International Journal of Advanced Computer Technology (IJACT)

ISSN:2319-7900

Decision Making On Service Quality Characteristics And Performance Measures Investigation Through Applying Quality Function Deployment; A Case Study in Jordanian Military Hospitals

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Abstract

The issue of Service Quality in the provisioning and delivery of medical becomes so vital. In an attempt to explore this issue, this article first provides an overview of the Quality Function Deployment (QFD) and Service Quality Characteristics and Performance Measures concerning the different players in military hospitals in Jordan. In its second part and based on the QFD technique, the article reports critical service quality characteristics that need to be enhanced by the studied military hospital in Jordan. From the study, it was found the service quality performance of the studied hospital was around 83% which the hospital top management feels satisfactory.

Key words: Critical service quality, House Of Quality (HOQ), performance, Quality Function Deployment (QFD).

Introduction

In today's global and highly competitive world, Health care institutions across the world are facing challenges in the delivery and provisioning of services in the medical sector.

Service Quality Characteristics and Performance is a major component of today's healthcare systems to provide the optimum service. Therefore a comprehensive and effective structured approach is essential to make sure that the service quality is in the best form.

Quality Function Deployment [QFD) is a systematic, user-driven quality assurance and improvement method which focuses on meeting customers' demands in the process of product development. This concept was developed in the early 1970s in Japan by Dr. Shigeru Mizuno from the Tokyo Institute of Technology. Then, QFD developed into a set of scientific research methods which could design and produce systematically on a basis of customers' expectations, and provided in-depth product evaluation [2].

In this context, Case study of military hospitals was studied by a team of chemical engineers in the hospital to establish the management philosophy of development as the main line and quality services for the hospital. This study concerned with finding services concerned by users and identified key areas of customer satisfaction to be improved.

Any institution in the health sector depends basically on the customers to improve, support its position and benchmarking between the competitors. A lot of methodologies and tools were established or improved throughout the last forty years like, TQM concept; International Standardization Organization (ISO), Just-in-Time (JIT) and Quality Function Deployment (QFD). Each one of these methodologies had its particularity properties, specifications and its influence on the service or production provided [1].

Aiming at improving hospital service to meet customer's satisfaction, this paper suggests an applicable model used to modify hospital service quality based on QFD concept. The suggested model will find the service items improved preferentially through quantitative analysis, which will help relevant departments making better decision.

Literature review

Quality Function Deployment [QFD) is one of the TQM quantitative tools and techniques that could be used to translate customer requirements and specifications into appropriate technical or service requirement. This is important in order to deliver product or service that fulfills or exceeds customer requirements [3]. QFD uses visual planning matrices that link customer requirements, design requirements, target values and competitive performance into one chart [4].

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By 1980s, QFD was introduced to Euramerican developed country and been applied widely [2]. The Cadillac car model 1992, considered one of the greatest car models that had attracted many customers at that time, this car model has been planned and designed entirely using the QFD technique [3].

In 2000, Valtasaari explored the ability of QFD to improve the efficiency of product development at Nokia Mobile Phones with a special emphasis given to locating and solving conflicting product parameter issues [1].

In 2010, Hamidullah investigated the using of QFD as a tool for development the car dashboard of Toyota and Honda motor cars. He used a questionnaire to get the VOC which translated to customers' needs which were then converted into technical specifications. The output from House Of Quality (HOQ) was used in concept generation. Pugh chart was used for concept selection. Computer Aid Drawing (CAD) models of the selected concepts were presented [1].

Regarding the application of QFD in quality service in medical sector, recent attempts to apply QFD principles to the healthcare sector concentrated upon gaining greater understanding of customers' needs and how to engineer the process to best meet these needs [1].

