ISSUES ON THE USING QFD FOR TRANSPOSITION OF CUSTOMER NEEDS IN FUNCTIONAL REQUIREMENTS

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Abstract: The customer has become the core element of the new product design process, as well as improving existing ones. Based on customer needs, multidisciplinary design teams have to develop products that provide satisfaction. The objective of this paper is to translate customer needs into design specifications, into functional requirements, to develop a product that provides satisfaction. Customer needs, identified by a market research are translated into functional requirements using QFD method (Quality Function Deployment).

1. INTRODUCTION

In the current economic conditions, the struggle to achieve competitive advantage is very strong. The results obtained after the completion of this work may constitute a starting point for any company that wants to attract new and loyal customers or to keep close the existing ones, providing them with products to meet their deepest needs. How customer needs are identified and quantified is a great advantage or disadvantage for the competitors.

In the first part of the paper are presented results of a market study, to determine the level of user satisfaction of a generic product, type ATV. Following the completion of market study, showed that the product do not meet users' expectations. In the second part of the paper is presented the transposition customer needs in functional requirements with QFD (case study).

The research methodology is presented in Figure 1:

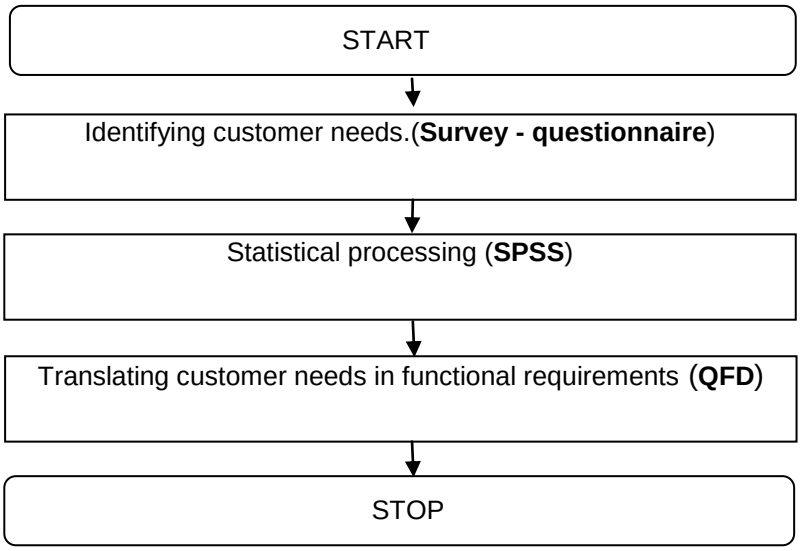


Figure 1. Research methodology

2. IDENTIFYING CUSTOMER NEEDS

In order to identify customer needs is necessary to conduct studies and market research [5].

To achieve the research applied in this work we used a questionnaire consisting of 18 closed questions applied in a virtual environment (HTML Interface), TO a sample of 50 subjects. 50% of the subjects investigated use this mode of transportation for business (employees of the Police, the Gendarmerie, the Mountain Rescue), and 50% for agreement. Statistical analysis of data was performed using SPSS software.

Following a market survey on satisfaction of a generic product user, such ATV, resulted:

- 93.9% of investigated subjects are not satisfied with the product use during periods with low temperatures, wind and rain;
- 69.4% are satisfied with the product's use in good weather conditions (high temperatures, no wind and rain);
- 63.3% think that main disadvantage of this mode of transport is that does not provide protection in adverse weather conditions.

Based on the gathered results of the market study, the design team had to seek solutions to eliminate- reduce the degree of customer dissatisfaction. Multidisciplinary design team must deliver solutions to meet the new functions. In this respect we can design a booth that is protection accessory.

After interviewing the participating subjects in the study, it showed that 55.1% want a permanent booth, and 44.9% see it as a temporary accessory that can be attached in adverse weather conditions. Therefore, it should provide solutions that meet user wishes.

3. TRANSPOSITION of CUSTOMER NEEDS IN FUNCTIONAL REQUIREMENTS

Among the instruments of need "transposition" is used QFD (Quality Function Deployment) which listen to the customer voice and try to give a functional representation.

