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Implementation of the SERVPERF model in a university using multi-variate statistic's tools



Colaboración

Manuel Baro Tijerina, Carmen Lorena Posada, Gerardo Duran Medrano, Instituto Tecnológico Superior de Nuevo Casas Grandes

ABSTRACT: *The quality of services has been a subject of interest to several authors. Due to the complexities of measuring an intangible asset, various scales attempting to measure and compare customer expectations against the perceptions of a service have emerged. Among the models used in the efficient measurement of quality services, is the SERVPERF model, which measures the perception of the service received by the customer within five dimensions, generating indicators to implement improvements. In this research, the SERVPERF model was applied to a university, and through this model, an improvement proposal for increasing the service quality provided by the institution was determined. On the other hand, ours can check the correct operation SERVPERF model for measuring the quality perceived by customers, with the use of qualitative variables and the Cronbach coefficient; the proposals and improvement in the service's quality will be significant for the university.*

KEYWORDS: *Cronbach coefficient, customer satisfaction, experience of quality, measurement of service quality, perception of quality, qualitative variables, scale, service, servperf, servqual.*

INTRODUCTION

Due to the special nature and characteristics of services over products, quality service cannot be measured in the same manner as tangible products. In service, the important thing is the quality perceived by the client that can be broken down into different dimensions, so that a more operational concept is created for the organization. On the other hand, measuring the quality of service differs substantially from the measurement of product quality, being more difficult to assess and having to consider two aspects: the process and the result of service [1].

The quality of service concept reveals a shift from the classic concept of quality in an objective sense to a subjective concept of quality based on customer perception. Nowadays, the quality is defined by the customer. Quality is what the consumer says it is, and the quality of a particular product or service is what the consumer perceives it is, or what is the same, the quality is what the customer says it is from their perception [2]. The tolerance zone is delimited by two levels of service: the desired service, the service level that the customer expects, and the right service, the level of service that the customer considers acceptable.

Among the most used in measuring customer expectations models are the SERVQUAL and SERVPERF models, in this study we chose to use the SERVPERF model because this model only takes into account customer perceptions, which decreases the number of items to be performed and provides simple interpretation [3]. On the other hand, measuring the quality of service in an educational institution and analyze the results using statistical models, allows for the generation of improvement strategies.

The structure of this research is as follows: Section 2 presents the conceptualization of experience of quality. Section 3 the Customers' Expectations of Service is shown. Section 4 presents the SERVPERF Model, Section 5 presents the Cronbach's Alpha. Section 6 shows the methodology. Section 7 the results of the research are shown. Section 8 presents the conclusions. Finally, references are shown in Section 9.

MATERIAL AND METHODS

2. EXPERIENCE OF QUALITY

Service Quality is crucial in any organization as it helps create the bond between the business and its clients [4]. In today's competitive business environment, service quality is very important to attract and retain customers. This is due to the fact that customers derive their perceptions of service quality on the levels of satisfaction they experience with a particular business [5]. Businesses need to be able to satisfy customers and meet their expectations of service quality in order to gain competitive advantage [4]. Thus, marketers need to continually assess customers' expectations of service quality in order to avoid customer dissatisfaction [6].

Service quality is a measure of how well the service level delivered matches customer expectations. Service quality results from customers' expectations of what the service provider should offer and how the provider actually performs to meet those expectations [7]. Thus, delivering service quality means ensuring consistency in service delivery performances on a daily basis. According to Kotler (2007: 68) service quality is very important to attract and retain customers. This is due to the fact that customers derive the perceptions of service quality on the levels of satisfaction they experience with the particular business [8].

3. Customer's Expectations of Service

Customer expectations are beliefs about service delivery that function as standards or reference points against which performance is judged. Customers hold different types of expectations for service performance. Customers compare their perceptions of service delivery with these reference points when evaluating service quality, therefore, knowing what customers expect is critical in gaining competitive advantage. Failure to understand the levels of service customers expects can mean losing a customer to competitors who are able to meet customer's expectations and therefore be at a risk of losing business [9].

