APPLYING DEMATEL APPROACH TO DETERMINE FACTORS AFFECTING HOSPITAL SERVICE QUALITY IN A UNIVERSITY HOSPITAL: A CASE STUDY

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Abstract

There are many studies in the literature that utilized SERVQUAL model for measuring service quality. In this study, first of all, the factors determining service quality were identified from point of views of patients or those of their relatives by using the SERVQUAL model via a field study. The result of this research; reveals nine essential factors; appearance of service personnel, doctors attitude towards patients, sufficient exploratory information on the status of patients, warm and comfortable environment, staffs' experience level, feeling of trust to services, sufficiency of medical equipment, communication skills, advice on rational medicine usage. After identifying the main factors affecting service quality, the importance level of each of the identified factors as well as the causal relationships among them are determined by applying the DEMATEL (Decision Making Trial and Evaluation Laboratory) method, which is one of the multi-criteria decision making methods, to the hospital administrators that are regarded as experts within the field of health. According to the results of the study, patients' feeling a sense of security from the medical services provided to them emerged as the most important factor in determining service quality, whereas dress and tidy appearance of service personnel appears to be the least significant factor.

Keywords: *Hospital Service Quality, SERVQUAL, DEMATEL*

Jel classification: I10, I11, I19

BİR ÜNİVERSİTE HASTANESİNDE HASTANE HİZMET KALİTESİNİ ETKİLEYEN FAKTÖRLERİN BELİRLENMESİNDE DEMATEL YAKLAŞIMI UYGULAMASI: BİR VAKA ÇALIŞMASI

Öz

Literatürde hizmet kalitesinin ölçülmesinde SERVQUAL modelinden yararlanan çok sayıda araştırma bulunmaktadır. Bu çalışmada önce, alan araştırması yoluyla SERVQUAL modeli kullanılarak hasta yada hasta yakını bakış açısından hizmet kalitesini belirleyen faktörler tespit edilmiştir. Bu araştırma sonucuna göre dokuz faktörün önemli olduğu tespit edilmiştir; hizmet sunan personelin kıyafeti temiz ve düzgündür, hekimlerin hastaya karşı tutumu olumludur, hekimler hastaları hakkında detaylı tıbbi kayıt ve rapor hazırlamaktadır, hastanede sıcak ve rahat bir ortam vardır, sağlık personelinin uzmanlık düzeyleri yeterlidir, hastanede sunulan hizmetler, hastalara güven vermektedir, hastane, tıbbi cihazlarda tam donanımlıdır, hastane personelinin hasta ile iletişim becerileri yeterlidir", hekimler akılcı ilaç kullanımı konusunda hastaları bilgilendirmektedir. Hizmet kalitesini etkileyen ana faktörler tespit edildikten sonra uzman kabul edilen hastane yöneticilerine çok amaçlı karar verme yöntemlerinden biri

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olan DEMATEL (Decision Making Trial and Evaluation Laboratory) yöntemi uygulanarak tespit edilen her bir faktörün önem derecesi ve faktörler arasındaki nedensel ilişkiler kurulmuştur. Araştırma sonuçlarına göre hizmet kalitesinin belirlenmesinde en önemli faktör; hastalara verilen hizmetlerin hastada uyandırdığı güven duygusu, en önemsiz faktör ise, hizmet sunan personelin kıyafeti temiz ve düzgündür ifadesi tespit edilmiştir.

Anahtar Kelimeler : *Hastane Hizmet Kalitesi, SERVQUAL, DEMATEL*

Jel sınıflandırması: I10, I11, I19

1. INTRODUCTION

The Healthcare sector, especially hospitals, is the most important element of the service sector. However, the most important distinction that differentiates these organizations from the other components of health sector lies in the fact that services provided by hospitals are directly related to human life and human health. Most of the customers of hospitals' are unwilling to take the hospital services; for that reason, their service quality demands are more critical compared to those of other service provider organizations. As perceived service quality causes the patient to exhibit diverse behaviors like repurchasing the services because of urgency, complaining or abandoning the health service of the associated hospital getting health service from other healthcare organizations, or receiving no service.

From this standpoint, deliveries of best quality health services and successes of these services should be viewed as a quality improvement process. In Turkey, there has been a substantial increase in the number of organizations providing health services. This rise increased competition among hospitals.

