ASSESSMENT AND ASSURANCE OF SERVICE QUALITY IN PEDIATRIC HEALTHCARE IN QATAR

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ABSTRACT

The purpose of this study was quality assessment and quality assurance in pediatric services of public and private hospitals in Qatar. The purpose of quality assessment was to identify gaps in the delivered services; while quality assurance process was carried out to ensure no future gaps in quality occur. The objectives were achieved using a modified SERVQUAL scale and Fuzzy-Quality Function Deployment (Fuzzy-QFD) approach. Data from 179 participants who visit public/private hospitals in Qatar was analyzed to find the gaps between expectations and perceptions. The results of the SERVQUAL study indicates negative quality gaps for all the service quality dimensions. The inference that can be drawn from this result is that, in general, the people are dissatisfied by the pediatric healthcare services offered by the public/ private hospitals in Qatar. Thus, the managers in these hospitals should work towards improving the quality of their services, in particular, the responsiveness and empathy dimensions. The output of the SERVQUAL study was then utilized to model those variables that are important in assuring service quality. This was achieved using Fuzzy-QFD model which demonstrates that there is a set of variables that should be accorded prime importance by the hospitals administrators' to assure quality in pediatric services.

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I. INTRODUCTION

As a matter of course most service-oriented companies and organizations put considerable efforts to enhance their performance and effectiveness in their market. Thus, service quality has become a challenging issue facing managers (Gupta and Chen, 1995). Measuring service quality is a critical gauge for different firms, eager to remain a key player in their business sector. In the service industry, healthcare has emerged as an important sector. It has attained the status of an entitlement that is being expected by all of the citizens in most modern countries, thus healthcare satisfaction has gained greater importance. When the healthcare system is strong, healthcare providers will be able to deliver better quality and value to patients (Radhika *et al.,* 2007). Healthcare in Qatar is accorded extreme importance as it is considered as one of the key elements of the Human Development Pillar of the Qatar National Vision (QNV) (Qatar National Development Strategy 2011-2016).

The purpose of this study is to help private and public pediatric hospitals identify the expected and perceived quality of the care that they provide. With that information acquired they would then use the Fuzzy QFD model to identify how hospitals can better meet patient expectations based on their current activities, and the level of achievement that those activities have registered.

The objectives of this study are to:

1- Compare public and private pediatric hospital customers' expectations with their perceptions by employing and adopting the SERVQUAL scale, and by studying the results of its application.

2- Compare the resulting differences between public versus private pediatric hospitals.

3- Adopt the Fuzzy QFD model in order to translate patients' expectations into proper service specifications, and to help these service providers to recognize how they can meet their customers' expectations most effectively.

II. LITERATURE REVIEW

Service Quality

Service is a vital part of any business activity, and it is considered to be the common factor that supports all tangible goods (Dale, 1999). The term service can also be clarified as including performances or experiences (Parasuraman et al, 1988). In business, service is important because of its evident relationship to costs (Crosby, 1979), profitability (Buzzell and Gale, 1987; Rust and Zahorik, 1993; Zahorik and Rust, 1992), customer retention (Reichheld and Sasser, 1990) and customer satisfaction (Bolton and Drew, 1991; Boulding *et al.,* 1993).

In services, quality definitions focus on meeting customer requirements and on how well service providers meet their customers' expectations (Lewis and Booms, 1983).

Measurement of Service Quality

As the need to measure the quality of service increased, it prompted the development of metrics for its measurement (Lewlyn *et al,* 2011). Several attempts have been made by researchers to systematically identify the variables that quantify service quality, among which the two most popular

metrics are SERVQUAL and SERVPERF (Lewlyn *et al,* 2011). SERVQUAL is considered to be a very reliable tool and its use has been widespread in the service industry.

According to (Parasuraman *et al,* 1988), SERVQUAL dimensions are: tangibility, reliability, responsiveness, assurance, and empathy.

There are five major gaps in the service quality concept (Parasuraman *et al,* 1988):

- Gap 1: Customers' expectations versus management perceptions

- Gap 2: Management perceptions versus service specifications

- Gap 3: Service specifications versus service delivery

- Gap 4: Service delivery versus external communication

- Gap 5: The discrepancy between customer expectations and their perceptions of the service delivered

While Parasuraman(1988) identified five gaps that can result in unsuccessful service delivery, the majority of literature has focused on the fifth gap, which is the difference between customers' expectations and their perceptions of the service delivered.

SERVQUAL was chosen for this study, since it is the most commonly used service measure and was tested in similar works (Lam, 1997; Woodside *et al.,* 1989; Reidenbach and Sandifer-Smallwood, 1990; Babakus and Boller, 1992; Lytle and Mokwa, 1992; Headley and Miller, 1993; O'Connor *et al.,* 1994; Bowers *et al.,* 1994; Bebko and Garg, 1995; Licata *et al.,* 1995).

Health Care Quality

Quality of healthcare refers to the safety, efficiency and effectiveness of healthcare. Quality of healthcare can also be defined as providing the right healthcare to the patient at the right time (Clancy, 2009).

There is a difference between private and public healthcare sectors. The private healthcare centers are owned by private bodies or companies, whereas public healthcare centers are owned by, or are an extension of, the government.

Healthcare quality is, in effect, the customer's (or patient's) perception about the quality of the service provided to them at the healthcare centers (Saxena, 2009). According to Koornneef (2006), SERVQUAL is considered to be the most widely used health quality measurement tool. The satisfaction of patients is the most evident and widely accepted indicator through which the quality of healthcare can be measured.

Health Care in Qatar

Qatar is a wealthy country with a lot of rich resources like oil and natural gas. The world health organization (WHO), ranked Qatar in the top 50 countries in terms of healthcare systems (World Health Organization, 2000). According to Allianz Worldwide Care (2012), Qatar also has been ranked at the top of the per capita health expenditure list among the members of the Gulf Cooperative Council (GCC).

In Qatar healthcare is largely dependent on Hammad Medical Corporation (HMC). HMC has numerous hospitals and healthcare centers. HMC is the first and only hospital corporation in the world to accomplish simultaneous accreditation and re-accreditation of all its public hospitals by the Joint Commission International (JCI) (Joint Commission International Accreditation Standard for Hospitals, 2011).

