

Implementation of quality function deployment to improve the healthcare of a private hospital

Implementación del despliegue de la función de calidad para mejorar la atención médica en un hospital privado

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Abstract

Objective: This study aims to provide recommendations for improving healthcare services in a private hospital and to demonstrate the potential use of multicriteria decision-making (MCDM) methods that are not commonly used in the context of quality function deployment. **Methods:** The research was carried out in two private hospitals. Data were collected from a total of 620 participants using the SERVQUAL scale and MCDM methods, specifically Decision Making Trial and Evaluation Laboratory and Stepwise Weight Assessment Ratio Analysis. **Results:** The most important customer requirements were “performing procedures correctly the first time” and “staff having sufficient knowledge.” In contrast, the least important was identified as the “visual appeal of buildings.” Regarding technical requirements, “corporate image” and “competitive structure” were prioritized. **Conclusions:** This study guides healthcare managers in optimizing resource allocation and developing customer-oriented strategies.

Keywords: Multicriteria decision-making. Quality function deployment. Private health institution. Quality of health care.

Resumen

Objetivo: Este estudio tiene como objetivo proporcionar recomendaciones para mejorar los servicios de salud en un hospital privado y demostrar el potencial uso de métodos de toma de decisiones multicriterio, los cuales no son comúnmente utilizados en el contexto del despliegue de la función de calidad. **Métodos:** La investigación se realizó en dos hospitales privados. Los datos fueron recolectados de un total de 620 participantes utilizando la escala SERVQUAL y los métodos de toma de decisiones multicriterio, específicamente DEMATEL y SWARA. **Resultados:** Los requisitos de los clientes más importantes identificados fueron «realizar los procedimientos correctamente la primera vez» y «que el personal tenga conocimientos suficientes». En contraste, el menos importante fue la «atracción visual de los edificios». En cuanto a los requisitos técnicos, se priorizaron la «imagen corporativa» y la «estructura competitiva». **Conclusiones:** Este estudio ofrece una guía para que los gerentes de atención médica optimicen la asignación de recursos y desarrollen estrategias orientadas al cliente.

Palabras clave: Toma de decisiones multicriterio. Despliegue de la función de calidad. Institución de salud privada. Calidad de la atención médica.

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Introduction

Service quality is the comparison of consumer expectations with actual service performance.^{1,2} Service quality helps an organization to differentiate itself from other organizations and gain a permanent competitive advantage.³ Service quality is the main element of customer satisfaction.⁴ In addition, satisfaction explains the extent to which the service process meets customer expectations⁵ because it is positively related to purchasing intentions and customer loyalty⁶ is of importance. Service quality helps an organization to differentiate itself from other organizations and gain a permanent competitive advantage.³ For this reason, institutions providing services in both the public and private sectors are trying to provide quality services and remain competitive.⁷ Healthcare quality can be defined in many ways, but quality health services are expected to be effective, safe, patient-centered, timely, fair, and efficient.^{8,9} If these six characteristics are addressed, the health system will achieve significant gains and better meet patient needs.⁸

Along with awareness of quality, individuals have become aware of health services. Today, patients attach importance to the safety of treatment, the instructions of physicians, and the overall quality of service. In this direction, health institutions focus on meeting the expectations and wishes of patients in addition to physical conditions and tools.¹⁰ According to Sofaer and Firminger, patients' expectations, previous experiences, personality traits, needs, sociocultural norms, scope of choice, reputation of the service provider, and level of knowledge about what to expect from the health service have an effect.¹¹ Expectations and patient perception toward the experience after using health care are formed, and quality definitions and criteria for the patient's healthcare are revealed. The level of satisfaction with definitions and criteria also reveals the patients' perceptions of quality. Taking into account patient perceptions offers the potential to make health systems more effective and responsive to people's needs and expectations. The use of healthcare services is sensitive to users' perceptions of quality. Therefore, patients' perceptions of health services have become essential to quality assessment in health services.¹² Collecting systematic feedback on patients' experiences is critical to monitoring and improving the quality of healthcare services.¹³ In addition, patient perceptions affect the choice of healthcare

professional, the patient's adherence to medical advice, patient complaints, the level and severity of malpractice claims, and most importantly, actual health and functional status outcomes.¹¹ Patient expectations and perceptions also determine customer satisfaction. Patient satisfaction is one of the main criteria for evaluating health institutions' service quality.¹⁴ It is necessary to clearly define the elements that affect patients' perceptions of quality and identify the areas that need to be intervened.¹⁵ When evaluating and securing quality, healthcare professionals must consider all factors, including patient and social preferences.¹⁶ In this direction, it can be stated that health managers should give direction to quality studies based on the patient's wishes and expectations.¹⁷ Quality function deployment (QFD), which can be used to improve the quality of the service provided in health institutions, is an important method that can provide a competitive advantage by guiding which patient requests are important, how much patient requests should be met, and how these patient requests can be met. QFD enables healthcare managers to understand the wishes and needs of patients and directs continuous quality improvement studies.¹⁸ In this way, the potential to satisfy customers increases.¹⁹ This customer-based approach also helps organizations gain customer focus. In this context, QFD is emerging as an essential product or service development tool.

In this study, QFD application was performed in a private hospital in Samsun, Türkiye. The SERVQUAL Scale, the most commonly used tool for evaluating the quality of healthcare, and multi-criteria decision-making (MCDM) tools are included in the application. It is observed that a limited amount of research has been carried out with QFD or MCDM tools in the field of health management. These methods were used in an integrated manner in the research. In this context, it is thought that the study will contribute to the literature and attract the interest of health professionals and researchers interested in the methods.

Methods

Purpose

In the study, in addition to the SERVQUAL scale, Decision Making Trial and Evaluation Laboratory (DEMATEL) and Stepwise Weight Assessment Ratio Analysis (SWARA), one of the MCDM tools, were used in the QFD. This study aims to provide recommendations for improving the health services of a

private hospital located in Samsun and show that MCDM methods, which are not widely used in quality function deployment, can be used.

Sample size

It is planned to select two hospitals from the private hospitals in the city center of Samsun for the study. One of the selected hospitals is where the QFD application will be performed and whose performance needs to be improved, while the other is the hospital to be taken as a reference. The health institution where the quality function distribution application should be carried out is coded as H6; the health institution to be referenced with the best performance is coded as H5. The main reason for limiting the study to Samsun is that the researchers are located in Samsun, and thus, the data collection process is carried out more effectively. In addition, the hospitals evaluated in this study and the patients receiving health services from these hospitals are also located in Samsun. Therefore, limiting the sample to this region increases the study's internal validity by ensuring that the findings accurately reflect the quality of health services in a specific local context. When referring to the doctoral thesis titled "Improving the Quality of Service in a University Hospital with Fuzzy Quality Function Deployment"²⁰ in the Power Analysis and Sample Size Software Demo program, the Expected Quality Cronbach Alpha value of the SERVQUAL Scale should be included in the sampling of 300 people with 93% confidence, 100% power, and a 0.926 effect size. The target population of this study consists of adult patients admitted to a private hospital and receiving services. The average number of patients receiving annual treatment at H6 hospital in 2019 was 220,000 ($n = 220,000$). The study's sample size was calculated, and it was found that 300 people should be reached. In evaluating health service expectations, the expectation part of the SERVQUAL scale was adapted to the SWARA method and planned to reach 300 people from the whole society. It is planned to ensure the participation of 150 people who have received services from H6 hospital and H5 hospital from two different institutions, determined to evaluate the perception of health services; a total of 300 people. The total required sample size was determined as 600 people, including 300 from the community and 300 from individuals who received services from H5 and H6 hospitals.

