Building Customer Satisfaction using Kano Model and QFD – A Pakistani Hospital Case Study

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BUILDING CUSTOMER SATISFACTION USING KANO MODEL AND QFD – A PAKISTANI HOSPITAL CASE STUDY

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INTRODUCTION

In order to provide maximum benefits to society, and to thrive and be competitive, companies must bring products/services to market in a timely manner with adequate levels of quality in all dimensions of interest to the customer. This lies true not only for products but also for service providing organizations, either profit or non-profit, big or small, whatever the magnitude of target market is. The service or commodity focused to the customer must relate the quality dimension. It is why, how to establish customer requirements that reflect the critical quality dimension having important position. Following are the quality dimensions for services and products.

DIMENSIONS OF QUALITY

There are various dimensions of quality for both services and Products (goods).

Dimensions of Quality Services are identified below:

1. Reliability
2. Responsiveness
3. Assurance
4. Empathy
5. Tangibles

Dimensions of Quality for products are;

1. Performance
2. Features
3. Reliability
4. Conformance
5. Durability
6. Serviceability
7. Aesthetics
8. Perceived quality

Since our case study relates the quality of services, so we’ll stick around the dimensions of quality services.
According to the above dimensions, reliability refers to the criticality of a service that affects the customer’s life, more reliable service means more loyal customers. As in case of a health service unit, treatment affects the life of customer (patient), if the service is more reliable, patient would like to come to the health unit again if re-treatment requires. Second quality attribute is responsiveness; since a health unit is an instant “gemba”, the patient-doctor (or other medical staff) instant interaction will determine the responsiveness dimension of the service.

Therefore, each quality dimension may further be extended into further customer requirements. In this case study a systematic way has been adopted to categorize these customer requirements (CRs) and then to “Voice the Customer Requirements”. Two modern quality tools have been adapted in this paper, the Kano model approach and the Quality Function Deployment. But before discussing each tool in detail, let’s have a little information about the back ground of the case study.

BACKGROUND:

The case study was carried out in a Pakistani hospital, specialized in eye care services. It is one of the largest hospital providing specialized eye care services in Pakistan. Since its inception in 1991, about 3.0 million patients have so far been treated from this hospital. Average patient visit frequency is 500 patients per day.

Besides the other outlets at Rawalpindi, Sukkur and now Kohat, the hospital also adopts a wide scale social screening programs through the country especially in remote areas to eradicate eye diseases.

Since the target customers (patients) in this case study were cataract patients, so a brief sampling process is graphically mentioned below. It is important because the whole case study is designed on these variables.
The above set of process variable shows the background of the “gemba”. As for segmentation variables are concerned, following is the graphical illustration.

Figure 5: Age wise distribution of Sampled Population

Figure 6: Gender wise distribution of Sampled Population

Figure 7: Education wise distribution of Sampled Population
BUILDING CUSTOMER SATISFACTION

At Al-Shifa Trust Eye Hospital

Q: how did you feel about treating at Al-Shifa hospital?
A: it was really a good experience.

Q: would you like to recommend others for treatment at Al-Shifa?
A: of course I do.

Q: would you like to comment anything about Al-Shifa trust hospital?
A: surely, everything was really best here.

The above conversation was going on between a doctor and a patient when I passed nearby them. Suddenly I recalled an article by Glenn H. Mazur of QFD institute, published at sixth annual service quality conference, 1997, where I read the following statement:

“Does nothing wrong mean everything is right?”

MODERN QUALITY VIEW:

Modern quality management focuses on customer satisfaction as a prime quality measurement parameter. Customer satisfaction is achieved by identifying customer requirements including both hidden and spoken needs. Voice of customer provides an insightful data of all customer requirements. To identify these customer requirements two approaches can be used, i.e. the Kano model and Quality function deployment.

In this case study, these two basic approaches are used to voice the customers’ requirements. Voice of customer is different from traditional quality management which aims at minimizing negative quality (such as poor service, broken product), with traditional systems, what is achieved as best is nothing wrong—which is no longer a good effort to achieve the customer satisfaction. In addition to eliminate negative quality, the positive quality (convenience, ease of use) must also be maximized. This creates “value” that leads to “customer satisfaction”.

