

PRODUCT DEVELOPMENT PROCESS REGARDING TO CUSTOMER EMOTIONAL NEEDS

Biljana MARKOVIĆ
Lozica IVANOVIĆ
Aleksija ĐURIĆ

Abstract: A successful development of a new product implies satisfaction of customer's requirements to the level of their individual wishes which include emotions as well. A new or innovative product should be designed to support customer needs, including the customer's persona which can be done by including feelings or emotions into interaction with the product. Customers tend to make a decision about a product based on their perception, values and reflections, so designers and manufacturers should consider making emotional design a bottom line in a product development. Therefore, the aim of this paper is to describe evaluation of customer needs regarding to product development process.

Key words: product development, emotional design, customer needs, evaluation

1. INTRODUCTION

Design, as a term that has been used for many years in the field of mechanical engineering, has had various interpretations and translations over the years. The understanding of the notion was usually based on the aesthetic experience of the object (product), and its interpretation was largely related to art, architecture, fashion, etc.

Incorporating the technical persons in the story of the design, the term is brought into the field of the design process, even projecting, as a wider term. Design is understood as a process that involves visual identification, but also any other design of constructions, including different aspects of observation and study, by authors, constructors. Today, in the literature, various definitions can be found, i.e. interpretations of the concept of design in mechanical engineering, which include the various fields of research and learning, such as: industrial design, product aesthetics, development of machine elements and systems (including development methods), ergonomic design, decision making methods and problem solving, bionics in design, specific development methods, axiomatic methods, etc. The ultimate goal of an optimal, or adequate design, lies in satisfying the requirements of customers, i.e. users, to the level of their individual wishes.

In the spirit of such interpretation, during previous last years the term of emotional design appears, as the means of expression users needs, from the standpoint of satisfying their emotional needs. This means that the designers, the constructors, are tasked to understand the needs of customers, including the emotional aspect, which is not easy to interpret and understand.

When speaking about emotional design, from the standpoint of the development of new products, then it is interesting to look at the approach of Arron Walter's theory, the author of the book "Designing for emotion", Fig.1.

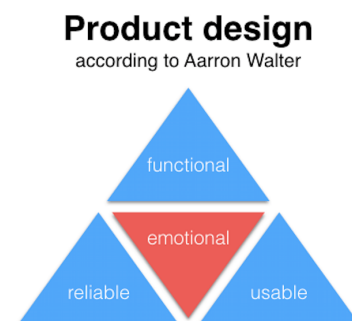


Fig.1: Product design, [1]

According to Aaron Walters theory, a product should be functional, reliable and usable, in that order. Emotional design is another level that adds an to product when mere functionality is secured. Emotional design should evoke a positive reaction in their users and should make the experience of using a product pleasant and memorable. Great design can evoke positive emotions, these could be: curiosity, gratitude, surprise, originality, success, satisfaction.

1.1. Engineer and emotions

Emotions, during the design process, if judged on the basis of years of experience in dealing with students or mechanical engineers, are not logical for engineers. They are expected to be immune to external influences or to

something that can make them happy or sad during the realization of the disadvantages. Why? Emotions are for the weak. Engineers work in a defined, strict and analytical way, while emotions are for everyday problems that "ordinary" people have.

However, it seems that things turn around a little. Recent studies suggest that the success of designing new products largely depends on the emotional perception of product users.

Naturally, based on this future engineers, they must seek techniques for integrating emotional perception into their product, and educators have to find a way to present to students the importance of this aspect and techniques for integrating emotional perception into product development methods. Reading these lines many young students or future engineers can wonder if they are, in fact, such non-emotional robots?

Design according to emotions requires the analysis of potential emotional reactions which can cause their product, therefore, to do something that they probably have never done before. The design of today's product must be more human, human oriented, and it arises by assimilating conceptual emotions into design principles. Designing products that are psychologically "satisfying" and attractive in terms of the emotional perspective of the users, they are guaranteed to become more attractive than the competition. So, how does a tangible product have a positive, immaterial, emotional effect on users? Easy. An attractive product designed to be aesthetically appealing to human emotions establishes a strong competitive advantage as users will be very satisfied [1].

Studying Wolters' approach, it can be concluded that he believes that the product can be personalized, which makes them much more human, related to people and their emotions. Considering that emotional design is essentially a detailed, complex process, it is important to integrate various aspects of human thinking into the very appearance, which is obvious in some engineering results of the process of developing a new product, such as interface, graphic design, customer service, development strategies, etc.