HMC has also achieved the first accreditation of its kind in the region for

its Home Healthcare Services. (Hamad Medical Corporation, 2012).

Quality Assurance and Quality Function Deployment (QFD)

Quality Assurance (QA) refers to the activities associated with ensuring the quality of a product or service. Accordingly, the best way to guarantee quality is in the design of products, services, and processes (Foster, 2010). Quality assurance is an emerging field. In the healthcare sector, it carries great importance and significance.

Quality Function Deployment (QFD) was introduced in Japan during the 1970s. QFD finds widespread application in today's business world as a technique that facilitates the development and implementation of both, long-term and short-term business decisions (Mehrjerdi, 2010). According to Puay and Nelson (2000), the application of QFD has demonstrated that it is a practical process that allows hospitals to become customer- and quality-oriented. QFD provides a way to systematically understand the voice of the customer.

Fuzzy Quality Function Deployment: Triangular Fuzzy Numbers

In real life, decision making is not as easy as it may seem. The decision maker is faced with a lot of questions, doubts and dilemmas. Hence, it becomes very difficult to provide one single objective answer to questions. In order to deal with this problem of uncertainty, a slight modification has been made to the traditional QFD. This development is referred to as the *Fuzzy Approach* or *Fuzzy Logic*. The traditional form of decision making considers only two answers for a question (Ex: yes/no, true/false), but in reality, problems are rarely solved using this bivalent method. Hence, fuzzy logic is used which is based on fuzzy sets. A fuzzy set is "a set of objects in which there is no clear-cut or predefined boundary between the objects that are or are not members of the set". (Bevilacqua, *et al,* 2011).

The most commonly used form of fuzzy sets is the *triangular fuzzy number* set. The reason for this is the relative ease of computation using triangular fuzzy numbers compared to other fuzzy numbers. The major use of the triangular fuzzy technique is the measurement of linguistic data. Triangular fuzzy numbers are represented by the terms of the type $A = (xL, x^*, xR)$, where xL and xR are, respectively, the lower and upper limits of the fuzzy number considered, while x^* is the element that indicates the nearest fit (Bevilacqua, *et al,* 2011).

For instance, we consider $U = \{VL, L, M, H, VH\}$ as a linguistic set that describes the opinions of customers on a specific attributes (VL = very low , L = low, M = medium, H = high, and VH = very high). Triangular fuzzy numbers can be used to quantify this linguistic data set U as shown in **Figure 1:**
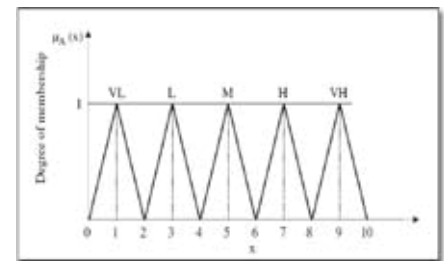

Figure 1. Triangular Fuzzy Numbers Example ((source: (Bevilacqua, et al, 2011)

VL →(0, 1, 2); L→(2, 3, 4); M→(4, 5, 6); H→(6, 7, 8); VH→(8, 9, 10).

If we interpret this data, we can say that the linguistic variable L tells us that the decision maker's evaluation contains elements with $xL = 2$, $xR = 4$ with a maximum degree of membership in $x^* = 3$ (Bevilacqua, *et al,* 2011).

III.   METHODOLOGY

The developers of *SERVQUAL* pointed out that SERVQUAL: "can be adapted or supplemented to fit the characteristics or specific research needs of a particular organization." (Parasuraman, *et al.,* 1988). Since SERVQUAL is a generic scale developed for measuring service quality's functional dimensions, it requires modifications to address a particular sector's needs.

This study adopted the modified SERVQUAL of Babakus and Mangold, (1991) for assessing hospitals.

By depending upon their study, the author developed the survey with three parts:

The first part (Part A) asked customers (patients' family) about their expectations of pediatric hospitals' services.

The second part (Part B) was divided into two sections; the customers would select one section depending on which kind of hospitals they visit (private or public). Section one (Section B1) asked them about their perception of public pediatric hospitals. Section two (Section B2) asked them about their perception of private pediatric hospitals.

Part three (Part C) asked about demographics. The survey was administered using *surveymonkey.com*. The link to the survey was published and distributed to customers through emails, blackberry broadcasts, and by posting it on one of the consumer protection sections in one of the most popular forums in Qatar. In addition to that, 55 hard copies were distributed to some customers because they prefer using hard copies rather than the soft one. The duration for the data gathering was approximately one month. Data was collected using the Excel worksheet format from SurveyMonkey.

It is important to mention at this point that before starting the distribution of the survey, an approval letter was issued from Qatar University Institute Review Board (QU-IRB) to execute the project with an exemption from the full ethics review.

In order to accomplish the second part of this study (which is to develop the Fuzzy-QFD model) customer expectations were rated based on the expectations part of the SERQUAL survey. Doing that addressed the first part of the Fuzzy-QFD which was the "what" part in the model. The next step was to address the "how" question in the Fuzzy-QFD model. This was accomplished by identifying the measurable and definable design features of the service package, including the processes necessary for its delivery (Lim, *et al.,* 1999). In this study, the activities adopted by a hospital to meet the patients' expectations were determined by forming a focus group consisting of three doctors, a nurse and one healthcare researcher. The input from this group was used to develop the correlation matrix, which was an important step in the Fuzzy-QFD process. The matrix showing the relationship between the ``what'' list and the ``how to'' list seeks to match patients' expectations with the activities adopted by the hospital (Lim, *et al.,* 1999). Also, the group established the correlation between the activities themselves.

IV.   DATA COLLECTION

In the beginning, a sample of 232 respondents was obtained and then later scrutinized. Thirty-eight (38) responses were deleted because they mentioned that that they don't visit pediatric hospitals, and fifteen (15) were excluded due to incomplete responses. Thus, we finished with 179 respondents who were

available to answer the first part of the survey--the expectation part. Thirty-nine (39) potential respondents mentioned that they visited public hospitals, nine (9) visited private hospitals, and 130 visited both public and private. That gave us a total of 178 potential respondents (one person did not provide an answer in this part).