KANO MODEL

To satisfy the customers first we must have to identify their needs. One of the most widely used methods now a day is the use of Kano model. Professor Noriaki Kano of Science University of Tokyo along with other associates worked in the basics of identifying customer needs. An abstract from the original Kano paper is given below:

ABSTRACT:

“Through the study on quality theory in the literatures of philosophy, quality control, the study of merchandise and so on, we made clear that there are two aspects of quality such as subjective and objective ones and that it is necessary to investigate the correspondence of these two aspects. Then, for this purpose, we propose that tow dimensional recognition should replace one-dimensional one which has been so far prevailing, and that this recognition of the correspondence is utilized for
categorizing quality elements of a product into attractive, must-be, one-dimensional quality ones and so on.

Then the practical validity of this theory is examined through the questionnaire survey about the TV set and the table clock to consumers and it is investigated how each quality element of these items is evaluated under the theory. Moreover, an example of new clock planning with applying this theory is discussed in order to show the practical effectiveness of this theory.”

‘Revealed requirements’ are typically, what we get by simply asking customers what they want. These needs simply satisfy (or dissatisfy) if present (or absent) in a product or service. Like in case of a health care unit, timeliness in provision of medical service will be a good example. The faster (or slower) the service, more will be the patients like (or dislike) it. Kano in his original paper used the term one dimensional quality element for the revealed requirements.

‘Expected requirements’ or must be quality elements as used originally by Kano in his paper, are often so basic that a customer may fail to mention them, until “we fail to perform them.” These are the basic expectations without which a product or a service is of no value to the customer. As in case of a health care unit, medical treatment is an expected or basic need for a patient – let us just think for a while about a hospital without any medical treatment.

‘Exciting requirements’ are usually difficult to locate. They are beyond the expectation of customers. Their absence does not dissatisfy, but their presence excites the customer. For example in case of a health care unit, for some patients, to know the time duration of medical treatment may be an excited need, but for other customer, an easy appointment procedures may be a delighter. Since customers are not apt to voice these needs it’s the organizational’ responsibility to explore the customer problems and opportunities to explore the exciting needs to better understand the voice of customer. As Kano suggested in his paper, exciting needs might be attractive quality elements, indifferent or reverse quality elements.

The process started by defining business statement. It is different from vision statement, the reason it is narrowed down to address a specific problem. Vision statement is broad in the sense that it covers the whole organizational objectives, where as this business statement focuses a specific area. The business statement being developed for this case study is given below;

“To provide accurate, convenient, effective eye treatment, assessment and education to the patients of Al-Shifa trust eye hospital in cataract department, using resources in cost-effective manner.”

Since the data collection method was same for Kano survey as well as for QFD, the only difference was questionnaire objective and design and interpreting the data, so it will be discussed separately for each approach, while other steps as testing, administering and processing the results will be discussed below collectively.

Kano model approach can be applied in the following steps:

1. Develop the questionnaire
2. Test the questionnaire and revise if necessary.
3. Administer the questionnaire to customers.
4. Process the result.
5. Analyze the result.
Each step is described briefly.

1 DEVELOP THE QUESTIONNAIRES (“Let learn from gemba!!”)

The basic task starts by developing the questionnaire. This is the foundation stone of retrieving potential customer requirements (CRs). In this case study, the questionnaire constructed for Kano survey was formulated as a pair of questions for each potential CR, these CRs were categorized in an affinity diagram. Each pair of question has two aspects; first part depicts the functionality while second part shows the dysfunctional aspects. Generate codes for all the questions so that during processing the results, responses can be interpreted in to objective scales. The major problem faced in customer surveys regarding services, is objectiveness of the data. Mostly the data to be measured is subjective in nature so during editing the questionnaires, the problem can be minimized by careful coding and decoding. Following recommendations should be considered while developing the questionnaire.

1. Customer statements sometimes are vague and fuzzy; avoid straying from the original intent of the CR statement, for this purpose refer to translation worksheet or data dictionaries if necessary.

2. Beware of polar wording, try to consider functional aspect in questionnaire, e.g. it is preferable to ask the question in a functional manner as “how would you like if you feel that staff’s attitude is non-convincing?”, instead of asking “how would you like if you feel that staff is ridiculous?”

