MODEL DEVELOPMENT FOR CUSTOMER SATISFACTION IMPROVEMENT
PROJECTS THROUGH QUALITY FUNCTION DEPLOYMENT (QFD)

Jae-Hyeon Ahn, Graduate School of Management, KAIST, Seoul, Korea
Kwang-Jae Kim, Department of Industrial Engineering, POSTECH, Pohang, Korea

ABSTRACT

Traditionally, spending on the customer satisfaction was considered as an expense, but it could be an excellent investment opportunity for the company. In this paper, a model is developed for analyzing customer satisfaction improvement projects. Quality Function Deployment (QFD) process is incorporated in the model in such a way that different design levels are considered as distinct investment opportunities and different level of design characteristics is selected by its financial impact.

The developed model analyzing customer satisfaction improvement projects provides not only a way of facilitating communications among the parties involved in the product/service development processes, but also generating good investment opportunities and allocating limited resources based on the financial criterion.

1. INTRODUCTION

No phrase would be more important than "Satisfying Customers" in corporate activities. In the past, major business interest was production, focusing every effort on producing higher quality products with lower costs. However, the focus has changed from production-oriented to customer-oriented, focusing on increasing customer satisfaction. Today, corporate activities focus on understanding the customer's needs and wants, and satisfying them. It is based on the belief that with satisfied customers, market shares and profits will take care of themselves [5]. That is, high customer satisfaction would i) increase loyalty for current customers while reducing price elasticity with potential to charge higher prices, ii) insulate current customers from competitive efforts, iii) lower costs of failure and future transactions, and attract new customers, and finally iv) enhance reputation for the firm [2].

With the understanding of the relationship between customer satisfaction and profitability, the effort to monitor and increase customer satisfaction is of vital importance [5]. Resources spent on customer satisfaction don't need to be considered as expenses any more. Rather than expenses, they could be excellent investment opportunities which need careful analysis.

To improve customer satisfaction, Quality Function Deployment (QFD) has been used. It is a technique that helps to incorporate the customers needs and wants into production/service development processes. The goal of QFD is to deploy the "voice of the customer" throughout marketing, design, R&D, and manufacturing stages of the product development process to enhance customer satisfaction [3]. Originally developed and implemented in Japan in early 1970's, it has been extensively employed by many U.S.-based companies since mid 1980's [4]. It provides a specific approach for ensuring quality throughout each stage of the product development and production processes.

Despite the understanding of the importance and effort to increase customer satisfaction, few work is known how the resources can be allocated to achieve customer satisfaction [6]. In spite of the value of QFD process, it does not provide a methodology for measuring the financial impact of the effort and how to allocate the limited resources.

In this paper, a model is developed analyzing resource allocation decisions to improve customer satisfaction. Project initiatives to increase customer satisfaction are considered as investment. Then the investment opportunities are incorporated as design options in the QFD process and their interactions are analyzed. Also their financial impacts, which is not calculated in the QFD process are measured as chain of effects from customer satisfaction to profitability. In the developed model, an optimization technique is used to provide a prescriptive advice regarding the allocation of resources. The developed model for analyzing projects for customer satisfaction provides not only a way of facilitating communications among the parties involved in the product/service development processes, but also generating good investment opportunities and allocating limited resources based on the financial criterion.

2. MODEL FRAMEWORK

Achieving a high level of overall customer satisfaction from project investment cannot be accomplished simply by focusing on individual projects. Each project has a different degree of impact on the attributes contributing to customer satisfaction. In order to maximize the overall customer satisfaction, company needs to consider the situation at the portfolio level. Moreover, in order to make investment decisions, the link between customer satisfaction and the company's bottom-line performance measure (profit in this case) should be identified.

In this section, a model for determining the optimal set of project initiatives is developed to maximize the company's incremental profit under the system and budget constraints. In the model, a design characteristic (DC) refers to a project investment option. If a project
is selected for investment, the corresponding DC is assigned a value of 1, and 0 otherwise. The financial implication of choosing a project is estimated as a chain of effects (customer satisfaction increase to market share increase and eventually to profit increase). The interactions between DC levels, such as cost synergy or dis-synergy, mutual exclusiveness can be easily considered in the model.