The required characteristics of the participants were determined as being over 18, residing in Samsun, and

volunteering to participate in the study. The application of the SERVQUAL scale was carried out online in June 2021. As a result of the application, 170 participants who received services from the H5 hospital and 150 participants who received services from the H6 hospital were reached. The January and February 2022 SWARA application was carried out face-to-face and online.. As a result of the application, 300 participants were reached. The total number of participants reached within the scope of the research is 620. Since the desired minimum number of participants was reached from both hospitals, oversampling does not affect the results.

Focus group interviews should be conducted with a decision-making group of experts in their field. For this reason, this stage was conducted with two experts in the quality field who volunteered to participate in the research at H6 hospital. Focus group interviews were conducted in different periods of 2021 and 2022. In the focus group interviews conducted, the technical requirements considered necessary to meet patient expectations were determined, the adequacy of the technical requirements at H6 hospital was scored, the point-of-sale evaluation form was filled out, the technical requirements were evaluated by the DEMATEL method, and the expectations and technical requirements were related. Focus group discussions have been critical in shaping the technical requirements and their overall analysis. Through these discussions, detailed information was obtained regarding the requirements to meet customer needs. Focus group discussions facilitated the identification of technical requirements and the relationships between them. Focus group discussions also integrated qualitative data from diverse perspectives, enabling a more comprehensive understanding. Consequently, a more strategic and expert-driven decision-making process was conducted.

Application steps of the research

The application steps of the research are summarized in figure 1.

QFD

The most common QFD process is the quality house matrix. A typical quality house consists of six main parts: customer requirements, design requirements, relationship matrix, competitive benchmarking evaluation, technical importance ranking, and

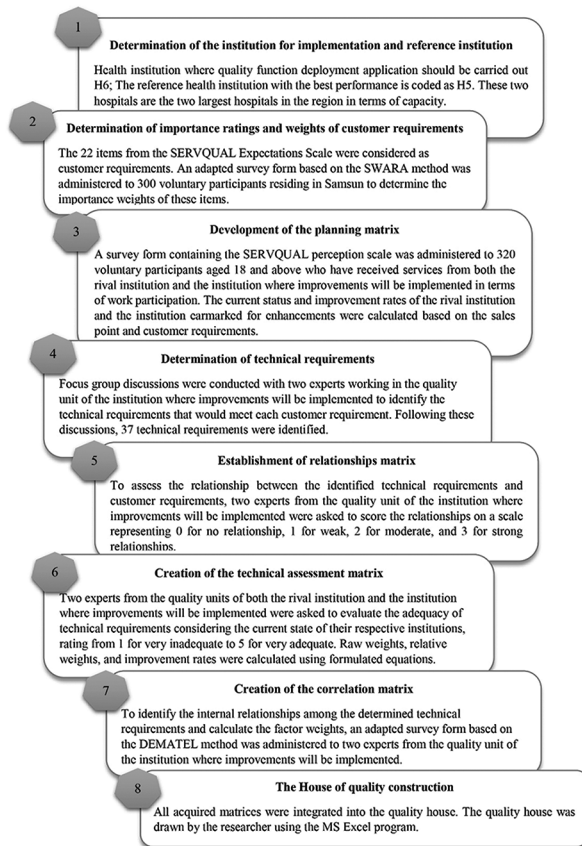


Figure 1. Application steps of the research.

roof matrix.²¹ Customer requirements are transformed into technical requirements in the quality house.¹⁹ In this context, the quality house reveals the characteristics that are critically necessary for achieving the goal and quality.²² The primary stages necessary for the construction of the quality house are as follows:²³

- Determination of customer requirements,
- Determination of design/technical requirements,
- Creation of the relationship matrix,
- Planning and implementation of the expected quality (listing customer requirements in order of importance and comparing competitive services),
- Comparison of technical characteristics (making a ranking of technical importance),
- It is the analysis of the correlations existing between various properties (creation of the correlation matrix)

A separate study was not conducted to determine customer requirements in the research, and the

22-item SERVQUAL Scale was taken as the basis. The SWARA method has been used to prioritize customer requirements. In this direction, the SERVQUAL Scale was adapted to the SWARA method and used.

While determining the technical requirements, focus group interviews were conducted with the quality team of the H6-coded hospital. As a result of the focus group interviews conducted, 37 technical requirements were determined, so there will be at least one technical requirement for each customer requirement.

Interviews were conducted with the quality team to create the relationship matrix, and it was requested that the relationship between customer requirements and technical requirements be scored between 1 and 3 (1: weak relationship, 2: moderate relationship, and 3: strong relationship).

Within the scope of the technical evaluation matrix, adequacy of technical requirements and point-of-sale evaluation questionnaires were applied to the quality team.

To evaluate the competition with competitors, the SERVQUAL Scale was applied to a total of 320 volunteer participants, including 170 from the H5 hospital and 150 from the H6 hospital.

In creating the correlation matrix, the DEMATEL method was used to evaluate the relationships between the 37 technical requirements determined by the quality team.

SERVQUAL

Service quality is considered one of the ten dimensions of the SERVQUAL scale, developed by Parasuraman, Zeithaml, and Berry in 1985. These dimensions are physical assets, reliability, enthusiasm, competence, courtesy, credibility, security, accessibility, customer understanding, and communication. In another study conducted by Parasuraman and others in 1988, the ten identified dimensions were reduced to five: physical properties, reliability, enthusiasm, trust, and empathy.

The physical properties dimension covers the physical condition of the buildings and the environment, the appearance of the personnel, and the condition of the equipment used. The reliability dimension refers to the institution's ability to provide the promised service on time, accurately, and reliably. The enthusiasm dimension covers the institution's ability to deal with complaints effectively and the speed of the service.

The trust dimension expresses how much the service offered by the institution is believed and trusted. The name and reputation of the service provider and the characteristics of the institution's employees contribute to the dimension of trust. The empathy dimension, on the other hand, expresses the desire and ability of the institution to adjust the service to meet the customer's needs.²

SWARA

The SWARA method was introduced to the literature by Keršuliene, Zavadskas, and Turskis in 2010. The method is among the constant-current/constant-voltage methods that take into account the opinions of experts or deciders.²⁴ SWARA is used to overcome the uncertainties involved in the linguistic evaluation of criteria and decision options.²⁵ The SWARA method can solve many problems because the application steps are few and based on expert opinions.^{24,26}

Compared to the AHP method, the SWARA method has some similarities but also has its unique features.²⁶ The number of comparisons is less in the SWARA method than in the AHP method. Therefore, if decision-makers give correct and sincere answers, the consistency of the results increases. No scale is used in the method, and decision-makers can act freely to evaluate the criteria.²⁶⁻²⁸ Decision-makers benefit from their knowledge and experience when evaluating criteria.^{24,28,29} The primary application steps of the SWARA method are given below.^{25-28,30}

(1) Stage 1: Sorting the criteria according to the degree of importance

In the first stage, experts or decision-makers sort the criteria according to the degree of importance. The rankings obtained reflect the individual evaluations of decision-makers or experts. In case there is more than one decision-maker, the geometric average of the rankings is taken, and an overall ranking is obtained.²⁹

(2) Stage 2: Determining the importance of the criteria

In the second stage, the degree of importance of each criterion is determined. For n pieces of criteria, $n-1$ number of comparisons are made. In this context, e 'th criterion is according to the $e + 1$ criterion by comparing it with the $e + 1$. The obtained value is indicated by f_e and is defined as the comparative advantage of the average value.