Upon completion, while 169 persons were available to respond to the perception of the public pediatric hospitals portion, only 150 actually completed this part. Also, of the 139 potential respondents for the perception of the private pediatric hospitals portion, only 125 did so.

With regard to the demographic characteristics of the survey, 152 respondents completed that portion.

V.   DATA ANALYSIS

The reliability of the data was not tested in this study because the modified SERVQUAL of Babakus and Mangold (1991) for assessing hospitals was utilized wherein a reliability test had already been performed. Microsoft Excel was used to calculate the means of the expectations and perceptions of customers. The difference between expectations and perceptions was calculated to arrive at the gap in each dimension. A negative result showed a potential chance for improvement. Questions 1-3 referred to the tangibility dimension. The customers' perception of the public hospitals obtained an overall average of -0.84, and the customers' perception of the private hospitals obtained an overall average of -0.48. All perceptions were lower than expectations in these three questions of this dimension, in both public and private hospitals. Further, the gap of tangibility between perceptions and

expectations of public hospitals was higher than that of the private hospitals (See Figure 2 below).
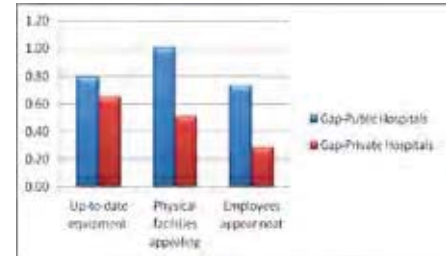

Figure 2. Tangibility perceptions gap

The reliability dimension was analyzed in questions 4-6. The customers' perception of the public hospitals obtained an overall average of -1.31, and the private hospitals scored an overall average of -0.73. All perceptions were lower than expectations in the three questions of this dimension, with all differences between them being negative. That suggests that they perceived considerable faults in hospital services that threaten any positive impressions of service quality. Expectations in all questions scored in the high area of the scale. This revealed that patients recognized this dimension as essential for service quality. Although the perceptions were less than expectations in both the public and private responses, the gap for public hospitals was higher than that for private hospitals, as illustrated in Figure 3 below.
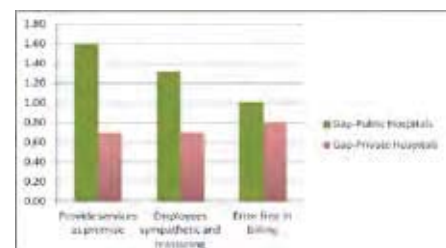

Figure 3. Reliability perceptions gap

The responsiveness dimension was analyzed in questions 7-9. The perception from patients registered averages of -1.39 for public hospitals, and -0.7 for private hospitals. All perceptions were lower than expectations in the three questions of this dimension. The expectations average was 4.62. Thus it was concluded that public hospitals' employees are less responsive than those of private hospitals, and the responsiveness of both is less than expected (refer to Figure 4 below).
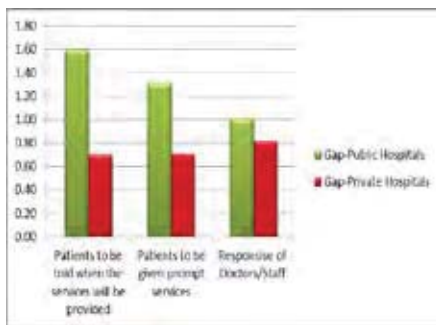

Figure 4. Responsiveness perceptions gap

The assurance dimension was determined with questions 10-13. All perceptions were lower than expectations in the four questions of this dimension. The perception of the patients from public hospitals was -1.23 and the perception of patients from private hospitals was -0.75. The expectations of this dimension got the highest score among other dimensions; the scores were between 4.66 and 4.7. The gap between the perceptions and expectations of both public and private hospitals (as illustrated in Figure 5 below) indicated that the patients perceived employees (Doctors and Staff) as inexpert or untrained in their fields (thus lowering the confidence rate among patients).

The final dimension, which is the empathy dimension, was analyzed in questions 14-15. The expectations of
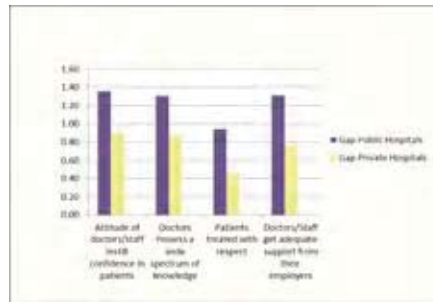

Figure 5. Assurance perceptions gap

question 14 (Doctors/Staff give patients personal attention) obtained an average of 4.5 and the expectations of question 15 got an average of 4.65. Perceptions were lower than expectations in both public and private categories, as illustrated in Figure 6 below. From the gaps, we concluded that patients didn't believe that their needs were well understood, nor were the people working hard to
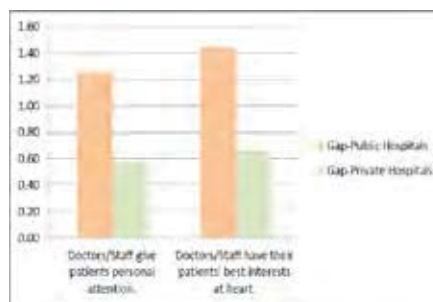
Figure 6. Empathy perceptions gap

fulfill their requests.

To sum up the results, Qatari patient pediatric service expectations surpassed their perceptions of actual pediatric care delivery. The gaps in public pediatric hospitals were greater than those in the private pediatric hospitals; nevertheless, all scored in the negative territory, indicating a serious problem. The negative gap on individual items, subscale and overall scale suggested an urgent need to address these quality gaps. Service responsiveness and empathy received the highest negative

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scores in public pediatric hospitals. Responsiveness negative scores indicated that healthcare providers' attitudes are not acceptable in healthcare service. This was understandable since customers normally come to a hospital feeling stressed and any delays responding to their problem will aggravate their suffering. To be competitive in an ever-increasing number of public healthcare hospitals, Qatari public hospital staffs need to emphasize employee training that 1) reduces response times and 2) institutes a genuine urgency when dealing with customers. Empathy negative scores indicated that health providers don't provide individualized care and attention to their patients. This should be considered to be important, since it means that doctors and staff are not motivated and committed to their organization, and they are not working for the full benefit of the hospitals.