3. One question should be focus to only one idea, cramming various thoughts in one question may confuse the respondent.

4. Questions should be easy and understandable to the respondents, i.e. should be in customer terms rather than the development terms, it means that in terms of benefits for customers rather than features of a future product/service, e.g. if we want to ask about the reliability of medical service of a health unit, our question should be phrases as “would you like to recommend your acquaintances/friends for treatment to this hospital?”

5. Reliability is an important aspect for any survey, to avoid the customer bias, create self checks within the questionnaire, as e.g. for measuring treatment reliability, the respondent can asked in the following manner. “In your view how much treatment you have got during treatment period in Al-Shifa hospital? i) 100%, ii) 80%, iii) 60%, iv) 40%, v) 20%, vi) 0%.

Another question focusing the reliability of treatment can be measured by this question. “Have you ever revisit Al-Shifa? If yes, what was the reason? i) treatment of same eye disease, ii) Treatment of some other eye disease, iii) Treatment for friend/acquaintances, iv) For all of the above reasons, v) Non of the above mentioned reasons.

2. TESTING THE QUESTIONNAIRES

Before administering the questionnaire in a real gemba, pretest the questionnaire and revise it if necessary. The best way to design a customer focused questionnaire is to have a discussion section with potential customers before designing a questionnaire, it will give us better idea how to develop the questionnaire and what customer needs are more important to focus in the questionnaire. But it does not mean that it will give us the exact idea about customer requirements, e.g. in this case study, a proper customer discussion section was commenced before devising the actual questionnaire, and there were few needs as for example the privacy of
patient was identified in a pre-survey discussion but during actual survey, this statement was mostly non responded.

3. **ADMINISTER THE QUESTIONNAIRE**

Once the questionnaire has been finalized and tested, start the actual survey. There are various methods of administering the questionnaire, like distributed it randomly to respondents, do sampling, or conduct personal interviews depending upon the situation. In this case study, individual interviews were conducted because of the reason that the most of the respondents were either too old to read or write or too young. Another major reason for conducting personal interview was that of literacy rate. As shown in the preceding section, 52% of population of the sampled respondents is illiterate. This was also the reason that the questionnaires were designed (both for Kano Survey and QFD) in the native language i.e. Urdu.

4. **PROCESS THE RESULT**

Since the data has been collected, the stage to process the data starts. First step is to decode the data, as described above; pre-coded questionnaire was administered to the respondents. Determine the codes for each question as for example, in questionnaire for QFD one question was coded and decoded as follows:

<table>
<thead>
<tr>
<th>CODED VALUE</th>
<th>DECODED VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRs. %age treatment</td>
<td>Question options</td>
</tr>
<tr>
<td>1. 100%</td>
<td>a1</td>
</tr>
<tr>
<td>2. 80%</td>
<td>a2</td>
</tr>
<tr>
<td>3. 60%</td>
<td>a3</td>
</tr>
<tr>
<td>4. 40%</td>
<td>a4</td>
</tr>
<tr>
<td>5. 20%</td>
<td>a5</td>
</tr>
<tr>
<td>6. 0%</td>
<td>a6</td>
</tr>
<tr>
<td>Comfort standard of waiting halls</td>
<td>1. Very comfortable</td>
</tr>
<tr>
<td>2. Comfortable</td>
<td>a2</td>
</tr>
<tr>
<td>3. n/comfortable n/- uncomfortable</td>
<td>a3</td>
</tr>
<tr>
<td>4. Uncomfortable</td>
<td>a4</td>
</tr>
<tr>
<td>5. Very uncomfortable</td>
<td>a5</td>
</tr>
<tr>
<td>6. Do not know</td>
<td>a6</td>
</tr>
</tbody>
</table>

5. **ANALYZE THE DATA (FOR KANO SURVEY):**

After the data has been processed, start interpreting the data. The CRs recorded in an affinity diagram were then calculated for three basic types of Kano needs i.e. the expected needs (basic/must be), revealed needs (one-dimensional needs) and exciting needs (attractive needs). For this purpose the following matrix was adapted from the article from David Walton, senator vice president of BBN.
Kano evaluation table

<table>
<thead>
<tr>
<th>Customer Requirements</th>
<th>Dysfunctional</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1. like</td>
</tr>
<tr>
<td>Functional</td>
<td></td>
</tr>
<tr>
<td>1. like</td>
<td>Q</td>
</tr>
<tr>
<td>2. must-be</td>
<td>R</td>
</tr>
<tr>
<td>3. neutral</td>
<td>R</td>
</tr>
<tr>
<td>4. live with</td>
<td>R</td>
</tr>
<tr>
<td>5. dislike</td>
<td>R</td>
</tr>
</tbody>
</table>