Stage 3: Calculation of the g_e coefficient

$$g_e = \begin{cases} 1, & \text{if } e = 1, \\ f_e + 1, & \text{if } e > 1, \end{cases} \quad (1)$$

Stage 4: Determination of the variable h_e

$$h_e = \begin{cases} 1, & \text{if } e = 1, \\ \frac{f_e - 1}{g_e}, & \text{if } e > 1, \end{cases} \quad (2)$$

Stage 5: Calculation of the value j_e , which represents the relative weight of the e 'th criterion

$$j_e = \begin{cases} 1, & \text{if } e = 1, \\ \frac{h_e}{\sum_{i=1}^n h_e}, & \text{if } e > 1, \end{cases}, (e = 1, 2, \dots, n) \quad (3)$$

DEMATEL

The DEMATEL method analyzes the network of causal relations between criteria through matrices.^{31,32} In addition to analyzing the relationships between the method and the criteria, the importance weights of the criteria can also be calculated.^{28,31} The DEMATEL method consists of six stages.

(1) Stage 1: Creating a direct relationship matrix

At this stage, the direct relationship matrix represented by G in equation (4) is created. For the G matrix to be created, the participants' evaluations are needed. By combining the participant evaluations, a direct relationship matrix is obtained; x and y represent the system's elements, and $x = 1, 2, \dots, a$ and $y = 1, 2, \dots, b$ decoupled.

$$G = \begin{bmatrix} g_{11} & \cdots & g_{1b} \\ \vdots & \ddots & \vdots \\ g_{a1} & \cdots & g_{ab} \end{bmatrix} \quad x = 1, 2, \dots, a \text{ and } y = 1, 2, \dots, b \quad (4)$$

(2) Stage 2: Normalized creating a direct relationship matrix

After creating the direct relationship matrix, it is necessary to calculate the normalized values using the formula shown in equation (5) and create a normalized direct relationship matrix represented by $\tilde{G}$ in equation (6).

$$x = \max \left[\max_y \left(\sum_{x=1}^t g_{xy} \right), \max_x \left(\sum_{y=1}^t g_{xy} \right) \right] \quad (5)$$

$$\tilde{G} = x^{-1} \tilde{A} G \quad (6)$$

(3) Stage 3: Creating a total relationship matrix

Using equation (7), the total relationship matrix shown by Y in equation (8) is obtained. The " g_{ab} " in the unit matrix I and equation (8) expresses the total degree of relationship between factor a and factor b .

$$Y = \tilde{G}(I - \tilde{G})^{-1} \quad (7)$$

$$Y = \begin{bmatrix} g_{11} & \cdots & g_{1b} \\ \vdots & \ddots & \vdots \\ g_{a1} & \cdots & g_{ab} \end{bmatrix} \quad x = 1, 2, \dots, a \text{ and } y = 1, 2, \dots, b \quad (8)$$

(4) Stage 4: Creation of the influence and interaction matrix

The formula in equation (9) is used to create the A_x matrix, which expresses the sum of the direct or indirect effects of factor x on other factors; the formula in equation (10) is used to create the E_x matrix, which indicates the degree to which factor x is affected by other factors. $x = 1, 2, \dots, a$ and $y = 1, 2, \dots, b$:

$$A_x = \begin{bmatrix} \sum_{y=1}^b g_{xy} \\ \vdots \\ \sum_{y=1}^b g_{ay} \end{bmatrix}_{b \times 1} \quad (9)$$

$$E_x = \begin{bmatrix} \sum_{x=1}^a g_{xy} \\ \vdots \\ \sum_{x=1}^a g_{xy} \end{bmatrix}_{1 \times a} \quad (10)$$

If $A_x - E_x > 0$, it is understood that the x 'th factor affects other factors and enters the result group; if $A_x - E_x < 0$, it is understood that the x 'th factor is affected by other factors and enters the cause group.

(5) Stage 5: Counting the averages

After determining the influencing and affected factors, the averages of the values in the expert opinion or total relationship matrix are taken to determine the threshold value. The threshold value is used to explain how one factor affects other factors. A relationship diagram showing the internal relationships between the factors is drawn by considering the determined threshold value.

(6) Stage 6: Calculation of the weights of the factors

To determine the degree of importance of the factors, their weights should be calculated. To calculate the weight of the x 'th factor represented by h_x in equation (11), the weight coefficients (z_x) in equation (12) must be calculated.

$x = 1, 2, \dots, a$ and $y = 1, 2, \dots, b$:

$$h_x = \frac{z_x}{\sum_{x=1}^a z_x} \quad (11)$$

Table 1. Sociodemographic information of the participants (SWARA)

Sociodemographic characteristics	n	%	Characteristics	n	%
Sex			Residence		
Female	152	50.7	City center	261	87.0
Male	148	49.3	Other districts	34	11.3
			The village	5	1.7
Age			Occupation		
19-25	76	25.3	Academic	28	9.3
26-32	73	24.3	Public Sector	65	21.7
33-41	70	23.3	Health Worker	45	15.0
42-69	81	27.0			
Marital status			Private Sector	84	28.0
Single	139	46.3	Student	55	18.3
Married	161	53.7	Housewife	19	6.3
Educational status			Retired	4	1.3
Primary school	1	0.3	Revenue		
Secondary school	1	0.3	0-2800	75	25.0
High school	31	10.3	2801-5250	80	26.7
Associate degree	26	8.7	5251-7000	84	28.0
Bachelor degree	176	58.7	7001 and above	61	20.3
Postgraduate education	65	21.7	Total	300	100

SWARA: Stepwise Weight Assessment Ratio Analysis.

$$z_x = \sqrt{\left((A_x + E_x)^2 + (A_x - E_x)^2\right)} \quad (12)$$

Results

Determination of the degree of importance and weights of customer requirements

In the research, 22 items included in the SERVQUAL Scale were accepted as customer expectations/requirements. In this context, the scale has been adapted to the SWARA method. According to the SWARA method, participants were asked to rank 22 items from 1 to 22 in order from most important to least important and to indicate how much % each item is more important than the lower-ranked item so that the importance weight of the first-ranked item is 100. The findings related to the sociodemographic information of the participants and the SWARA method are given in table 1.

50.7% ($n = 152$) of the participants who answered the SWARA form were women, and 49.3% ($n = 148$) were men. The average age of the participants was 33. In addition, 46.3% ($n = 139$) were single, and 53.7% ($n = 161$) were married. 58.7% of the participants ($n = 176$) were undergraduate graduates. Most

of them reside in the city center (87%). When the occupations of the individuals answering the form were examined, 9.3% (n = 28) were academic staff, 21.7% (n = 65) were public sector employees, 15% (n = 45) were health workers, 28% (n = 84) were private sector employees, 18.3% (n = 55) were students, 6.3% (n = 19) were housewives, and 1.3% (n = 4) were retired. The average income of the participants was calculated as 4887.50 TL.