Moving on to the private pediatric hospitals, it can be concluded that the services reliability and assurance received the highest negative scores, which indicated that healthcare providers are mistrusted by their customers. Reliability negative scores indicated that services are not received on time, and customers doubted that they would receive the right service the first time. Patients think that because they are paying significant amounts of money to private hospitals, the service will be provided right away. In this scenario they also expect no billings problems and well trained employees. The assurance negative scores meant that customers felt that the knowledge and courtesy of employees, and their ability to inspire trust and confidence, were missing. To stay competitive and achieve a high level of world class health service, private hospitals should focus on employee training. They need particularly to focus on providing services on time, which

means reconsidering their appointment and scheduling system(s). These results underscored the importance of quality healthcare in order to realize Qatar's 2030 Vision, and, accordingly, the need to develop the aspect of their health care strategy that focuses on the quality of their services. In general, it could be safely said that Qatari's pediatric private hospitals enjoy a better image of quality than the public sector. This is because of different reasons. First, the staff at the public hospitals are not satisfied with their salary, their non-monetary benefits and their career progression. As a result they don't have the necessary incentive to work hard. Secondly, the results of the quality assessment using a modified SERVQUAL indicated that the workload was much higher in the public hospitals, since the services are provided nearly free of charge. Interestingly, on a side note it was obvious that patients expected that the more investigations and medications that a doctor requested, the more care they get--which proved to be wrong. This is done in private hospitals and sometimes in public hospitals. That is why the patients' perception of private hospitals is better than that of public.

VI. FUZZY QUALITY FUNCTION DEPLOYMENT

Since there were serious gaps between customer expectations and perceptions in the results of the SERVQUAL survey, a fuzzy QFD was developed to better understand customers' expectations, to translate these expectations into appropriate service specifications and to perform existing processes assessment. The following steps were implemented to develop a fuzzy QFD for hospitals in Qatar: (1)

Identify the customer expectations from the SERVQUAL as the "WHATs" (2) Identify the activities and processes relevant to patients assessment ("HOWs") (3) Determine the relative importance of the "WHATs" (4) Determine the "WHAT"–"HOW" correlation scores and constructing the HOQ (5) Prepare the matrix for correlating the "HOWs" (6) Draw up the final ranking (7) Find out the final score and classification.

Steps 1 and 3 depended upon the SERVQUAL expectation part; steps 2 and 4 were made by the focus group. The other steps (5-7) were completed by the authors.

To be able to determine the relative importance of the WHATs, the results from the SERVQUAL expectations part were utilized. The respondents' answers for each expectation statement were classified into Very Low (VL), Low (L), Medium (M), High (H), and Very High (VH). The linguistic variables were translated into fuzzy numbers by defining appropriate fitness functions. Triangular fuzzy numbers were used, characterized by the following fitness functions for each linguistic variable as shown in Figure 1: VL (0,1,2); L(2,3,4); M(4,5,6); H(6,7,8); VH(8,9,10).

In this paper the weights assigned by the respondents were aggregated using the average operator, as described by the following equation:

WEIGHTS$_{WHAT}$ = {w_i; where i = 1; . . . ; k},

$$w_i = 1/n * (w_{i1} + w_{i2} + \ldots\ldots + w_{in})$$

where k is the number of "WHATs" and n is the number of respondents (k= 15 and n= 179 in our case). Each element on the WEIGHTS$_{WHAT}$ vector is a triangular fuzzy number defined by the triplet w_i=

($w_{i\alpha}$; $w_{i\beta}$; $w_{i\gamma}$). The weights were obtained by aggregating the opinions expressed by each respondent. By this, steps 1 and 3 are completed.

As mentioned earlier, the focus group determined the "HOWs" part and then they completed step 4. Each member of the focus group was asked to express an opinion, using one of the five linguistic variables, on the impact of each "HOW" on each "WHAT". The opinions expressed by the five members are shown in Exhibits 1 and 2 in Appendix A. Here also, triangular fuzzy numbers were used to quantify the linguistic variables and the fuzzy numbers obtained for each member of the focus group were aggregated by means of the following equation:

RATING= {r_{ij}; where i= 1; . . . ; k and j=1; . . .; m},

$$r_{ij} = 1/n * (r_{ij1} + r_{ij2} + \ldots\ldots r_{ijn}),$$

where k = number of the "WHATs"

m = number of the "HOWs"

n = number of the members of the focus group (in our case, k = 15, m = 22 and n= 5).

This time, the RATING is the matrix of the "how"–"what" correlation scores, where r_{ij} elements represent an aggregate correlation score between the ith "what" and the jth "how". The r_{ij} elements are triangular fuzzy numbers defined by the triplets rij =($r_{ij\alpha}$; $r_{ij\beta}$; $r_{ij\gamma}$). Doing these steps, we can complete the HOQ, calculating the weights of the "HOWs" and averaging the aggregate weighted r_{ij} correlation scores with the aggregate weights of the "WHATs" w_i, according to the equation:

WEIGHT$_{SHOW}$ ={W_j ; where j=1; . . . ;m},

$$W_j = 1/k * [(r_{j1*} w_1) + \ldots\ldots (r_{jk*} w_k)]$$

where k = 15, and m = 22. Each W_j on the WEIGHT$_{SHOW}$ vector represents the weight of each patient attribute. The W_j are, once again, triangular fuzzy numbers defined by means of the triplets ($W_{j\alpha}$; $W_{i\beta}$; $W_{i\gamma}$). Moving on to step 6, the focus group was asked to specify the correlations between the ''HOWs'' that are contained in the ''roof'' of the HOQ. This step is important because it focuses on the need to keep track of pairs of ''HOWs'' needing parallel improvements and/or ''HOWs'' in potentially difficult relationships, that consequently implied results that were inconsistent with each other. The completed fuzzy-