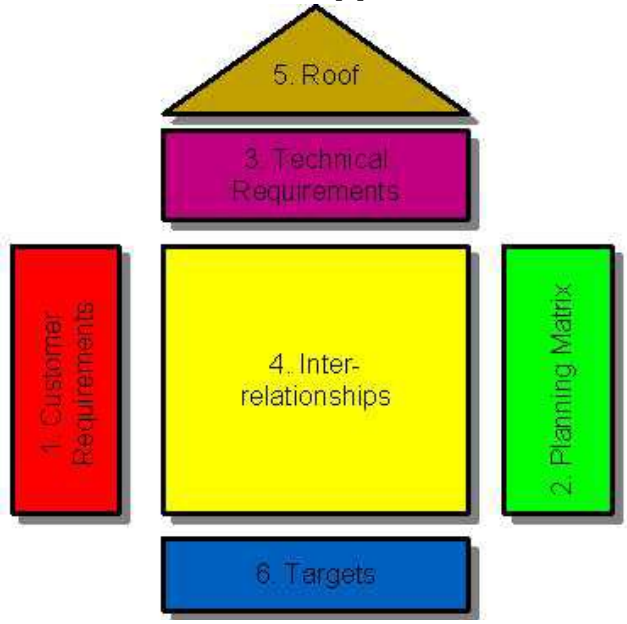

Figure 1, House Of Quality (HOQ) [6]

Most of the early studies on QFD in medical sector were primarily conducted from the viewpoint of medical services and medical safety. In 1990, Puritan-Bennett, a medical equipment company, successfully used QFD to help redesigning its spirometry business in order to regain their market share [1].

In relation to the quality of service, a number of experts explained this concept with the understanding that reinforces each other in accordance with the perspective that is used to determine the characteristics of a specific service. Service quality is a comparison between the realities of the service received with expectations for the service to be received [5].

Methodology:

Case study methodology was used in this research by a team of chemical engineers in two military hospitals: Prince Ali Military Hospital (PAMH) and King Hussein Medical Centre (KHMC). It started from identifying the customer requirements (Voice Of Customer) (VOC) which are a specific group of medical sectors dealers in order to get their feedback on the QFD matrix which called also HOQ case study model as shown in figure 1.

This model was designed to present details needed for performance measures. The case study model included information regarding the importance weight of customer requirements, hospital service performance, competitive assessment, and performance assessment.
In order to construct HOQ of QFD, the six sections of the HOQ in figure 1 have been identified and described in detail as stated in [2]:

1- Customer desires' input (Whats) matrix. It represents what the customers need, namely the requirements for the product and service attributes, and is the "What" of HOQ.

2- Quality planning and competition evaluation. This part stands for customers to evaluate whether the enterprises' products/services and other competitors' products in the market can satisfy customers requirements. And the assessments are comprised of evaluations on importance of customers requirements, competitiveness of products/services, current situation of products/services, service of the competitors, and the performance/point of sales which can be reached by improved products/services.

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3- Technical requirements (Hows) matrix. It means that how the enterprises should design services and set up management requirements to satisfy customers' demands, namely the "How" of HOQ.

4- Interrelationship matrix. It describes the degree of relationship between customer's demands and technology/service management requirements which are necessary to satisfy customer desires, then translates customer demands into technology/service management requirements, and indicates the interrelationship between them.

5- Roof which represents the Quality characteristics relationship matrix

6- Hows' output matrix (Targets). It shows technical and cost evaluations of Hows, including the importance of technology/service management requirements, decision-making of target values, technical and competitive assessments. The results of evaluation are used to determine the priority items which should be improved by enterprises. The output can be obtained through qualitative and quantitative analysis, namely the "Hows" which will transform "what the customers need" into "how the enterprises should do".

Establishing customer requirements is the most important step in QFD process. In this research, the main customer requirements (WHATs) have been adapted from questionnaire written by the chemical engineers team and interviews. In these two cases, hospitals were visited physically in order to get direct observation of the different kinds of service quality characteristics problems they were facing. Second, it is important to establish technical specifications in QFD process.

In order to meet customers' requirements, the hospital's personnel involucrate had identified the technical specifications (HOWs). Other parameters for QFD matrix had also been identified. These parameters included the importance weight of customers' requirements and competitive assessment. They were assessed using the case study model; the relative and absolute weights of the customer requirements and technical specifications were calculated from QFD equations.