As a result of this, hospitals focus more on providing better services as well as high-quality health services so as to maintain the patients' trust in the long term. In other words, the necessity of making an effort to increase loyalty of patients to a health institution through ensuring customer satisfaction is increasing gradually. Consequently, the hospitals put into practice the various approaches like increasing managerial efficiency and reducing medical errors, which improve service quality. Due to the fact that service quality has become an important issue in a hospital, it is essential to develop an appropriate method for measuring healthcare service quality (Chang et al., 2006).

On the other hand, cost is an important factor for hospitals, as it is for every organization. Moreover, quality as a cost cutting component is a key factor in determining return on investment and market share. Even though university hospitals are non-profit organizations, they perform activities similar to those performed by private hospitals, such as covering personnel expenses, purchasing medical equipments and services, and making innovative and technological investments (Babakus and Mangold, 1992).

Two forms of quality related to service-providing organizations are mentioned in the

literature as technical quality and functional quality (Gronroos, 1984). Technical quality in health institutions and organizations is defined on the basis of technical accuracy of the diagnoses and processes. "Various methods for measuring technical quality have been proposed and they are currently in use" (Joint Commission for Accreditation of Health Care Organizations, 1987). Since this information is not open to the general public, knowledge of the technical quality of health institutions and organizations remains within the concern of health administrators and professionals (Bopp, 1990). Conversely, functional quality tackles with how the health care service is delivered to the patient. Since patients cannot be able to accurately assess the technical quality of healthcare organizations functional quality is the primary factor for quality perception of patients (Babakus and Mangold, 1992). Thus, technical quality directly interests the professional healthcare workers, whereas, functional quality directly interests customers, namely patients (Chakravarty, 2011).

There is an increasing number of evidences which show that perceived service quality is the unique variable affecting the value perception of the patient. This value perception ultimately influences consumers' intentions to purchase products or services. Both hospitals operating in private health sector and those operating in public health sector should be open to new technological advances and new expectations. However, healthcare providers may fail to meet these expectations as requested by the patients and for that reason a discrepancy arises between expectations and perceptions of the patient during providing the healthcare services. This gap between the expectation and perception of the patient is the determinant of service quality (Parasuman et al. 1985). According to this inference, the point of view of patients has gained importance in measuring service quality and studies carried out in recent years have supported this inference (Bolton, 1991).

SERVQUAL is one of the most commonly used methods in measuring functional quality in healthcare organizations (Taner & Antony, 2006). SERVQUAL was used in different service sectors such as health, tourism, education, information systems, restaurant, and purchasing in measuring service quality. For a sampling of literature on SERVQUAL, it was observed that this method was used in studies of various researchers such as Li (1997), Lam (1997), Dean (1999), Lee et al. (2000), Lim and Tang (2000), Andaleeb (2001), Bowers and Kiefe (2002), Wisniewski & Wisnievski (2005), Pakdil and Harwood (2005), Lee and Yom (2007), Bowers et al. (1994) in measuring service quality.

2. DEMATEL

DEMATEL (Decision Making Trial and Evaluation Laboratory) is a method which was initiated at the end of 1971 within the frame of the Science and Human Program of the Battelle Institute at the Geneva Research Center (Ching-Lai Hwang**)**. At the time, the DEMATEL method was used to research and to solve complex and difficult, global problems, including ethnic issues, hunger, energy, environmental protection, etc. (Fontela and Gabus, 1976). During its first two years of operation, it concentrated on three major areas of research: (1) the study of the world problem structure, (2) the development and adaptation of methodologies suitable to the analysis of complex world problems, and the

review of existing studies, models and data sources related to world problems. Since the method is comprehensive in terms of building as well as analyzing the structural models involving relationships among complicated factors, it has been especially commonly used in Japan (Wei-Wen Wu, 2008).

In this Graph-Theory based method, complex causal relationships are denoted with matrices or directed graphs. Directed graphs are graphs which portrays a contextual relationship between the elements of a system. Dividing the factors into cause and effect groups (clusters) so as to understand the causal relationships between the involved factors in the problem enhances researchers to construct the draft plan for the problem and solve it. DEMATEL is utilized to investigate the interrelations among criteria in multi-criteria decision making problems either alone or integrated with the other multi-criteria decision-making methods. DEMATEL method was successfully applied in many fields, such as information technology auditing (Wen-Hsien Tsai, Yu-Wei Chou, Wang-Rung Lin and Elliott T.Y. Hwang, 2013), industry cluster comparison (Chia-Li Lin, Gwo-Hshiung Tzeng, 2009), tourism policy development (Chui-Hua Liu, Gwo-Hshiung Tzeng, and Ming-Huei Lee, 2012), vendor selection (C.-H. Hsu, Fu-Kwun Wang, Gwo-Hshiung Tzeng, 2012), portfolio selection (Karthika Varma and K. Sunil Karma, 2012), determination of supplier selection (Betty Chang, Chih-Wei Chang, Chih-Hung Wu, 2011), emergency management (Quang Zhou, Weilai Hwang and Ying Zhang, 2011), personnel selection (Erdem Aksakal and Metin Dağdeviren, 2010), knowledge management strategy selection (Wei-Wen Wu, 2008), determination of critical factors in epidemic deases (Shih-Ming Ou, Li-Ling Liu, and Ko-Chien Chin, 2012).