Part of QFD is illustrated in Figure 7. After completing the fuzzy QFD, it was important to evaluate and classify the values obtained. There are numerous studies related to the ranking of fuzzy numbers (Yager and Filev, 1999; Liou and Wang, 1992; Buckley, 1985). In this particular study, we used the approach of choosing the convex combination between pessimistic and optimistic methods that were applied to a triangular fuzzy number:

FN = (FN$_{\alpha}$, FN$_{\beta}$, FN$_{\gamma}$) (Facchinetti, et al., 1998). This produces a score identified by the value:

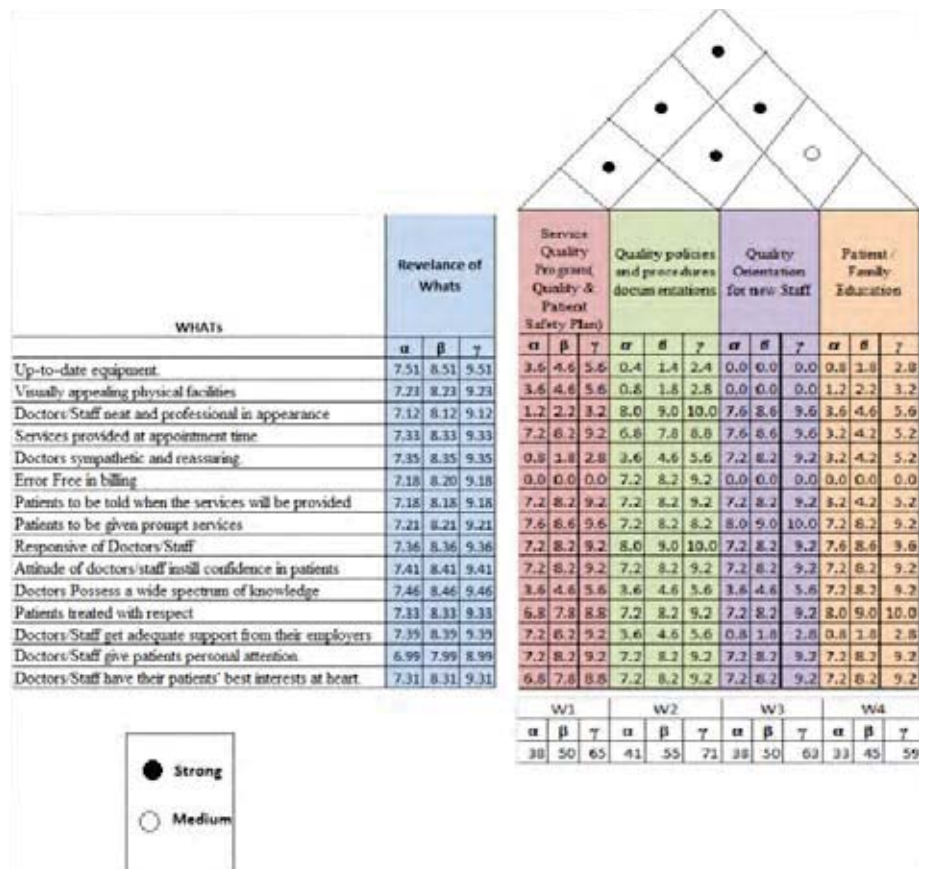$$FN = (FN_{\alpha} + 2FN_{\beta} + FN_{\gamma})/4$$

Figure 7. Part of fuzzy QFD

Fuzzy QFD Discussion:

Priority processes list at the hospitals can be prepared for the management; so that they can focus on the activity with the high score of one (1). W10, which is "Survey of patients" got the highest score, so management should focus on utilizing various surveys so that patients' expectations can be maximized and satisfied. The following seven activities were the most important that hospital managers should consider when raising the customers/patients satisfaction with services provided by their hospitals: i) Conduct surveys of patients, ii) Emphasize patients and family rights, iii) Review quality policies and procedures, iv) Provide in-service/continuous education and training, v) Develop/ review management techniques for nursing operations, vi) Install a Service Quality Program (Quality and Patient Safety Plan), and vii) Audit their waiting and distribution systems.

VII. RECOMMENDATIONS AND CONCLUSION

Overall, the SERVQUAL approach clearly indicated that the customers' expectations exceeded their perceptions. Customers/patients nowadays have very high expectations, especially when it comes to the medical treatment that they are receiving. Responsiveness and empathy variables had the highest service gaps within the scores in public hospitals. This meant that customers, overall, were unsatisfied with the level of healthcare services rendered by public healthcare settings. They felt that the waiting time was too long to receive the service. These were very important responses and the hospital management must look into them in order to ensure that customers/patients do not feel this way,

and so that their levels of satisfaction can be increased. On the other hand, reliability and assurance received the highest negative scores in private hospitals. This indicated that healthcare providers were not trusted by their customers. Thus, hospital management should look further into improving the areas that the survey highlighted. Both the private and public sectors should:

1. invest additional efforts in determining patients' perceptions of the delivered service quality in order to be more effective in their quality assessment and assurance programs.

2. find ways to provide their healthcare personnel the incentive to help patients with their best efforts.

3. focus more on their waiting system and staff trainings. Staff education, especially in terms of developing customer care and inter-personal skills should be regarded as investments in the future enhancement of service quality.

It is recommended that this kind of survey tool be used at regular intervals (e.g. bi-annually) so as to monitor changes in patient expectations and hospital performance.

The second part of the study was to implement fuzzy QFD techniques in order to translate customers' expectations into appropriate service specifications and to perform existing processes assessments. Determining the customers' expectation ratings, correlating between their expectations and the hospitals' processes and activities to meet their expectations and the final weighting and ranking are all necessary ingredients that will help in determining the most important activities that hospital management should consider in order to increase customers/patients' satisfaction.

In general, it was found that management should focus mostly on the following to increase customers (patients) satisfaction: 1) continuous surveying of patients, 2) patients and family rights, 3) the quality of policies and procedures documentation, 4) in-service continuous education and training, 5) the management of nursing operations, 6) the Service Quality Program (quality and patient safety), and 7) the waiting and distribution systems.

