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Prioritizing Service Organizations Based on Classified Service Quality Dimensions by MADM and Importance-Performance Analysis

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Abstract. Current study aims to prioritize four-star hotels through a two-step procedure: firstly, classifying service quality dimensions (SQDs) based on Importance-Performance Analysis and secondly prioritizing hotels based on classified SQDs analysing the results. To reach that aim, the customers of three 4-star hotels were considered and asked to state the quality of the service they expected to receive prior to its delivery as well as their feelings toward it after they received the service. Then, Importance-Performance Analysis was used to classify SQDs.

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Finally, we exploited TOPSIS and Shannon Entropy to prioritize Hotels. The method taken in this paper, which first categorizes SQDs, is rather noble. Findings revealed that among the 12 dimensions of service quality, Competence, Tangibles and Price are the most crucial factors, and hence should receive more attention in hospitality industry. The results of this research may provide insightful hints to the hotel managers about those aspects of service that form their customers' perception of service quality.
The findings can also help the practitioners to assign resources appropriately and offer a more competitive service to the customers through paying attention to those factors of service which are of critical importance in this industry.

Keywords: Service quality; prioritization; hotel industry; importance-performance analysis; TOPSIS.

1. Introduction

Service quality as an important factor that plays a critical role in the success of any service organization. Since customers cooperate in delivery services, they interact closely with various aspects of organizations. Therefore, they have the opportunity to evaluate the quality of services provided by organizations [1]. Customers usually assess service quality by comparing their perceptions and expectations toward the delivered services [2]. Service quality can influence adding value to the overall service experience [3].

During the last three decades, the tourism industry has become one of the most important players of economies worldwide. As the role service industries in modern economies have been more critical, new challenges made in service marketing have received more attention [4]. Competitiveness as a new challenge in each industry is derived from the performance of its enterprises [5]. Service industries must enhance quality of services that exceed customers' expectations in order to be successful in competitive market [6]. Competitive condition in service industries has forced companies to seek competitive advantages, efficiency and profitable ways in order to get ahead of other firms.

Performance evaluation, as a managerial issue, is not only limited to some concepts such as productivity, efficiency, etc., and can be anal-

ysed from different points of view [7]. Mahadeo and Durbarry [8] stated that companies should deliver appropriate service quality in competitive condition. More recently, a number of researches have been done to find out the relationships between service quality and organisations' performance. It has been proved that high quality of service plays a vital role in the success of organisations [9]. Organisations have realized that delivering appropriate services can improve financial performance and customer satisfaction [10]. Chen [11] stated that the performance evaluation factors in hospitality industry are inherently multidimensional and can hardly be measured. Czepiel [12] stated that business success depends on the performance of a service provider which is derived from its interaction with customers. Service quality has been recognized as an overall evaluation of service by customers. This concept is an indispensable criterion in service evaluation by customers [13].

Since the concept of service quality is inherently intangible, measuring service quality has been a challenging issue [14]. Service quality in service industries can be described as meeting customers' needs and requirements and how well customers' expectations are fulfilled [9].

A number of scholars and researchers have applied gap concept to identify critical performance attributes which have the most influence on customer satisfaction. Deng and Pei [15] stated that due to the existence of a non-linear relationship between attribute performance and overall satisfaction, there is a casual relationship between attribute importance and attribute performance. Therefore, customer's self-stated importance may not be the actual importance of service attribute.

This study evaluates hotels based on SQ criteria. To do so, the customers' perceptions and expectations in three 4-star hotels are measured. Then IPA is used to categorize service aspects based on their importance. Finally, exploiting Entropy and TOPSIS each dimension of SQ, each dimension is prioritized and the hotels are ranked.

Service quality is an applicable concept in private sector, because poor quality of services can negatively influence the reputation of an organisation. The first step in service quality evaluation is to explain its definition in order to measure and analyse this concept. Consequently, it can help service organisations to determine the desired level of quality

and its related problems [16]. Service quality is related to different aspects of organisations. Schlesinger and Heskett [17] and Heskett et al. [18] stated that there are significant relationship between service quality, the value of services, customer satisfaction, customer loyalty and financial outcomes of an organisation. Thus, improving the level of service quality can influence the level of customer satisfaction, customer loyalty and performance of organisations [19].