For implementation of customer needs in functional requirements using QFD method, the form of graphic is the quality house. QFD is a method designed to transform customer needs into quality conception, to perform functions that make up quality and to divide that quality conception into subsystems quality that will ultimately lead to specific elements of the production process. In other words, QFD method helps to transform customer needs (Voice of the Customer VoC) in engineering / technical features (voice of Technician).

The first step for the transposition of customer needs in functional requirements using QFD and QFD Designer is to define QUALITY PLANNING TABLE (Figure 2), in which, based on customer needs and results from the market study is determined their relevance (of customers' needs).

For implementation of customer needs in functional requirements (technical specifications) is required to develop two quality homes. In the first house (Figure 3) is made the transition from customer needs to quality characteristics, and in the second (Figure 4) implementation of quality characteristics in functional requirements [6].

Based on previously established relevance of customer needs, in the quality planning table, is determined the importance score – Ici - for each need of customers, which represents the WHAT's in the first house of quality, as follows:

- To provide protection in harsh conditions, Ic1 = 9;
- To be permanent, Ic2 = 7;
- To be temporary Ic3 = 5;

- To be plastic, with classic door locking system, Ic4 = 5;
- Be the transparent canvas, with zippers, Ic5 = 5;
- To have affordable Ic6 = 7.

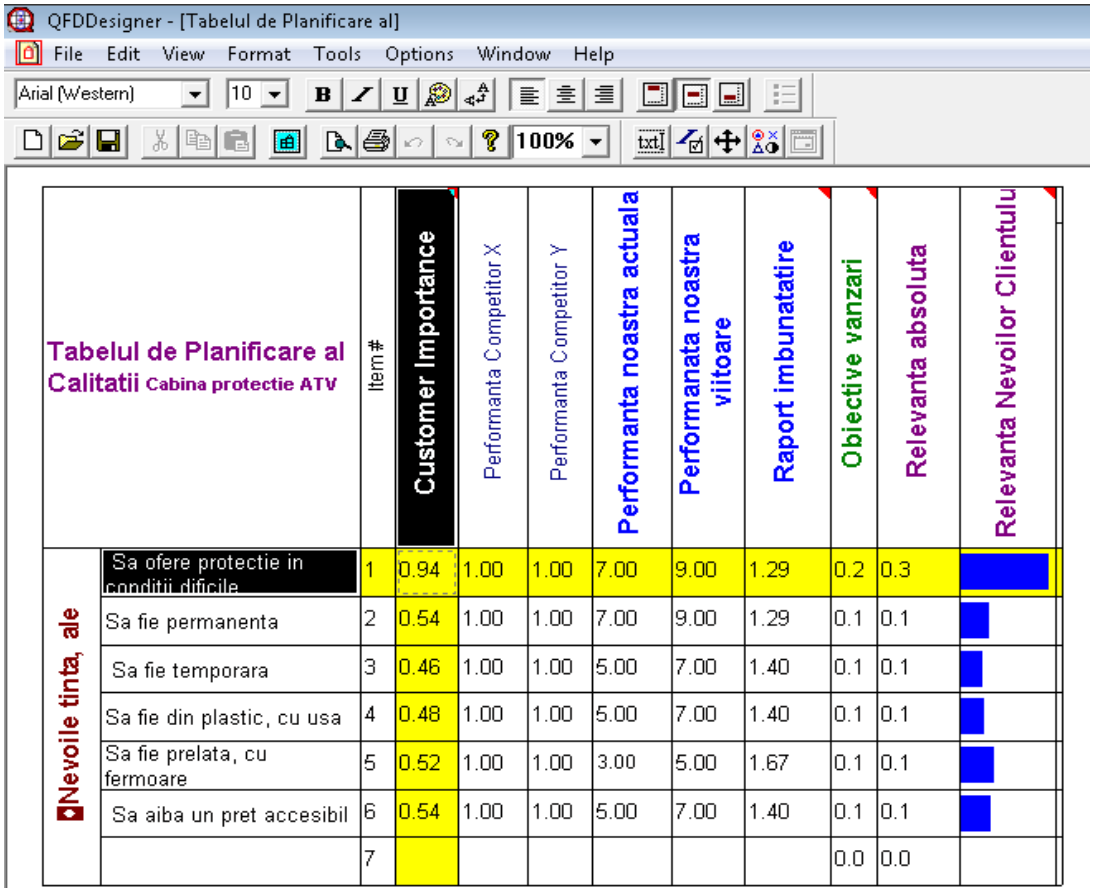
Once customer needs have been identified (WHAT's) and the points of importance Ici settled, they are placed in HoQ1 (Figure 3), and then are defined the quality characteristics (HOW's). This are:

- Sealing (water, dust);
- Installation speed, strength;
- Mass;
- Design (shape, material);
- Sizes;
- Price.

