# Quality Function Deployment to Improve Quality of Service

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## *Abstract*

*This paper is a study to analyze the implementation of Quality Function Deployment to improve quality of service. The purpose of this paper is to analyze an overview assessment of the performance of the company compared customers expectations so that they can know the important things that are repaired by the company to improve the quality of service to its customers. Method approach with descriptive analysis on the implementation of Quality Function Deployment includes product, price, people, processes and physical evidence to improve quality of service. Companies need to implement Total Quality Management through the house of quality in order to provide quality service to the customers. Service attributes that companies provide is considered very important for the customer, so the nonoptimal service make a non loyal customers.*

*Key words : Quality Function Deployment, Total Quality Management*

## INTRODUCTION

In our Era, Tsoukalidis said in his article (Tsoukalidis, 2009) that organizations have to plan and implement strategies that will not only allow them to survive but will provide them capabilities to be more competitive and become leaders. In order to achieve this, they have to make strategic decisions which are in the majority of cases too complex and difficult and involve risk and many times conflicts. To overcome such difficults, the organizations can use several methodologies that can support making the proper decisions.

Competition in services company are required to provide the best quality services. Company should give the needs and desires of customers, both of product quality and service provided. It can be taken to improve by trying to know and understand the customer's expectation. Company conduct feedback in order to improve the quality of service. Based on this information, company can be developed the better service quality so as to improve customer satisfaction.

Quality is an important thing in products and services. Quality of service is a measure of how good the level of service provided to the customer in accordance with expectations. Kotler (Kotler, 2012:150) argues that customer satisfaction is a person's

feelings of pleasure or disappointment that emerged after comparing the perception or impression of the performance or the outcome of a product and its expectations.

## CONCEPTUAL FRAMEWORK

### 1.1. Theoritical Concepts

Quality of service related with the implementation of operations management. According to Heizer and Render (Heizer & Render, 2011:36), Operations Management is a series of activities to create value in the form of goods and services through the conversion of inputs into outputs. Input consists of human resources (labor), capital (equipment and facilities), raw materials and services, land and energy. While the output of goods or services. According to Heizer and Render (Heizer & Render, 2011:39), ten strategic decisions in operations management consist of "Design of Goods and Services, Quality Management, Process and Capacity Design, Strategic Location, Layout Design, Design of Human Resources and Employment, Supply Chain Management, Inventory Management, Material Requirements Planning and Just In Time; Short and Medium-Term Scheduling, Maintenance and Engineering."

Quality management can be done with the application of the Integrated Quality Management (Total Quality Management / TQM). TQM is a planning and control activities which focus on quality assurance of products and services offered to customers. Total Quality Management can be defined as Total (overall); Quality (quality, degree / level of excellence of goods or services); Management (action, how to manage, control, direction).

Yamit (Yamit, 2004:181) states that, TQM is a "management system to improve the overall quality of competitive advantage towards the achievement-oriented customer satisfaction by involving all members of the organization". Total Quality Management (TQM) by Heizer and Render (Heizer & Render, 2011:226) is "Management of an entire organization so that it excels in all aspects of products and services that are important to the customer". TQM emphasizes a commitment to get a referral management company constantly to achieve excellence in all aspects of the products and services which are all important for the customers so that the company can compete to become the world market leader.

Tenner and DeToro (Tenner and DeToro, 1992:32), three principles of Total Quality Management are (1) focus on the customer (customer focus), (2) an increase in process (process improvement), and (3) the involvement of the total (total involvement). According to Juran (Goetsch, 2006:262), three concepts of quality, known as the Juran Trilogy, are

    1. Quality Planning, company prepare targets for achieving quality goals.

2. Quality Control, company perform in achieving the goal of quality control.

3. Quality Improvement, company try to fix or improve the quality of its products.

One method of TQM is QFD (Quality Function Deployment). According to Heizer and Render (Heizer & Render, 2011: 191), Quality Function Deployment is a process of setting customer desires (what customers want) and how to translate them into the attributes of each functional area can understand and implement. Cohen (Cohen, 1995:11), QFD is a structured methodology that is used in the design and development of product specifications to determine customer needs and wants, and evaluate the product or service capability to fulfill the needs and desires of customers.