Table 1: Kano Evaluation Table

Customer requirement is:

A: Attractive
O: One-dimensional
M: Must-be
Q: Questionable (Kano used the word “Skeptical” instead of Questionable)
R: Reverse
I: Indifferent

As described above in “developing the Questionnaire section”, each pair of question has two parts; first part was the functional aspect of the quality attribute while the second part of question was the dysfunction aspect of the quality attribute. For example see the figure below

Figure 8: Sample of questionnaire for Kano model

Here customer encircles in first part the option 1 i.e. “When the doctor is courteous to me during treatment, I like it”. For second part of the above question, customer encircles the option “5”, i.e.
“When doctor is not courteous to me during treatment, I dislike it”. The resultant response when compare with Kano evaluation table, found to be the one-dimensional requirement i.e. revealed needs, therefore we can categorize the Kano evaluation table according to following need categories.

- **Expected requirements**
- **Revealed requirements**
- **Exciting requirements**

- **Basic needs**
- **revealed needs**
- **Exciting needs**

- **Must-be**
- **One-dimensional**
- **Attractive needs**

Following is the table given showing the categorized needs identified by Kano method survey.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>NEED STATEMENT</th>
<th>REQUIREMENT CATEGORY</th>
<th>NEED CATEGORY</th>
<th>KANO CLASSIFICATION FOR (PATIENT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Politeness and courtesy of doctor</td>
<td>Revealed requirements</td>
<td>Revealed need</td>
<td>One dimensional</td>
</tr>
<tr>
<td>2.</td>
<td>Politeness and courtesy of admin.staff.</td>
<td>Expected requirement</td>
<td>Basic need</td>
<td>Must be.</td>
</tr>
<tr>
<td>3.</td>
<td>To know the time duration of treatment.</td>
<td>Exciting requirement</td>
<td>Exciting need</td>
<td>Attractive</td>
</tr>
<tr>
<td>4.</td>
<td>Easy appointment procedure.</td>
<td>Revealed requirements</td>
<td>Revealed need</td>
<td>One dimensional</td>
</tr>
<tr>
<td>5.</td>
<td>Doctor’s advise to purchase medicine from Al-Shifa Medical store.</td>
<td>Expected requirement</td>
<td>Basic need</td>
<td>Must be</td>
</tr>
</tbody>
</table>

*Figure 9: Need Assessment for Al-Shifa customers.*

The purpose of Kano survey is to better understand the better characteristics of customer requirements. The responses should be not be assumed as guidelines, as it does not lead to identify exactly which attributes should be added to the service or not in order to satisfy the customer. In this regards various approaches can be applied to interpret data, in the following case study, an approach to rank order the customer requirements was adopted\[9\]. The problem was identified when customer responses were classified in Kano evaluation table. As for example, for 50 customer responses, CR 1 was identified as *Must-be* by 25 customers and as *Attractive* by another 25 customers. Therefore when two Kano codes are tied in the scoring for a given characteristics, consider the following:

1. Selecting the classification that would have greater impact on the overall product/service (the following rank order was used as a preference in this case study. M>O>A>I).
2. Second consideration might be to follow up with the customer for additional insight.
3. Market segmentation difference may also be considered. Since in this case study two different market segments were surveyed separately, so this option was also one of the major consideration in this regard.
BENEFITS OF KANO METHODS:

1. Invisible ideas about quality can be made visible.
2. Customer requirements can be categorized.
3. Customer requirements can be translated into quality dimensions.
4. Customer requirements can be classified by questionnaires.
5. Customer requirements can be prioritized for development activities.
6. Customer requirements can be voiced into system requirements (next step in QFD).
7. Customer requirements can be weighted into potential better and worse quality variables.

QUALITY FUNCTION DEPLOYMENT

DEFINITIONS OF QFD:

Quality Function Deployment (QFD) is a way of making the ‘voice of the customer’ heard throughout an organization. It is a systematic process for capturing customer requirements and translating these into requirements that must be met throughout the ‘supply chain’.