Service quality has been defined by many researchers and practitioners ([20, 21, 22, 23, and 24]). The common part of all of these studies is the definition of service quality which is based on the customers' expectations and perceptions. Lehtinen and Lehtinen [25] introduced physical and interactive quality while Greenrooms [26] identified three types of dimensions including technical, functional and firm's image.

Zeithaml [27] stated that service quality concept is interrelated with consumer's judgement about a product's excellence. However, there is no consensus about the definition of product quality and its dimensions. Parasuraman et al. [28] proposed ten dimensions for service quality. These dimensions include tangibles, reliability, responsiveness, competence, courtesy, creditability, security, access, and communication and understanding customer [29].

Parasuraman et al. [22] proposed SERVQUAL approach in which five dimensions of reliability, responsiveness, tangibles, assurance and empathy are addressed [30]. Bruck et al. [31] introduced six dimensions of ease of use, functionality, performance, durability, serviceability and prestige for durable goods. Shahin [32] proposed a comprehensive list of SQDs for British Airways and some international and domestic hotels.

In his study, SQDs were classified into 12 major categories in the first level and 30 items in the second level (Table 1). Comparing the Shahin's proposed set of SQDs with other studies, it seems the 12 categories are relatively more comprehensive and therefore, the authors have decided to use it for this study.

Table 1. Service quality dimensions, [32]

First level	Second level
(1) Reliability	(1) Performance
	(2) Accuracy and Dependability
	(3) Consistency
	(4) Completeness
(2) Responsiveness	(1) Willingness to help customer
	(2) Readiness, Promptness (Timeliness and speed)
	(3) Comfort
(3) Security and confidentiality	(1) Physical security
	(2) Financial security
	(3) Safety
(4) Access and approachability	(1) Ease of contact
	(2) Timely access
(5) Communication	(1) Word-of-mouth communication
	(2) Giving information
(6) Understanding the customer	(1) Comprehension
	(2) Individual attention
(7) Credibility	(1) Trustworthiness and Believability
	(2) Honesty
	(3) Reputation of service
(8) Tangibles	(1) Appearance
	(2) Tools or equipment used to provide the service
	(3) Availability of physical facilities
(9) Courtesy	(1) Politeness, respect and consideration
	(2) Empathy
(10) Price	(1) Discountable for money
	(2) Valuable for money
(11) Competence	(1) Skills,
	(2) knowledge and professionalism of personnel
(12) Flexibility	(1) Specification and volume flexibility
	(2) Service delivery speed

2. Importance-Performance Analysis

A useful technique to classify various factors of a study into high/low importance category is Importance-Performance Analysis (IPA) [33]. Martilla and James [34] introduced this analysis to identify customer requirements. IPA can provide insightful information on important dimensions as well as less important ones [35]. The prime advantage of this technique is the way it presents data, suggests and implies practical, strategic suggestions [36]. These advantages have extended the application of IPA to a wide range of purposes: it has been exploited as a means for analysing customer satisfaction [37] tourism management and marketing performance [38], industry [39], banking [40], food industry [41], restaurants [42], and hotel management [43].

IPA looks like a two-dimensional coordinating system, with its vertical axis usually representing the customer's satisfaction of a specific dimension of the service he/she has received, and its horizontal axis generally reporting the importance of that aspect of service to him/her [35]. This two-dimensional coordinating system along with its axes is called IPA grid [44]. IPA grid is further divided into four quadrants, mostly with arithmetic means of the sample values represented by the horizontal and vertical axes [33]. The first quadrant-possible overkill-holds the aspects the service provider has performed very well, but maybe too well, because the customer does not care a lot about them. The second quadrant-keep up the good work-comprises the attributes that are crucial for the customers, and the service provider has succeeded to gain their satisfaction in those attributes, and it is important to focus and keep working on them. The third quadrant - concentrate here-highlights the aspects that are crucial for the customer, but the service has failed to comply with his/her expectations. Finally, the fourth quadrant-low priority-bolds the attributes of the service that neither satisfied the customer, nor they are important to him/her, which means the management need not try to improve those aspect even though they are not performed well.

