

Measuring hotel's perceived service quality using Fuzzy approach

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Abstract

The paper measures and explores the relationship and the impact of perceived service quality on consumer satisfaction in hotel services. The majority of service quality metrics are expressed in terms of linguistic expressions using a Likert scale. For the present study a 5- 5point Likert scale has been used. Therefore, the uncertainty inherent in subjective assessments is ignored when evaluating client perceptions and expectations regarding service quality using an approach wherein the fuzzy technique was not involved. The study uses surveys to propose a fuzzy SERVQUAL method known as fuzzyqual for dynamically assessing the service quality of a hotel in India. Questionnaires were used to gather data from 191 users of the hotel services. The findings indicate that there are gaps in the expectations and perceptions of services. The study also measures the relative importance of each service attribute by integrating partial correlation with log values analysis.

Keywords: Fuzzy logic, service quality, hotel services, customer perception.

Background

The significance of excellence in service for corporate success has been acknowledged in past studies because of its immediate effect on client happiness and client retention and loyalty Arif et al. 2013). The quality of service provided by a service provider has a positive association with client loyalty, according to a study on Chinese hotels (Kuo et al., 2013) and Banks. (Ahmed., 2021) Some studies have suggested that customers are likely to remain loyal if the perceived quality of the services matches their expectations. Cheng and Rashid 2014). The term "quality" essentially pertains to attributes that define a product or service and is seen to be suggestive of a high degree of consumer satisfaction. It is challenging to describe and quantify service quality. (Udo G.J et al 2011), which is an elusive and abstract concept. Service quality is a combination of various characteristics and comprises both objective and subjective qualities (Lee et al., 2012). Intangible qualities like happiness, safety, and comfort are hard to quantify. It is therefore challenging to measure the quality of services because of their intangibility, inseparability, heterogeneity, and perishability.

Accordingly, the ability to satisfy client demands is one definition of service quality that may be found in the literature. The customer performs the assessment of perceived quality during or after the service delivery process. (Das G 2014). The assessment compares perceived quality to what the customer expected. Conventional measures make use of various scales to assess the quality of the service. Each customer has certain level of expectations, needs and likes. The assessment of service quality is thus crucial. (Ounsri and Thawesaengskulthai 2019). The measurement scale has several limitations. One criticism of the measurement-based scale is that the result may not always accurately reflect the user's preferences.

Because people are not always able to quantify their preferences precisely, their preference assessments are frequently imprecise. As such, it is advised to use language to express the intended value and the relative relevance of the criteria (e.g. extremely low, low, fair, high, etc.). Due to this imprecision in the service measurement process, Fuzzy set theory ‘ a suitable approach to handle ambiguity is used.

2. Literature review

The framework of the study is composed of two stages. The first stage deals with identifying the factors that determine the quality of services. covered in the literature study. In the next step, the SERVQUAL Scale is discussed in brief.

2.1 Service quality indicators

Different quality criteria may apply to different service types. (Charles V, Kumar M. 2014). A broad collection of criteria that applies to all kinds of services has been attempted to be defined by several writers. Several writers have described it as a set of norms for service excellence.

- Tangible include buildings, the staff's look, and the equipment's state are all considered tangibles.
- Customization is the readiness and capacity to modify the service in order to satisfy the preferences of the client.
- Access—the simplicity of being contacted and approachable.
- Communication: informing clients in a language they can comprehend and paying attention to their needs.
- Knowing/understanding the client- involves making an effort to comprehend their wants and particular requirements, giving them specialized attention,).
- Safety – being free from threat and uncertainty. Financial stability, secrecy, and physical safety are all involved.
- Courtesy refers to treating consumers with grace, decency and kindness.

Competency refers to an employee's ability to do a job well by having the information, abilities, and knowledge required.

Credibility -The degree to which a service is accepted and trusted is known as its credibility.

- Reliability: refers to delivering the promised service precisely, reliably, and on schedule.
- Responsiveness: the capacity to handle complaints skillfully and provide timely service.
- Cost: The money spent on the service. Pricing is a competitive factor that significantly affects an organization's strategic positioning, which may view price and quality as separate attributes.

Determinants that are important to the service organization may exist for each kind of service. Measuring service quality is difficult as numerous intangible factors influence customer satisfaction. This means that each quality determinant's significance and utility value vary according to the type of service.

2.2. SERVQUAL Measurement System

The service quality measurement scale known as SERVQUAL was first synthesised by Parasuraman et. al in 1985. The SERVQUAL scale has been the most widely used indicator of service quality. (Wang et al 2012). SERVQUAL was developed to monitor service quality across sectors and evaluate the significance of important customer expectations and perceptions (Carrilat et al 2007). The SERVQUAL tool utilizes five primary characteristics to assess and measure the quality of services: tangibles, assurance, responsiveness, empathy, and reliability.