QFD is:

1. Understanding Customer Requirements
2. Quality System Thinking + Psychology + Knowledge/Epistemology
3. Maximizing Positive Quality That Adds Value
4. Comprehensive Quality System for Customer Satisfaction
5. Strategy to Stay Ahead of the Game

QFD WORLDWIDE APPROACH

QFD has been an integral part of QS-9000, automobile industry specific standard. The following diagram was developed by Mr. Glenn Mazur, it shows that QS-9000 incorporates QFD. In Japan, Professor Yoshizawa is spreading the effort in getting QFD recognized as an international standard and incorporated in the ISO.

Quality Function Deployment (QFD) is a systematic process for motivating a business to focus on its customers. It is used by cross-functional teams to identify and resolve issues involved in providing...
products, processes, services, and strategies, which will more than satisfy their customers. A prerequisite to QFD is Market Research. This is the process of understanding what the customer wants, how important these benefits are, and how well different providers of products that address these benefits are perceived to perform. This is a prerequisite to QFD because it is impossible to consistently provide products, which will attract customers unless we have a very good understanding what they want.

**WHY USE QFD?**

Once a team has identifying the customers’ wants, QFD is used for two fundamental reasons:

- To improve the communication of customer wants throughout the organization.

- To improve the completeness of specifications and to make them traceable directly to customer wants needs, QFD requires that representatives of the different organizations involved in producing/delivering the product/service he involved in its definition. Consequently, these representatives discuss the meaning of the customer wants and work together to ensure that they come to a common understanding. Communications throughout the organization is greatly improved. This process will also uncover many issues whose resolution will lead to a more complete specification.

**QDF METHODOLOGY**

The basic tools of QFD varies according to situation to situation, basically the QFD approach consists of following route, as has been adapted in this case study.
System Planning Matrix

Figure 11: HOQ for system design attributes
I LEVEL - SYSTEM PLANNING MATRIX

(INITIAL STRATEGIC PLANNING STAGES)

The first step in the QFD process is defining who the customers are, and then establishing the customer’s needs and demands by direct dialogue (personal interviews). This is the basis for all process to follow and it must be done without altering the customer’s needs. Apparently the step seems trivial; just consider the concept of hard wired and soft wired organizational structure by Thomas Pyzdek. According to Thomas the hard wired organizations are large, multilevel organizations, every department departed from each other, only involved in their specific activities.

“The common form of many modern organizations is what I call “hard wired.” The organization chart is the blueprint, and the policy-and-procedure manuals are the operating instructions for this machine. As with a circuit board, the idea is that certain outputs (products, services, profits) will be produced when certain inputs (money, people, ideas) are provided. Such organizations are highly efficient; resources are carefully managed to avoid waste. However, they are also very inflexible and difficult to change”.

The resources are not fully utilized if remain idled for long time. Development and production staff has little or no contact with the customer. The customer’s actual requirements filter through the marketing department, development staff and then to the production staff. Where as in spontaneous organizations, which is a self adaptive and complex system, the resources are free to utilize by any departments.

“They could depend on self-organization, rather than on a costly and ineffective system of rules and hierarchy (i.e., management), for order.”

There is a very real need to ensure the customer’s needs, or “the voice of customer” is not misinterpreted or distorted.

There are four basic steps of the first level of QFD.

1. DEFINE AND PRIORITIZE CUSTOMER REQUIREMENTS

Using QFD, the customer needs are documented in the customer’s own phrases to the greatest extent possible. During customer survey for determining these needs the customer is forced to rank order the needs. This is particular an important step to fully understand the customer viewpoint and get the product/service’s maximum share in the market.

The voice of the customer or customer requirements comprises the room 1 on right side of the house of the quality [refer to the above fig.]. The next column just adjacent to the voice of the customer shows the customer’s priority or importance to the customer. Level of customer satisfaction comprises room 2 of QFD on the left side of the house of quality. At the very left of the house of quality, the graph shows the customer’s perceptions about the quality attribute of the service delivered to them. At the top of the HOQ, product /service attributes are enlisted. Since this is the very initial stage where the system attributes are directly related with the voice of customers. Some times in practicing QFD, it is considered an enough exercise. As a matter of fact, this is the beginning of the task. At this stage, the scope is very wider but not focused. Only general aspects are under considerations. This stage only gives us the rough idea that from where we have to take the start. The actual task starts after this exercise. When technical values of the system attributes are defined and concept development and selection is done.
2. ANALYZE COMPETITIVE OPPORTUNITIES