In this research, service performance characteristics and measures that need to be enhanced were defined team by the chemical engineer during data analysis and evaluation. The data collected from case study model has been integrated and analyzed to the QFD matrix. Then, the technical specifications were identified. These shall have the highest relative and absolute weights that the hospital should focus on and improve, in order to meet or exceed customer expectations and improve the service performance provided by the hospital. The last activity was measuring the service performance of the case study hospital. Finally, the quantitative value in % of the hospital's quality performance was measured by dividing the actual performance level to the maximum performance level.

Results and Discussions:

As stated earlier, the two main aims of this study are to measure service performance and identify service characteristics that need to be enhanced in order to improve the studied hospital's customer satisfactions. This can be achieved by constructing QFD matrix.

In building our QFD model, we began the first step which was identifying the customer (patients and reviewers) requirements as shown in table 1:

Table 1, Customers (Patients and reviewers) requirements, Voice Of Customer (VOC)

			Importance weight
Customers (Patients and reviewers) requirements Voice Of Customer (VOC)	Financial affairs	Cost of therapy	10
		Flexibility in paying ways	4
		Chances of offering discounts	8
	Human related factors	Performance of duty	10
		Staff's treatment ability of patients and reviewers treatment	7
	Technical af-	Applying the	6

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	fairs	updated technology	
		Meeting the standard requirements in all procedures	5
	Responsiveness factor	Rapid response for any query from the patient and reviewers.	10
	Availability factor	Availability of doctors and medical staff	9
		Availability of a lot of medical devices	5
	Reliability factor	Staff with best qualifications	10
		Safe medical device	8
	Geographic factor	Easiness of arriving the hospital	5
		Easiness of identifying the internal departments of the hospital	4

In this step the data collected from the PAMH and three experienced persons representing the major sectors of hospitals in Jordan (public, private and military) were used to evaluate the value of importance weighting for each performance indicator. This value was put on the Customers' requirements on the left side of HOQ as shown in table 1.

From the table, it was remarked that the cost of therapy was the most important performance aspect in the financial affairs and the flexibility in paying ways was the least important performance aspect in the financial affairs.
It was also remarked that performance of duty was the most important performance aspect in the human related factors and staff's treatment ability of patients and reviewers treatment was the least important performance aspect in the human related factors.

It was also noticed that rapid applying the updated technology was the most important performance aspect in the technical affairs and meeting the standard requirements in all procedures was the least important performance aspect in the technical affairs.

It was also remarked that rapid response for any query from the patient and reviewers was the most important performance aspect in the responsiveness factor, availability of doctors and medical staff was the most important performance aspect in the availability factor and availability of a lot of medical devices was the least important performance aspect in the availability factor.
It was also noticed that staff with best qualifications was the most important performance aspect in the reliability factor and Safe medical device was the least important performance aspect in the reliability factor.

It was also remarked that easiness of arriving the hospital was the most important performance aspect in the geographic factor and easiness of identifying the internal departments of the hospital was the least important performance aspect in the geographic factor.

The second step was establishing the service characteristics as shown in table2; this information was generated by identifying all the measurable characteristics of the PAMH staff which they were perceive they were related to meeting the specified customers' requirements.

Affinity diagrams were applied to interpret the PAMH characteristics; an additional row was put to illustrate the direction of change in each of these variables which was considered to result in an improvement in PAMH performance as shown in figure 2.

Technical Specifications	Modern concepts and tool adaption		Management role evaluation		Human recourses improvement			Logistic process improvement		Financial Abilities	
	Safety procedures implementation	Quality culture enhancement	Evaluation of managements involvement and empowerment of staff	Complexity of management process	Staff behavior training	Staff technical Training	Hiring more staff	Improve the supply process and Extenaim the guarantee penod	Adapting the purchasing policy according to ISO standards	Availability of big capital	Hospital website utilization to apply visa payment
	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑

Figure 2, Technical requirements and its direction of changes

ISSN:2319-7900

The roof matrix then constructed, it was used to identify where the technical requirements that characterized Service Quality Performance (SQP) supported or impeded one other. It has been worked through the cells of the roof asking the question: Does improving one requirement cause a deterioration or improvement in the other technical requirement? [1]

The roof highlighted where a focused design improvement could lead to a range of benefits to SQP. It focused attention on the negative relationships in the SQP. This represented opportunities for innovative solutions to be applied.