QFD is used to identify and fulfill the needs and desires of customers to the products or services it produces. Besides that, QFD can help company to find innovative responses to customer needs and improve processes to achieve maximum effectiveness. Lou Cohen (Cohen, 1995:23), if QFD have implemented appropriately, the Quality Function Deployment will provide the following results :

1. Improve communication activities intra departments.

2. Customer needs to be taken through the process of direct operational.

3. Less system changes.

4. Built-in system quality.

5. Lower start-up costs.

6. Less development time.

7. Identify conflicting needs and desires of many customers.

Kenneth A. Crow in his article said that Quality Function Deployment (QFD) is a structured approach to defining customer needs or requirements and translating them into spesific plans to produce products to meet those needs. Marvin in his article (Marvin, 2003) said that the dynamic hierarchy process model for QFD was used to help the product development team make effective decisions in satisfying the requirements of the customer constrained by limited resources. Tsoukalidis (Tsoukalidis, 2009) said that the idea behind QFD is to take into serious consideration the "Wants" of the customers or otherwise *the Voice of the Customer*. "A main goal of QFD is to translate customers demands into target values for the engineering characteristics od a product" (van de Poel, 2007:21). According to Franceschini and Rosetto (1995:270), the main goal of QFD is to maximize the satisfaction of customer.

Zheng, Xiaosong and Pulli, Petri (Zeng and Pulli, 2005) said that QFD is a design approach that translates customer requirements into the appropriate technical requirements at each stage of the production process. So, quality function deployment is a systematic process to integrate customer requirements into every aspect of the design and delivery of products and services (Cudney and Elrod, 2011:46). QFD is a system that utilizes customer demands to meet client missions by outlining what the customer wants in a service or product. QFD is a planning process that translates customer needs into appropriate company requirements at each stage, from research and product/service development to engineering, manufacturing, marketing/sales, and distribution.
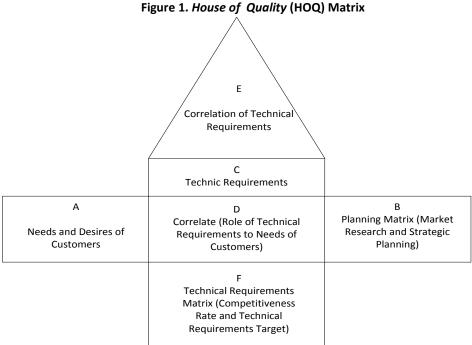
## 2.2 *Empirical Evidence*

Zheng, Xiaosong and Pulli, Petri (Zeng and Pulli, 2005) said that once the demand qualities are gathered, they must be translated into quantitive and explicit quality characteristics. One tool of QFD is the House of Quality. House of Quality by Jay Heizer and Barry Render (Heizer and Render, 2006:159) is a graphical technique for explaining the relationship between needs and wants of customers with products or services. House of Quality is a matrix that describes the needs and desires of customers and how the company is doing something to meet the needs and desires.

The House of Quality (HOQ) is used as an interface tool in these types of applications (Hui-Ming Kuo & Cheng-Wu Chen, 2011). The HOQ includes six major parts :

1. Customer needs : Description of customer quality needs and expectations. Information on customer quality needs to be retrieved by means of survey questionnaires and interviews. A complete understanding of customers must be made before applying QFD. Since most customers are usually vague about their primary needs, these must be expanded to secondary needs, sometimes even tertiary needs.

2. Quality elements : Customer needs are transformed into strategies which enterprises are able to apply.

3. Relationship matrix : Reveals the relationships between each quality element and customer needs. Comparison is made of the relationship between each customer need item and each quality element item. Each vector of quality elements must be orthogonal to each vector of customer needs. A matrix is formed where the complex relationships between quality elements and customer needs are displayed with signs or weights.