3. APPLICATION Of DEMATEL IN IDENTIFYING FACTORS AFFECTING HOSPITAL SERVICE QUALITY IN A UNIVERSITY HOSPITAL

3.1. Research Objective

The purpose of this study is to identify the factors affecting hospital service quality in a university hospital by using DEMATEL method.

3.2. Research Method

In the study, a questionnaire was applied to 366 patients by using the SERVQUAL scale that has been widely used in measuring functional quality in healthcare organizations and nine most significant criteria was obtained through the analysis of the data. Subsequently, with the aid of DEMATEL, which was applied to the administrators and expert doctors of the hospital, the direct relation between the criteria was tried to be determined.

3.2.1 Steps of the DEMATEL Method

The steps of the method are as follows

Step I: Generating the direct-relation matrix. The most relevant experts

associated with the problem are consulted while generating this matrix. Experts evaluate the influence between criteria with the help of a predetermined scale. In this study, a four-level scale was used as shown below in Table 1.

Table 1 Comparison Scale

Score	Meaning
0	No Influence
1	Low Influence
2	Medium Influence
3	High Influence

Experts that are named as decision makers (DM) in multi-criteria decision making methods make sets of the pairwise comparisons in terms of influence and direction between criteria (Wu, 2008). As a result of this comparison, the direct-relation matrix that is a **n**x**n** (dimensional) matrix **A** is obtained. Each element of matrix **A**, $\mathbf{a_{ij}}$, denotes the degree to which the criterion **i** affects the criterion **j**. The main diagonal elements of matrix **A** are zeros. For a problem that includes '**n**' (number) of decision makers, the elements of direct relation matrix will be the mean of the evaluation results of '**n**' decision makers. That is, each expert respondent's evaluation results with a direct relation matrix and an average matrix **A** is then derived from the mean of the various direct matrices for all respondents. For that reason, in some literature, this matrix is named as an average matrix.

STEP II. Normalizing the direct-relation matrix. Based on the direct-relation matrix **A**, the normalized direct-relation matrix **X** is obtained by using the equivalences (1) and (2).

$$X = k.A \qquad (1)$$

$$k = \frac{1}{\max\limits_{1 \le i \le n} \sum_{j=1}^{n} a_{ij}}, i, j = 1,2,...,n \qquad (2)$$

Step III. Calculating the total-relation matrix [T]. The total-relation matrix **T** is derived by using the equivalence (3). In this equivalence, **I** is an [**n** × **n**] dimensional identity matrix.

$$\mathbf{T = X\,(I - X)^{-1}} \qquad (3)$$

$\mathbf{r_{nx1}}$ and $\mathbf{c_{1xn}}$ are regarded as two vectors representing the sum of rows and sum of columns of the total relation matrix T, respectively.

$$r = \left(r_1,...,r_i,...,r_n\right)' = \left(r_i\right)_{nx1} = \left[\sum_{j=1}^{n} t_{ij}\right]_{nx1} \quad (4)$$

$$c = \left(c_1,...,c_j,...,c_n\right) = \left(c_j\right)_{nx1} = \left[\sum_{i=1}^{n} t_{ij}\right]_{1xn} \quad (5)$$

$\mathbf{r_i}$ which is the sum of the **ith** row of matrix T, denotes both direct and indirect effects of factor **i** on the other factors. $\mathbf{c_j}$ which is the sum of the **jth** column of matrix T, denotes the sum of direct and indirect effects that criteria **j** has received from the other criteria. Additionally, when **i=j**, the sum of $\mathbf{r_i+c_j}$ shows the total effects both given and received by factor i. That is to say, this sum shows the importance degree that factor **i** plays in the entire system. Besides, the difference ($\mathbf{r_i-c_j}$) denotes the net effect of factor **i** on the system. There are two specific situations that may be encountered related to the difference ($\mathbf{r_i-c_j}$). If this difference is positive, factor **i** is a causer that is affecting the other criteria. Whereas it is negative, factor **i** is a receiver; the other criteria is influencing criteria **i**.