Using IPA requires a four-step procedure: first, the key factors of the problem should be recognized. Then, the importance of each factor and

also the performance in that factor should be measured. In the third step, the data should be plotted on the IPA grid by pairing the mean scores for each attribute measured in step 2. Lastly, the quadrants of IPA grid should be assigned through what was explained above [45]. Based on the IPA methodology, the attributes that fall in the first quadrant are the ones that are receiving too much attention, and hence are wasting the budget; whereas the ones in the second quadrant are managed efficiently, and the policy should not change for them. The attributes in the third quadrant need urgent attention, because they are probable sources of customer dissatisfaction; and the attributes in the fourth quadrant do not need urgent attention, for they are not very important in the customer's point of view [46].

A simple yet powerful method used to assign weights to criteria-based on the dispersion and variance-is Shannon Entropy [47].
The process is as follows [48]:

1. Normalizing the criteria

$$P_{ij} = \frac{X_{ij}}{\sum_j X_{ij}}$$

2. Calculating Ej indicator for each criterion using the formula below

$$E_j = -k \sum P_{ij} Ln(P_{ij}) \qquad K = \frac{1}{Lnm}$$

m=number of alternatives

3. Calculating D_j indicator

$$D_j = 1 - E_j$$

4. Calculating each indicator's final weight

$$W_j = \frac{D_j}{\sum D_j}$$

Technique for order preference by similarity to an ideal solution (TOPSIS) as a multiple criteria method aims to address solutions from a finite

set of alternatives [49]. The underlying logic of TOPSIS is to define both positive and negative ideal solutions [50]. The basic principle is that the chosen alternative must have the shortest distance from the ideal solution and the farthest distance from the negative-ideal solution. TOPSIS is a practical and helpful tool for prioritising and selecting the most appropriate alternative through distance measures [51]. The TOPSIS procedure consists of the following steps [52]:

Step 1: computing the normalized decision matrix:

$$n_{ij} = \frac{x_{ij}}{\sqrt{\sum_{i=1}^{m} x_{ij}^2}}, n_{ij} : \textit{the normalized component of the decision matrix}$$

Step 2: Calculating the weighted normalized decision matrix:

$$V = ND \times W_{n\times n}$$

V: the weighted normalized component of decision matrix

Step 3: Determining the ideal and negative ideal solution:

$$V^+ = \{V_i^+, V_n^+\} = \{(maxV_{ij}/i \in I'), (minV_{ij}/i \in I')\}$$
$$V^- = \{V_i^-, ..., V_n^-\} = \{(minV_{ij}/i \in I'), (maxV_{ij}/i \in I')\}$$

Where I' is associated with the advantage criteria and I'' is associated with the cost criteria.

Step 4: Computing the separation measures, utilizing the n-dimensional Euclidean distance. The distance between each element of the alternative from that of ideal solution is calculated through the following formulas:

$$S_i^+ = \sqrt{\sum_{j=1}^{n}(V_{ij} - V_J^+)^2} \qquad i = 1, 2, ..., m$$

$$S_i^- = \sqrt{\sum_{j=1}^{n}(V_{ij} - V_J^-)^2} \qquad i = 1, 2, ..., m$$

in which V_j^+ is the positive ideal option, and V_j^- is the negative deal option.

Step 5: Calculating the relative closeness to the ideal solution. The relative closeness of the alternative a_j with respect to cl_i^+ is defined as:

$$cl_i^+ = \frac{S_i^-}{S_i^- + S_i^+}$$

3. Research Methodology

Step 1: Measuring customers' perceptions of Four-Star hotels
In order to measure customers' perceptions of the service, a five-point Likert scale was designated based on the 30 items in the second level of proposed list for SQDs (Table2). In this questionnaire, participants were asked how they evaluated the performance of the hotels in the delivered services. In our Likert scale, 1 notified strongly disagree and 5 notified strongly agree

Step 2: Measuring customers' Expectations of Four-Star hotels
Another questionnaire was also designed to measure the customers' expectations of SQDs as brought in Table 2. In this questionnaire, the customers were demanded to state how important every single SQD in their points of view is. The second questionnaire resembled the first one in that it also used a 5-point Likert scale in which 1 notified strongly disagree and 5 notified strongly agree.