4. SERVPERF Model

Cronin and Taylor (1992) in their empirical work presented the framework of Parasuraman, Zeithaml and Berry (1985, 1988), with respect to conceptualization and measurement of service quality, and propounded a performance-based measure of service quality called

'SERVPERF', illustrating that service quality is a form of consumer attitude. They argued that SERVPERF was an enhanced means of measuring the service quality construct. Their study was later replicated and findings suggest that little if any theoretical or empirical evidence supports the relevance of the E-P= quality gap as the basis for measuring service quality [10]. In equation form, SERVPERF service quality can be expressed as:

$$Q_i = \sum_{j=1}^k W_j P_{ij} \quad \text{Eq. (1)}$$

Where:

Q_i = perceived quality by individual i ;

k = number of attributes;

P_{ij} = perception of individual " i " with respect to performance of a service firm on attribute " j ".

W_j = attribute importance " j " in quality perception.

5. Cronbach's Alpha

There are various types of reliability coefficients. Cronbach's (1951) alpha is one of the most commonly used reliability coefficients and for this reason the properties of this coefficient will be emphasized here. Cronbach's (1951) alpha was developed based on the necessity to evaluate items scored in multiple answer categories. Cronbach (1951) derived the alpha formula from the KR-20 formula:

$$KR - 20 = \frac{k}{(k - 1)} \left[1 - \sum \frac{p_i q_i}{\sigma_{total}^2} \right] \quad \text{Eq. (2)}$$

Where:

K = the number of items

P = the proportion of people with score 4

q = the proportion of people with score 1

σ = the variance of the total measurement

When items are perfectly correlated, and have mixed signs, the sum of item variances will be greater than the total score variance. When the individual score variance is greater than total score, internal consistency is non-existent between the item scores; therefore, the items are measuring different concepts. In general, as items are more correlated, shared variance increases, increasing internal consistency; therefore increasing the magnitude of the alpha coefficient [11].

6. Methodology

In this section, once the concept of quality experience is presented, the methodology for the implementation of the model SERVPERF at a university is demonstrated through the five dimensions perceived by customers.

1. Select and specify the dimensions and attributes that underlie the service of quality provided by the university.

2. Provide information on the level of dimensions: tangibility, reliability, responsiveness, assurance, and empathy in public services.

3. A survey to collect primary data, which give information on what the size and perception of the service will be.

4. The sampling rate is determined for the information collection. In this application, simple random sampling was selected.

5. The number of observations according to the range of the ratio and deriving this equation n is calculated with:

$$\frac{k}{k_1} * 1 \frac{s_i^1}{s_{sum}^2} \quad \text{Eq. (3)}$$

Where:

Z (α / 2) = the value of the standard deviations.

p = the proportion of expected success of the population.

q = the failure rate of the population or phenomenon to study.

e = the allowable error in the number of observations.

6. To assess the reliability of the measurement instrument, it was analyzed by Cronbach's alpha. Within this category of coefficients, Cronbach's alpha is undoubtedly the most widely used by researchers. Alfa estimated lower limit of the reliability coefficient and is expressed by the equation:

Where

k = the number of test items.

Si = the variance of the items.

Ssum = the variance of the total test.

7. The questionnaire used in this study is based on the SERVPERF model, measuring satisfaction using only perception, through 12 items, using a Likert response scale of 4 points where more means a higher level. Also, 4-level Likert scale was used to avoid the central points.

8. The questionnaire is applied and the data is analyzed to verify what is significant.

9. Data was standardized to use the mean μ instead of mode as a measure of central tendency and analyze data as normal.

10. With the data standardized, the Mahalanobis distance is applied in order to establish significant factors, it is to say, the Euclidean distance.

11. Based on the results of the Euclidean distance, improvement proposals for increasing the students quality experience are carried out at a confidence level of 95%.

12. Based on the results of Euclidean distance at confidence level of 95%, improvement proposals for increasing the degree of service satisfaction are created.

7. Results of the Research

The dimensions selected to develop the SERVPERF model are: the aspect of the company, facilities attractive visually, the service and responsiveness. According to this dimensions, the questionnaire applied was:

- 1) The university has functional facilities to provide a good service?
- 2) The university facilities are suitable to be comfortable during the hours that remain in it?
- 3) Were the syllabi completed in your classes of this this semester?
- 4) If an academic problem occurs, the teachers have disposition to fix it?
- 5) Did the teachers gave good lessons?
- 6) Is the teacher's knowledge appropriate?
- 7) Did the teachers cared about your specific needs?
- 8) The university provides personal attention?
- 9) Is the University education quality adequate?
- 10) If you have any administrative problem, the solution that you received satisfied your needs?
- 11) Does the administrative staff offer fast and a quality service?
- 12) According to your needs, does the University have adequate hours?

