LINKING A TOTAL QUALITY MANAGEMENT APPROACH WITH COMPETITIVE TECHNICAL INTELLIGENCE

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Key words:
Quality Function Deployment, Competitive and Technical Intelligence Product Development, Planning.
Mots clés:
Déploiement de Fonction de Qualité, Veille Technologique, Planification de produits.
Palabras clave:
Despliegue de la Función de Calidad, Inteligencia Competitiva, Inteligencia Tecnológica, Planeación del Diseño de Productos.

Summary

Many tools have been developed to gather, analyze and disseminate information. But how is it possible to know more about customer desires? Is it possible to improve this knowledge using Total Quality Management focus like “Customer Voice”? In this work we intend to answer this kind of questions. Our proposal is based on integration Quality Function Deployment (QFD) with Competitive Technical Intelligence. This proposal aims to support the planning of product development, intending to reduce uncertainty and to have a greater link to the customer.

Résumé

Beaucoup d'outils ont été développés pour recueillir, analyser et diffuser l'information. Mais comment mieux connaître les désirs du client? Est-ce possible d'améliorer cette connaissance en utilisant la Gestion de la Qualité Totale comme la "Voix du Client"? Dans ce travail, nous avons l'intention de répondre à ce genre de questions. Notre proposition est basée sur le Déploiement de Fonction de Qualité (QFD) avec l'Intelligence Technologique Concurrentielle. Cette proposition vise à soutenir la planification du développement de produits, en essayant de réduire l'incertitude et avoir un meilleur lien avec le client.

1. Background

Quality Function Deployment (QFD) is a methodology that links an organization with its customers - both intermediate and final. To accomplish that it is important to know the customers' needs (Customer Voice) so they can be involved from the first stages of the planning process. This implies proposing technological solutions by specialists (Technician Voice) to determine the customers´ requirements. The application of QFD is based on a matrix configuration named "Quality House", as sketched in Figure 1.

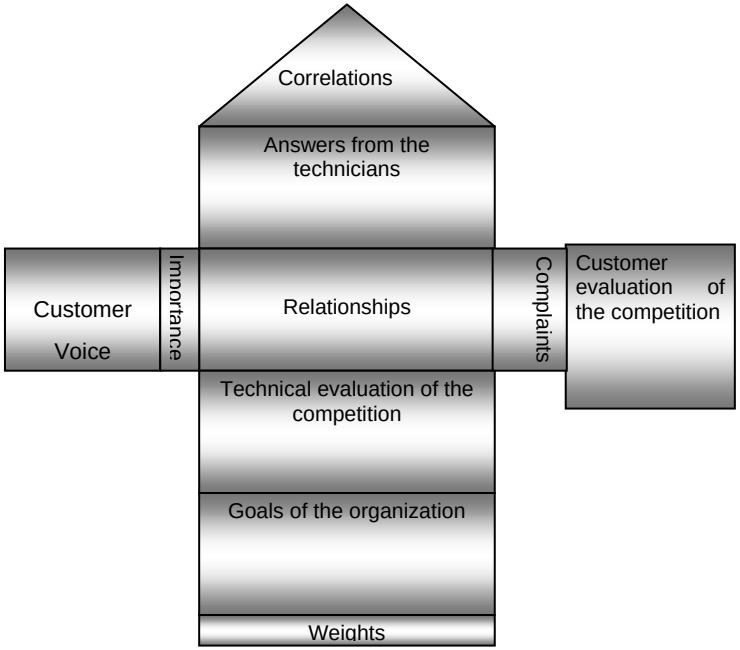

Figure 1. Quality House

QFD provides important benefits, such as: reducing costs, decreasing times of product development, speeding up changes during the different stages, etc. Due to this, as time elapsed, this methodology has become a popular support to the process of product planning [1],[2],[3]. Thus, many companies have applied QFD for the analysis of competitors, the development of new products, the identification of control points, the communication among participants of development of products, for the redesign of products, for reduction and improvements in the products design, for market analysis, etc. [1].

2. Approach to Incorporate QFD with Competitive Technical Intelligence

We propose a model based on five stages which are shown in Figure 2 and are explained in the following sections.

2.1 Planning

This stage basically involves:

- Definition of objectives (general and specific).
- Definition of the area of research (customers, competitors, etc.).
- Characterization of the kind of customers to study.
- Definition of necessary resources (human, time, monetary, information, etc.).
- Definition of the activities to carry out.

2.2 Information Gathering

This phase includes a combination of the information sources, primary (field research focused on the competitive aspects of the market and technology), as well as secondary (published and public information). Following the approach of Total Quality, the Customer and Technician Voice will be identified; these refer to the specific requirements established regarding the product.

We propose to start with collection of secondary information in order to have a large vision which leads to the identification of a global group of requirements to develop the product that, subsequently (once the field research is done) will be prioritized.