In the QFD context, the proposed DC change can be translated into an investment opportunity or project initiative. If there are more than two options for the change of a specific DC, each option becomes distinct project initiatives and they are considered as mutually exclusive.

Figure 1 shows the modeling framework proposed in this paper -- the procedural steps and supporting component models and input linking each chain of effects. The focus is the development of the model for improving customer satisfaction with logical links between QFD process and the economic models.

For more detailed description of each component of the model, refer to the work by Ahn and Kim [1].

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**Input**
- Listen to the customer needs through focus group or one-to-one interviews
- Estimate the customer satisfaction change for i-th attribute (c_i) at time t when P_i is selected
- Portion of Market which renew contracts
- Cost information for project initiatives

**Procedural Steps**
- Identify Project Initiative j (P_j) and attributes for customer satisfaction
- Develop a model estimating purchase probability
- Estimate purchase probability for each Project Initiative for both our and competitor's customers
- Estimate Market Share Change
- Estimate Revenue Change (ΔR_j)
- Determine the Optimal Set of Project Initiatives

**Component Models**
- Logistic regression
- Market Share Model
- Revenue Impact Model
- Investment Model

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Figure 1. A framework for analyzing customer satisfaction improvement projects
3. APPLICATIONS FOR TELECOMMUNICATIONS INDUSTRY

The developed model is demonstrated for the selection process of project initiatives in the telecommunications industry. A telecommunication Giant AT&T provides dedicated private data services at the national level to accommodate the increasing need for high bandwidth digital transmission. The service is marketed under the brand name of ACCUNET® service. With the increasing competitions from MCI, Sprint, Witel, and others, AT&T considered introducing new initiatives to continue to be competitive in the dedicated private lease line service. Many initiatives were proposed to increase the customer satisfaction for the services AT&T was providing. Among the initiatives, decisions have to be made which initiatives need to be funded under budget constraint while maximizing the impact to the customer satisfaction and eventually profit to the company. The detailed formulation and analysis is available [1].

4. DISCUSSIONS

In this paper, a model for analyzing customer satisfaction projects was developed. QFD process was incorporated in the process in such a way that different design levels were considered as distinct investment opportunities and different level of design characteristics was selected by their financial impact. The financial impacts for investment opportunities or project initiatives were measured as a chain of effects (from customer satisfaction to profitability), and were used to allocate limited resources. The model was then demonstrated for the allocation of customer satisfaction projects in AT&T. With the model, spending on the customer satisfaction projects is no longer considered as expense, but an investment opportunity for profit. The detailed model and analysis is omitted because of the space limit.

The contributions of this paper are several folds. First, the graphical representations of the design tradeoffs and the relationships between customer attributes and project initiatives help to develop balanced project initiatives. The developed model was greatly facilitated by adopting the house of quality chart from the QFD. Second, the development of financial model linking project initiatives to customer satisfaction and then to profit makes it possible to estimate the financial impact to the business. Therefore, an initiative to improve customer satisfaction is no longer considered an expense, but as an investment opportunity which can be evaluated financially. Third, there is no need to assess the importance weights of customer satisfaction attributes which are subjective and rather arbitrary. In the developed model, the weights are derived from the actual and potential customer survey data. Finally, the developed model provides a tool which can make easy trade off conflicting design options. Therefore, it provides a prescriptive alternative to the existing approach to QFD, and also extends the scope of QFD by linking DCs to profitability as well as to customer satisfaction.

Despite the above values, there are two areas to pay extra attention to. First is related to the cost and assessment requirement for collecting data. Although many big companies make regular surveys related to customer satisfaction, collecting customer survey data may mean additional burden for some companies with limited resources. Considering the importance of customer satisfaction to business profitability, however, additional effort could prove to be worthwhile. Second, depending on applications, there could be various ways of measuring the financial impact of project initiatives. A better understanding of the relationship among project initiatives, customer satisfaction, market share, and profitability in the specific application area would be very helpful in implementing the model demonstrated in this paper.

Finally, the suggested areas of work would be, first, how to reduce the burden of assessments as mentioned above. Maybe, screening process or attention-focusing method can be developed to reduce the assessment burden while maintaining the quality of analysis. Second, comparison and interpretation should be made between the project initiatives which would have been selected by the model developed in this paper and by other method. The analysis may give some insight how we can improve the model developed in this paper.

5. REFERENCES