According to absolute and relative importance of quality characteristics (HOW's) of HoQ1, the multidisciplinary design team should pay particular attention to the following characteristics: sealing (water, dust), strength, design etc.

Relationship matrix shows clearly and quickly the following:

- No symbols or a majority of weak relationship indicates not considering of a requirement;
- Most powerful relationship indicates that all requirements / characteristics of product were considered essential.



Tabelul de Planificare al Calitatii Cabina protectie ATV		Item #	Customer Importance	Performanta Competitor X	Performanta Competitor Y	Performanta noastra actuala	Performanata noastra viitoare	Raport imbunatatire	Obiective vanzari	Relevanta absoluta	Relevanta Nevoilor Clientulu
Nevoile tinta, ale	Sa ofere protectie in conditii dificile	1	0.94	1.00	1.00	7.00	9.00	1.29	0.2	0.3	
	Sa fie permanenta	2	0.54	1.00	1.00	7.00	9.00	1.29	0.1	0.1	
	Sa fie temporara	3	0.46	1.00	1.00	5.00	7.00	1.40	0.1	0.1	
	Sa fie din plastic, cu usa	4	0.48	1.00	1.00	5.00	7.00	1.40	0.1	0.1	
	Sa fie prelata, cu fermoare	5	0.52	1.00	1.00	3.00	5.00	1.67	0.1	0.1	
	Sa aiba un pret accesibil	6	0.54	1.00	1.00	5.00	7.00	1.40	0.1	0.1	
		7							0.0	0.0	

Figure 2. Quality planning table [6]

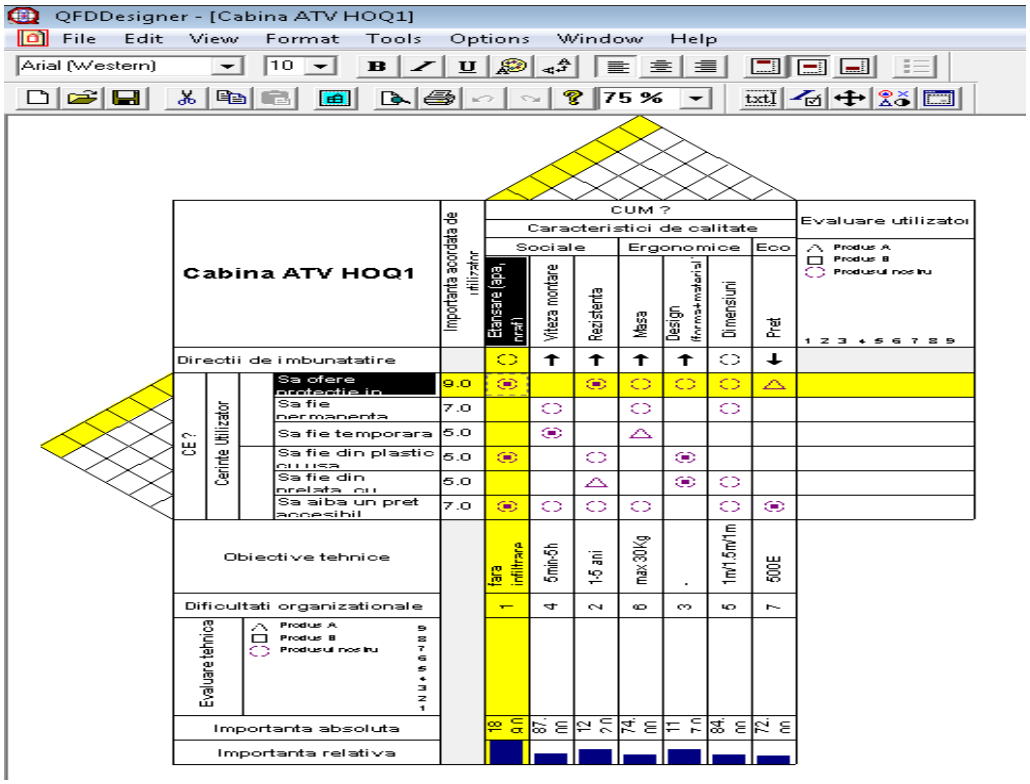


Figure 3. HoQ1: Transposition of customer needs in quality features [6]