There are different techniques that are traditionally used in Quality to know the Voice of the Costumer and that may be applied in this model, particularly, focus groups and interviews. This analyzed information will identify the requirements (needs) established by the customer, which have to be weighed up in order to determine priorities. Once the information from the Voice of the Customer is ready, the Technician Voice is collected. The idea is that experts in the field give specialized answers (mainly linked to the process of production and design), to assist the needs, wishes or expectations of the customers.

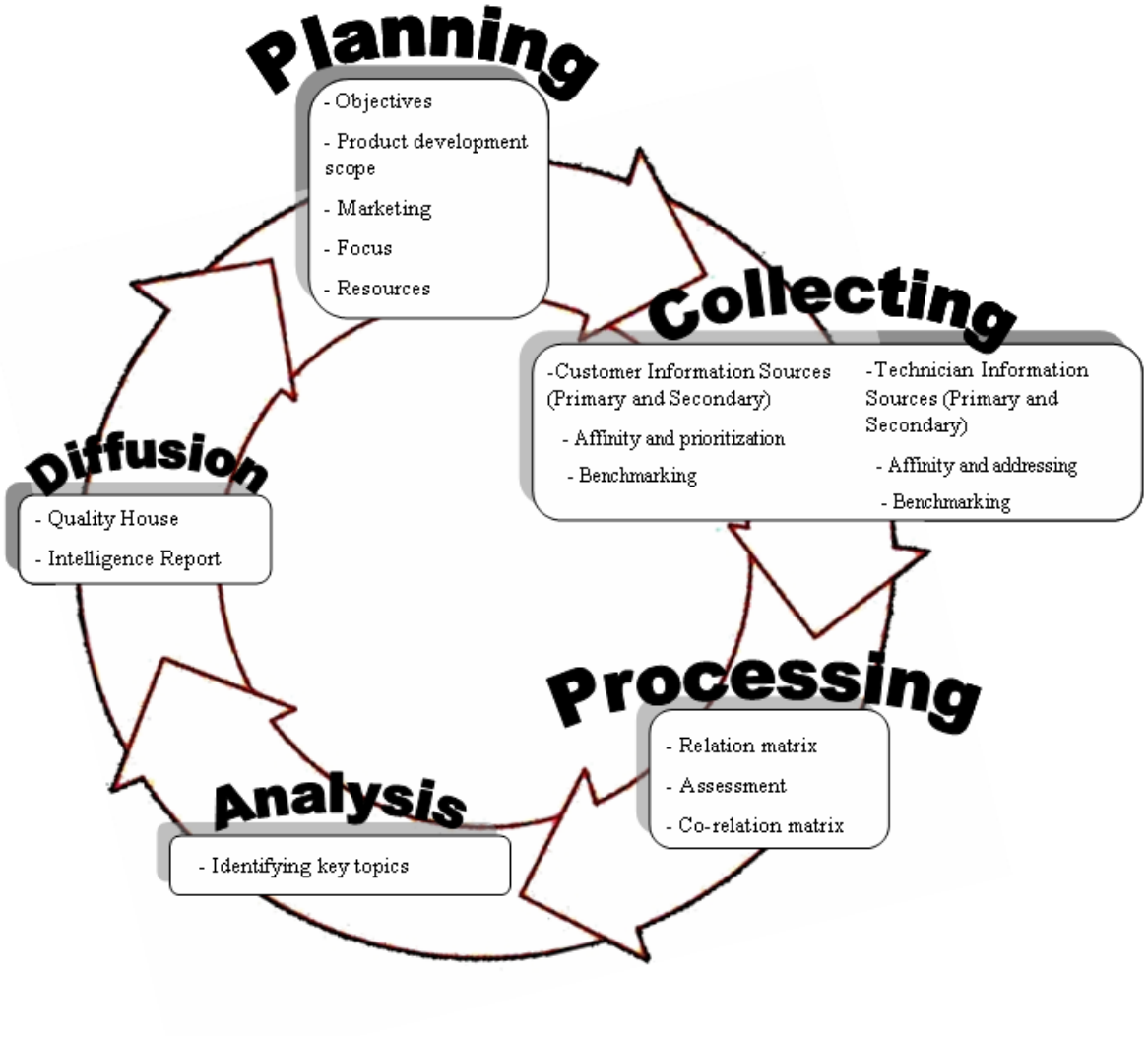

Figure 2. QFD Model with Competitive Technical Intelligence

2.3 Processing the Customer and Technician Voice

This stage begins by identifying the impact that each technological solution can have upon each requirement of the customer (strong, medium, weak or void). Based on the importance that customer gives to each requirement (identified in the previous stage), a new comparison should be done. The purpose is to identify the degree of importance of these solutions according to the needs of the customer, assigning the greatest values to those solutions that have a high impact on the established requirement and where this requirement is of high priority for the customer. Finally, the possible co-relations are identified determining how a solution can affect another.

2.4 Analysis

This stage intends to identify key topics for the development of the product, considering the most important requirements of the customer, and at the same time, those that are technologically feasible to carry out. The synergies between the solutions are also considered with the purpose of achieving global solutions that make the lever effect for different requirements. This process of alternatives development also implies the analysis of the technical-economical feasibility of each proposed solution.