Step IV. Setting the threshold value and obtaining impact-directed graph. The threshold value is determined to obtain impact-digraph. **"**Since matrix T provides information on how one factor affects another, it is necessary for a decision maker to set up a threshold value to filter out some negligible effects" (Roy et al., 2012). Impact-digraph is obtained by plotting ($\mathbf{r_i+c_j}$,$\mathbf{r_i-c_j}$) points in a coordinate plane where horizontal axis and vertical axis are represented by ($\mathbf{r_i+c_j}$) and ($\mathbf{r_i-c_j}$), respectively.

3.2.2. Application Steps of the DEMATEL Method

According to the results of the questionnaire research conducted with patients' families in the first part of the study, the following nine factors were identified as factors affecting hospital service quality:

i. Tidy and clean appearance of service personnel,

ii. Doctors' caring attitude to patients,

iii. Doctors' detailed description about the conditions of patients through preparing medical reports and recordings,

iv. Warm and comfortable environment in the hospital,

v. Medical staff with sufficient experience level,

vi. Feeling a sense of trust through the services provided in the hospital,

vii. Fully-equipped with medical equipment,

viii. Hospital personnel with sufficient communication skills,

ix. Medical Doctors' advice on rational medicine usage.

In the second part of the study, a second questionnaire was developed by taking these nine factors into consideration to determine the effect of one factor on another. The following raw data in a matrix format was obtained by taking opinions of 20 experts involved in the management level of a university hospital, including deputy chief physician of hospital, and hospital manager through this second questionnaire.

Step I: The Direct-Relation Matrix **A** generated in the first step of DEMATEL method is based on these 20 experts' opinions. Direct-Relation Matrix **A** was obtained by taking average of experts' opinions. The experts' opinions in matrix format are shown in Table 3 in the Appendix.

Table3. Initial Direct-Relation Matrix A through DEMATEL

Method- Average of Experts' Opinions

Direct-Relation Matrix **A**									
	0,00	0,85	0,40	1,05	0,70	2,10	1,00	1,60	0,25
	0,95	0,00	1,50	1,30	1,45	1,85	1,15	1,60	1,75
	0,35	1,25	0,00	1,00	1,85	2,05	1,45	1,40	1,30
	1,15	1,10	0,75	0,00	1,00	1,65	0,90	1,45	0,85
	0,70	1,15	1,60	0,95	0,00	2,00	1,25	1,40	2,05
	1,95	1,70	1,90	1,85	2,05	0,00	1,70	1,50	1,65
	0,95	1,00	1,10	0,85	1,40	1,80	0,00	0,95	0,95
	1,65	1,65	1,30	1,10	1,40	1,50	1,10	0,00	1,05
	0,30	1,35	1,15	1,05	1,75	1,65	0,85	0,95	0,00

Step II: Direct-relation matrix was normalized by using equations (1) and (2). This matrix denotes the direct relations between the factors.

Table 4. Normalized Direct-Relation matrix X

Normalized Direct-Relation Matrix X									
	0,00	0,06	0,03	0,07	0,05	0,14	0,07	0,11	0,02
	0,07	0,00	0,10	0,09	0,10	0,13	0,08	0,11	0,12
	0,02	0,09	0,00	0,07	0,13	0,14	0,10	0,10	0,09
	0,08	0,08	0,05	0,00	0,07	0,11	0,06	0,10	0,06
	0,05	0,08	0,11	0,07	0,00	0,14	0,09	0,10	0,14
	0,13	0,12	0,13	0,13	0,14	0,00	0,12	0,10	0,11
	0,07	0,07	0,08	0,06	0,10	0,12	0,00	0,07	0,07
	0,11	0,11	0,09	0,08	0,10	0,10	0,08	0,00	0,07
	0,02	0,09	0,08	0,07	0,12	0,11	0,06	0,07	0,00

Step III: Total Relation Matrix. Total relation matrix is derived by using the equation

(3). Total relation matrix T consists of all the relations including direct and indirect relations between the factors. Taking an element of matrix T into consideration, **tij >0** denotes that there is a relationship from factor I toward factor j directly or indirectly with influence value of $\mathbf{t_{ij}}$. This can also be interpreted as that factor **i** is prior to factor **j** with degree of $\mathbf{t_{ij}}$. For instance, the indirect relationship from factor 2 toward factor 1 is as **2→6→5→8→9→7→1** with degree of 0.25 (Seyed-Hosseini and Asgharpour, 2006). Column **r**, which is the last column at the end of the table denotes the sum of rows, whereas, row **c**, which is the last row at the bottom of the table, denotes the sum of columns.

