

Methods and techniques to improve the design of cell phones with the help of Quality Function Deployment (QFD)

Prathamesh Mohite, Jimit Shelat

Abstract- With the advancement of technology the world is becoming increasingly interconnected, both economically and socially. Over the years there has been a significant increase in the percentage of people accessing the internet and using a mobile phone. The quality of mobile services and the smartphones is ultimately judged on the basis of one key factor that is, customer satisfaction. This is particularly true in case of third or fourth generation connectivity. For this purpose we make use of QFD to acquire and analyse the voice of customer (VOC) and then transform it into product requirements and quality assurance measures throughout the design, build, test, commercialisation and even product retirement process. In this paper we have presented an example to illustrate the use of QFD in the process of designing a smartphone based on customer reviews and their requirements.

Index terms- Quality function deployment, voice of customer, house of quality, quality assurance, mobile service, customer requirements

[1] Introduction

The initial design of the cell phones, at the time when they were introduced for the first time, was bulky in appearances and were expensive. Several other problems such as good reception also existed. As cell phone technology advanced, this difficulty became less of a problem. Gradually over the years, the reception improved due to improvised satellite communication. As a result, the use of cell phone became important. Cell phone industries began manufacturing cell phones on a large scale. However, a key challenge in mobile services industry was how to design high quality smartphones in order to satisfy the end

Customers or even to exceed their expectations? For this we make use of quality improving technologies to be used in mobile services industry. One of these methodologies is the Quality Function Deployment (QFD). The aim is to satisfy the customer by ensuring quality and precision at each stage of the product cycle.

The term QFD was first coined in the year 1960 by Dr. Yoji Akao. It originates from the Japanese phrase, *hin shitsu ki no ten kai* which can be translated as below

hin shitsu – Quality, attributes or features

ki no – Function or mechanization

ten kai –Deployment,diffusion,development

Before doing QFD analysis, all the members should reach some agreement on the following issues:

[2] QFD Methodology

Step 1

- Prathamesh Mohite Pursuing B.E In Production Engineering From Fr.Conceicao Rodrigues College Of Engg.,
Bandra,Mumbai -400050,India,Email-Pradzegem1996@Gmail.Com
- Jimit Shelat Pursuing B.E In Production Engineering From Fr.Conceicao Rodrigues College Of Engg.,
Bandra, Mumbai-400050,India,Email-Jimitshelat@Gmail.Com

Which product or product characteristic are we going to focus on?

Who do we consider as our customers?

Which competing products will be used as a reference?

Step 2

This step deals with the kind of customer to focus on. Especially for consumer products a clear customer profile is needed. A good description includes the end-users but could also include profiles of persons or interest-groups who influence the purchase decisions, e.g., retailers, consumers' associations or public authorities (environmental regulations). For a particular product specific group of customer is chosen e.g. Mobile phones (age group 18-26).

To collect the various information about the product various data collection methods are available like market survey, service calls by this methods we can collect the data from the customer of required age group

Asking consumers about their requirements, a distinction should be made between expressed requirements and implicit requirements. The Kano model relates customer satisfaction to the degree to which product features are achieved. Kano model divides customer preferences into 3 distinct categories described below and shown in figure. 1

It is divided into 3 parts i.e. performance, basic, excitement

Performance- these are the requirements that customer are able to articulate and are at the top of their minds when making choices and evaluation.