2.5 Diffusion

An Intelligence Strategic Report is done, showing the most important results according to the outcomes of the previous stages. The execution of the report will depend on the type of project, the kind of persons it is addressed to and the policies of the organization in question.

3. Application

For this purpose we present an application in a food product proposed by a student from the Food Engineering major during an Entrepreneur Development program at *Tecnológico de Monterrey* (*Instituto Tecnológico y de Estudios Superiores de Monterrey*), Campus Monterrey. As a brief reference this Institute is one of the most important private academic institutions in Latin America. Since its origin, the institute has developed strong relations with the industry and is distinguished for its training and consulting services to companies. Also, *Tecnológico de Monterrey* promotes the development of new businesses among its students and has a program to support entrepreneurs by incubating potentially successful new products or services.

The general objective of the project was to identify, opportunity areas to improve the initial design of the product. The product was a snack made from a dehydrated vegetable and seasoned with chili pepper, lemon and salt.

The first stage of the project was to define a plan which involved the integration of QFD to the intelligence system. The initial activities were focused on the collection of secondary information. Internet was used for this purpose (Google, CODEX Alimentarius, and the Official Catalogue of Mexican Norms), as well as the available databases at *Tecnológico de Monterrey's* digital library (EBSCOhost EJS, Google Acholar, ProQuest, Euromonitor Global Market Information, Infolatina e ISI Emerging Markets).

The purpose of searching in these sources was both, to find the demands of the market and to identify its respective technological solutions. Hereafter, the collection of primary information was produced; the objective in this case was to identify the requirements of the product from the Voice of the Customer and the Technician Voice as well, and subsequently to determine the most important. The Voice of the Customer was analyzed first. To do this, 57 random surveys were applied to youngsters (between 18 and 29 years old) obtaining a return rate of 85.71 %., according the following formula:

$$n = \frac{k^2 N(0.25)}{e^2(N-1) + k^2(0.25)}$$

Where N is the size of the population, 16979, figure that corresponds to the number of students of *Tecnológico de Monterrey*, Campus Monterrey, signed up in the 2006 August- December term: The constant K is related with the level of confidence, in this case we used K of 1.15, which gives a result of 75% level of confidence.

During the surveys, besides requesting which were the desired attributes (requirements) of the product, it was also requested to assign priorities for each requirement using the numeric scales from 1-5, where 5 was of greatest importance. Averages were calculated according to the following equation.

$$PC_{QUE} = \frac{\sum_{i=1}^{a} PCi}{a}$$

Where:

PC_{QUE} , is the average priority of each customer requirement

$\sum_{i=1}^{a} PCi$, is the addition of all the priorities assigned to that requirement by each customer

a , is the total number of times each priority has for each requirement

Later, the team of technicians was interviewed in order to identify the possible technological solutions to the previous requirements. To do that, Affinity Diagrams (Cause-Effect) were used. The collection of primary information also included an evaluation of competitor products (potato chips and salted peanuts) by both the Voice of the Customer and the Technician's.

With the objective of processing the primary and secondary information, the typical approach of Quality Function Deployment was applied beginning with the matrix of relation (Technical solutions and Customer desires). Once the processing of all the collected information was completed the stage of analysis proceeded, with the aim of identifying those topics that would be the most important for the product development (including product attributes and manufacturing characteristics). To do this, the diagram known as Quality House (see Figure 1) was used which allows the identification of critical points including areas of opportunity, important threats, latent opportunities, among other elements.

The final phase of this activity consisted in carrying out an integral and global analysis of all the results, where points of convergence and synergies were founded to identify the most appropriate technological solutions. After all these evaluations, lines of action which allowed redefining or redirecting the

product development were identified considering both the expectations of the customer and the feasibility in the production and launching, including technical, economic, organizational restrictions, etc.

- Product Characteristics: taste, color, texture, level of salt and other spicy additives, size, weight, packing, design, cost, etc.
- Manufacturing process: equipment and infrastructure necessary for production.

In this way, the last stage consisted in the elaboration of a strategic report of intelligence. This report included a series of recommendations to carry out which greatly impacted the direct attributes of the product (sensory, design, chemical aspects, etc.) as well as the recommendations for its production process (types of ovens, temperatures, etc.).

4. Conclusion

In this paper we present a first approach to integrate QFD with Competitive and Technical Intelligence. We explore how to get a better understanding of customer and to give support to the planning of product development applying a technique from the field of Total Quality Management.

We showed an initial application within the academic context. The results obtained allowed the identification of key characteristics for the production of a snack proposed in an Entrepreneur Development Program. In this paper we pursued to offer a holistic vision where the Voice of the Customer and the Technician's could be analyzed in a synergic way together with the research of the competitive intelligence. The major findings pointed out that it is possible to narrow the distance between customer desires and technical solutions and improve decision process design, but there is still a lot to do. The case presented previously is only a small approach to a more advanced and complete application that the proposed model can have.

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