Key findings from the SWARA analysis are summarized in table 2. According to the findings obtained from the analysis, the most critical customer requirement is that the procedures applied to patients are performed correctly and for the first time (g). In the second place, the employees have sufficient information and do not leave questions unanswered (p). Hospital employees' ability to provide the requested services as soon as possible (j) ranked third. It has been concluded that the requirement (b) for buildings to be visually attractive is the least important customer requirement of importance. Using the SWARA method to rank customer requirements provides a structured and systematic approach to prioritization based on expert judgment. In this context, the criterion "Performing the procedures applied to patients for the first time and correctly" is considered the most critical requirement due to its impact on patient safety, treatment effectiveness, and overall healthcare quality.

Creating a planning matrix

After the importance of customer requirements was determined using the SWARA method, the planning matrix on the right side of the quality house was created. To be used in the planning matrix, a questionnaire was applied to individuals over 18 who received services from the competing institution and the institution where the improvement will occur to participate in the study. The questionnaire consists of sociodemographic questions and a 22-item SERVQUAL scale. The sociodemographic findings of the individuals who participated in this research stage are in table 3.

The requirement refers to the 22 items included in the SERVQUAL Expectation Scale, the weights of the items whose weight of importance is calculated by the SWARA method, the perception scores of individuals who have received services from the H6 perception institution for each item, the perception scores of individuals who have received services from the H5 perception or target perception hospital for each item, the mathematical value required to achieve the

Table 2. The average of the j_e values of the items

Item code	Item definition	Arithmetic mean	Significance level
a	Hospitals should have modern equipment and equipment	0.05923	5
b	The buildings are visually attractive	0.00232	22
c	Employees should be well-dressed and proper-looking	0.00629	20
d	The materials used during the service should be modern and convenient	0.04152	8
e	Diagnosis and realization of treatment services at the given appointment time	0.06057	4
f	When patients have problems, being sympathetic and reassuring in solving these problems	0.03491	10
g	Performing the procedures applied to patients for the first time and correctly	0.25175	1
h	Hospitals should perform services at the time they promise	0.04817	6
i	Keeping patient records regularly and completely	0.02270	14
j	Telling patients when the service will be performed	0.02046	15
k	Hospital employees should provide the requested services as soon as possible	0.07385	3
l	Hospital employees are always willing to help patients	0.02827	13
m	Hospital employees respond quickly to patients' requests, even if they are swamped	0.01767	17
n	Hospital employees give confidence to patients	0.03342	12
o	To make patients feel safe in the transactions related to the service they receive and in their relationships with the employee	0.04674	7
p	Employees should be polite	0.01800	16
q	Employees have sufficient information and do not leave questions unanswered	0.12981	2
r	Particular attention should be paid if patients feel the need	0.00567	21
s	Employees make patients feel special and show special attention	0.01018	19
t	Employees should know what the needs of patients are and should put the interests of patients above everything else	0.03490	11
u	A private hospital should keep patient interests at the forefront and do its best	0.04006	9
v	The working hours should be in the appropriate time zone for the patients	0.01315	18

Table 3. Sociodemographic findings of the participants who received services from H5 and H6 hospitals

Sociodemographic characteristics	n	%	Sociodemographic characteristics	n	%
Sex			Occupation		
Female	169	52.8	Public sector	99	30.9
Male	151	47.2	Private sector	123	38.4
Age			Housewives	52	16.3
19-30	68	21.3	Student	14	4.4
31-40	97	30.3	Retired	32	10.0
41-50	91	28.4	Revenue		
51 and above	64	20.0	0-2800 TL	74	23.1
Marital Status			2801-3500 TL	68	21.3
Married	247	77.2	3501-5000 TL	88	27.5
Single	73	22.8	5001 TL and above	90	28.1
Educational Status			Residence		
Illiterate	1	0.3	City Center	258	80.6
Primary school	11	3.4	Other Districts	58	18.1
Secondary school	15	4.7	Small town	3	0.9
High school	89	27.8	The village	1	0.3
Associate degree	49	15.3	Total	320	100
Bachelor degree	124	38.8			
Postgraduate education	31	9.7			

improvement rate target perception, and the evaluation of customer requirements that have a direct impact on point-of-sale service delivery. To determine the point-of-sale score (PS), the quality teams of H6 hospital was asked to evaluate 22 customer requirements (CR) in such a way that 1: low degree of effectiveness, 2: moderate effectiveness, and 3: significant effectiveness. As a result of all the values obtained, the raw (RW) and relative weights (REW) were calculated, and customer requirements were ranked. The improvement rate (IR) was obtained with the help of equation (13), the raw weight equation (14), and the relative weight equation (15). The planning matrix is shared table 4.

$$IR = \text{Target Performance Value} / \text{Current Performance Value} \quad (13)$$

$$RW = CR(x)IR(x)PS \quad (14)$$

$$REW(\%) = RW / (\text{Total RW}) \times 10 \quad (15)$$

Determination of technical requirements

After creating the planning matrix, the technical requirements to meet each customer's requirements have been determined. While determining the technical requirements, focus group meetings were held with the quality team of H6 hospital. The SERVQUAL Expectation Scale with 22 items was considered as

customer requirements. In this direction, at least one technical requirement has been determined for each item. Technical requirements are given in table 5.

Creating a relationship matrix

The relationship matrix is obtained by scoring the relationship between the technical requirements determined in response to the SERVQUAL Expectation Scale and the scale items between 0 and 3. In this context, the quality team of H6 hospital has evaluated the relationship between the technical requirements they have determined and the SERVQUAL Expectation Scale items. The relationships were evaluated as "Weak," "Moderate," or "Strong." 1: indicates a weak relationship, 2: indicates a moderate level relationship, and 3: indicates a strong relationship. The relationship matrix refers to the matrix in which customer and technical requirements are related. The relationship between customer requirements and technical requirements is given in table 6.

Creation of a technical evaluation matrix

Creating a relationship matrix is necessary to determine the priority status of technical requirements. The importance weights of the technical requirements were calculated using the DEMATEL method. These calculated weights are evaluated as raw weights in the technical evaluation matrix. After the raw weights, the relative weights were calculated with the help of equation (15). In addition, the quality team of H6 and the rival institution H5 hospital were asked to evaluate the technical requirements determined in such a way that "1: very insufficient, 2: insufficient, 3: neither sufficient nor insufficient, 4: sufficient, and 5: very sufficient," taking into account the current situation of the institution where they work. In this context, the improvement rates have been calculated by considering the evaluations made by the quality team. The improvement rates were obtained by dividing the evaluation made by the H5 hospital for each technical requirement by the evaluation made by the H6 hospital. The formula for calculating the improvement rate is given in equation (13). The findings related to the technical evaluation carried out are given in table 7.