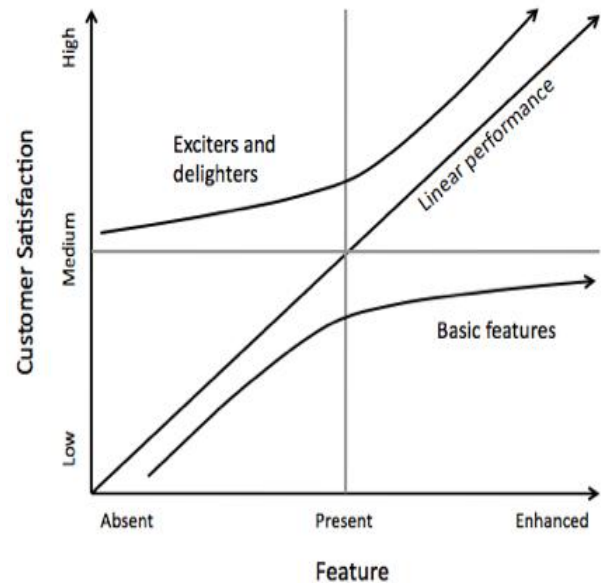


Fig. 1

<https://scalingsoftwareagility.wordpress.com/category/lean-thinking/>

Basic- these are the requirements that customer expects and they are taken for granted.

Excitement- these are unexpected and pleasant surprise you provide your customer they are the innovations that differentiate your offering.

The voice of customer should be worked out in order to gain a collective understanding using a house of quality chart.

Beginning with the initial matrix, commonly termed the **house of quality**, depicted in Figure 2, the QFD methodology focuses on the most important product or service attributes or qualities. These are composed of customer *wows*, *wants*, and *musts*.

Once you have prioritized the attributes and qualities, QFD deploys them to the appropriate organizational function for action. Thus, QFD

is the deployment of customer-driven qualities to the responsible functions of an organization.

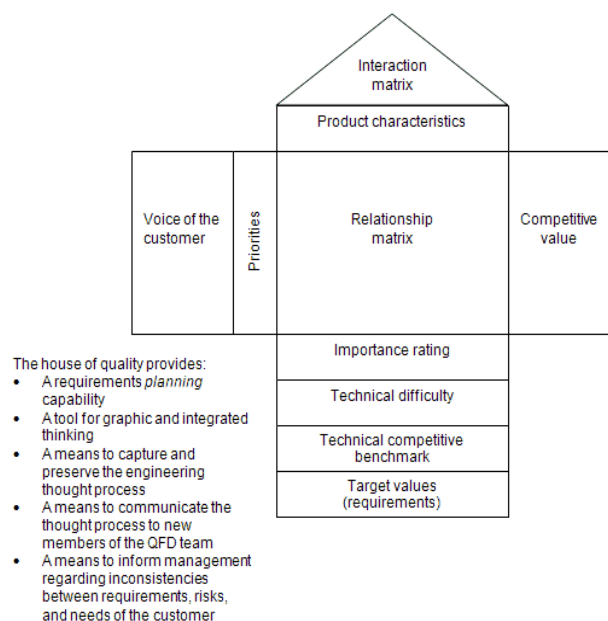


Fig. 2

Total Quality Management by Dale H. Besterfield ISBN 978-93-325—3445-2

[3] Preparation of the house of quality

1. Customer needs or requirements are stated on the left side of the matrix. These are organized by category based on the affinity diagrams. Insure the customer needs or requirements reflect the desired market segment(s). Address the unspoken needs (assumed and excitement capabilities). If the number of needs or requirements exceeds twenty to thirty items, decompose the matrix into smaller modules or subsystems to reduce the number of requirements in a matrix. For each need or requirement, state the customer priorities using a 1 to 5 rating. Use ranking techniques and paired comparisons to develop priorities.

2. Evaluate prior generation products against competitive products. Use surveys, customer meetings or focus groups/clinics to obtain feedback. Include competitor’s customers to get a balanced perspective. Identify price points and market segments for products under evaluation. Identify warranty, service, reliability, and customer complaint problems to identify areas of improvement. Based on this, develop a product strategy. Consider the current strengths and weaknesses relative to the competition? How do these strengths and weaknesses compare to the customer priorities?

3. Establish product requirements or technical characteristics to respond to customer requirements and organize into related categories. Characteristics should be meaningful, measurable, and global. Characteristics should be stated in a way to avoid implying a particular technical solution so as not to constrain designers.