Once the competitive ranking of the service attributes have been defined there comes the stage to analyze the competitive opportunities. Generally there has been a lot of data available with in the organization about its competitive position. But in case of Al-Shifa, there was one problem, that is, there is no prominent competitor being present in the market, it almost enjoys a monopolistic status. But in customer survey, a direct question was forcedly asked by the respondent that, where does he rank a certain quality attribute of Al-Shifa? Best, better, good, neutral, do not know or if any other hospital. Since almost every other respondent only visited Al-Shifa because of the reason that it is the only one hospital in Pakistan being specialized in eye care services, so we only got the data about the performance of quality attributes of services provided by Al-Shifa. On the very left side of the house of quality, a graph is plotted between the customer perception of the service and the importance of that quality attribute in customer view points. It also gives some good idea that which quality attributes are important in customer’s view point and what is the performance level of that quality attribute. It also gives us some direction to strive forward in the future analysis of data at 2\text{nd} and 3\text{rd} level of QFD.

3. PLAN A PRODUCT (SERVICE) TO RESPOND TO NEEDS & OPPORTUNITIES.

The roof of the house of quality (HOQ) shows the products/service attributes to specifically address the voice of customer. This can also be termed as “voice of the system” or “design requirements” or “Hows”. Each customer requirement is considered in turn, in isolation, to establish the required design attribute to satisfy it. This is the first transformation of voice of customer into the voice of system or “Jargon of the Corporation”. Customer terms are rewritten in terms of measurable characteristics which can be used as a functional parameter. Let’s take an example, which will continue throughout the case study just to show how at each level the customer requirements are further transformed into system, subsystem, process and at the end service delivery control parameters. Let’s have a primary customer need suppose, I need 100% treatment. This is the primary need which now be disintegrated up to secondary or even tertiary level. For this customer need, various voice of system can be designed as for example, no. of technologies used, pre-surgery, post surgery examination duration, post surgery retention of patient duration, no. of deviations of process and protocols, no. of procedure available etc, etc. each of this technical characteristic is then correlated individually with each customer requirements, thus establishing a matrix in the house of quality at the center. We can then identify the existence and strength of relationship between each design requirement and each and every customer requirements. Relative weights are usually identified symbolically having scale 9-5-1 (strong, moderate, and weak).

4. ESTABLISH CRITICAL CHARACTERISTICS TARGET VALUES:

The design attributes so designed are not only correlated with the potential requirements but they are also traded off among themselves. The purpose of this exercise is to see whether existence or improvement in one design requirement does have any impact on the existence or improvement of any other design requirement. This impact may be synergetic or compromising, in both cases, it does has an impact on the potential product/process/service design, ultimately affecting the customer requirements. When two specific design requirements are traded off with each other, the following points are also considered during this tradeoff.

a. strength of consecutive correlation with any voice of customer.

b. customer’s perception about that quality attribute.

c. satisfaction level of a particular quality attribute in customer view point.

d. importance of a particular quality attribute in customer view point.
On the basis of these above four considerations the decisions have been taken whether to improve the potential design requirement eliminate it or just put it aside for future decisions.

Once the tradeoff has been done, now a stage comes to define the technical characteristics of the potential design requirements. Technical benchmarks are assigned from a survey of competitive products at the bottom of the house of quality (HOQ). Following the review of benchmark performance versus design concept, technical targets are assigned to the design characteristics. Importance of the design attribute is highlighted graphically in order to feed back the next stage in QFD process. This graph also gives us the idea by utilizing Pareto analysis, which design requirements are more important to be addressed aggressively in the form of technical targets.

The following example of the case study will show how QFD approach help to trickle down the voice of customer deep into voice of system.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Prompt services at my appointed time</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I do not want to go anywhere</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3.2</td>
<td>8</td>
<td>12.8</td>
</tr>
<tr>
<td>What treatment is required</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4.2</td>
<td>4</td>
<td>3.8</td>
</tr>
<tr>
<td>How treatment will affect my life</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4.2</td>
<td>4</td>
<td>3.8</td>
</tr>
<tr>
<td>Target values</td>
<td>30 min.</td>
<td>10 min.</td>
<td>30 min.</td>
<td>5 min.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Absolute importance</td>
<td>33</td>
<td>72</td>
<td>93</td>
<td>61</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Matrix 1: System Planning Matrix