4. Correlation matrix : Reveals the correlations between solutions.

5. Competition analysis : Compares major competitors with this enterprise to find advantages and disadvantages. A weight evaluation table is created according to customer needs and quality elements.

6. Prioritize : Finally, customer needs can be prioritized based on the HOQ results and solutions executed in order of importance.

**Figure 1. *House of Quality* (HOQ) Matrix**



E
Correlation of Technical Requirements

C
Technic Requirements

A
Needs and Desires of Customers

D
Correlate (Role of Technical Requirements to Needs of Customers)

B
Planning Matrix (Market Research and Strategic Planning)

F
Technical Requirements Matrix (Competitiveness Rate and Technical Requirements Target)

*Source* : Cohen L., *QFD: How To Make QFD Work for You*, 1995:12.

Description :

1) Section A: Contains the data or information obtained from the results of market research on the needs and desires of customers.

2) Section B: Contains 3 types of data:
   - Level of importance needs and desires of customers
   - Level of customer satisfaction data to the product from the company and competitors
   - Strategic objective for new products or services that will be developed

3) Section C : Contains the technical requirements for new products or services that will be developed. This data is derived based on the information obtained about the needs and desires of customers (matrix A).

4) Section D : Contains management's assessment of the strength of the relationship between the elements contained in the technical requirements (matrix C) to

customer needs (matrix A) that are affected. Strength of the relationship is shown by using certain symbols.

5) Section E : Indicates the correlation between the technical requirements with technical requirements contained in another matrix C. The correlation between the technical requirements are indicated by using certain symbols.

6) Section F : Contains 3 types of data:

- Rank of technical requirements

- Information performance comparison results of the technical requirements of the product against a competitor product performance

- Performance targets the technical requirements of new products being developed.

Steps to make the House of Quality (Cohen, 1995:14) :

1. Sub matrix formation in Section A by identifying the needs and desires of customers (through an initial interview) with respect to the characteristics of the desired product.

2. Establishment of Sub Matrix needs and desires of customers who have obtained then weighted based on the interests of consumers themselves. The level of consumer interest pick a scale of 1 to 5, where 5 indicates that the value of the existing characteristics are needed and these characteristics must be present on the desired product. This level decreases with the decrease of the value given, where a value of 1 means that the characteristics are not always in the poduk.

3. Establishment of Sub Matrix in Section C by translating customer needs and desires into engineering characteristics.

4. Establishment of Sub Matrix Relations in Section D to determine the relationships between customer needs and engineering characteristics of the company as follows :

- There is no relationship (weight = 0).

- The relationship is weak (weight = 1).

- Relationships are moderate (weight = 3).

- A strong relationship (weight = 9).

5. Determination of the target based on the characteristics of the company and the level of technical difficulty with the company describing the target values of the

design requirements. Degree of difficulty in meeting the target company with the following provisions :

- The simplest (1), to realize there are no constraints.
- Easy (2), arising challenges still easily overcome.
- Quite difficult (3), is quite difficult to realize because of the difficult obstacles arise and many.
- Difficult (4), it is difficult to realize because there are issues such as technical variables that can not be controlled.
- Very difficult (5), the most difficult diealisasikan may even be possible because biaanya constraints faced by a side effect of the technology used.

6. Creating a target representation, ie the values of the target may be increased or decreased in accordance with the development being done (use arrows). When development on the target and the target does not match the best is par picture, then its representation using the "O".
   - ↑ means the bigger is the better.
   - ↓ means the smaller is the better.

7. Correlation Matrix Sub establishment, namely by showing the correlation between any design need. Sub Correlation Matrix located on the upper part of the image quality triangular symmetry. As for the explanations are as follows :
   - The positive correlation (+), showed the changes occur in the immediate needs of the design can have a positive impact on the needs of the other designs.
   - The correlation is negative (-), shows the changes in the design needs to direct a negative impact on other design needs.

