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QFD Integrated in New Product Development - Biometric Identification System Case Study

Andreea Cristina Ionica [a]*, Monica Leba [b]

[a] *Department of Management, University of Petrosani, Str.Universitatii, 20, Petrosani, 332006, Romania*
[b] *Department of Computer and Electrical Engineering, University of Petrosani, Str.Universitatii, 20, Petrosani, 332006, Romania*

Abstract

The paper attempts to integrate the Quality Function Deployment (QFD) method in the New Product Development (NPD) cycle. We propose a methodology to evaluate the voice of the customers in designing innovative products. The results presented after applying the methodology focus on the first stage of requirements capture for both the design phase and for the development of the actual product phase. There was considered as case study an innovative, newly patented product, a biometric identification system for emergency cases. The research methodology is inter, multi, trans- disciplinary approach for the development of innovative products. In the context of our study NPD was the pathway for the research steps to follow, and QFD the logic glue among the specialists from different fields, like quality management, electronics, computer programming and medicine. The methodology follows the general steps of the QFD formalism and consists in developing a mathematical model that quantifies by an overall index, that we call offset, the level of customer requirements achievement by the technical characteristics of the designed or developed innovative product.

Keywords: innovation; quality; NPD; fingerprint;

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* Andreea Cristina Ionica. Tel.: +4-072-336-0726
  E-mail address: andreeaionica2000@yahoo.com

1. Introduction

In the world of business competition, subject to the fast development of new technologies and continuous changes in customer needs, the companies have to adopt according to Graessel and Zeidler, (1993), new approaches in new product development (NPD).

For this, let us look at past successful innovation stories. Steve Jobs, cofounder and CEO of Apple, is widely regarded as one of the most successful innovators in history. From his innovation secrets revealed by Gallo (2010), results that customers cannot say for sure which product they want.

During the development of Apple this approach worked, because, only the large companies had access to innovative technologies and innovative techniques. Currently, customers also have access to these and are able to decide what innovative products they want. In Steve Jobs' approach certainly mattered customers, but more in the sense of familiarizing them with the innovative technologies. In other words, there was created a basis on which customers can build their own ideas. Now, innovative ideas cannot exist without taking into account the customers' needs. It is the merit of Steve Jobs for getting here.

The innovative product life cycle is the main subject of the new product development (NPD) framework. In this context, the QFD methodology can be used in order to avoid the development of a new product that will not be a success on market and to minimize the costs of development. This represents a tool that can help companies to successfully develop new products or to improve the existing ones through a series of innovation related steps, starting from the process of idea generation and ending at the launch of the product into the market.

We chose the QFD method, stated by Chan and Wu (2002), as the method that transforms the "customers' voice" into "product technical characteristics" to be integrated into the NPD, because the most important requirement for a successful NPD is defined as: "Meet the needs of potential customers." Putting customers first, and really understanding them, gives companies a "higher power" that can shake them loose of their stuck-in-the-mud ways. In fact, around 50% of new products fail in the marketplace. And the biggest reason for failure is that the products don't fill the needs of customers.

The study presents the use of QFD method in NPD applied on a biometric identification system for emergency cases. The paper attempts to reconsider the QFD method by proposing a methodology in order to support the NPD as previously applied by Shiu, Jiang and Tu (2007). The biometric identification system for emergency cases uses a method of storing relevant medical information based on biometric identification, generating medical records that allow the emergency medical personal to track the patient medical history and identify problems or patterns that may help determine the course of health care. The innovative product eliminates the classical methods insufficiencies by optimizing the time response, facilitating access and by ensuring an increased security regarding the primary medical information for emergency situations and represents a new storage approach of the primary healthcare information based on biometric identification by means of fingerprint sensor.

2. Research Method

Our research methodology was oriented on inter, multi, trans- disciplinary team work in order to develop an innovative product. The NPD was the pathway for the research steps to follow, and the QFD was the logic glue among the specialists from different fields, like quality management, electronics, computer programming and medicine. The methodology used in our research to perform the QFD analysis consists in developing a mathematical model that quantifies by an overall index, that we call offset, the level of customer requirements achievement by the technical characteristics of the designed or developed innovative product.

The methodology follows the general steps of the QFD formalism according to Akao (1997), but in order to quantify the entire system by the proposed offset, we introduced: the use of different distribution functions for the characterisation of the different difficulty degrees of the quality characteristics; the generalisation of the correlation matrix with the asymmetrical form due to the different dependencies between the quality characteristics; the measurement of the achievement level of each quality characteristic; the use of the influence matrix between the customers' requirements and the quality characteristics; the influence matrix together with the achievement matrix determines the relationship matrix and, thus, the relationship matrix contains exact values resulted from measurements instead of generally used estimations $\{0, 1, 3, 9\}$.