Let’s take the highlighted example of a customer requirement “I do not want to go anywhere”. Apparently this is a vague requirement. Few design attributes have been brainstormed to emancipate this requirement into the system. Few of those attributes could be “Check-in duration per patient”, “Pre-Surgery Examination duration per Patient”, “Surgery Duration per Patient” and “Post Surgery Examination duration per Patient”. In the above matrix, it shows that this requirement has a strong relationship with Pre-surgery examination duration per patient(9), mild relation with surgery duration(5) and a weak relation with check in time duration per patient(1). This requirement is highly important to the customer, but level of customer satisfaction is very low, thus increasing the Gap Importance. The gap importance can be calculated by the formula $x_{ii}$;
Gap Importance = Importance to the Customer + (Importance to the Customer – Level of Customer Satisfaction)

Example of calculating Gap Importance of CR “I do not want to go anywhere”:

\[
\text{Gap Importance} = 8 + (8 - 3.20) = 12.8
\]

The perception level or the competitive ranking is very low as compare to importance. Thus all these “values” highlights the strength for importance to the customer requirement, therefore strengthening area for potential market segment. The direction for improvement of product attribute can be obtained by the highest absolute importance value of design attribute “Surgery Attribute” i.e. 93. Let’s now shift to the second level of QFD which is subsystem planning matrix.

**SUBSYSTEM PLANNING MATRIX (II – LEVEL)**

II Level - Subsystem Planning Matrix has the following steps;

1. Identify Critical Subsystem (service delivery) parameters
2. Flow down Critical Service delivery characteristics.
3. Translate into Critical Service Delivery parameters and Target Values

The area of improvement highlighted in the I-Level of QFD is now shifted to IIInd level of QFD. In the first level the scope was very broad, I Level focused on the macro attributes of the organization. The micro attributes can only be reached by a ladder down to II, III and IV Level of QFD whatever the situation is.

<table>
<thead>
<tr>
<th>System Attributes</th>
<th>Subsystem Attributes</th>
<th>Direction of improvement</th>
<th>1. Equipment down time</th>
<th>2. Availability of staff per hour (hours)</th>
<th>3. No. of technologies used (hours)</th>
<th>4. No. of procedures supported</th>
<th>Absolute importance</th>
<th>Relative Importance</th>
<th>System performance</th>
<th>Target values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surgery duration per patient</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>93</td>
<td>60 min.</td>
</tr>
<tr>
<td>Importance of Subsystem Attribute</td>
<td>286</td>
<td>395</td>
<td>210</td>
<td>190</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relative Importance</td>
<td>26.45</td>
<td>36.45</td>
<td>19.42</td>
<td>17.57</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subsystem Performance</td>
<td>60 min.</td>
<td>3</td>
<td>4</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Target Value</td>
<td>20 min</td>
<td>5</td>
<td>4</td>
<td>15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Matrix 2: subsystem planning matrix (II-Level)
**PROCESS PLANNING MATRIX (III – LEVEL)**

Process Planning Matrix has the following steps:

1. Determine Critical Service Delivery processes and process flow
2. Develop Critical Service Delivery Process Requirements
3. Establish Critical Process Parameters

<table>
<thead>
<tr>
<th>Subsystem Attributes</th>
<th>Process Attributes</th>
<th>Direction of improvement</th>
<th>Relative Importance</th>
<th>Importance of Subsystem Attributes</th>
<th>Subsystem Performance</th>
<th>Target values</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1. No. of Staff per Patient Surgery Duration</td>
<td>2. Frequency of Surgery per Day</td>
<td>3. Staff’s downtime to get ready to assemble at OT</td>
<td>4. Supply of Sterilized Instruments at OT (Points)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>395</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>36.54</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5</td>
</tr>
</tbody>
</table>

Matrix 3: process planning matrix (III-Level)

**SERVICE DELIVERY CONTROL (IV – LEVEL)**

1. Determine Critical Service Delivery characteristics
2. Establish Service Delivery Control methods.
3. Establish minimum requirements & method parameters