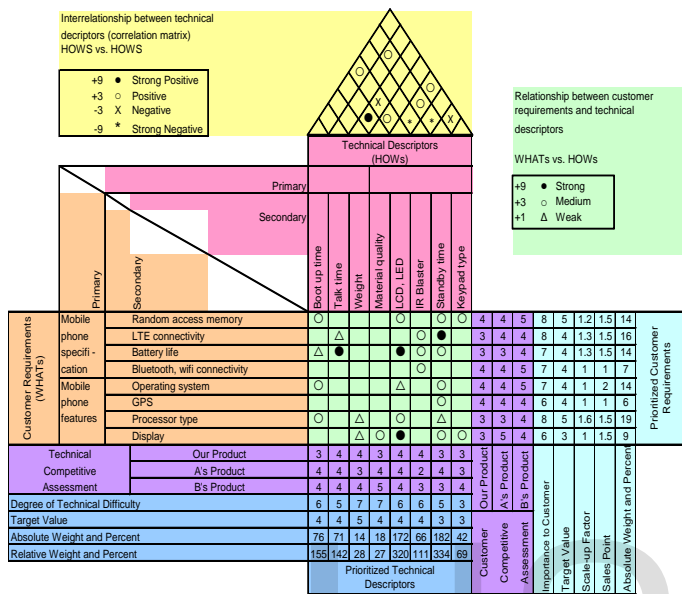
4. Develop relationships between customer requirements and product requirements or technical characteristics. Use symbols for strong, medium and weak relationships. Be sparing with the strong relationship symbol. Have all customer needs or requirement been addressed? Are there product requirements or technical characteristics stated that don’t relate to customer needs?

5. Develop a technical evaluation of prior generation products and competitive products. Get access to competitive products to perform product or technical benchmarking. Perform this evaluation based on the defined product requirements or technical characteristics. Obtain other relevant data such as warranty

or service repair occurrences and costs and consider this data in the technical evaluation.

equipment maintenance and testing can be supported by additional matrices.

Fig. 3 House of quality



[4] Process design

Quality Function Deployment continues this translation and planning into the process design phase. A concept selection matrix can be used to evaluate different manufacturing process approaches and select the preferred approach.

Again, the “how’s” from the higher level matrix (in this case part characteristics) become the “what’s” which are used to plan the process for assembling the product. Important processes requirements can be identified to focus efforts to control, improve and upgrade processes and equipment. At this, communication stage between Engineering and Manufacturing is emphasized and tradeoffs can be made as appropriate to achieve mutual goals based on the customer needs.

In addition to planning manufacturing processes, more detailed planning related to process control, quality control, set-up,

[5] Result

From the above analysis (Refer Fig. 3 House of Quality) of mobile phones based on the house of quality according to prioritize technical descriptors, the ‘standby time’ and ‘LCD/ LED display’ are important. And according to prioritize customer requirements, ‘processor type’ and ‘LTE (Long Term Evolution) connectivity’ are important.

[6] Conclusion

Based on above analysis we can conclude that mobile phone manufacturers should focus primarily on ‘processor type’ and ‘LTE connectivity’ for a better market response and earn higher profits.

[7] References

- <http://www.pewglobal.org/2016/02/22/smartphone-ownership-and-internet-usage-continues-to-climb-in-emerging-economies/>
- Zheng, Xiaosong, and Petri Pulli. "Improving mobile services design: a QFD approach." *Computing and Informatics* 26.4 (2007): 369-381.
- http://www.streetdirectory.com/travel_guide/153893/cell_phones/the_importance_of_cell_phones_in_modern_society.html
- Total Quality Management by Dale H. Besterfield ISBN 978-93-325—3445-2
- Carnevalli, Jose A., and Paulo Cauchick Miguel. "Review, analysis and classification of the literature on QFD—Types of research, difficulties and benefits." *International Journal of Production Economics* 114.2 (2008): 737-754.
- <http://www.eiu.edu/~pingliu/tec5133/resources/fall2008/QFD-Group%20Presentation.ppt>

[7]Chan, Lai-Kow, and Ming-Lu Wu. "Quality
function deployment: A literature review."

European journal of operational research
143.3 (2002): 463-497

IJSER