To construct the roof, the roofs for PAMH, KHMC and five experienced persons' matrices were found and then brainstorming was made to construct the average roof that represents all of them as shown in figure 3:

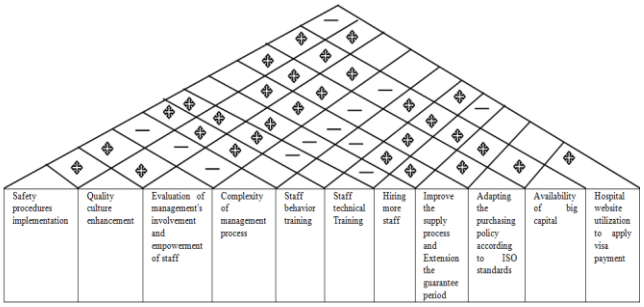

Figure 3, The roof

The planning matrix attached to the right side of the HOQ was then constructed. It quantified the customers' requirements priorities and the performance of PAMH staff. The measures used here were generated by questionnaires distributed in the hospital.

The planning matrix was established through quantifying the performance of PAMH and KHMC which obtained by finding the performance measure of performance variables in each category. The interpolation method was used to find the weighting ranking for each variable. The results were shown in table 2:

Table 2, Performance measure for PAMH

		Performance Measure
Financial affairs	Cost of therapy	5.0
	Flexibility in paying ways	2.2
	Chances of offering discounts	4.0
Human related factors	Performance of duty	5.0
	Staff's treatment ability of patients and reviewers treatment	3.54
Technical affairs	Applying the updated technology	3.1
	Meeting the standard requirements in all procedures	2.55
Responsiveness factor	Rapid response for any query from the patient and reviewers.	5.0
Availability factor	Availability of doctors and medical staff	4.52
	Availability of a lot of medical devices	2.4
Reliability factor	Staff with best qualifications	5.0
	Safe medical device	4.3
Geographic factor	Easiness of arriving the hospital	2.6
	Easiness of identifying the internal departments of the hospital	4.0

After the mean value for each performance indicator was obtained, the performance indicator cost of therapy was assigned a value of 5 because it had the highest mean value; the performance indicator flexibility in paying ways was assigned a value of 1 because it had the lowest mean value. The interpolation method was used to find the weight of each performance indicator.

The other measures of operators satisfaction included in the planned matrix were:

1. Service Quality Performance (SQP):

To calculate SQP, the interrelations matrix combining the technical requirements and VOC should be constructed. The level of interrelation discerned was weighted on a four point scale (High, Medium, Low and None which represent with space) and a symbol representing this level of interrelation was entered in the matrix cell [1]. To construct it, the matrices for PAMH and KHMC and five experienced people's matrices were found and then brainstorming was made to construct the average matrix that represented all of them as shown in table 3:

Table 3, Interrelation matrix

	Safety procedures implementation	Quality culture enhancement	Evaluation of management's involvement and empowerment of staff	Complexity of management process	Staff behavior training	Staff technical Training	Hiring more staff	Improve the supply process and Extension the guarantee period	Adapting the purchasing policy according to ISO standards	Availability of big capital	Hospital website utilization to apply visa payment
Cost of therapy	M	L	L	L	L	M	M	L	L	H	L
Flexibility in paying ways	L	H	M	H	L	M	L	L	L	H	H
Chances of offering discounts	L	L	L	L	L	L	L	M	L	H	M
Performance of duty	H	H	H	H	H	H	H	H	H	M	L
Staff's treatment ability of patients and reviewers treatment	M	M	M	L	H	M	M	L	L	L	L
Applying the updated technology	M	M	L	L	L	M	L	H	H	H	L
Meeting the standard requirements in all procedures	H	H	M	H	M	M	L	H	H	H	M
Rapid response for any query from the patient and reviewers.	L	H	L	M	H	M	H	L	L	L	L