VIII. LIMITATIONS OF THE STUDY

There were several limitations for this study that prevented broad conclusions from being drawn:

1. Customer/patient expectations and perceptions are a subjective matter and, as such, are in a constant state of flux and change. The findings, therefore, can only be generalized to a given period, a pre-defined market, and the corresponding economic scenarios. A longitudinal study could probably overcome or alleviate this limitation.

2. Due to the small sample size, the findings on this study can't be generalized. Yin (2003), a prominent researcher, advises researchers to generalize findings to theories, like a scientist generalizes from experimental results to theories.

3. A time limit prevented gathering more data which precluded the use of electronic questionnaire survey methods, and, instead, forced a reliance upon a snowball sampling technique, which might have affected the representational aspects of the data.

4. Again, due to time limitations the Fuzzy QFD was developed with the help of the focus group; it would be more representative if another survey were developed and distributed to decision makers from different hospitals in Qatar in order to get their feedback on the "HOWs" part and on the correlations between "HOWs" and "WHATs".

5. Hospitals were not contacted regarding this study, since the approval process to do this kind of research takes much time. We might have achieved better results if hospital management had helped by distributing the survey in their hospitals.

IX. REFERENCES

Allianz Worldwide Care (2012). *Healthcare in Qatar*. Retrieved from: http://www. allianzworldwidecare.com/healthcare-in-qatar (Accessed 1 April 2012).

Babakus, E. and Boller, G.W. (1992). An empirical assessment of the SERVQUAL scale. *Journal of Business Research*, *24*, 253-68.

Babakus, E. and Mangold, W.G. (1991). Adapting the SERVQUAL scale to hospital services: an empirical investigation. *Health Services Research, 26*(6), 767-88.

Bebko, C.P. and Garg, R.K. (1995). Perceptions of responsiveness in service delivery. *Journal of Hospital Marketing*, *9*(2), 35-45.

Bevilacqua, M., Ciarapica, F. E., and Marchetti, B. (2011). Development and test of a new fuzzy-QFD approach for characterizing customers rating of extra virgin olive oil. *Elsevier*, 3-10.

Bolton, R.N. and Drew, J.H. (1991). A multi stage model of customer's assessments of service quality and value. *Journal of Consumer Research, 17, 375-84.*

Boulding, W., Kalra, A., Staelin, R. and Zeithaml, V. (1993). A dynamic process model of service quality: from expectations to behavioral intentions. *Journal of Marketing Research, 30* (1)

Bowers, M.R., Swan, J.E. and Koehler, W.F. (1994). What attributes determine quality and satisfaction with health care delivery? *Health Care Management Review*, *19*(4), 49-55.

Buckley, J. J. (1985). Ranking alternatives using fuzzy numbers. *Fuzzy Sets and Systems, 15*, 21–31.

Buzzell, R. D. and Gale, B. T. (1987). *The PIMS Principles: Linking Strategy to Performance*. New York: The Free Press.

Clancy, C. (2009). What is healthcare quality and who decides? *Health care committee.*

Crosby, P. B. (1979). *Quality is free*. New York: McGraw-Hill.

Dale, B. (1999). Quality costing, a management review. *International Journal of management review, 1*

Facchinetti, G., Ghiselli Muzioli, R., and Ricci, S. (1998). Note on ranking fuzzy triangular numbers. *International Journal of Intelligent Systems, 13*, 613–622.

Foster S.T. (2010). *Managing Quality: Integrating the Supply Chain*. New Jersey: Pearson Education Inc.

Gupta, A. and Chen, (1995). Service quality: implications for management development. *International Journal of Quality and Reliability Management, 12* (7).

Hamad Medical Corporation (2012). *About HMC*. Retrieved from: http://www.hmc. org.qa/en/hcp/about_hmc/about_hmc.aspx (Accessed: 10 April 2012).

Headley, D.E and Miller, S.J. (1993). Measuring service quality and its relationship to future consumer behavior. *Journal of Health Care Marketing*, *13*(4), 32-41.

Jeliazkova, M., and Westerheijden, D.F. (2002). Systemic Adaptation to a Changing Environment: Towards a Next Generation of Quality Assurance Models. *Higher Education*, *44*(3/4), 433-448.

Joint Commission International Accreditation Standard for Hospitals, 2011. Retrieved from:http://www.jointcommissioninternational.org/Accreditation-Manuals/ IAS400/1543/. (Accessed: 15 April 2012).

Koornneef, E. (2006). Measuring quality in services for children with an intellectual disability. *International Journal of Health Care Quality Assurance, 19*(5), 400 – 408.

Lam S.S.K. (1997). SERVQUAL: A tool for measuring patient's opinions of hospital service quality in Hong Kong. *Total Qual. Manage, 8*(4), 145-52.

Lewis, R.C. and Booms, B.H. (1983), "The marketing aspects of service quality. *Emerging Perspectives on Services Marketing, American Marketing,* 99-107.

Lewlyn, L.R., Barkur, G., Varambally K.V.M. and Motlagh, F.G. (2011), Comparison of SERVQUAL and SERVPERF metrics: an empirical study. The *TQM Journal, 23*(6), 629 – 643.

Licata, J.W., Mowen, J.C. and Chakraborty, G. (1995). Diagnosing perceived quality in the medical service channel. *Journal of Health Care Marketing*, 15(4), 42-9.

Lim, P. C, Tang, N. and Jackson P.M. (1999). An innovative framework for health care performance measurement. *Managing Service Quality,9*(6), 423 – 433

Liou, T. S., and Wang, M. J. J. (1992). Ranking fuzzy numbers with integral values. *Fuzzy Sets and Systems, 49*, 247–255.

Lytle, R.S. and Mokwa, M.P. (1992). Evaluating health care quality: the moderating role of outcomes. *Journal of Health Care Marketing*, *12*(1), 4-14.

Mehrjerdi, Y. Z. (2010). Quality function deployment and its extensions. *International Journal of Quality and Reliability Management*, 616-640.

National Health Strategy (2012). Retrieved from: http://www.nhsq.info/ (Accessed: 20 April 2012)

O'Connor, S.J., Shewchuk, R.M. and Carney, L.W. (1994). The great gap: physicians' perceptions of patient service quality expectations fall short of reality. *Journal of Health Care Marketing*, *14* (2), 32-9.