Table 5. Total Relation Matrix

										r
$T = X(I - X)^{-1}$	0,14	0,22	0,19	0,22	0,24	0,35	0,22	0,28	0,18	2,06
	0,25	0,23	0,32	0,29	0,36	0,43	0,29	0,34	0,34	2,86
	0,20	0,30	0,22	0,27	0,37	0,42	0,30	0,32	0,30	2,70
	0,22	0,25	0,23	0,17	0,27	0,35	0,23	0,28	0,23	2,24
	0,23	0,30	0,32	0,27	0,26	0,43	0,29	0,32	0,35	2,77
	0,34	0,38	0,39	0,37	0,44	0,38	0,36	0,38	0,38	3,41
	0,21	0,25	0,25	0,23	0,30	0,36	0,18	0,26	0,25	2,29
	0,28	0,32	0,29	0,27	0,33	0,39	0,27	0,23	0,28	2,66
	0,18	0,27	0,26	0,24	0,33	0,36	0,23	0,26	0,19	2,32
c	2,06	2,52	2,48	2,32	2,89	3,47	2,37	2,67	2,51	

With the help of **r+c** and **r-c** values, the impact of one criterion on other criteria and relation was determined. When the **r-c** values are taken into consideration, it is accepted that criteria having positive values of **r-c** have higher influence on other criteria and have higher priority. This type of criteria is called causer. Conversely, it is inferred that the criteria having negative values of **r-c** receive more influence from other criteria and have lower priority. This type of criteria is called as receiver.

The values in column r+c denote the relation between each criterion with other criteria. Criteria having higher of r+c are more related with other criteria. In contrast, criteria having little values of r+c are less related with other criteria (Aksakal and Dağdeviren, 2010; Seyed-Hosseini, et.al.,2005).

From the values of r-c in Table 6 “positive attitude of doctors towards patient”, and “detailed description of the conditions of patients by the (medical) doctors” have been observed as the only two criteria having positive values of (**r-c**). It is inferred from this result that these two criteria have higher impact and priority in determining hospital service quality. The last two factors “sufficiency of medical staffs’ experience” and “doctors give rational information on usage of medicine” with the lowest **r-c** values -0.12, and -0.19 respectively are the factors receiving more influence from the other factors. The factor “positive attitude of doctors towards patient” with having the highest **r-c** value, is prior to the other factors and called master dispatcher. And with the lowest **r-c** value the factor “doctors give rational information on usage of medicine” is called a master dispatcher

(Seyed-Hosseini and Asgharpour, 2006).

When the column **r+c is** investigated in Table 7, it is possible to reach a conclusion that 6th, 2nd, 5th, and 8th criteria have more relationship with other criteria, whereas, the remaining criteria have less relationship. Factor 6 with the highest value of **r+c** (6.89) has the most relation with the other factors. And factor 1 with the lowest value of 4.12 has the least relation with the other factors.

Table 6. Prioritization of factors according to r-c values.

	r-c
2. The doctors have positive attitude towards patients.	0,33
3. The doctors prepare detailed medical reports and recordings about their patients.	0,21
1. The appearance and clothing of service personnel are clean and tidy.	-0,01
8. Hospital personnel have sufficient communication skills with patients.	-0,01
6. The medical services offered in the hospital provide a sense of security to patients.	-0,06
4. There exists a warm and comfortable environment in the hospital.	-0,08
7. The hospital is fully-equipped with medical equipment.	-0,08
5. Experience level of medical staff is sufficient.	-0,12
9. Medical doctors inform the patients about rational medicine usage.	-0,19

Table 7. Prioritization of factors according to r+c values.

	r+c
6. The medical services offered in the hospital provide a sense of security to patients.	6,89
5. Experience level of medical staff is sufficient.	5,66
2. The doctors have positive attitude towards patients.	5,38
8. Hospital personnel have sufficient communication skills with patients.	5,32
3. The doctors prepare detailed medical reports and recordings about their patients.	5,18
9. Medical doctors inform the patients about rational medicine usage.	4,84
7. The hospital is fully-equipped with medical equipment.	4,66
4. There (is/ exists) a warm and comfortable environment in the hospital.	4,56
1 The appearance and clothing of service personnel are clean and tidy.	4,12