Step 3: Measuring service quality gaps
Service quality gap was calculated from the distance between customers' expectations and perceptions. This step was completely described in section three.

Step 4: Importance-Performance Analysis of service quality dimensions
The last stage comprises two steps; firstly, the mean value of expectation and perception should be calculated by simply adding up the scores of the two and dividing the sum into the number of subjects in each group. Secondly, the dimensions should be plotted on the IPA grid. The

coordination is calculated by simply adding up the perception values for a certain dimension and dividing the number by the number of participants, then doing the same calculation for the expectation values of the sub-dimension, and finally pairing the two values to pinpoint the location of that dimension on the grid.

Step 5: Ranking Hotels by Entropy and TOPSIS techniques

In this step, we utilize gap values as the entry of Entropy and TOPSIS techniques. Then, we classify the SQDs into three groups of very important (the SQDs in quadrant 3), important (the SQDs in quadrant 2) and not important (the SQDs in quadrants 1 and 4). Using Entropy we calculate the weights of SQDs in each quadrant. Finally, we rank the hotels based on the gap values and the calculated weights by TOPSIS method.

Hospitality industry highly relies on the customers' perception from delivered services. Therefore, service quality, as a critical issue, can play a vital role in this industry (Lee, 2008). In this study, the questionnaires were designed based on the 30 sub-dimensions of service quality (second column in Table 1) and were distributed in three four-star hotels in Isfahan. There are just four four-star hotels in Isfahan city and only three of them accepted to cooperate in this study. In these questionnaires, participants were asked to reflect on their expectations and perceptions for each sub-dimension of SQ. The sample in each hotel includes 66 Iranian customers.

Aseman Hotel, which is located in the centre of Isfahan City, has 13 floors as well as two quest elevators on each floor and accommodates customers in 90 rooms. Just about half of the respondents are between 25 to 35 years old (53 percent), 68.2 percent are married and male, which means only about a third of the customers are single and female. More than half of the respondents have a bachelor degree (53 percent) and earn more than 5 hundred dollars per month (75.8 percent).

Ali Qapu Hotel is located in the most ancient neighbourhood of Isfahan called Chaharbagh-Abbasi. This hotel is close to some historical places of Isfahan such as Sio-se-Pol Bridge, Naghsh-e-Jahan Square and Chehel-Sotoun Palace. The majority of participants in this hotel are

between 25 to 35 and 45 to 55 years old (51.5 percent), 69.2 percent are married and 53 percent are female, and 72.7 percent of customers have higher education degrees.

Piruzi hotel is located in the centre of the city, in Chaharbagh Street. In this hotel, most participants are young (54.5 percent less than 35 years old). In this group, 10.6 percent are between 15 and 25 years old and 43.9% are in the category of 25 and 35 years old. More than half of the respondents (= 56.1%) are male and the rest are female. A great portion of customers (80.3%) are married and the rest are single. Most customers (43.9 percent) have four years of academic study and make more than 500 dollars per month.

4. Findings

The obtained data passed through the four steps mentioned in section 5. The results are as follows:

Step 1: Measuring customers' perceptions of Four-Star hotels
As shown in Table 2, customers' highest and second highest perception in Aseman, Ali Qapu and Piruzi Hotels belong to "reliability" and "courtesy", respectively. On the other hand, the customers' lowest perceptions values in Aseman and Piruzi goes to "price". However, the lowest performance value in Ali Qapu Hotel belongs to "tangibles". A note worthwhile to mention is that the average value of customers' perceptions in Ali Qapu Hotel is higher than four.

Step 2: Measuring customers' expectations of Four-Star hotels
According to Table 3, the customers' highest expectations in Aseman, Ali Qapu and Piruzi Hotels refer to "flexibility", "reliability" and "price", respectively. The lowest perception value in Aseman and Piruzi goes to understanding the customer. However, the lowest performance value of Ali Qapu Hotel is related to "communication". It is important to note that customers of Ali Qapu Hotel, who have greater perceptions, have greater expectations as well.