Creation of the correlation matrix

At this research stage, the DEMATEL method was used to determine the internal relationships among

Table 4. Planning matrix

Customer requirements	Weight of importance	H6 Perception	H5 Perception (target)	Improvement rate	Point of sale	Raw weight	Relative weight	Ranking
CR1	0.05923	4.28000	4.16471	0.97306	2	0.11527	4.15732	5
CR2	0.00232	4.26667	4.18235	0.98024	1	0.00227	0.08196	22
CR3	0.00629	4.33333	4.38824	1.01267	1	0.00637	0.22960	20
CR4	0.04152	4.26000	4.19412	0.98453	3	0.12262	4.42258	8
CR5	0.06057	4.10000	3.98235	0.97131	3	0.17651	6.36625	4
CR6	0.03491	4.05333	3.96471	0.97813	3	0.10244	3.69474	10
CR7	0.25175	4.03333	3.91765	0.97132	3	0.73360	26.45888	1
CR8	0.04817	4.13333	4.08235	0.98767	3	0.14273	5.14784	6
CR9	0.02270	4.26667	4.25294	0.99678	2	0.04526	1.63238	14
CR10	0.02046	4.22667	4.09412	0.96864	3	0.05946	2.14443	15
CR11	0.07385	4.10667	4.08235	0.99408	3	0.22022	7.94291	3
CR12	0.02827	4.03333	4.09412	1.01507	3	0.08609	3.10517	13
CR13	0.01767	3.90000	3.83529	0.98341	3	0.05214	1.88072	17
CR14	0.03342	4.06000	3.97059	0.97798	3	0.09806	3.53684	12
CR15	0.04674	4.00667	4.00000	0.99834	3	0.13999	5.04911	7
CR16	0.01800	4.22000	4.23529	1.00362	2	0.03614	1.30340	16
CR17	0.12981	4.04667	3.95882	0.97829	3	0.38097	13.74045	2
CR18	0.00567	3.98667	3.87059	0.97088	2	0.01101	0.39717	21
CR19	0.01018	3.94667	3.86471	0.97923	2	0.01994	0.71907	19
CR20	0.03490	3.77333	3.62353	0.96030	2	0.06703	2.41748	11
CR21	0.04006	3.84000	3.65294	0.95129	3	0.11433	4.12373	9
CR22	0.01315	4.22000	4.29412	1.01756	3	0.04015	1.44798	18

the 37 technical requirements identified by the quality team of H6 hospital, to identify which requirements influence others, and to calculate the factor weights. Expert opinions or the averages of the values in the total relationship matrix were used to determine the threshold value. The threshold value is used to explain how one factor influences others. This study calculated the threshold value by taking the average values in the total relationship matrix (0.0238). After determining the threshold value, the influencing and influenced factors were identified. The DEMATEL method was used to determine the internal relationships between the 37 technical requirements determined by the quality team of H6 hospital. The DEMATEL form was applied to two employees working in the quality unit of H6 hospital who are experts

in their field. A scale of 0: ineffective, 1: effective, 2: highly effective, and 3: very highly effective was used for the experts' evaluations. Technical requirements weights are given in table 8.

In transferring the findings obtained by the DEMATEL method to the correlation matrix of the quality house, it is necessary to determine the level of impact of technical requirements. In this context, the technical requirements remaining at the threshold value and below are ineffective, while the technical requirements exceeding the threshold value are grouped as 0: Weak, 1: Moderate, 2: Strong, and 3: Very Strong, taking into account the scores given by the participants.

All results are visualized in the quality house and are given in figure 2.

Table 5. Customer requirements and technical requirements

Customer Requirements	Technical Requirements
Hospitals should have modern equipment and equipment	Technology tracking Adequacy of technological equipment The financial strength of the institution Specialized personnel
The buildings are visually attractive	Visualization Smart and modern building Hygiene and comfort
Employees should be well-dressed and proper-looking	Supervision of work and personnel by department managers Compliance with procedures and instructions
The materials used during the service should be modern and convenient	Financial strength of the institution
Diagnosis, realization of treatment services at the given appointment time	Patient notifications via SMS and e-mail Appointment analysis Planning
When patients have problems, being sympathetic and reassuring in solving these problems	Patient rights department and the presence of experts in this department Accessibility Communication and empathy training
Performing the procedures applied to patients for the first time and correctly	Advanced technology usage Procedures carried out by experts in the field
Hospitals should perform services at the time they promise	Supervision of work and personnel by department managers Periodic maintenance of equipment Planning
Keeping patient records regularly and completely	Number and competency of employed personnel Efficiency and reliability of the automation system
Telling patients when the service will be performed	Being a trustworthy institution Effective communication
Hospital employees should provide the requested services as soon as possible	Efficient and effective use of resources Adequacy of technological equipment Number and competency of employed personnel
Hospital employees are always willing to help patients	Communication and empathy training

(Continues)

Table 5. Customer requirements and technical requirements (continued)

Customer Requirements	Technical Requirements
Hospital employees respond quickly to patients' requests, even if they are swamped	Nurse call system Motivation Job and wage satisfaction
Hospital employees give confidence to patients	Informing patients and obtaining their consent Involving patients in the process Corporate identity Communication and empathy training
To make patients feel safe in the transactions related to the service they receive and in their relationships with the employee	Attention to patient privacy Effective customer management Effective communication Informing patients and obtaining their consent
Employees should be polite	In-service training programs
Employees have sufficient information and do not leave questions unanswered	Procedures carried out by experts in the field Specialist personnel in their respective fields Communication and empathy training
Particular attention should be paid if patients feel the need	Number and competency of employed personnel
Employees make patients feel special and show special attention	Number and competency of employed personnel Hygiene and comfort Reception and guidance staff
Employees should know what the needs of patients are and should put the interests of patients above everything else	Communication and empathy training Patient rights department and the presence of experts in this department
A private hospital should keep patient interests at the forefront and do its best	Corporate image Being a trustworthy institution Competitive structure
The working hours should be in the appropriate time zone for the patients	Accessibility Providing 24/7 service Offering outpatient services after regular working hours based on patient needs

Table 6. Relationship between customer requirements and technical requirements

Customer requirements	Technical requirements	Relationship level
Hospitals should have modern equipment and equipment	Technology tracking	2
	Adequacy of technological equipment	2
	The financial strength of the institution	3
	Specialized personnel	1
The buildings are visually attractive	Visualization	2
	Smart and modern building	3
	Hygiene and comfort	2
Employees should be well-dressed and proper-looking	Supervision of work and personnel by department managers	2
	Compliance with procedures and instructions	3
The materials used during the service should be modern and convenient	Financial strength of the institution	2
Diagnosis, realization of treatment services at the given appointment time	Patient notifications via SMS and e-mail	2
	Appointment analysis	2
	Planning	2
When patients have problems, being sympathetic and reassuring in solving these problems	Patient rights department and the presence of experts in this department	3
	Accessibility	3
	Communication and empathy training	2
Performing the procedures applied to patients for the first time and correctly	Advanced technology usage	2
	Procedures carried out by experts in the field	3
Hospitals should perform services at the time they promise	Supervision of work and personnel by department managers	1
	Periodic maintenance of equipment	3
	Planning	3

(Continues)

Table 6. Relationship between customer requirements and technical requirements (continued)

Customer requirements	Technical requirements	Relationship level
Keeping patient records regularly and completely	Number and competency of employed personnel	3
	Efficiency and reliability of the automation system	3
Telling patients when the service will be performed	Being a trustworthy institution	2
	Effective communication	3
Hospital employees should provide the requested services as soon as possible	Efficient and effective use of resources	3
	Adequacy of technological equipment	2
Hospital employees are always willing to help patients	Number and competency of employed personnel	3
	Communication and empathy training	2
Hospital employees respond quickly to patients' requests, even if they are swamped	Nurse call system	3
	Motivation	2
	Job and wage satisfaction	3
Hospital employees give confidence to patients	Informing patients and obtaining their consent	3
	Involving patients in the process	3
	Corporate identity	3
To make patients feel safe in the transactions related to the service they receive and in their relationships with the employee	Communication and empathy training	3
	Attention to patient privacy	3
	Effective customer management	3
Employees should be polite	Effective communication	3
	Informing patients and obtaining their consent	3
	In-service training programs	1
Employees have sufficient information and do not leave questions unanswered	Procedures carried out by experts in the field	3
	Specialist personnel in their respective fields	3
	Communication and empathy training	2

