 1: Group statistics

A glance at the mean scores reveals that the mean scores are higher in the case of private hospital in respect of all the dimensions than the public hospital

Variables	Wilks' Lambda	F	df1	df2	P Value
Tangibles	0.402	593.196	1	398	0.000
Reliability	0.367	687.162	1	398	0.000
Responsiveness	0.449	488.125	1	398	0.000
Assurance	0.696	173.644	1	398	0.000
Empathy	0.351	736.183	1	398	0.000
Overall satisfaction	0.492	410.520	1	398	0.000

Table 2: Tests of quality of group means

Table 2 shows results of one-way ANOVA used to assess the significance between the means of the two groups, for each of the independent dimensions. It is seen from the table that all dimensions (factors) contribute significantly in differentiating between two groups of hospitals expressed on quality measures using the six factors. Since the

objective is to determine the dimensions which discriminate most efficiently between two groups of patients, all the factors are retained for further analysis and the stepwise approach is used to remove insignificant factors. The stepwise procedure begins with examining all the variables for inclusion in the function. The variable, if selected that maximizes the Mahalanobis Minimum D Square between the groups is entered in to the function first. In order to restrict all the variables being entered into the equation, a minimum F value of 1.00 is fixed as entry criteion for inclusion in the Discriminant Function.

Step	Variables	Tolerance	F to Remove	Min. D Square	Between Groups
1	Empathy	1.000	736.183		
2	Empathy	1.000	370.112	4.105	Public and Private
	Over all satisfaction	1.000	149.847	7.362	Public and Private
3	Empathy	0.742	67.892	11.219	Public and Private
	Over all satisfaction	0.999	129.272	9.443	Public and Private
	Reliability	0.742	55.314	11.643	Public and Private
4	Empathy	0.696	44.676	12.570	Public and Private
	Over all satisfaction	0.999	124.954	10.015	Public and Private
	Reliability	0.669	30.976	13.103	Public and Private
	Responsiveness	0.740	13.694	13.825	Public and Private
5	Empathy	0.598	25.978	13.551	Public and Private
	Overall satisfaction	0.996	126.505	10.165	Public and Private
	Reliability	0.606	19.748	13.815	Public and Private
	Responsiveness	0.703	9.151	14.283	Public and Private
	Tangibles	0.536	5.660	14.442	Public and Private

Table 3: Variables in the Analysis

Table 3 gives the list of variables considered for analysis at each step, with corresponding F-to remove and D^2 values to examine the possible inclusion of variables

in the equation. A look at the table reveals that the entry criterion has eliminated the variable, "Assurance score" from possible inclusion in the equation. Also this table gives the information as which variable should be entered first. By examining D^2 value, which maximizes the distance between the two groups, it is seen that at each step a variable is entered, the D^2 value has increased, thereby increasing the discrimination between the two groups. The variable which maximum discriminated between the two groups can be identified from the variable which was entered first. Here it is Empathy score. At each step a variable is entered, the significance of the function is tested using Wilk's Lambda ( ) and D^2 values arrived for this function. Both the statistics show that the Discriminant Function is significant at 1% level. The results are given in Table 4.

Step	Number of Variables	Lambda	df1	df2	df3	Exact F			
						Statistic	df1	df2	Sig
1	1	0.351	1	1	398	736.183	1	398.0	0.00
2	2	0.255	2	1	398	580.677	2	397.0	0.00
3	3	0.224	3	1	398	458.518	3	396.0	0.00
4	4	0.216	4	1	398	358.336	4	395.0	0.00
5	5	0.213	5	1	398	291.183	5	394.0	0.00

Table 4: Wilk's Lambda

Once entered in the equation, at each step, the variables already entered are further examined for positive removal from the equation. A variable is removed if high multicollinearity exists between the included independent variables. Like entry criterion, the removal criterion is also fixed at 1.00. The process of selection, inclusion and removal continues until all the variables satisfying above entry and removal conditions are satisfied.

Once entered in the equation, at each step, the variables already entered are further examined for positive removal from the equation. A variable is removed if high multicollinearity exists between the included independent variables. Like entry criterion,

the removal criterion is also fixed at 1.00. The process of selection, inclusion and removal continues until all the variables satisfying above entry and removal conditions are satisfied.