Table 2. Customers' perceptions of hotels from service quality dimensions

No	Service Quality Dimensions	Aseman Hotel	Ali Qapu Hotel	Piruzi Hotel
1	Access and approachability	3.871	4.174	3.886
2	Communication	3.864	4.250	3.462
3	Competence	3.765`	4.417	3.568
4	Courtesy	3.992	4.424	4.091
5	Credibility	3.950	4.462	3.670
6	Flexibility	4.008	4.500	3.777
7	Price	3.242	4.296	2.712
8	Reliability	4.106	4.503	3.888
9	Responsiveness	3.939	4.379	3.589
10	Security and confidentiality	3.970	4.285	3.824
11	Tangibles	3.955	4.079	3.530
12	Understanding the customer	3.630	4.432	3.477

Table 3. Customers' expectation of hotels from service quality dimensions

No	Service Quality Dimensions	Aseman Hotel	Ali Qapu Hotel	Piruzi Hotel
1	Access and approachability	4.333	4.379	4.273
2	Communication	4.220	4.364	4.212
3	Competence	4.394	4.500	4.333
4	Courtesy	4.394	4.485	4.508
5	Credibility	4.308	4.503	4.508
6	Flexibility	4.500	4.508	4.462
7	Price	4.121	4.523	4.553
8	Reliability	4.576	4.627	4.546
9	Responsiveness	4.374	4.451	4.426
10	Security and confidentiality	4.354	4.424	4.436
11	Tangibles	4.409	4.449	4.415
12	Understanding the customer	4.091	4.447	4.182

Step 3: Measuring service quality gaps
Table 4 denotes the gap values of service quality dimensions. As it is represented in the mean columns, all the gap values are positive which notifies that service performance was lower than the customers' expectations. The highest positive gap in Aseman and Piruzi Hotels refers to "price" dimension. The lowest positive gap values in these two hotels go to the "communication" and "access and approachability", respectively. Yet, the highest and lowest positive values in Ali Qapu Hotel refer to "tangibles" and "flexibility", respectively. As it is shown in Table 6, high standard deviation is observed in some cases. For instance, the value of standard deviation of "price" in Piruzi Hotel is equal to 1.120, which is relatively high. It should be noted that the highest value of gap is four. Therefore, the values of these dimensions need to be considered more cautiously.

Step 4: Importance-Performance Analysis of service quality dimensions
As mentioned in the methodology section, this last stage comprised two steps: firstly, the mean value of expectation and perception was calculated. The mean values of expectation and perception were 4.41 and 3.94 for the customers, respectively. The results are drawn in the Figure 1.

Table 4. Service quality gaps of four-star hotels

No	Service Quality Dimensions	Aseman Hotel	Ali Qapu Hotel	Piruzi Hotel
1	Access and approachability	0.462	0.205	0.386
2	Communication	0.356	0.114	0.750
3	Competence	0.629	0.083	0.765
4	Courtesy	0.386	0.061	0.417
5	Credibility	0.359	0.041	0.838
6	Flexibility	0.492	0.008	0.692
7	Price	0.879	0.227	1.841
8	Reliability	0.470	0.124	0.658
9	Responsiveness	0.434	0.212	0.836
10	Security and confidentiality	0.384	0.239	0.612
11	Tangibles	0.455	0.370	0.885
12	Understanding the customer	0.462	0.015	0.705

After calculating the mean values, the dimensions were plotted on the grid. Figures 1 illustrates the results graphically. As it is shown, one dimension named "access and approachability" is placed in Q1 (possible overkill). Six dimensions including "reliability", "responsiveness", "creditability", "flexibility", "security & confidentiality", and "courtesy" are placed in the Q2 (keep up the good work). "Tangibles", "competence" and "price" are positioned in Q3 (concentrate here); and "communications", "understanding the customer", are plotted in Q4 (Low priority).