"The responses to the items are measured in a five or seven-point Likert-type style, with the anchors 'strongly agree' and 'strongly disagree. Thereafter, by using a brief item scale with 22 pairs of items, the gaps have been identified. The gaps between customers' perception and expectation (P-I) of service are used to quantify the quality of the service. Creating a questionnaire survey is the first step in assessing the quality of the services. SERVQUAL's recommended service quality standards were used in the preparation of the questions. We used the following quality dimensions for evaluating the service of business hotels:

- Tangibles: the building, tools, and staff look.
- Reliability: The ability to deliver the service consistently..
- Assurance: personnel's understanding as well as their capacity to instil confidence and trust.
- Empathy: the degree to which the company gives each client personalized attention.
- Accessibility: includes approachability and ease of interaction as components of access.

For this study gap model is used to measure the service quality. The fuzzy SERVQUAL scale is used as an assessment instrument for understanding the strengths and weaknesses of the companies. Additionally, when used consistently, it may be utilized for a number of purposes, such as identifying trends in the quality of the services provided.

Methodology

The Fuzzy set theory was introduced by Zadeh. Belonging to a fuzzy set is not a question of acceptance or rejection, but rather of degree. Fuzzy logic assures high computational efficiency by translating language strategies into control actions. (Sumathi et al 2007). In this paper, FuzzyQual will be used to measure the service quality in hotel industry. The new fuzzyqual framework integrates logarithmic observations, fuzzy theory, and partial correlation analysis. In the first step, customer 's perception for each characteristic of hotel services and aggregate customer perception was measured by using a 5 point likert scale. In the second step crisp value was calculated by assigning Triangular fuzzy number (Triang FN) to the perception of hotel services. The third step involves calculating relative importance of each attribute by using logarithmic values and partial correlation.

Modelling of values

In surveys, linguistic terms are mostly used to measure service equity. However, even when the same term is used, people's perceptions vary greatly. The five lingual scales and their corresponding values are shown in table 1

The phases used in this approach are given below.

- 1 In the first stage, the customers provided the range of each linguistic term on the basis of their assessment.
2. In the next stage client perception for overall service quality and attribute performance are measured.
3. In the third stage customer assessment of attribute performance and total customer perception are assigned an average triangular fuzzy number .
4. After assigning triangular fuzzy number the reverse fuzzification is done using the following formula.

$$\text{Reverse fuzzification } z_{\text{value}} = \frac{z_1 + 2z_2 + z_3}{4} \dots\dots\dots 3$$

where as z_1, z_2, z_3 are three values of F N.

5. In the next step the relative importance of each attribute was calculated by transforming attribute perception into log value. Exponential values (log (Averg Perf ir) and total customer Perception (TCP), the crisp number obtained after defuzzification of TCP are included in the new correlation model . Each variable has total n data.

partial correlation of each logarithmic (Avg Perf ir) with OCP was calculated .

correlation values obtained between TCP and log (Avg Perf ir) is the indirectly calculated importance of rth feature.

Questionnaire design: Questionnaires were used to gather information for assessing the quality of the hotel's services. The items were designed using previous literature. In the questionnaire, there are 22 items which are based on 5 dimensions of service quality. The survey is divided into four sections. The first section primarily focused on the scope of each linguistic phrase. The subsequent parts focused on service attribute expectations and perception. The third part is based on total customer perception. A sample size of 191-responses was used for analysis. The reliability was measured using Cronbach alpha and was found to be above .79. The linguistic variable used by authors and modelled by Triangular fuzzy no (Trian FN) are given in the table I

Table 1

Scale	Service Expectation	Fuzzy Belongingness	ServicePerception	Fuzzy Belongingness
1	Extremely low	0,1,1	Extremely low	0,1,1
2	Low	1, 2, 2	Low	1, 2, 2
3	Fair	2,3,3	Fair	2,3,3
4	High	3,4,4	High	3,4,4
5	Extremely High	4,4,5	Extremely High	4,4,5

Table 2 shows the hotel's service performance

	Criteria	Hotel perception in TFN			Hotels perception in crisp	Hotels expectation in lingual numbers	Hotel's perception in lingual numbers	Gap score Perep-Expec
	Tangibles							
1	Attractive and Pleasing hotel rooms	3.78	3.5	3.74	3.63	4.74	3.77	-0.97
2	Sufficient capacity of the hotel rooms	3.76	3.48	3.51	3.56	4.54	4.27	-0.27
3	Modern equipment(electronic lockers, furniture, elevator, communication devices, etc.)	3.93	3.61	3.25	3.60	4.23	3.75	-0.48
4	The pleasing and aesthetic atmosphere .(comfortable and cosy beds and clean lounges etc	3.51	3.31	3.89	3.51	4.5	4.62	0.12
5	Modern equipments without causing breakdowns	3.71	3.45	3.93	3.64	4.5	4.79	0.29
6	Sufficient material of services (soap, shampoo, towel, etc.).	3.94	3.53	3.71	3.68	4.22	4.21	-0.01
7	Food and beverages are adequate and sufficient.	3.72	3.3	3.88	3.55	4.1	4.01	-0.09
8	Attractive employees (a uniforms and personal hygiene).	4.18	3.74	3.87	3.88	4.45	4.17	-0.28
	Reliability							
9	Services were accurate and delivered as promised.	3.91	3.43	3.83	3.65	4.67	3.99	-0.68