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Availability of doctors and medical staff	L	H	M	L	M	L	H	L	L	H	L
Availability of a lot of medical devices	M	H	L	M	L	L	L	H	L	H	L
Staff with best qualifications	L	H	M	L	L	H	H	L	L	H	L
Safe medical device	H	H	L	H	L	M	L	H	H	H	L
Easiness of arriving the hospital	L	L	L	L	M	L	L	L	L	L	L
Easiness of identifying the internal departments of the hospital	L	L	L	L	H	L	L	L	L	L	L

Each level of interrelation weighting was assigned a score, e.g. High=9, Medium=3,
Low =1 and none =0. It was noticed from the table that the relationship between the safety procedures implementation and safe medical devices is high because the implementation enhances the existence of safe medical devices.

The relationship between hospital website utilization to apply visa payment and chances of offering discounts is moderate. The existence of hospital website utilization to apply visa payment affects the probability of offering discounts but its influence was not huge. When having the facility of payment through the website, that facilitates the discounts but not means having discounts in every case.

The relationship between hiring more staff and flexibility in paying ways is low because the flexibility in paying ways does not change whether hiring more staff or not.

Service quality performance (SQP) for the studied PAMH is calculated in terms of quantitative value by dividing the total maximum service performance level to the total actual service performance level. The following steps which have been adapted and modified were used to calculate SQP (7).

Actual performance is identified from the questionnaires administered to the hospital's customers. Maximum performance is the maximum performance the hospital could perform which is excellent and ranked with numerical number (5).

$$\text{Actual service performance} = \text{Final importance weight} \times \sum \text{Relationship value between WHAT and HOW for the technical requirements} \times \text{actual performance} \quad (1)$$

$$\text{Maximum service performance} = \text{Final importance weight} \times \sum \text{Relationship value between WHAT and HOW for the technical requirements} \times \text{maximum performance} \quad (2)$$

$$\text{Total actual service performance level} = \Sigma \text{Actual service performance} \quad (3)$$

the internal departments of the hospital					
			Total	17935.27	21626.0

$$\text{Total maximum service performance level} = \sum \text{maximum service performance} \quad (4)$$

$$\text{Service quality performance} = \frac{\text{Total actual service performance level}}{\text{Total maximum service performance level}} \quad (5)$$

Referring to the interrelation matrix and when applying the previous equations, the SQP for PAMH can be calculated using Equation (5) as shown in table 4:

Table 4, Service quality performance (SQP) analysis for PAMH

	Actual performance	Max performance	Importance weight	Actual service performance	Max service performance
Cost of therapy	5.0	5.0	10.0	1250.0	1250.0
Flexibility in paying ways	2.2	5.0	4.0	466.4	1060.0
Chances of offering discounts	4.0	5.0	8.0	736.0	920.0
Performance of duty	5.0	5.0	10.0	4250	4250.0
Staff's treatment ability of patients and reviewers treatment	3.54	5.0	7.0	718.62	1015.0
Applying the updated technology	3.1	5.0	6.0	762.6	1230.0
Meeting the standard requirements in all procedures	2.55	5.0	5.0	854.25	1676.0
Rapid response for any query from the patient and reviewers.	5.0	5.0	10.0	1950.0	1950.0
Availability of doctors and medical staff	4.52	5.0	9.0	1586.0	1755.0
Availability of a lot of medical devices	2.4	5.0	5.0	540.0	1125.0
Staff with best qualifications	5.0	5.0	10.0	2250.0	2250.0
Safe medical device	4.3	5.0	8.0	2098.4	2440.0
Easiness of arriving the hospital	2.6	5.0	5.0	169.0	325.0
Easiness of identifying	4.0	5.0	4.0	304.0	380.0

Service quality performance (SQP) of the studied Hospital, PAMH = $\frac{17935.27}{21626}$ = 82.9 % (6)

For KHMC, we did the same previous analysis and we got

Service quality performance (SQP) of the KHMC = $\frac{16875.45}{21626}$ =78% (7)

The result from the calculation shows that the current quality service performance of PAMH is about 83 %, its performance is better than KHMC, it is very critical for KHMC to further improve its SQP to higher level in order to ensure their customers are satisfied, thus provide long term sustainability and growth.