(Continues)

Table 6. Relationship between customer requirements and technical requirements (*continued*)

Customer requirements	Technical requirements	Relationship level
Particular attention should be paid if patients feel the need	Number and competency of employed personnel	3
Employees make patients feel special and show special attention	Number and competency of employed personnel	3
	Hygiene and comfort	2
	Reception and guidance staff	2
Employees should know what the needs of patients are and should put the interests of patients above everything else	Communication and empathy training	2
	Patient rights department and the presence of experts in this department	3
A private hospital should keep patient interests at the forefront and do its best	Corporate image	3
	Being a trustworthy institution	3
	Competitive structure	3
The working hours should be in the appropriate time zone for the patients	Accessibility	2
	Providing 24/7 service	3
	Offering outpatient services after regular working hours based on patient needs	3

Discussion

According to the degrees of importance determined within the scope of the research, the most critical customer requirements are, respectively, "The procedures applied to patients are performed correctly and correctly the first time" (0.25175), "Employees have sufficient information and do not leave questions unanswered" (0.12981), "Hospital employees provide the requested services as soon as possible" (0.07385), "Diagnosis, treatment services are performed at the given appointment time" (0.06057) and "Hospitals have modern equipment and equipment" (0.05923). This is determined. In this context, it can be said that the most critical expectations of participants from a private hospital are the accuracy of the procedures performed during the diagnosis and treatment process, that the correct procedure was performed the

Table 7. Technical evaluation matrix

Technical requirement code	Raw weights	Relative weights	H6	H5 (Target)	Improvement rate
TR ₁	0.03943	3.94263	4	5	1.25
TR ₂	0.02636	2.63572	3	5	1.67
TR ₃	0.04014	4.01353	3	5	1.67
TR ₄	0.02116	2.11601	3	5	1.67
TR ₅	0.01534	1.53439	4	5	1.25
TR ₆	0.02162	2.16223	4	5	1.25
TR ₇	0.03073	3.07260	4	5	1.25
TR ₈	0.03267	3.26697	4	5	1.25
TR ₉	0.01458	1.45848	4,5	5	1.11
TR ₁₀	0.01687	1.68709	5	5	1.00
TR ₁₁	0.02321	2.32120	4	5	1.25
TR ₁₂	0.02703	2.70254	5	5	1.00
TR ₁₃	0.02639	2.63892	3,5	5	1.43
TR ₁₄	0.03450	3.44961	4	5	1.25
TR ₁₅	0.03363	3.36297	4	5	1.25
TR ₁₆	0.02246	2.24580	4	5	1.25
TR ₁₇	0.02328	2.32764	4,5	5	1.11
TR ₁₈	0.02847	2.84671	3,5	5	1.43
TR ₁₉	0.03450	3.45001	3,5	5	1.43
TR ₂₀	0.03219	3.21893	3	5	1.67
TR ₂₁	0.02849	2.84896	3	5	1.67
TR ₂₂	0.03223	3.22252	3,5	5	1.43
TR ₂₃	0.02329	2.32889	4	5	1.25
TR ₂₄	0.01727	1.72684	3,5	5	1.43
TR ₂₅	0.01657	1.65729	3	5	1.67
TR ₂₆	0.01908	1.90821	2	5	2.50
TR ₂₇	0.01810	1.81001	4,5	5	1.11
TR ₂₈	0.02687	2.68662	4	5	1.25
TR ₂₉	0.02204	2.20354	4	5	1.25
TR ₃₀	0.02271	2.27091	3	5	1.67
TR ₃₁	0.04261	4.26077	4	5	1.25
TR ₃₂	0.05083	5.08286	3	5	1.67
TR ₃₃	0.02322	2.32197	3	5	1.67
TR ₃₄	0.02642	2.64152	3	5	1.67
TR ₃₅	0.01619	1.61948	4	5	1.25
TR ₃₆	0.03721	3.72072	3	5	1.67
TR ₃₇	0.03235	3.23491	4	5	1.25

first time, employees who are experts in their field and do not leave questions unanswered, providing the desired service as soon as possible, adhering to the

Table 8. Weights of technical requirements

Technical requirement code	Description of the technical requirement	Weights (%)	Impact of the technical requirement
TR ₁	Specialized personnel	0.0394	Affecting
TR ₂	Technology tracking	0.0264	Affected
TR ₃	The financial strength of the institution	0.0401	Affected
TR ₄	Smart and modern building	0.0212	Affecting
TR ₅	Visualization	0.0153	Affected
TR ₆	Hygiene and comfort	0.0216	Affecting
TR ₇	Compliance with procedures and instructions	0.0307	Affecting
TR ₈	Job and personnel tracking of department managers	0.0327	Affecting
TR ₉	Patient information via SMS and e-mail	0.0146	Affected
TR ₁₀	Appointment analysis	0.0169	Affecting
TR ₁₁	Patient rights department and the presence of specialists in the department	0.0232	Affected
TR ₁₂	Accessibility	0.0270	Affected
TR ₁₃	Communication and empathy training	0.0264	Affected
TR ₁₄	The use of advanced technology	0.0345	Affecting
TR ₁₅	Applications made by experts in the field	0.0336	Affected
TR ₁₆	Periodic maintenance of equipment	0.0225	Affected
TR ₁₇	Ensuring that the automation system is fast and reliable	0.0233	Affecting
TR ₁₈	Number of employees and their competence	0.0285	Affected
TR ₁₉	Becoming a reliable institution	0.0345	Affected
TR ₂₀	Effective customer management	0.0322	Affected
TR ₂₁	Effective and efficient use of resources	0.0285	Affected
TR ₂₂	Adequacy of technological equipment	0.0322	Affected

(Continues)

Table 8. Weights of technical requirements (continued)

Technical requirement code	Description of the technical requirement	Weights (%)	Impact of the technical requirement
TR ₂₃	In-service training	0.0233	Affected
TR ₂₄	Nurse call system	0.0173	Affecting
TR ₂₅	Motivation	0.0166	Affected
TR ₂₆	Job and wage satisfaction	0.0191	Affected
TR ₂₇	Informing the patients and obtaining their consent	0.0181	Affected
TR ₂₈	Corporate identity	0.0269	Affecting
TR ₂₉	Taking care of patient privacy	0.0220	Affected
TR ₃₀	Reception and forwarding staff	0.0227	Affecting
TR ₃₁	Corporate image	0.0426	Affecting
TR ₃₂	Competitive structure	0.0508	Affecting
TR ₃₃	Providing after-hours outpatient clinic services according to patient needs	0.0232	Affected
TR ₃₄	Planning	0.0264	Affecting
TR ₃₅	Inclusion of patients in the process	0.0162	Affected
TR ₃₆	Effective communication	0.0372	Affecting
TR ₃₇	Providing 24/7 service	0.0323	Affecting

given appointment time, and using the most up-to-date tools and equipment by following the latest technology of the hospital. In addition, it is observed that the most critical expectations of the participants regarding a private hospital are usually related to the service delivery process. At this point, the importance of quality emerges in the service delivery process.