8. Made a priority calculation, by performing mathematical calculations through its weight and value is based on the relative importance of each customer's needs. Technical characteristics that have a higher value should be given priority for the development of the product. Calculation is as follows, for each column, multiply the value of the interest rate mode subscribers with each input value associated with their respective weights. Total each column will produce absolute values were converted in percentage of the absolute values.

**METHODOLOGY AND DATA**

In this study, the method used is descriptive method. According to Uma Sekaran (Sekaran, 2010: 105), "descriptive study was conducted to determine and explain the characteristics of the studied variables in a situation. Descriptive study was also carried out to understand the characteristics of organizations that follow certain common practices." Some of the data collection techniques used were :

1. Interviews, conducted with owner and customers.

2. Observations, carried out by observing the process of providing services, facilities, and attitudes / behaviors of employees.

3. Questionnaire, to determine the essensial characteristics of customer satisfaction, as well as to determine the level of assessment of the customer's business performance.

Indicators consists of product, price, people, processes, and physical evidence. Number of respondents are 100 employees. The data obtained will be examined validity and realiabilitasnya, further data will be discussed.

**RESULTS AND DISCUSSION**

Customer needs is an important factor to improve quality services. Here are the results of Test Reliability Characteristics of Customer Needs.

**Table 1.** **Reliability Test of Characteristics Customer Needs**

| Questionnaire | *Cronbach's Alpha* |
|---|---|
| Customer Interest Average | 0.908 |
| Performance Average | 0.921 |

Validity test of characteristic attributes are valid for r-value ≥ 0.361. The next step is the calculation of the level of customer interest and the performance. It can be calculated according to the customer so that the gap between the level of interest and performance.

**Table 2. Customer Interest Average**

| No | Dimension | Customer Interest Rate |
|---|---|---|
| 1 | Human Resources | 4,56 |
| 2 | Price | 4,31 |
| 3 | Product | 4,27 |
| 4 | Physical Evidence | 4,27 |
| 5 | Process | 4,24 |

**Table 3. Performance Average**

| No | Dimension | Average |
|---|---|---|
| 1 | Human Resources | 4,28 |
| 2 | Process | 4,14 |
| 3 | Price | 3,98 |
| 4 | Physical Evidence | 3,96 |
| 5 | Product | 3,92 |

From Table 2, we can be seen that the dimensions of the employees have the most important role in determining customer satisfaction. And from Table 3, we can be seen that the highest average on the dimensions of employee performance and the lowest average performance on the product.

Further analysis will be conducted to compare the levels of customer satisfaction and expectations of each attribute satisfaction of services provided by the company. Levels of inequality can be determined by subtracting the average performance with average Customer Expectations.

**Table 4. Expectation and Performance Gap**

| No | Dimension | Customer Interest Average | Performance Average | Gap |
|---|---|---|---|---|
| 1 | Product | 4,27 | 3,92 | -0,35 |
| 2 | Price | 4,31 | 3,98 | -0,33 |
| 3 | Physical Evidence | 4,27 | 3,96 | -0,31 |
| 4 | Human Resources | 4,56 | 4,28 | -0,28 |
| 5 | Process | 4,24 | 4,14 | -0,10 |

Based on Table 4, we can be seen that expected > perceived, meaning customers are not satisfied with the services provided by the company (The gap is negative). The company should take improving action to complete customer expectations

**CONCLUSIONS**

The results of the questionnaire found that all the service attributes important for customers and has a negative gap. Attributes have a negative gap means incompatibility with the importance of customer service and the customer was not satisfied with the service provided by the company. In addition, a negative value indicates that the gap is the service provided to the customer is not maximized company that makes customers become loyal customers will not rule out move to competitors.

Based on the preliminary results of interviews and questionnaires known companies need to have some technical characteristics. The important technical characteristics to improve the performance of the company are provide training for employees, list of all services, use quality products, have a standard of operational service,

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