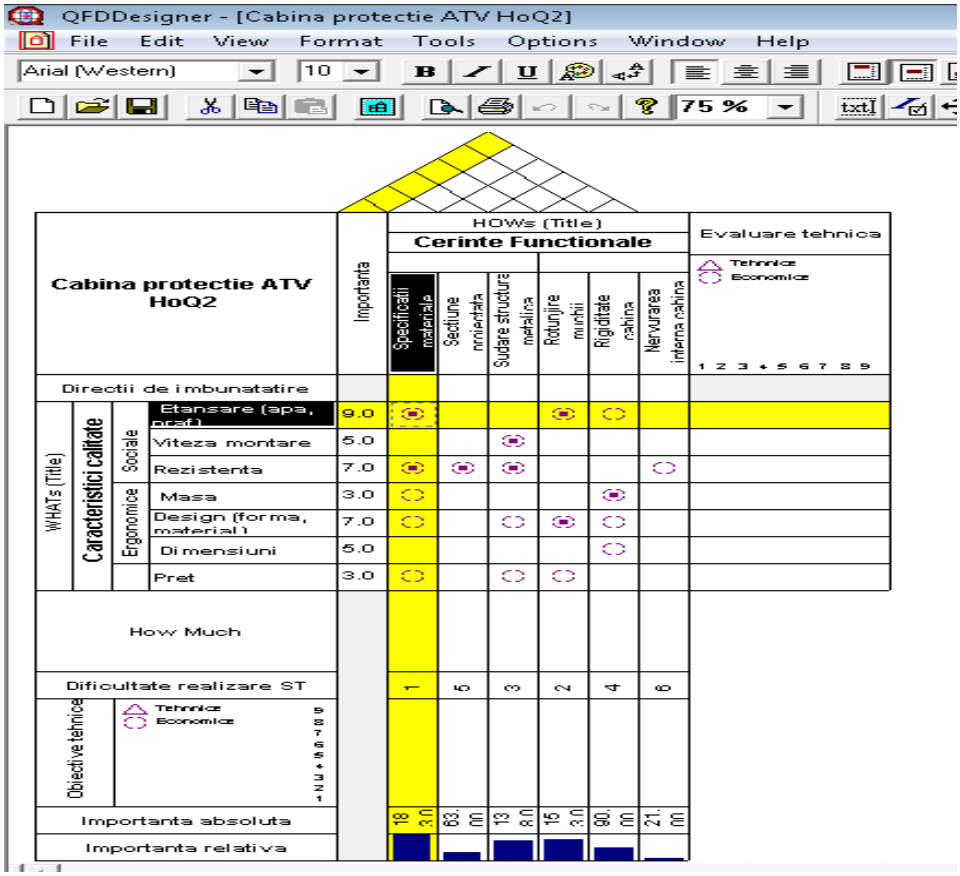


Figure 4. HoQ2: Transposition of quality features in functional requirements [6]

Based on absolute and relative importance of quality carcateristics (WHAT's), the significance score – Ici - is defined from HoQ1 for the WHAT's in HoQ2 in order to translate the characteristics of quality in technical specifications or functional requirements. In this respect, in HoQ2, the HOWs in HoQ1 become WHATs in HoQ2.

- The importance of WHATs in HoQ2 will be:
- Sealing (water, dust), Ic1 = 9;
- Speed installation, Ic2 = 5;
- Resistance Ic3 = 7;
- Mass Ic4 = 3;
- Design (shape, material), Ic5 = 7;
- Dimensions, Ic6 = 5;
- Price Ic7 = 3.

The importance absolute and relative of HOWs are extremely valuable indicators which help multidisciplinary design team to prioritize attention on the most important HOWs. Thus, one can say that the most important FRs, for ATV protection cabin design are:

- Material specification, Ia1 = 183;
- Welding steel structure, Ia3 = 138;
- Rounding edges, Ia4 = 153.