The most important thing, in fact, is to have a full understanding of the expectations, motivations and intentions of the target market. These are the data that lead engineers in achieving a comprehensive understanding of user needs, and engineers can then design a suitable brand interface to meet these requirements.

The ability of a person to rationalize easily exceeds the power of emotions, and this is precisely what emotional design intends to do, to cause an emotional response in communication with the user, in order to establish a sense of attachment. The emotional design, the segment of the humanistic design, is based on the fact that the products increase their usefulness with aesthetic customer satisfaction, which is used as a tactic that makes users more tolerant towards minor difficulties. The issue of emotion and aesthetics: attractive things work better because emotional design is equal to the identity of satisfying all the user's senses.

According to the original model of the hierarchy of needs, presented as a pyramid, people need health and safety for their existence, than love and self-esteem, before starting

to think about higher - level needs, such as self-actualization, i.e., the need for reaching one owns potentials (Fig.2 a).

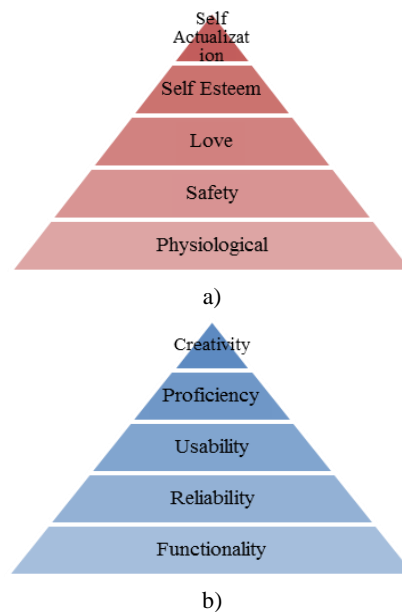


Fig.2: a) Maslow's hierarchy of needs b) Design hierarchy of needs

In design hierarchy of needs, for a customer to be satisfied, a product has to be functional at first place, reliable and simple for usage (Fig.2b). Level of satisfaction which can be reached at the level higher than the mentioned levels is expressed through emotional design. Thus, at the top of the design pyramid are proficiency (professionalism) and creativity which are necessary to generate innovative solutions [5].

Maslow's hierarchy of needs, join with shortcomings, is a framework of thinking reflection, in order to add new value to the product.

2. EDUCATION OF DEVELOPMENT ENGINEERS

In the contemporary era of technical and technological, socio-economic and cultural development of society, the role and importance of theoretical and methodological training of students in the field of product development is increasing. The mission of education of mechanical engineers today is much wider, as well as the challenges they face during professional activities. In this context, both the industry and the academic community have a need for the latest knowledge, techniques and methods in the field of product development. In the past years, the concept of education based on innovative competences has been developed with the aim of developing students' creativity and shaping their thinking in the context of customizing the shape of products to needs and the wishes of the users.

A design engineer or "the one who is developing the project", a central designer and the one who is capable of designing product. Requirements of such position are high engineering understanding, as well as high competencies with respect to the process understanding. Designers must mutually differ by methodological knowledge paired with

social competencies and potential in order to realize ideas. Industry is in search for engineers who are able to continually overcome problematic situations that occur during development of a new product, besides their good established basic training for acquiring methodic skills and ability to abstract and design models. What is important is understanding of competences of control of complicated challenges referring to product development. These competences comprise fundamental knowledge of field of general development of a neutral product and appropriate skills, in respective specific technical fields of product development.

It is evident that great deficit in general engineering education [9] is existent, which is reflected in engineers' inability to transfer their theoretical knowledge to practice. In order to use potential capacities of engineers' personality capacities, as team members, in the best possible manner, it is necessary to use existent, or develop new or different evaluation methods, and/or evaluation of key personality characteristics of every engineer, all according to environment. Also, it is very important to affect the system of thinking, according to which it is crucial for an engineer to possess only professional, technical skills, not to have necessary knowledge of all segments included in product production, as well as innovative management or emotional design influences.

The aim of university education of mechanical engineers is implementation of complex knowledge necessary for efficient development of a product in industrial environment, and students to learn which are the key skills required in their professional work.

If results of study, which has been conducted by VDI, regarding to reasons why engineers did not adapt during probation period, are taken into consideration, it is logical conclusion that the basic goal and request of education of engineers should be improvement of key personal competences.

Engineers have to be „team players“, they should be trained in technical, „now-how“ and business management, making and implementing decisions.

A creative engineer is a visualiser, a diligent worker and a constructive nonconformist with knowledge in his field and the ability to analyze things in his head.