Step	Entered	Min.D. Square	F-Statistic	df1	df2	Sig.
1	Empathy	7.362	736.183	1	398.00	0.00
2	Overall satisfaction	11.643	580.677	2	397.00	0.00
3	Reliability	13.825	458.518	3	396.00	0.00
4	Responsiveness	14.442	358.336	4	395.00	0.00
5	Tangibles	14.707	291.183	5	394.00	0.00

Table 5: Summary table

Table5 provides the overall stepwise discriminant analysis results after all significant variables have been included in the Diuscriminant Function. Table 3.4.5 indicates that out of 6 variables considered for the analysis 5 variables are included in the model, leaving one variable namely 'Assurance' from the function.The significance of the discriminating variables are tested using Wilk's Lambda( ) and min D^2 values which are given in the table5.

Canonical Discriminant Function

Table 6 provides the multivariate aspect of the model given under the heading 'Canonical Discriminant Function'. Note that Discriminant Function is significant at 1% level and displays a correlation of 0.818. By squaring it we get (0.818)^2=0.6691 and may be interpreted as 66.91% of the variation in the dependent variable sector, may be explained by all the discriminating variables included in the model and the Wilk's Lambda and its chi-square value explain that the model is significant in discriminating between two sectors at 1% level.

Test of Function	Canonical	Wilk's	Chi-Square	Df	Sig.

	Correlation	Lambda			
1	0.818	0.213	611.658	5	0.000

Table 6: Canonical Discriminant Function

Discriminant Function Coefficients

Table 7 gives the co-efficients of the discriminating variables finally derived for the Discriminant Function.

Dimensions	Function
Tangibles	0.066
Reliability	0.105
Responsiveness	0.079
Empathy	0.120
Overall satisfaction	0.213
(Constant)	-18.378

Table7: Canonical discriminant function coefficients

The Discriminant Function (Z) for the problem under study can be written, as

Z = -18.378 + 0.066 x Tangibles + 0.105 x Reliability + 0.079 x Responsiveness + 0.12 x Empathy + 0.213 x Overall satisfaction --- (A)

Classification

Once the Discriminant Function is arrived at, then the efficiency of the function as to, how accurately it predicts the respondents in to the respective groups must be assessed. For this a classification matrix is to be developed using 'original' and 'predicted' group membership of the respondents.

Before a Classification Matrix can be considered, several things must be decided beforehand, i.e., first the group centroids (means), second cutting score and third a prior probabilities of each group.

Group Centroids

Using the Discriminant Functions given in (A) the Discriminant score for each respondent is calculated by substituting the values for discriminating variables from the study data. Then mean scores for Public Hospital (Z^0) and Private Hospital (Z_1) are calculated, which are called Group Centroids. The results of these Group centroids are given in Table 8

Cutting Score

Using the sample sizes and centroids for these two groups Cutting Score is calculated as follows:

$$Z_c = \frac{N_0 \times Z_0 + N_1 \times Z_1}{N_0 + N_1}$$

Where,

Z_c = Cutting Score

Z_0 = Centroids for Public Hospital

Z_1 = Centroids for Private Hospital

N_0 = Sample size of Public Hospital

N_1 = Sample size of Private Hospital

Functions at Group Centroids

Hospital	Function
Public Hospital	-1.917
Private Hospital	1.917

Table 8: Unstandardized Canonical Discriminant Functions Evaluated at Group Means

Hence substituting the respective values the cutting score is

$Z_c = [200 \times (-1.917) + 200 \times (1.917)] / (200 + 200) = 0.0$

Against this cutting score each respondent's Discriminant score is examined. If his score is less than Z_c value, then he is classified in the Public Hospital.

Prior Probabilities

Prior probabilities are calculated for each group based on the proportionate size of the sample in the respective groups and the results are given in table.

Hospital	Prior	Cases used in Analysis
Public Hospital	0.5	200
Private Hospital	0.5	200
Total	1.000	400

Table 9: Prior probabilities for Groups

Using these prior probabilities, centroids and cutting score the classification Matrix is formed.

	Hospital	Predicted Group Membership		Total
		Public	Private	
Original Count	Public	192	8	200
	Private	4	196	200
%	Public	96.0	4.0	100.0
	Private	2.0	98.0	100.0

Table10: Classification Results

97.0% of original grouped cases correctly classified.

Table 10 is the Classification Matrix giving how many of the respondents were correctly classified into the respective groups and the overall correct classification percentage. Thus it is seen that the Discriminant Function has predicted 96% of the cases correctly in the Public Hospital group and 98% of the cases in the Private Hospital group and on the whole classified 97% of the cases correctly.

Interpretation

The efficiency of the discriminating variables in the Discriminant Function is based on the discriminateing power or the contribution of each variable to the function. Table11 gives the structural correlations which measure the simple linear correlations between each independent variable and the Discriminant Function.