Subsequently the observations number was estimated according to the confidence interval of the proportion. The used formula is as follow:

$$n = \frac{p(1-p)Z_{\alpha}^2}{e^2} = \frac{1.96^2(0.95) * (0.5)}{(0.07)^2} = 37 \quad \text{Eq. (4)}$$

The number of observations to perform is 37 to guarantee a confidence level of 95%.

On other hand to assess the reliability of the measuring instrument we proceeded with an analysis of the internal consistency by calculating the Cronbach's alpha. Within this category of coefficients, Cronbach's alpha is undoubtedly the most widely used by researchers. Alfa estimates the lower limit of reliability coefficient and is expressed by the equation:

$$\frac{k}{k_1} * 1 \frac{s_i^1}{s_{sum}^2} \quad \text{Eq. (5)}$$

The next table shows the matrix by items to estimate the Cronbach alpha:

Table 1: Results Matrix

Questionnaire	Item 1	Item 2	Item 3	Item 4	Item 5	Item 6	Item 7	Item 8	Item 9	Item 10	Item 11	Item 12
1	2	3	3	2	3	3	2	2	3	2	3	2
2	2	3	3	3	3	3	3	2	3	2	3	3
3	2	3	3	3	3	3	3	2	3	2	3	3
4	3	3	3	3	2	4	3	3	3	3	2	3
5	3	3	3	3	3	4	3	3	3	3	4	3
6	3	3	2	3	3	4	4	3	2	3	2	3
7	3	3	3	2	3	4	3	2	3	3	2	4
8	3	3	3	2	3	4	3	2	3	3	3	3
9	3	3	3	3	3	4	3	3	4	4	3	4
10	4	3	3	3	3	4	2	3	2	4	3	4
11	3	1	1	2	3	3	2	3	2	2	3	3
12	3	3	2	3	3	4	2	3	3	3	2	3
13	3	4	4	4	2	3	4	4	3	4	3	2
14	3	2	1	3	3	2	3	2	2	2	3	4
15	4	3	4	3	3	3	3	4	3	3	3	3
16	3	3	4	1	3	3	4	4	4	3	3	3
17	3	3	3	4	3	4	3	2	2	3	3	3
18	4	3	3	4	4	4	4	3	4	3	3	2
19	2	3	3	4	3	4	3	2	3	3	3	3
20	4	3	2	3	4	4	3	4	2	3	3	3
21	3	2	4	4	3	3	3	2	3	3	4	2
22	3	3	3	3	3	3	3	2	3	3	3	3
23	3	2	3	3	3	3	3	3	2	3	3	4
24	3	3	2	3	3	3	3	2	2	3	2	4
25	3	3	4	2	3	4	3	4	3	2	2	4
26	3	3	4	1	4	3	3	1	3	3	3	4
27	3	3	4	2	4	4	4	2	3	4	3	3
28	3	3	4	3	4	3	4	4	3	3	3	3
29	3	3	3	4	3	3	3	4	2	3	3	4
30	3	2	3	3	2	3	3	4	3	2	3	3
31	4	3	3	3	3	2	4	2	3	3	3	3
32	4	2	3	3	2	3	3	2	2	2	3	3
33	4	3	3	4	3	2	3	3	3	2	2	4
34	4	4	4	4	4	3	3	3	3	3	3	3
35	4	4	4	4	4	3	4	3	3	3	3	3
36	4	4	3	3	3	3	3	3	3	3	2	3
37	4	4	2	4	3	3	3	3	2	3	3	2
38	3	4	3	2	3	3	3	2	3	3	3	3
39	4	4	3	2	3	3	3	4	3	2	3	3
40	4	4	3	2	4	3	2	3	3	3	3	4

Then, using the matrix table showed above, the correlation coefficient was estimated for each item. The results of the analysis are shown below:

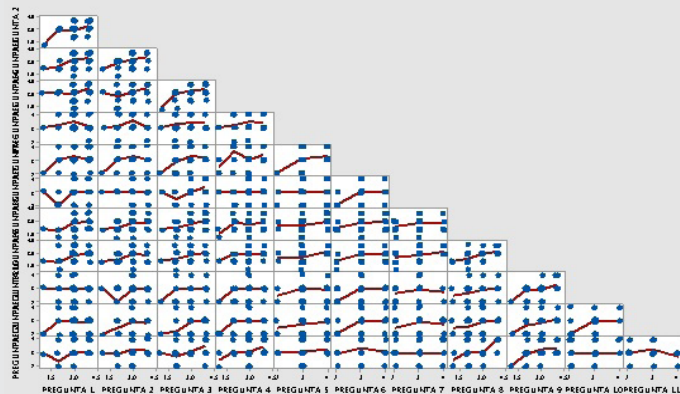


Fig. 1: Correlation Matrix

The figure 1 presents the correlation between the analyzed items and the obtained responses in the number of the questionnaires applied. According to the correlation matrix, it was obtained that there is an adequate correlation by items, due this, the expected values of correlation must be higher than the 0.70.

Table 2: Cronbach Alpha

Variable	Mean	StDev	Total	Corr	Alpha
Item 1	32.650	4.258	0.3575	0.4646	0.7945
Item 2	32.850	4.222	0.4075	0.3411	0.7899
Item 3	32.725	3.974	0.6536	0.5672	0.7628
Item 4	32.775	4.098	0.4828	0.3413	0.7830
Item 5	32.450	4.350	0.2899	0.4325	0.7989
Item 6	32.625	4.295	0.3478	0.2421	0.7948
Item 7	32.825	4.314	0.3350	0.4039	0.7956
Item 8	33.075	4.047	0.5460	0.4101	0.7757
Item 9	33.000	4.051	0.6715	0.6215	0.7636
Item 10	32.950	4.314	0.3748	0.4855	0.7925
Item 11	33.000	4.285	0.4046	0.3903	0.7900
Item 12	32.600	4.260	0.4335	0.2935	0.7876

According to the results of Cronbach's alpha for each item ≥ 0.7 it is assumed that the applied questionnaire measures the necessary dimensions of SERVPERF model to estimate the quality of service. In addition Cronbach's alpha global, that is, the overall average of the coefficients is equal to 0.8006 or 80.06% expressed as a percentage indicating a good fit of the data to be measured.

Once the analysis of the Cronbach coefficient has been accepted, and proving that the items measure the required dimensions, the data of each item were normalized in order to establish the main factors, as shown below.

With the results of the coefficients, the data is standardized to use the average μ and standard deviation σ as the parameters, in other words the data are normalized to estimate the Mahalanobis distance. A standardization of data was performed to convert qualitative variables to quantitative type, using Minitab 17, allowing the change of parameters. The standardization of data was carried out by:

$$Z = \frac{X - \mu}{\sigma} \rightarrow N((0,1)) \quad \text{Eq. (6)}$$

The standardized data table shown below:

Table 3: Standardized data

Item 1 STD	Item 1 STD	Item 1 STD	Item 1 STD	Item 1 STD	Item 1 STD	Item 1 STD	Item 1 STD	Item 1 STD	Item 1 STD	Item 1 STD	Item 1 STD
-1.63897056	0.1080945	-1.28846231	0	-0.56785207	-1.84818895	-1.59128698	-0.85080176	-2.54471863	-1.50143244	-1.34363195	-1.97708056
-1.63897056	0.1080945	-1.28846231	0	-0.56785207	-1.84818895	-1.59128698	-0.85080176	-2.54471863	-1.50143244	-1.34363195	-1.97708056
-1.8210784	0.1080945	-0.06135535	-1.22474487	1.17938506	1.36603792	0.08375195	1.58006041	0.32256997	-1.50143244	0.3900867	1.38816295
-1.8210784	0.1080945	-0.06135535	-1.22474487	1.17938506	1.36603792	0.08375195	1.58006041	0.32256997	-1.50143244	0.3900867	1.38816295
-1.8210784	0.1080945	-0.06135535	0	1.17938506	-0.24106552	0.08375195	0.36462933	1.75621426	2.1380534	2.12380534	-0.29445881
-1.8210784	0.1080945	-0.06135535	1.22474487	1.17938506	1.36603792	0.08375195	-0.85080176	0.32256997	-1.50143244	-1.34363195	-0.29445881
-1.8210784	0.1080945	-1.28846231	0	1.17938506	-0.24106552	-1.59128698	0.36462933	0.32256997	-1.50143244	2.12380534	-0.29445881
-1.8210784	0.1080945	-1.28846231	0	1.17938506	-0.24106552	-1.59128698	0.36462933	0.32256997	-1.50143244	2.12380534	-0.29445881
-1.8210784	0.1080945	-0.06135535	0	1.17938506	-0.24106552	0.08375195	1.58006041	1.75621426	0.31848567	0.3900867	-0.29445881
-1.63897056	0.1080945	1.28846231	0	1.17938506	-0.24106552	-1.59128698	0.36462933	0.32256997	-1.50143244	-1.34363195	-0.29445881
-1.63897056	0.1080945	1.28846231	0	1.17938506	-0.24106552	-1.59128698	0.36462933	0.32256997	-1.50143244	-1.34363195	-0.29445881
-3.09583328	-2.7742548	1.28846231	0	-0.56785207	-1.84818895	0.08375195	-0.85080176	-1.1107433	0.31848567	-1.34363195	-0.29445881
-1.8210784	0.1080945	-1.28846231	-1.22474487	-0.56785207	1.36603792	-1.59128698	0.36462933	0.32256997	0.31848567	-1.34363195	-0.29445881
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-1.8210784	0.1080945	-1.28846231	-1.22474487	-0.56785207	1.36603792	-1.59128698	0.36462933	0.32256997	0.31848567	-1.34363195	-0.29445881
-1.8210784	0.1080945	-1.28846231	-1.22474487	-0.56785207	1.36603792	-1.59128698	0.36462933	0.32256997	0.31848567	-1.34363195	-0.29445881
-1.8210784	0.1080945	-1.28846231	-1.22474487	-0.56785207	1.36603792	-1.59128698	0.36462933	0.32256997	0.31848567	-1.34363195	-0.29445881
-1.8210784	0.1080945	-1.28846231	-1.22474487	-0.56785207	1.36603792	-1.59128698	0.36462933	0.32256997	0.31848567	-1.34363195	-0.29445881
-1.8210784	0.1080945	-1.28846231	-1.22474487	-0.56785207	1.36603792	-1.59128698	0.36462933	0.32256997	0.31848567	-1.34363195	-0.29445881
-1.8210784	0.1080945	-1.28846231	-1.22474487	-0.56785207	1.36603792	-1.59128698	0.36462933	0.32256997	0.31848567	-1.34363195	-0.29445881
-1.8210784	0.1080945	-1.28846231	-1.22474487	-0.56785207	1.36603792	-1.59128698	0.36462933	0.32256997	0.31848567	-1.34363195	-0.29445881
-1.8210784	0.1080945	-1.28846231	-1.22474487	-0.56785207	1.36603792	-1.59128698	0.36462933	0.32256997	0.31848567	-1.34363195	-0.29445881
-1.8210784	0.1080945	-1.28846231	-1.22474487	-0.56785207	1.36603792	-1.59128698	0.36462933	0.32256997	0.31848567	-1.34363195	-0.29445881
-1.8210784	0.1080945	-1.28846231	-1.22474487	-0.56785207	1.366037						

Table 6: Results and Proposal of Improvement

Dimension Improvement	Problem	Proposed improvement
Good presentation	Variation in presentation	To establish uniform for working days.
Easily locatable	It is not well located Parking missing	Carry out publicity campaign and delivery of information leaflets Expanding car park
Good relationship	Inadequate service	Training and standardize staff for the service rendered equal.
Interests of students	Lack of interest in students	Train teachers and administrative staff in order to ensure a quick response to the student's needs.
Clear and understandable information	The information is not transmitted adequately at all levels	Due to the structure of the university it is necessary to create a real time electronic information system for all staff and students.
Security service	Adequate	No improvement is necessary.
Telephone contact	Adequate	No improvement is necessary.
Instruments and procedures	Adequate	No improvement is necessary.

According to the analysis shown, it is observed that the most significant factors as the results are the lack of standardized work, by the administrative and teaching staff, and the absence of effective communication, which can occur through an electronic communication system, to ensure that the administrative staff, teachers and students are informed about developments within the university and most importantly, students are listened and their needs are met.

8. Conclusions

According to the analysis, it was shown that the significant factors based on the results obtained, are, the lack of standardized work by the administrative and teaching staff, besides the lack of effective communication at all levels, which can be treated with the implementation of an electronic communication system, which ensures that the administrative staff, teachers and students are aware

of the events within the university and students are heard and that their needs are met. Furthermore you can verify the proper functioning of the model SERVPERF in measuring customer expectations, based on qualitative data and making a transformation to treat them as quantitative data.

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