Parasuraman, A., Zeithaml, V.A. and Berry, L.L. (1988). SERVQUAL: a multiple-item scale for measuring consumer perceptions of service quality. *Journal of Retailing, 64*(1).

Puay C.L., and Nelson K.H. T., (2000), "The development of a model for total quality healthcare", Managing Service Quality, Vol. 10 Iss: 2 pp. 103 - 111

Qatar National Development Strategy (2011-2016). Available at: http://www.gsdp. gov.qa/NDS/e_book/en/index.html#/0 (Accessed: 3 March 2012).

Radhika, V., Assaf, R.R. and Al-Assaf, A.F. (2007). JHQ 197 – Making Patient Safety and Quality Improvement Act of 2005 work. *Journal for Healthcare Quality, National Association for Healthcare Quality.* retrieved from: www.nahq.org/ journal/ce/article.html?article_id¼282 (accessed May 2008).

Reichheld, F.F. and Sasser, W.E. (1990), Zero defections: quality comes to service. *Harvard Business Review, 68* (5)

Reidenbach, E.R. and Sandifer-Smallwood, B. (1990). Exploring perceptions of hospital operations by a modified SERVQUAL approach. *Journal of Health Care Marketing*, *10*(4), 47-55.

Rust, R.T. and Zahorik, A.J. (1993). Customer satisfaction, customer retention and market share. *Journal of Retailing, 69* (2).

Saxena, M.N. (2009). A Study on the Customer Perceptions of Quality of Services of a Large Hospital in New Delhi. *Institute of Management Technology*.

Woodside, A.G., Frey L.L., Day T.R. and (1989). Linking service quality, customer satisfaction, and behavioural intentions. *J. Health Care Mark*, *9*, 5-17.

World Health Organization (2000). *The World Health Report 2000*. Available at: http://www.who.int/whr/2000/en/index.html (Accessed: 5 April 2012).

Yager, R. R., and Filev, D. (1999). On ranking fuzzy numbers using valuations. *International Journal of Intelligent Systems, 14*, 1249–1268.

Yin, R.K. (2003). Case Study Research: Design and Methods. *Thousand Oaks: Sage Publications.*

Zahorik, A. J., and Roland T. R. (1992). Modeling the Impact of Service Quality on Profitability: A Review. *Advances in Services Marketing.*

Short Bio of Hana Al-Shouli and Mohd Nishat Faisal

Hana Al-Shouli is currently the Section Head for Strategic Planning at Qatar University. She has received Master of Business Administration (MBA) in 2012 and a Bachelors in System and Industrial Engineering in 2006 from Qatar University. She has worked as project coordinator for Al Serdal (Academic Information system) and Rawafed Project (Library Management System) at Qatar University. She also conducts Strategic Planning workshops for PMI-AGC Chapter and Community College-Qatar, and has served in many committees at Qatar University.

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Appendix A

Service Quality Program(Quality & Patient Safety Plan)			Quality policies and procedures documentations			Quality Orientation for new Staff			Patient / Family Education			Perform Environment and safety control(FMS)			Scheduling			Advance Clinical Research			In Service Continuous Education and Training			Manage Nursing Operations			Survey of patients			Benchmarking			Teamwork / committees / systems		
α	β	γ	α	δ	γ	α	δ	γ	α	δ	γ	α	δ	γ	α	δ	γ	α	δ	γ	α	δ	γ	α	δ	γ	α	δ	γ	α	δ	γ	α	δ	γ
3.6	4.6	5.6	0.4	1.4	2.4	0.0	0.0	0.0	0.8	1.8	2.8	7.2	8.2	9.2	0.0	0.0	0.0	7.2	8.2	9.2	7.2	8.2	9.2	7.6	8.6	9.6	8.0	9.0	10.0	7.2	8.2	9.2
3.6	4.6	5.6	0.8	1.8	2.8	0.0	0.0	0.0	1.2	2.2	3.2	7.2	8.2	9.2	0.0	0.0	0.0	3.6	4.6	5.6	0.4	1.4	2.4	7.2	8.2	9.2	3.6	4.6	5.6			
1.2	2.2	3.2	8.0	9.0	10.0	7.6	8.6	9.6	3.6	4.6	5.6	7.2	8.2	9.2	0.0	0.0	0.0	0.8	1.8	2.8	3.6	4.6	5.6	7.2	8.2	9.2	7.6	8.6	9.6			
7.2	8.2	9.2	6.8	7.8	8.8	7.6	8.6	9.6	3.2	4.2	5.2	0.8	1.8	2.8	6.8	7.8	8.8	7.6	8.6	9.6	7.6	8.6	9.6	7.2	8.2	9.2	7.2	8.2	9.2			
0.8	1.8	2.8	3.6	4.6	5.6	7.2	8.2	9.2	7.2	8.2	9.2	0.8	1.8	2.8	0.4	1.4	2.4	0.8	1.8	2.8	0.4	1.4	2.4	3.2	4.2	5.2	0.4	1.4	2.4			
0.0	0.0	0.0	7.2	8.2	9.2	0.0	0.0	0.0	0.0	0.0	0.0	0.8	1.8	2.8	0.0	0.0	0.0	7.6	8.6	9.6	0.0	0.0	0.0	6.4	7.4	8.4	0.4	1.4	2.4			
7.2	8.2	9.2	7.2	8.2	9.2	7.2	8.2	9.2	3.2	4.2	5.2	3.6	4.6	5.6	7.6	8.6	9.6	0.4	1.4	2.4	7.2	8.2	9.2	7.6	8.6	9.6	8.0	9.0	10.0	7.6	8.6	9.6
7.6	8.6	9.6	7.2	8.2	8.2	8.0	9.0	10.0	7.2	8.2	9.2	3.6	4.6	5.6	7.2	8.2	9.2	7.2	8.2	9.2	7.2	8.2	9.2	8.0	9.0	10.0	7.2	8.2	9.2			
7.2	8.2	9.2	8.0	9.0	10.0	7.2	8.2	9.2	7.6	8.6	9.6	3.2	4.2	5.2	7.2	8.2	9.2	3.6	4.6	5.6	3.6	4.6	5.6	7.6	8.6	9.6	7.6	8.6	9.6			
7.2	8.2	9.2	7.2	8.2	9.2	7.2	8.2	9.2	7.2	8.2	9.2	0.4	1.4	2.4	7.6	8.6	9.6	3.2	4.2	5.2	7.2	8.2	9.2	7.2	8.2	9.2	3.2	4.2	5.2			
3.6	4.6	5.6	3.6	4.6	5.6	3.6	4.6	5.6	7.2	8.2	9.2	0.8	1.8	2.8	0.0	0.0	0.0	7.2	8.2	9.2	7.6	8.6	9.6	3.6	4.6	5.6	7.2	8.2	9.2			
6.8	7.8	8.8	7.2	8.2	9.2	7.2	8.2	9.2	8.0	9.0	10.0	3.6	4.6	5.6	0.8	1.8	2.8	3.2	4.2	5.2	7.2	8.2	9.2	7.2	8.2	9.2	7.2	8.2	9.2			
7.2	8.2	9.2	3.6	4.6	5.6	0.8	1.8	2.8	0.8	1.8	2.8	3.2	4.2	5.2	3.6	4.6	5.6	4.0	5.0	6.0	3.6	4.6	5.6	6.0	7.0	8.0	3.6	4.6	5.6			
7.2	8.2	9.2	7.2	8.2	9.2	7.2	8.2	9.2	7.2	8.2	9.2	7.2	8.2	9.2	0.8	1.8	2.8	3.2	4.2	5.2	7.6	8.6	9.6	7.2	8.2	9.2	3.6	4.6	5.6			
6.8	7.8	8.8	7.2	8.2	9.2	7.2	8.2	9.2	7.2	8.2	9.2	3.6	4.6	5.6	0.4	1.4	2.4	7.2	8.2	9.2	7.2	8.2	9.2	7.2	8.2	9.2	0.0	0.0	0.0			