After determining the SQP and identifying the critical service characteristics that need to be improved, PAMH should have clearer vision of its strengths, weaknesses, opportunities and threats. In other words, the hospital had benchmarked itself against its competitors and identified the critical areas that need to be enhanced in order to improve customer satisfaction.

2. Planned satisfaction rating

The planned satisfaction rating quantified the level that PAMH staff plan to arrive it to achieve the operators satisfaction. They were obtained from its staff. The results of planned satisfaction rating were illustrated in table 5:

Table 5, planned satisfaction rating, improvement factor and the overall weighting of the performance indicators.

	planned satisfaction rating	improvement factor	overall weighting
Cost of therapy	5.0	0.0	0.0
Flexibility in	4.0	0.45	1.8

ISSN:2319-7900

paying ways			
Chances of offering discounts	5.0	0.2	1.0
Performance of duty	5.0	0.0	0.0
Staff's treatment ability of patients and reviewers treatment	5.0	0.292	1.46
Applying the updated technology	4.0	0.225	0.9
Meeting the standard requirements in all procedures	4.0	0.3625	1.45
Rapid response for any query from the patient and reviewers.	5.0	0.0	0.0
Availability of doctors and medical staff	5.0	0.096	0.48
Availability of a lot of medical devices	4.0	0.4	1.6
Staff with best qualifications	5.0	0.0	0.0
Safe medical device	5.0	0.14	0.7
Easiness of arriving the hospital	4.0	0.35	1.4
Easiness of identifying the internal departments of the hospital	4.0	0.0	0.0

Regarding the planned satisfaction rating, it was observed that the lowest operators' satisfaction was found in a lot of performance aspects like easiness of arriving the hospital, easiness of identifying the internal departments of the hospital, availability of a lot of medical devices, meeting the standard requirements in all procedures, applying the updated technology and flexibility in paying ways. The rest of performance aspects achieved the satisfaction.

The improvement factor shown in table 6 was calculated by subtracting the performance score of the PAMH staff from its planned performance score. This difference was divided by 5 to give the improvement factor, for example: the improvement factor for availability of doctors and medical staff was:

$$(5-4.52) / 4 = 0.096 \quad (8)$$

Regarding the improvement factor, it was noted that the highest improvement needed to be done was found in flexibility in paying ways. The lowest improvement needed to be done was found in availability of doctors and medical staff.

It was remarked that the cost of therapy, performance of duty, rapid response for any query from the patient and reviewers, staff with best qualifications and easiness of identifying the internal departments of the hospital did not need improvement to be done.

The overall weighting has been calculated by multiplying the importance weighting by the improvement factor as illustrated in the table 6, For example; the overall weighting for availability of doctors and medical staff was:

$$5 * 0.096 = 0.48 \quad (9)$$

Regarding the overall weighting, it was noted that the flexibility in paying ways had the highest priority to begin with because it had the highest overall weighting. The cost of therapy, performance of duty, rapid response for any query from the patient and reviewers, staff with best qualifications and easiness of identifying the internal departments of the hospital were the performance aspects

had the lowest priority to begin with because they had the lowest overall weighting.