The least essential customer requirements were determined to be “Visually attractive buildings” (0.00232), “Special attention should be paid if patients feel the need” (0.00567), “Employees should be well dressed and neat-looking” (0.00629), “Employees should make patients feel special and show special attention” (0.01018), and “Working hours should be in the appropriate time zone for patients” (0.01315), respectively. As a result of the findings obtained, it is observed that the least essential expectations of the participants regarding a private hospital are usually

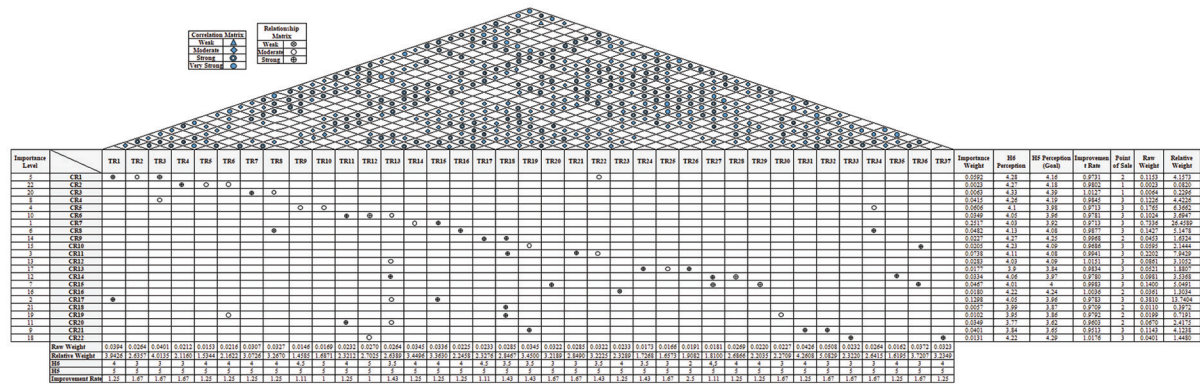


Figure 2. House of quality.

related to physical characteristics and enthusiasm. In this direction, it can be said that the participants attach more importance to trust, expert employees in their field, and timely and high-quality service delivery than physical characteristics, special attention, and enthusiasm.

Camgöz-Akdağ et al.³³ determined that the behavior and attitude of the staff are the most critical customer requirements in their research. "The fact that hospitals have modern equipment and equipment," determined to be the fifth most crucial customer requirement in the research, was identified as the most critical patient expectation in Karahan's research, which determines inpatient wishes.²⁰ Altuntaş and Kansu³⁴ found that the most critical customer expectations are employees who respect inpatient privacy, a sufficient number of toilets/bathrooms, the frequency of doctors' patient visits, and appropriate patient visiting hours for patient relatives. Naralan and Çetinyokuş³⁵ concluded in their research that the most critical customer requirements are protecting the patient's interests and responsiveness to patients' questions; the least essential customer requirement is to provide the services entirely offered the first time. Devecan and Aksaraylı³⁶ state that the factors related to reliability and trust are evaluated as the most important dimension of service quality because health care is directly related to human life, and it is necessary to provide accurate and reliable service. In the related study, physical characteristics and items related to empathy were evaluated as the least important. Gülmez and Kitapçı³⁷ concluded that specialized doctors and nurses are the most critical factors in choosing a hospital. Gavahi et al.³⁸ found that the most critical customer requirements are modern equipment, accurate and short-term execution of transactions, and sufficient

equipment and employees. They found that the willingness of employees to help is among the least essential customer requirements. Since no research has an exact similarity with the research, it can be stated that the findings obtained are partially parallel to some studied research findings.

In the study, the SERVQUAL scale was applied to a total of 320 volunteer participants, including 170 who received services from the H5 hospital and 150 who received services from the H6 hospital, to determine the performance scores of the hospitals. As a result of the evaluations, hospital performance scores were obtained. According to the H5 hospital performance scores, it was found that the factors that patients were most satisfied with were "The employees are well-dressed and neat-looking" and "The working hours are in the appropriate time zone for the patients." Patients are least satisfied with the factors that "Employees know what patients' needs are and put patients' interests above everything" and that "A private hospital prioritizes patient interests and does its best." According to the H6 hospital performance scores, "Employees are well dressed and neat-looking" and "Hospitals have modern equipment and equipment" are the factors that patients are most satisfied. The minor patient satisfaction factors are the same as those in H5 hospital. As a result of the findings, it can be stated that patients are satisfied that the employees are well-dressed and neat-looking. At the same time, it can be stated that there is dissatisfaction in hospitals that do not care about patient interests and that the best service is not provided. To improve service quality, it may be recommended that improvements be implemented aimed at low perceived service quality statements. Improvements to be made to these service quality items may provide an increase in perceived service

quality and patient satisfaction. Rahman et al.³⁹ concluded that participants' perceptions of the items "Hospitals have modern tools and equipment" and "Hospitals' physical facilities are visually attractive" were the lowest, whereas their perceptions of the items "Hospital employees are knowledgeable" and "Hospital employees are polite" were the highest. Gülmez and Kitapçı³⁷ determined that the participants' perceptions of the physical characteristics of the health institution were at a low level, whereas their highest perceptions were related to the competence and trust of health workers. Butt and de Run⁴⁰ determined that the lowest perception was related to the special attention of the staff, the modern building, and the friendly treatment. The highest perception is related to the fact that the staff does not leave questions unanswered, builds trust, and performs the services at the promised time. Savaş and Kesmez⁴¹ found that the lowest level of perception of the participants related to physical characteristics: "This family health center has modern tools and equipment." In their statement, the highest level of perception is related to reliability: "When patients have a problem, these family health center employees show sincere interest in solving it." In their research conducted in Iran, Matin et al.⁴² concluded that the lowest perception is that the institution has modern and up-to-date equipment.

As a result, the findings have determined that the customer requirement with the highest improvement rate is "To have working hours in the appropriate time zone for patients." It has been concluded that the lowest improvement rate is "For a private hospital to prioritize patient interests and do its best." Considering the improvement rates, it can be said that it will benefit H5 hospital to carry out improvement activities in terms of working hours to ensure customer satisfaction and maintain competition.

Within the scope of the research, focus group interviews were conducted with two specialists working in the quality team of H6 hospital. One of the questionnaires applied to the experts in the focus group interviews is the point-of-sale evaluation questionnaire. The point of sale refers to evaluating customer requirements that can directly affect the service delivery for each customer requirement. A higher point of sale than competitors means that the organization under study has a competitive advantage.⁴³ In their evaluation, experts stated that the customer requirements of "Visually attractive buildings" and "Well-dressed and neat-looking employees" are of low practical importance in service delivery. "Employees should know

what patients' needs are and keep patients' interests above everything", "Special attention should be paid if patients feel the need", "Employees should make patients feel special and show special attention", "Employees should be polite", "Hospitals should have modern equipment and equipment" and "Patient records should be kept regularly and completely" customer requirements are moderately effective. customer requirements are moderately effective. Experts have stated that other customer requirements are significantly practical. It is observed that the customer requirements, which are low-degree and moderately effective, are mainly related to physical characteristics and enthusiasm. It can be said that the sales point evaluation scores and priority rankings for customer requirements show parallelism.