4. FINDINGS

In this study, the measurement of healthcare service quality as well as determination of determinants of healthcare service quality is investigated with the application of DEMATEL method in a university hospital. The university hospital, founded in 1992, is

the most important medical institution of the city with its approximately 547 academic staff members, and 1186 students, and more than half-million outpatient visits each year. It is obvious that evaluation of service quality of such an important health organization using patients' viewpoints will provide great contribution to healthcare administrators. Besides, determination of determinants of service quality will provide guidance to the administrators in increasing service quality. As emphasized in previous sections, SERVQUAL was used as the instrument for measuring service quality. The weights of the service quality factors acquired from patients' point of view were determined for a university hospital by designing a questionnaire including 22 questions based on the SERVQUAL model. The general structure of the study was adapted from the study carried out by Shieh et al. (2010) in a hospital in Taiwan. In this study, a questionnaire was applied to the 366 inpatients or their relatives by asking degree) of each criterion with a Likert-Type five-point scale, where 1 and 5 denote "strongly disagree" and "strongly agree", respectively. The demographic distribution of the respondents is presented in Table 7.

Table 7. The demographic information of the respondents

		Frequency	Percent (%)
Gender	Female	208	56,8
	Male	150	41
Age Group	10-18	13	3,6
	19-34	104	28,4
	35-54	142	27,9
	55 and above	102	98,6
Education Level/ Educational Status	illiterate	21	5,7
	literate	10	2,7
	Primary School	146	39,9
	Secondary School	43	11,7
	High School/Lycee	80	21,9
	University	58	15,8
Occupation/Job	Self-Employement/Independent Business	52	14,2
	Employee/Labor/Worker/	57	15,6
	Housewife	156	42,3
	Service industry	23	6,7
	Civil Servant/Public Officer/ Government Employee	35	10,2
	Farmer	8	2,3

The internal consistency of SERVQUAL scale is investigated by calculating Cronbach's alpha value. Cronbach's alpha is a value that varies between zero and one. The acceptable limit value of Cronbach's alpha is 0,7. In the literature, it is possible to come across with lower values than the acceptable limit value, but this value should not

be lower than 0,5 (Purcarea, et al. 2013; Bonett and Wright, 2015). The Cronbach's alpha value obtained for internal consistency in this research was 0.926, indicating an excellent internal consistency. Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy is a measure that takes values between 0 and 1. A high KMO value denotes the presence of a statistically acceptable factor solution. KMO value obtained through this research was 0,924, which is far above the value of 0.60 recommended by Kaiser in 1974.

According to the descriptive statistics generated from the obtained data, the degree of importance given by patients and/or their families to each of the service quality criteria are summarized in Table 8 by sorting their mean values in a descending order.

Tablo 8. The weights of service quality criteria (in terms of/from) point of view of patient

Criteria	N	Mean
The appearance and clothingof service personnel are clean and tidy.	362	4,0856
Pharmacists inform the patients about rational medicine usage.	359	3,9833
The doctors prepare detailed medical reports and recordings about their patients.	354	3,9802
There exists a warm and comfortable environment in the hospital.	364	3,9478
Experience level of medical staff is sufficient.	357	3,9272
The medical services provided in the hospital provide a sense of security to patients.	360	3,8028
Service personnel have immediate problem-solving abilities	356	3,7809
The hospital is fully-equipped in terms of medical equipment.	363	3,7769
Hospital personnel have sufficient communication abilities with patients.	362	3,7624
Medical doctors inform the patients about rational medicine usage.	360	3,7472
There exists a concern for individual needs by medical staff.	362	3,5912
There exists a sufficient guidance in delivery of outpatient service.	356	3,5758
Operating procedures of the emergency service are fast.	350	3,5686
Publicity of hospital services is sufficient.	352	3,5540
Pharmacy and medicine preparation services of hospital are sufficient.	355	3,5183
Hospitality services and operations of the hospital are sufficient.	354	3,4633
The Appointment System of Hospital is easy to access and use.	355	3,1803
There exists a competition between professional and trusted medical staff about patient care.	351	3,0798
Outpatient waiting time for medical treatment is not long.	356	2,9803
Taste and heat of patient meals as well as quality of patient meal delivery are appropriate.	352	2,7812

5. CONCLUSION

The service quality has direct relationship with the factors like customer satisfaction, profitability and cost. For that reason, service quality measurement is one of the most focal research topics for hospital administrators. The results of the study indicates that patients and their relatives give most importance to the appearance of service personnel, but least to taste of patient meals and quality of patient meal delivery. There is no doubt that patients attach importance to each of the criterion used in measuring service quality, but it is clear that among all of these criteria, the patients give more importance to the criteria having a weight of above 3,75. Following the identification of these nine prominent criteria, in the second step of this study, the priorities of these criteria and the causal relationships among them were tried to be put forward through the DEMATEL method by applying the second questionnaire to the hospital experts.