The final part of HOQ which was the targets was constructed. The targets summarized the conclusions drawn from the data contained in the entire HOQ. They were made up from three parts:

- Technical priority
- Competitive benchmarking
- Targets

The technical priority was calculated by summing up the product of the overall weighting shown in table 5 and the interrelations value shown in table 3 as shown in table 6. For example; the technical priority for hospital website utilization to apply visa payment was calculated as follow:

$$(1*0)+(1.8*9)+(1*3)+(1*0)+(1.46*1)+(.9*1)+(1.45*3)+(1*0)+(0.48*1)+(1.6*1)+(1*0)+(0.7*1)+(1.4*1)+(1*0)=29.99 \quad (10)$$

Table 6, Technical priority, competitive benchmarking and targets

		Safety procedures implementation	Quality culture enhancement	Evaluation of management's involvement and empowerment of staff	Complexity of management process	Staff behavior training	Staff technical Training	Hiring more staff	Improve the supply process and Extension the guarantee period	Adapting the purchasing policy according to ISO standards	Availability of big capital	Hospital website utilization to apply visa payment
Technical priority		35.91	63.75	21.17	45.14	29.13	23.41	17.5	49.99	35.14	74.23	29.99
Benchmarking	PAMH	Low 30 %	Medium 60 %	Excellent	Three weeks for internal administrator procedures(from writing a spare part order to obtaining it) and four months for external administrator procedures	There is no Staff behavior training	Poor (The internal and external training courses are available just for very small percentage of the staff)	There is excess of staff members	Good	100%	Enough budget with complexity with administrative procedures	Not at all
	KHMC	Medium60 %	High 90%	Excellent	One week for internal administrator procedures(from writing a spare part order to obtaining it) and three	There is no Staff behavior training	Very Good (The internal and external courses are available for about 75 % of the staff)	There is excess of staff members	Good	100%	Enough budget with complexity with administrative procedures	Not at all

ISSN:2319-7900

					months for external administrator procedures							
Targets		High 100 %	High 100 %	Excellent	One day For internal administrator procedures and less than one week for external administrator procedures	Adapting Staff behavior training policy	Excellent (The internal and external training courses must be available for staff)	There is no excess	Excellent	100 %	Enough budget with flexibility with administrative procedures	Must adopting Hospital website utilization to apply visa payment policy

It was noticed from the table that the availability of big capital performance aspect had the highest technical priority so it should be thought of it firstly and trying to solve its problems like the complexity with administrative procedures, it was also noticed that the hiring more staff performance aspect had the lowest technical priority so it was not critical one.

The competitive benchmarking represented the measurement of the technical requirements identified for the Quality Characteristics and Performance Measures of QAMC and KHMC in table 7. This illustrated the relative technical position of Quality Characteristics and Performance Measures of QAMC and identified the target levels of performance to be achieved. The competitive benchmarking was obtained through direct observations of the performance aspect. For example; regarding the enough staff, it was found that there were 10 persons in PAMH and 40 persons in KHMC. Table 7 illustrates the competitive benchmarking.

It was noticed from table 7 that, the situation of PAMH in all performance aspects was not better than that in KHMC but there were some cases like the evaluation of management's involvement and empowerment of staff, staff behavior training, hiring more staff, improve the supply process and extension the guarantee period, adapting the purchasing policy according to ISO standards, availability-y of big capital and hospital website utilization to apply visa payment, where both situations were the same.

The final stage of HOQ was a set of engineering target values to be met by the new quality characteristics and performance measures. The process of building this matrix enabled these targets to be set and prioritized based on an understanding of the operators' needs, the competitor's performance and hospital current performance. It was needed to draw on all this information when deciding on these values [1].

The targets were obtained by observing the performance of QAMC and KHMC in each performance aspect and comparing it to the typical situation known by the expertise opinions. For example; regarding the complexity of management process staff, it was found that it was complicated in both hospitals because it takes long time for obtaining spare parts and so there was a backlog and by asking the PAMH staff and expertise about the optimum time needed, they suggested one day for internal administrator procedures and less than one week for external administrator procedures. Table 7 illustrates the targets.

It was noticed from the table that some targets were not met like the safety procedures implementation, quality culture enhancement, complexity of management process, improve the supply process and extension the guarantee period, staff behavior training, staff technical training, availability of big capital and hospital website utilization to apply visa payment. On the other hand a lot of targets were met like evaluation of management's involvement and empowerment of staff and adapting the purchasing policy according to ISO standards. Some targets needed a lot to do to be achieved like quality culture enhancement and some targets were easier to be achieved like hiring enough staff.

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