Step 5: Ranking Hotels by Entropy and TOPSIS techniques
According to previous step, the SQDs can be categorized into three groups. The SQDs in the Q3 including "Tangibles", "competence" and "price" are considered as the most important criteria. Six dimensions including "reliability", "responsiveness", "creditability", "flexibility", "security & confidentiality", and "courtesy" are considered as the important criteria since they are in keep up the good work quadrant (Q2) and the SQDs including "access and approachability", "communications" and "understanding the customer", are considered as the less important criteria. In this step, the gap values were fed into the TOPSIS and Entropy and the process of calculating the weights of criteria and ranking the alternatives are performed for three times. According to the Table 5, the highest weight is refers to the price and the lowest weight is related to the tangibles. Also, Ali Qapu and Aseman Hotels are in the first and second rank, respectively. Considering important criteria in Table 6, creditability and flexibility criteria have the highest weight. Similar to previous ranking, Ali Qapu Hotel has the best rank. As it is shown in Table 7, the highest weight refer to the "understanding the customer" criterion and Ali Qapu Hotel has been determined as the best Hotel.

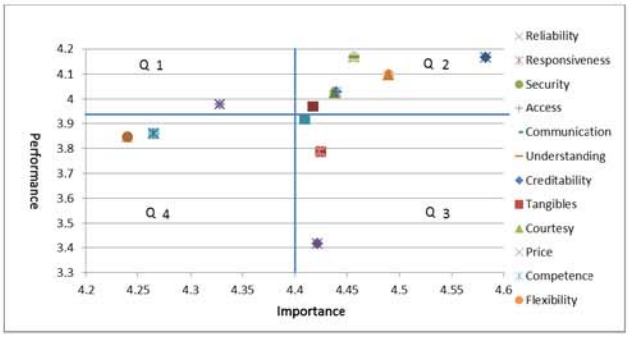

Figure 1. Importance-Performance Analysis of Service Quality Dimensions for Customers in Four-Star Hotels

Table 5. Ranking hotels based on the SQDs in Quadrant 3

Hotel	**Service Quality dimensions**			Cl_i^+
	Competence	Tangibles	Price	
Aseman	0.629	0.455	0.879	0.428
Ali Qapu	0.103	0.371	0.078	1
Piruzi	0.676	1.008	1.709	0
Weight	0.304	0.157	0.539	0

Table 6. Ranking hotels based on the SQDs in Quadrant 2

Hotel	**Service Quality dimensions**						Cl_i^+
	Reliability	Responsiveness	Security	creditability	courtesy	Flexibility	
Aseman	.470	.435	.384	.358	.386	.492	.3321
Ali Qapu	.129	.069	.291	.017	.078	.009	1
Piruzi	.596	.757	.531	.770	.365	.608	.0001
Weight	.104	.193	.021	.294	.116	.270	

5. Conclusions

With increased competition and the challenging environment, the role of service quality in improving customer satisfaction has become more critical. Although customer satisfaction concept is a general issue, improvement of this concept requires a thorough analysis. Specifically, in this study gap analysis, Importance-Performance analysis (IPA), and Entropy and TOPSIS Techniques were undertaken to evaluate SQDs and rank the service providers. The gap analysis seems to provide managers of hotels with a better understanding of their shortcomings in services, and hence improve their customer satisfaction. Besides, the customers' expectations and perceptions may provide suitable opportunities to understand their customers' requirement and their own performance. In this research a comprehensive list of service quality dimensions was used to involve all customers' requirements thoroughly. This list included 12 major factors and 30 sub factors.

Table 7. Ranking hotels based on the SQDs in Quadrants 1 and 4

Hotel	**Service Quality dimensions**			Cl_i^+
	Access	Communication	Understanding the Customer	
Aseman	0.462	0.356	0.462	.2513
Ali Qapu	0.233	0.112	0.017	1
Piruzi	0.345	0.682	0.655	.0004
Weight	0.063	0.338	0.598	

The main aim of this paper was to evaluate service quality dimensions in three four-star hotels and rank the hotels based on the classified SQDs. The results from Importance-Performance Analysis revealed that "competence", "tangibles", and "price" are positioned in the third quadrant and should be concentrated more. The findings of ranking by TOPSIS revealed that based on all three categories of SQDs, Ali Qapu has the best rank. The values of gap analysis reveal the gap of SQDs in

all hotels and as it is clear, all the values are positive. These positive values point that the performances of hotels are lower than customers' expectations.

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