In the identification of the hospital service quality, the criterion “physicians are preparing detailed medical records and reports about patients” with the criterion of “the attitude of the physicians towards the patient are favorable” has more influence on the other criteria and has higher priority. It is inferred that the criterion of “the services provided at the hospital gives confidence to the patients” has priority and influence over the other criteria.

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Appendix.

Table 2. Experts' opinions in form of matrices.

X^1

0	0	0	0	1	2	0	0	0
0	0	1	2	3	3	3	1	3
0	1	0	2	2	3	3	2	3
0	1	2	0	2	3	3	2	2
1	1	2	1	0	3	3	2	3
3	3	3	2	3	0	3	3	3
0	2	3	2	3	3	0	3	3
1	3	2	1	2	2	1	0	3
1	2	2	2	2	2	2	1	0

X^2

0	0	0	1	1	3	0	1	0
0	0	1	1	2	3	1	3	1
0	1	0	0	3	3	3	2	2
1	0	0	0	0	2	0	0	0
1	1	3	0	0	3	1	2	2
3	3	3	2	3	0	3	3	3
0	1	3	0	1	3	0	0	0
1	3	2	0	2	3	0	0	0
0	1	2	0	2	3	0	0	0

X^3

0	2	2	2	2	2	3	2	2
2	0	2	2	2	2	3	2	2
2	2	0	2	2	2	3	2	2
2	2	2	0	2	2	3	2	2
2	2	2	2	0	2	3	2	2
2	2	2	2	2	0	3	2	2
3	3	3	3	3	3	0	3	3
2	2	2	2	2	2	3	0	2
2	2	2	2	2	2	3	2	0

X^4

0	0	1	2	0	3	0	1	0
2	0	2	1	3	2	2	3	2
0	1	0	2	3	2	1	3	1
1	0	0	0	1	2	0	2	0
0	1	2	0	0	2	1	2	1
2	0	0	2	3	0	1	3	1
0	0	1	2	1	2	0	1	0
2	1	2	0	1	2	0	0	1
0	0	1	0	1	2	0	1	0

$$X^5=\begin{bmatrix}0&3&0&2&0&1&0&3&0\\3&0&3&3&1&3&0&3&3\\0&3&0&1&2&3&0&3&1\\2&3&1&0&3&3&0&3&3\\0&1&2&3&0&3&2&1&2\\1&3&3&3&3&0&2&2&2\\0&0&0&0&2&2&0&1&3\\3&3&3&3&1&2&1&0&2\\0&3&1&3&2&2&3&2&0\end{bmatrix}\quad X^6=\begin{bmatrix}0&1&2&2&2&2&1&2&2\\2&0&2&3&3&3&3&2&2\\2&2&0&3&3&2&3&2&2\\2&2&2&0&2&3&3&2&3\\2&2&2&3&0&3&3&2&3\\2&2&2&3&3&0&3&2&3\\2&2&2&3&3&3&0&2&3\\1&2&2&3&3&2&3&0&3\\2&2&2&3&2&3&2&2&0\end{bmatrix}$$

$$X^7=\begin{bmatrix}0&3&1&2&1&1&3&1&0\\3&0&1&2&1&2&2&1&1\\1&1&0&1&1&3&2&1&1\\2&2&1&0&2&2&2&1&1\\1&1&1&2&0&1&2&1&2\\1&2&3&2&1&0&2&1&2\\3&2&1&2&2&2&0&2&2\\1&1&1&1&1&1&2&0&1\\0&1&1&1&2&2&2&1&0\end{bmatrix}\quad X^8=\begin{bmatrix}0&1&1&0&0&1&0&1&0\\2&0&2&2&1&2&0&2&2\\1&2&0&1&1&2&1&1&1\\0&1&0&0&1&2&0&1&1\\0&0&1&0&0&2&0&1&1\\1&2&1&2&2&0&1&1&1\\0&0&0&0&0&1&0&0&0\\1&2&1&1&0&2&0&0&1\\0&1&1&1&2&2&0&1&0\end{bmatrix}$$