Dimensions	R	R^2%
Empathy	0.708	0.501
Reliability	0.684	0.468
Tangibles	0.635	0.403
Responsiveness	0.576	0.332
Overall satisfaction	0.528	0.279

Table 11: Structure matrix

R^2% gives the percent contribution of each variable to Discriminant Function. It is seen from the table that about 50% of the variation in the Discriminant Function is due to Empathy score, which contributes maximally, in discriminating between types of hospitals. Next comes, Reliability score, which contributes 46.8% in discriminating between the types of hospitals followed by Tangibles and Responsiveness of the hospitals. Overall satisfaction seems to contribute the least in discriminating types of hospitals.

Findings

In today's highly competitive environment, hospitals are increasingly realizing the need to focus on service quality as a measure to improve their competitive position. Customer based determinants and perceptions of service quality, therefore, play an important role when choosing a hospital. The study has adopted the basic dimensions of SERVQUAL instrument developed by Parasuraman et. al.[4] Though all the dimensions are equally important in measuring the service quality, the relative importance of the dimension is taken up for study in this section, using Discriminant analysis. The five dimensions such as Tangibles, Reliability, Responsiveness, Assurance and Empathy along with overall satisfaction have been analysed to discriminate one group of patients (Public hospital) from the other group (Private Hospital). This is attempted in three stages viz., 1. Construction of Discriminant Function 2. Classification and 3. Interpretation. The most important dimension that discriminates the patients between the two hospitals is Empathy, which contributes 50% of the respondents followed by the Reliability dimension that contributes 46.8% Tangibles (40%) and Responsiveness (33%) and the overall satisfaction contributes only about 28% is discriminating the patients to choose either the public hospital or the private hospital.

Conclusion

The most important dimension that discriminates the patients between the two hospitals is Empathy that contributes 50% of the respondents. This indicates that patients give importance to trustworthiness, believability, honesty, caring and individualized attention provided to the patients these are the areas that discriminate the hospitals in choosing between the hospitals. Health care managers should focus more on this aspect in providing service delivery and improvements are still needed to meet the patients expectations.

Reference

1. Balaji B.,Services Marketing and Management, 2002, New Delhi:S.Chand and Company Ltd.
2. Jha S.M., Services Marketing. 2003 Mumbai: Himalaya Publishing House.
3. Krishnasamy O.R. and Ranganatham M., Methodology of ResearchIn Social Sciences, 2005, Mumbai: Himalaya Publishing House.
4. Cronin, J.J.Jr. and Taylor, S.A., "Measuring Service Quality:A Re-examination and Extension", Journal of Marketing, 56,1992, pp.55-68.
5. Darshen Parikh, " Measuring Retail Service Quality: An empirical study in a Developing Country", South Asian Journal of Management, Vol.12,No.2, pp. 43-52.
6. Darshen Parikh, " Measuring Retail Service Quality: An empirical study in a Developing Country", South Asian Journal of Management, Vol.12,No.2, pp. 43-52.
7. Headley, D.E. and Miller, S.J., "Measuring Service Quality and its relationship to future consumer behavior", Journal of Health Care Marketing 13(4), 1993, pp.32.41.
8. Lam, S.S.K., SERVQUAL : "A Tool for Measuring Patients", Opinions of Hospital Service Quality I Hong Kong, Total Quality Management 8(4), 1997, pp.145-152.
9. Parasuraman, A. Zeithaml, V.A. and Berry, L.L., "A Conceptual Model of Service Quality and its Implications for Future Research" Journal of Marketing, Vol.49, fall, 1985, pp.41-50.
10. Parasuraman, A. Zeithaml, V.A. and Berry, L.L., "SERVQUAL : a multiple item scale for measuring customer perceptions of service quality", Journal of Retailing 64, Spring, 1988, pp.12-40.
11. Parasuraman, A. Zeithaml, V.A. and Berry, L.L., "Refinement and re-assessment of the SERVQUAL scale", Journal of Retailing, 67(4), 1991, pp.12-40.
12. Parasuraman, A. et. al., "More on Improving Service Quality Measurement", Journal of Retailing, Vol.69(1), 1993, pp.140-147.
13. Parasuraman, A. et. al., "Re-assessment of expectations as a comparison standard in measuring service quality: Implications for future research", Journal of Marketing, 58, 1994, pp.111-124.
14. Quoted in: Mik Wisniewski, "Measuring Service Quality in a Hospital Colposcopy Clinic",Op.Cit., pp.217-228.
15. Quoted in: M.Sadiq Sohail, "Services Quality in Hospitals: more favourable than your might think", Op.Cit., pp.197-206.