Exhibit 1. WHATs-HOWs Correlations-Part1

New Technologies			Appointment System			Doctor to patient ratio			Mandatory Life Support Courses			Waiting and Distribution System			Number of Emergency Centers			Social services			Help Desk			Patient / Family Rights			Complaint resolution		
α	δ	γ	α	δ	γ	α	δ	γ	α	δ	γ	α	δ	γ	α	δ	γ	α	δ	γ	α	δ	γ	α	δ	γ	α	δ	γ
7.6	8.6	9.6	0	0	0	3.6	4.6	5.6	7.2	8.2	9.2	7.6	8.6	9.6	3.6	4.6	5.6	0	0	0	6.8	7.8	8.8	0	0	0			
3.6	4.6	5.6	0	0	0	0	0	0	0	0	0	3.6	4.6	5.6	0.4	1.4	2.4	0	0	0	0.8	1.8	2.8	4	5	6	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.4	5.4	6.4	3.6	4.6	5.6	2.8	3.8	4.8			
7.2	8.2	9.2	7.2	8.2	9.2	7.2	8.2	9.2	3.6	4.6	5.6	7.2	8.2	9.2	7.6	8.6	9.6	4	5		2.8	3.8	4.8	4.8	5.8	6.8	6.8		8.8
0	0	0	0	0	0	7.6	8.6	9.6	3.2	4.2	5.2	3.2	4.2	5.2	3.6	4.6	5.6	2.8	3.8	4.8	7.2	8.2	9.2	7.2	8.2	9.2			
7.2	8.2	9.2	0	0	0	0.4	1.4	2.4	0	0	0	3.6	4.6	5.6	0	0	0	0.4	1.4	2.4	3.2	4.2	5.2	7.2	8.2	9.2			
3.6	4.6	5.6	7.6	8.6	9.6	7.6	8.6	9.6	0	0	0	8	9	10	3.6	4.6	5.6	2.8	3.8	4.8	7.2	8.2	9.2	6.8	7.8	8.8			
7.2	8.2	9.2	7.6	8.6	9.6	7.2	8.2	9.2	3.6	4.6	5.6	8	9	10	7.2	8.2	9.2	0.4	1.4	2.4	7.0	8.6	9.6	7.2	8.2	9.2	7.2	8.2	9.2
7.6	8.6	9.6	3.6	4.6	5.6	7.2	8.2	9.2	7.2	8.2	9.2	6.8	7.8	8.8	7.2	8.2	9.2	6.8	7.8	8.8	4.3	5.3	6.8	7.6	8.6	9.6	7.2	8.2	9.2
0	0	0	3.6	4.6	5.6	7.2	8.2	9.2	8	9	10	7.6	8.6	9.6	4.8	5.8	6.8	1.6	4.6	5.6	6.8	7.8	8.8	7.6	8.6	9.6			
7.2	8.2	9.2	0	0	0	0.4	1.4	2.4	7.2	8.2	9.2	3.2	4.2	5.2	0.8	1.8	2.8	0	0	0	6.8	7.8	8.8	4.4	5.4	6.4			
0	0	0	3.6	4.6	5.6	7.2	8.2	9.2	0.4	1.4	2.4	4	5	6	0	0	0	4.8	5.8	6.8	4.4	5.4	6.4	7.2	8.2	9.2			
3.6	4.6	5.6	3.2	4.2	5.2	3.6	4.6	5.6	0.4	1.4	2.4	0.4	1.4	2.4	4.4	5.4	6.4	0.4	1.4	2.4	0.8	1.8	2.8	3.2	4.2	5.2	2.4	3.4	4.4
0	0	0	0.4	1.4	2.4	7.2	8.2	9.2	0.4	1.4	2.4	7.2	8.2	9.2	7.2	8.2	9.2	5.6	6.6	7.6	4	5	6	4.4	5.4	6.4			
0	0	0	0.4	1.4	2.4	6.4	7.4	8.4	0.8	1.8	2.8	7.2	8.2	9.2	7.6	8.6	9.6	4.8	5.8	6.8	3.2	4.2	5.2	7.2	8.2	9.2	4.8	5.8	6.8

Exhibit 2. WHATs-HOWs Correlations-Part2