**Central Sterilization Supply Department (CSSD)**

<table>
<thead>
<tr>
<th>Supply of Sterilized Instruments at OT Critical service control Steps</th>
<th>Service Control Parameters</th>
<th>Control Points</th>
<th>Control Methods</th>
<th>Sample size and Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity of Sterilizing Incubator</td>
<td>Retention ward packs = 12 OT Trays = 6 Mix = 6/3</td>
<td>No Overloading Capacity</td>
<td>Inspection</td>
<td>100 %</td>
</tr>
<tr>
<td>Calibration of Sterilizing Incubator</td>
<td>Calibration</td>
<td>Annual Certification</td>
<td>Testing</td>
<td>100%</td>
</tr>
<tr>
<td>Staff at CSSD</td>
<td>Training</td>
<td>Bi-Annually training</td>
<td>Job Rotation</td>
<td>N/A</td>
</tr>
<tr>
<td>Preparation of OT Trays</td>
<td>Time</td>
<td>Time for an OT Tray = 4 min.</td>
<td>Random Sampling</td>
<td>X bar &amp; R Charts</td>
</tr>
<tr>
<td>Storage area of Sterilized Store</td>
<td>Sqr. Ft per Rack</td>
<td>Two racks per 5 Sqr. Ft with a gap of 3 Sqr. Ft</td>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>
Matrix 4: Service Delivery control matrix (IV-Level)

**BENEFITS OF QFD**

QFD is a tool used to translate and document the product quality requirements among the functional groups involved in creating the systems and processes. This tool is used to spread throughout the organization the real customer requirements statistically in their (customer’s) own words without distorting the actual objectives of improving the service criteria. Clausing has described QFD as a means to *integrate the corporation holistically with a concentrated focus on customer satisfaction*.xviii

Few benefits of QFD are as follow:

1. QFD provides means to share information throughout the organization.
2. QFD facilitates communication, planning, and decision making with in a process/product development and improvement teams.
3. QFD helps in documenting essential documents like process flow charts, process diagrams, design sheets, job profiles, specification sheets etc.
4. QFD is helpful in mapping out the critical customer needs throughout the organization with controllable quality parameters.
5. QFD helps in utilizing resources cost effectively thus reducing cost of quality. It also helps in increasing market share and gaining customer loyalty, as the objective of this study was also to utilize the resources cost-effectively while providing best services to the customers.

**THE FINAL REMARKS.**!

QFD begins with the product/service/system planning, continues with product/service/system design (subsystem and process planning) and ends up with the service delivery control, quality control, testing, equipment calibration, maintenance and training. During the whole process of QFD there was a greater focus on the “Critical Fews”xv that affect the success of the service delivery directly to the customer. According to J. M. Juran, service means direct selling to the customer or in other words direct interaction with the customer while rendering a service, very much true in case of a healthcare industry. The “gemba”xv itself provides the prompt response on the quality of service, so it does not take a long time to get a proper customer response or it does not require floating cumbersome questionnaires to get the customer response. The customer’s decision is at the spot about the quality of the service.

Note: special acknowledge have been made to the management of Al-Shifa trust eye hospital Rawalpindi, allowing the author to get interacted with their patients and studying the system. It was the hospital management’s kindness to permit researcher to use their organization as the target.
organization. It is feeling proud to pay gratitude to their kindness. The special permission has been seek to used the data being collected during all surveys and is again used in this study paper which is right protected and in any case if so, required to use for further research purpose or same, once again a permission will be seek out from Al-Shifa to utilize this data.

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i An Introduction to Quality Function Deployment: Benoit Gauthier, University of Rhode Island, Spring 1998

ii Original Paper of Kano Model is,

iii Center for quality management journal: David Walton, senator vice president of BBN. Volume 2, Number 4. Fall 1993

iv Professor kozo Koura, 2 September 2002, President, Kozo Koura & Associates
In a review of the case study “Let learn from gemba!!”


vii Center for quality management journal: Bill Dumouchel of BBN, Volume 2, Number 4. Fall 1993 page 18

viii www.QFD institutes/what is QFD.htm

ix Ref. with the courtesy of Yoji Akao, ©1997 International symposium on QFD ’97 linköping


xii International Technigroup Incorporated (ITI). www.qfdcapture.com/qfdbcasestudy.htm

xiii An Introduction to Quality Function Deployment: Benoit Gauthier, University of Rhode Island, Spring 1998


xv Professor kozo Koura, 2 September 2002, President, Kozo Koura & Associates
In a review of the case study.