As a result of evaluating the relationships between technical requirements and customer requirements, it was determined that the technical requirement of "Hospitals to have modern equipment and equipment" and the technical requirement of "specialized personnel," the customer requirement of "Hospitals to perform services at the promised time," the technical requirement of "Department managers to track work and personnel," and the technical requirement of "Employees to be polite" and the technical requirement of "In-service training" are poorly related. In this context, it can be said that the improvements that the hospital will make regarding equipment will not affect the level of expertise of the staff and, therefore, customer satisfaction. It is thought that factors such as planning, periodic maintenance of the equipment used, modern tool use, patient density, and the number of health workers can impact the delivery of services at the promised time. Although in-service training is carried out for employees to gain competence or skills in certain subjects, it is believed that being polite to the patient or patient's relatives may be related to the employee's personal characteristics, job satisfaction, and burnout level.

When the weights of the technical requirements are examined in the technical evaluation matrix, it is seen that the technical requirements of "TR32 competitive structure," "TR31 corporate image," and "TR3 financial strength of the institution" are the most important technical requirements for ensuring customer satisfaction. It is expected that the health institution will be in a competitive structure and will be able to maintain its existence in an intensely competitive environment. For this reason, the institution's competitiveness level is considered essential. Corporate image can be effective in patients'

decision-making processes and in maintaining the competitive advantage of the health institution on Sundays.⁴⁴ For this reason, it can be stated that it is not surprising that it is among the most critical technical requirements in the research. Tzeng et al.⁴⁵ concluded that nurses' job satisfaction positively affects inpatient satisfaction. Szecsenyi et al.⁴⁶ found that the job satisfaction of health workers other than physicians in primary health institutions affects patient satisfaction. Janicijevic et al.⁴⁷ found that despite the general belief that health worker satisfaction significantly impacts patient satisfaction, the two factors are relatively poorly related in their research. In their research, Emül and Naldöken⁴⁸ found a strong, positive, significant relationship between corporate image and patient satisfaction. Similarly, Hoşgör and Cengiz⁴⁹ determined that corporate image positively affects patient satisfaction in private hospitals. Biçer⁵⁰ also found that corporate image impacts patient satisfaction. The fact that institutions have a strong economy is among the most critical factors for the institution's future. Institutions with a strong economy and financial performance provide a competitive advantage. A strong economy brings branding, customer satisfaction, competitiveness, and sustainability.⁵¹ To increase quality and performance in an intensely competitive environment and ensure customer satisfaction and efficiency, the institution's financial strength must be high.

The technical requirement that needs to be improved the most is "TR26 job and wage satisfaction." In the health sector, which is labor-intensive, it is unlikely that an employee with low job satisfaction will provide quality services and ensure patient satisfaction.⁵² For individuals to receive high-quality and effective health services, service providers must be satisfied with their jobs and the institutions they serve.⁵³ Schneider et al.⁵⁴ state that there may be a relationship between a decline in patient satisfaction, a decrease in job satisfaction, and an increase in burnout among physicians. In addition, Nal and Nal⁵⁵ found that wage significantly affects job satisfaction. In this context, it can be said that implementing improvements aimed at ensuring wage satisfaction will also positively impact job satisfaction. In addition, it is stated that a more friendly and efficient business environment has been created by improving the quality of service, and therefore, employees' job satisfaction levels have increased.⁵⁵

Conclusions

Based on the results obtained, it may be recommended that H6 hospital follow developments

regarding the equipment used in the diagnosis and treatment process and increase the number of trained, specialized personnel involved in providing health services with equipment. Hospital employees are expected to provide the requested services as soon as possible. In this context, emphasis can be placed on taking care not to disrupt appointment hours, putting into operation applications that will shorten waiting times, and employing sufficient staff. In addition, for diagnostic and therapeutic services to be performed at the given appointment time and to avoid delays in appointments, standard appointment times can be determined, and it may be recommended that you take care not to exceed these periods. Care can be taken not to disrupt the periodic maintenance of the technological equipment. An automation system can be installed to track appointment times. Attention can be drawn to the fact that the tools and equipment in the hospital are modern and innovations are followed. Communication between patients and employees is also essential.

In this context, it is thought that providing regular in-service training on the attitudes and behaviors of employees, communication skills, clothing, ways of handling complaints, and problem-solving abilities may be beneficial for the institution. To encourage other employees, employees who pay attention to their clothing during working hours, behave with care and discretion in communicating with patients, are solution-oriented, and have a high level of knowledge and skills can be rewarded. The hospital building's decor, safety, and capacity are also important. Emphasis can also be placed on the timely implementation of the necessary repairs and renovations to the hospital building.

The findings reveal that health managers can use the recommended integrated approach to improve the quality of services. In addition, healthcare organizations need continuous improvement tools to meet and exceed customer requirements. Health managers are also trying to find the best way to meet and exceed customer requirements. It is thought that the approach used in the study can be used as a continuous improvement tool for quality health service delivery. Healthcare organizations have to develop innovative ideas and approach development from a strategic point of view in order to cope with intense sector competition. Based on this, health institutions need to design their services based on customer requirements. When research on the quality of health care is examined, it is seen that it is more focused on how to investigate the quality of service or that the quality of service

is considered in one way. This study is critical because it addresses the issues of service quality, service improvement, and customer-oriented service design. The approach used in the research is based on customer-oriented service design and offers an overall assessment to reduce possible errors encountered in the service delivery process and improve service quality by considering customer requirements.

In line with the approach adopted for quality improvement in healthcare, the information required for the quality house was analyzed simultaneously using different tools. As a result of all the results obtained, a quality house was created. Areas of improvement can be easily identified using the quality house, where all results are visualized. In this way, hospital managers can easily make decisions about the optimal allocation of resources. In addition, the current situation of the areas requiring resource allocation and the competing organizations can be evaluated by associating customer satisfaction as the final goal. Because health services have an essential place in our lives, this research is vital because it provides preliminary information to health managers about the areas where improvements will be made based on customer requirements. With the approach adopted in the research, health managers can determine the institution's strengths and weaknesses by considering customer requirements during the service delivery process. In addition, it can consider which customer requirements are a priority and can be more effective in the quality improvement process and focus on prioritizing those requirements.

Health institutions must determine customer requirements that significantly impact their competition within the sector, rank them, identify areas for improvement, and start operations. QFD is an effective tool at this point. The quality house, a part of QFD, allows the visual presentation of all the results.

Limitations

The SERVQUAL scale was applied using the SWARA method to determine participants' expectations regarding healthcare service quality. The SWARA method is based on expert opinion. For this reason, it includes subjective evaluations of the participants. If the participants are selected from different audiences and the criteria change, the relationship network and factor weights will change. In this direction, the number of participants was kept high in order to reduce subjectivity as much as possible and to

obtain reconciled results. The stated limitations should be taken into account when interpreting the research findings.

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Conflicts of interest

The authors declare no conflicts of interest.

Ethical considerations

Protection of human subjects and animals. The authors declare that no experiments on humans or animals were performed for this research.

Confidentiality, informed consent, and ethical approval. The authors have followed their institution's confidentiality protocols, obtained informed consent from all patients, and secured approval from the Ethics Committee. SAGER guidelines have been followed as applicable to the nature of the study.

Declaration on the use of artificial intelligence. The authors declare that no generative artificial intelligence was used in the writing or creation of the content of this manuscript.

The research was conducted in a private hospital serving the Black Sea Region, Türkiye. To carry out the research, ethical permission was obtained from the Social and Human Sciences Ethics Committee of Ondokuz Mayıs University on 31.12.2021 with decision number 2021-988. Informed consent was obtained from all participants participating in the study. The principles of the Declaration of Helsinki were complied with in the collection of research data and all processes of the research.

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