$$X^9=\begin{bmatrix}0&2&0&0&0&3&0&1&0\\0&0&2&1&1&3&0&2&0\\0&0&0&1&2&1&2&1&0\\3&2&1&0&1&3&0&3&0\\0&3&3&1&0&3&1&2&0\\2&3&3&3&3&0&0&2&3\\0&0&1&0&0&3&0&0&0\\0&3&3&3&2&3&3&0&0\\0&0&0&0&0&1&0&1&0\end{bmatrix}\quad X^{10}=\begin{bmatrix}0&2&1&2&2&3&1&2&1\\2&0&3&1&3&3&3&1&3\\1&3&0&1&2&3&3&1&2\\2&1&0&0&1&2&1&1&0\\2&3&3&1&0&3&2&1&2\\1&2&3&1&3&0&2&1&1\\1&2&1&1&3&3&0&2&1\\2&3&3&1&2&3&3&0&1\\0&1&2&1&1&2&0&1&0\end{bmatrix}$$

$$X^{11}=\begin{bmatrix}0&0&0&0&0&2&0&1&0\\0&0&2&0&1&3&0&2&3\\0&2&0&0&3&3&2&3&3\\0&0&0&0&0&0&0&3&0\\0&0&0&0&0&3&0&3&2\\2&3&3&2&3&0&3&3&3\\0&0&0&0&0&3&0&0&0\\0&0&0&1&3&0&0&0&0\\0&2&1&0&0&3&0&0&0\end{bmatrix}\quad X^{12}=\begin{bmatrix}0&0&0&0&0&1&0&1&0\\0&0&2&1&2&1&1&2&2\\0&1&0&0&2&1&1&2&2\\0&1&0&0&1&1&1&1&0\\0&2&2&1&0&2&2&2&2\\2&2&2&1&2&0&2&1&2\\0&0&2&0&2&2&0&1&0\\2&2&0&1&2&2&2&0&2\\0&2&2&1&2&2&2&2&0\end{bmatrix}$$

$$X^{13}=\begin{bmatrix}0&0&0&0&0&1&0&2&0\\0&0&2&2&2&2&2&2&2\\0&2&0&1&2&2&2&2&2\\0&2&2&0&2&2&2&2&2\\0&2&2&2&0&2&2&2&2\\0&2&2&2&2&0&2&2&2\\0&2&2&2&2&2&0&2&2\\0&2&2&2&2&2&2&0&2\\0&2&2&2&2&2&2&2&0\end{bmatrix}\quad X^{14}=\begin{bmatrix}0&1&0&2&1&2&0&2&0\\1&0&1&2&2&1&2&1&0\\0&1&0&2&2&2&2&1&1\\2&2&2&0&2&2&2&2&1\\1&2&2&2&0&2&2&2&1\\2&1&2&2&2&0&2&2&1\\0&2&2&2&2&2&0&2&1\\2&1&1&2&2&2&2&0&1\\0&0&1&1&1&1&1&1&0\end{bmatrix}$$

$$X^{15}=\begin{bmatrix}0&0&0&1&1&3&3&0&0\\0&0&0&0&0&0&0&0&1\\0&0&0&0&0&0&0&0&0\\1&0&0&0&0&0&1&1&0\\1&0&0&1&0&0&0&0&3\\3&0&0&3&0&0&0&0&0\\1&0&0&0&3&0&0&0&1\\3&0&0&0&0&0&0&0&0\\1&0&0&2&1&0&0&0&0\end{bmatrix}\quad X^{16}=\begin{bmatrix}0&0&0&1&1&3&3&3&0\\0&0&0&0&0&0&0&0&1\\0&0&0&1&2&3&0&0&0\\1&0&0&0&0&0&0&0&0\\1&0&0&0&0&0&0&0&3\\3&0&0&0&0&0&0&0&0\\3&1&0&0&0&0&0&0&0\\3&0&0&0&0&0&0&0&0\\0&1&0&0&3&0&0&0&0\end{bmatrix}$$

$$X^{17}=\begin{bmatrix} 0 & 0 & 0 & 1 & 1 & 3 & 3 & 3 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 3 \\ 3 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 3 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 3 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 3 & 0 & 0 & 0 & 0 \end{bmatrix} \quad X^{18}=\begin{bmatrix} 0 & 0 & 0 & 1 & 1 & 3 & 3 & 3 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 3 \\ 3 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 3 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 3 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 3 & 0 & 0 & 0 & 0 \end{bmatrix}$$