10	The hotel fulfills its commitment to offer the services on schedule	3.71	3.43	3.87	3.61	4.44	3.89	-0.55
11	It maintains correct records (bookings, visitor logs, invoices, purchase orders, etc.).	3.4	3.3	3.78	3.45	4.22	4.15	-0.07
12	Of the staff members as needed.	3.6	3.35	3.86	3.54	4.23	3.94	-0.29
	Assurance							
13	The hotel addresses complaints from visitors	3.78	3.49	3.83	3.65	4.74	4.76	0.02
14	The hotel offers customized services based on the needs of its customers.	3.5	3.51	3.87	3.60	4.54	4.24	-0.3
15	Consistent services	3.68	3.25	3.77	3.49	4.23	3.97	-0.26
16	Updated and adequate knowledge of employees about the tasks they perform	3.79	3.5	3.91	3.68	4.5	4.61	0.11
	Empathy							
17	Employees provide each visitor with individualized attention	3.93	3.45	3.83	3.67	4.5	3.97	-0.53
18	Employees are aware of unique needs of customers.	3.41	3.43	3.87	3.54	4.15	3.93	-0.22
19	The hotel is convenient for guests with disabilities	3.31	3.3	3.78	3.42	4.5	4.17	-0.33
	Access							
20	The hotel has convenient hours	3.82	4.61	3.86	4.23	4.39	4.57	0.18
21	Easy access to the hotel in terms of parking, loading and unloading	3.72	4.32	3.83	4.05	4.39	3.99	-0.4
22	Getting information about hotel's is easy	3.24	4.47	3.44	3.81	4.44	3.86	-0.58
	Average Total customer perception (Triang FN)	3.69	3.57	3.77				
	Crisp number (average)				3.65			

Table 3

	Criteria	Relative importance
	Tangibles	
1	Attractive and Pleasing hotel rooms	0.178
2	Sufficient capacity of the hotel rooms	0.111
3	Modern equipment (air conditioning, furniture, elevator, communication devices, etc.).	0.194
4	The pleasing atmosphere and comfortable and clean beds, chairs, lounges, etc	0.175
5	Works properly of equipment without causing breakdowns	0.164
6	Sufficient material of services (soap, shampoo, towel, etc.).	0.222
7	. Food and beverages adequate and sufficient.	0.232
8	Attractive employees (a uniforms and personal hygiene).	0.249
	Reliability	
9	Services were accurate and delivered as promised.	0.179
10	The hotel fulfills its commitment to offer the services on schedule	0.185
11	It maintains correct records (bookings, visitor logs, invoices, purchase orders, etc.).	0.176
12	Of the staff members as needed.	0.156
	Assurance	0.15
13	The hotel addresses complaints from visitors	0.15
14	The hotel offers customized services based on the needs of its customers.	0.133
15	Consistent services	0.101
16	. knowledge of employees about the tasks they perform	0.171
	Empathy	
17	Employees provide each visitor with individualized attention	0.166
18	Employees are aware of unique needs of customers.	0.185
19	The hotel is convenient for guests with disabilities	0.132
	Access	0.176
20	The hotel has convenient hours	0.145
21	Easy access to the hotel in terms of parking, loading and unloading	0.1

22	Getting information about hotel's is easy	0.185
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First the hotel's perception in both Triang FNs and crisp number is presented .(See table 2)
The Expectation and perception linguistic values of each attribute are also shown in Table

2. The aggregate mean total customer perception and mean crisp values are shown

Table 3 shows the relative importance of each attribute of bank calculated by using logarithmic expressions and partial correlation

Conclusion

The result of the score of perception and expectations revealed wide gap between the two. The findings shows that the quality of services rendered in several areas where expectations exceeds perceptions. Based on these results, the organization may take appropriate action in areas where there is a discrepancy between the expectations and perceptions of the quality of the services rendered. The management should focus on these attributes to improve its service mage. The study demonstrates that service providers must monitor how well their offerings are satisfying client demands and expectations in order to gain a competitive edge.

Businesses must first assess how their delivery of high-quality services affects customers' reactions, including how they intend to indicate behaviors that might be advantageous or disadvantageous to the business. The relative importance calculated by integrating logarithmic and partial correlation analysis revealed that in order to increase service quality and customer happiness, bank managers can identify service qualities of critical relevance and, rather than concentrating on all attributes. They can create an action plan for important attributes using fuzzy. The fuzzy SERVQUAL method and partial correlation is shown to be sufficient for evaluating the quality of services. It is recommended that multicriteria approaches linked to fuzzy logic be used in future studies, and that indicators be proposed for evaluating service quality. The hotel's services ranked lowest in terms of consistency.

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