Based on these results, multidisciplinary design team should give priority to indicators of aerodynamics and strength of the materials that will be made the protection cabin.

After transposition of customer needs into functional requirements will be provided the basis for product design and can be made an intermediate representation of the prototype product (figure 5, 6).

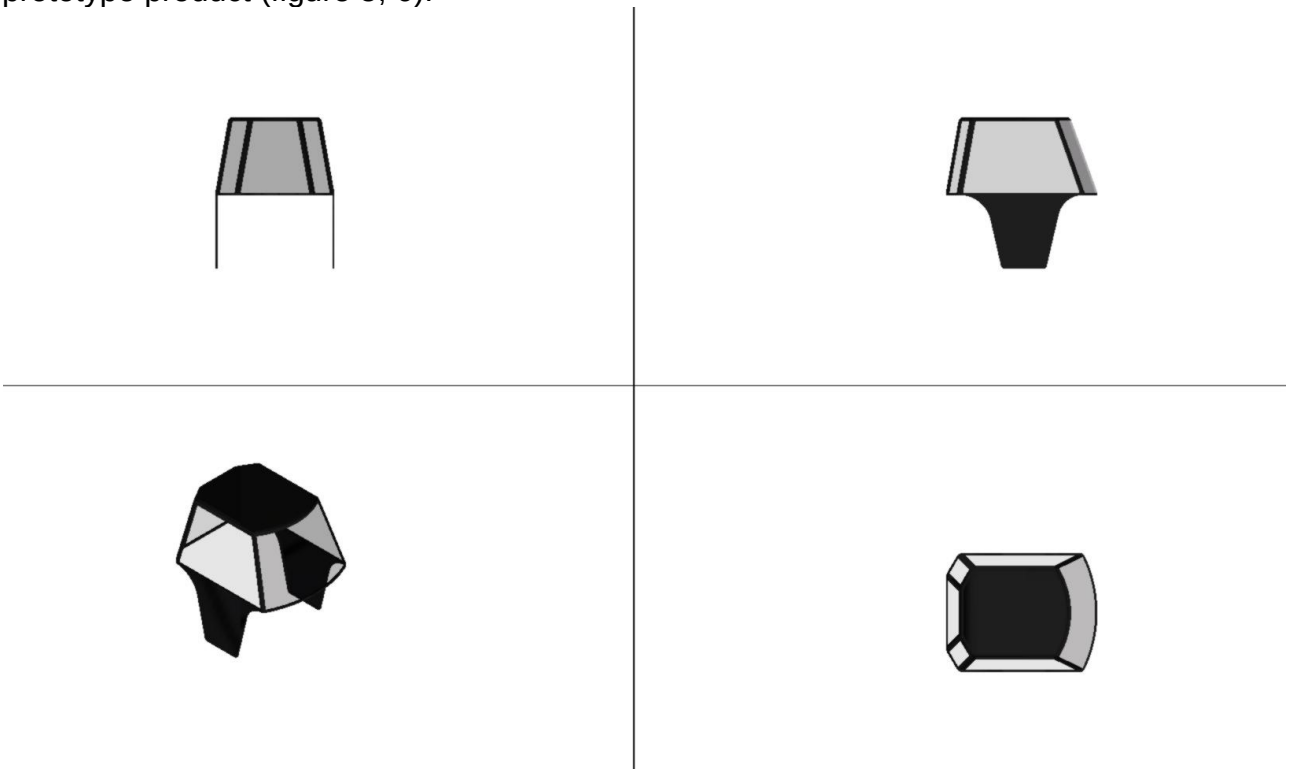


Figure 5. Intermediate representation of the prototype product [6]

Figure 6. Use of intermediate representation of the prototype product [6]

4. CONCLUSIONS

The success of the product will depend on customers knowing, quality of information collected from them, understanding their needs.

Companies have difficulties in identifying customer needs and translate them into functional requirements.

The proposed methodology is a general concept and can be applied to any product, of any industry. Methodology to transposition customers needs in functional requirements is targeting small and medium enterprises, which have no financial resources available to invest in expensive software packages (Product Lifecycle Management PLM) [6].

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