It is important to emphasize that a problem of need for „closing space“ between engineer education and practice requests is not just evident in immediate surrounding (former Yugoslavian republics), but solution of this problem represents challenge to most of big developed countries and their mechanical engineers education system. The basic reason why this space appeared is lack of „rational“ and „detailed“. That is why modern approach to education of mechanical engineers has to assure capabilities: **Conceive, design, implement and operate**.

2.1. Design as socio-cultural way of thinking

Over the last 15 years, changes in world trends have contributed to changes in the sphere of design and reflected that professional capabilities are at a critical stage today more than before.

This was prompted by rapid changes in technologies, especially information, external sources, globalization of the market, which has made a great impact on

professional skills.

The next four major trends have a crucial impact on technical practice and knowledge acquisition in skills that are much more than technical:

- Changing the relationship of forces (leading forces) in a world-sensitive (fragile) economy;
- Mobility of professors and students;
- Using communication and teaching technologies,
- Strengthening the impact of the social imperative.

The previously mentioned "soft" skills, which are much more than the ability of public expression, managerial skills, teamwork skills, are the needs of understanding how the growth of social consequences worldwide is an imperative for mechanical engineers, which helps them to understand the implications of their work.

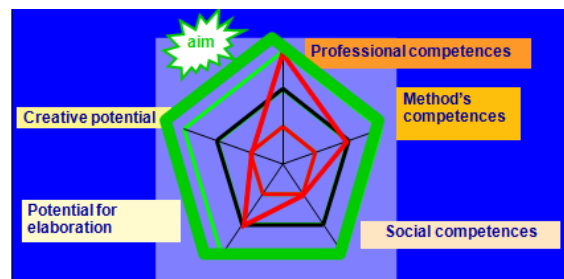


Fig.3: Competences evaluation of engineer's profile [10]

Figure 3. shows one of the methods used in engineering practice to evaluate the overall performance of engineers, taking into account both "hard" and "soft" skills.

Globalization also implies the globalization of the profession of engineers, it is to consider the future role of machine engineers and education must meet this role. Today, it is clear, however, that many US companies are looking for talented engineers anywhere around the world, where possible. Quality in design, low cost of engineering services and production capabilities determine the place where such personnel can be located and sought.

In order to consider "soft" skills, it is possible to divide them into two groups:

- Process skills: ability to communicate, teamwork, the ability to recognize and solve ethical dilemmas,
- Conscious Skills: understanding the impact of global and social factors, knowledge from modern sources, lifelong learning, including adapting to changing trends, tracking contemporary demands from screening users, which also means the skills to comprehend and use the postulate of emotional design.

Teams of people are designing new products today. Reciprocity between transfers of new knowledge on individual level is cognitive distributing process.

This is so-called "socio-cultural" cognitive phenomena, which is a base for management of individuals, i.e. human resource management, in process of product development, in phase of design, and in the rest phases.

In the first place, it is necessary to understand three levels of thinking process. First level is in connection with cognitive behavior of individuals, designers. The second level is the level when the group of people are going to meet design conditions. The «hard» skills of every person

are becoming visible in that level. The third level is level where subject of analyzing is process of individual thinking, in the context of group design.

Generally, a relation between these levels of thinking is a link between technical design tools and mental processes, because designers can reach their ideas only by usage of technical design tools and equipment. Generally, a conclusion is – technical tools and methods are in the strong and intensive link with a social context (depends on boundary conditions of social context itself).

Accordingly, entering a new value into the product, through the design process, not only involves consideration of the emotions of potential users of the new product, but also of the social context in which the process occurs.

3. CONCLUSION

Facing the difference between scientific and practical engineering demands and needs, it is necessary to accept the challenge of reforming engineering education, especially in the field of construction, beyond design. This implies a reversible process, where the starting point for reforming engineering education of design engineers is to consider the demands of users (customers), including their emotions.

Every successful product is the result of the research in the process of product development which requires a special methodological approach. A modern approach to product design which is quality life improvement oriented, is emotional design. Such approach identifies and analyzes emotional responses of customers in order to create an innovative product and solve the problem of the effective usage of the product. In such way, emotional design can be helpful to many companies in implementation of creative strategies and integration of concepts directed to emotions and satisfaction of customers [5].

Therefore, the imperative of each company is to conquer the modern market, by placing an innovative product before the competition, which will in every sense, and even emotionally, satisfy the needs of the users. For this reason, the concept of developing an innovative product, from idea to realization, with the support of all purposeful methods of development and teamwork, must also include consideration of the emotional demands of users. Students and young engineers must be familiar with these needs before engaging in practical work.

Therefore, the goal of engineering education today is far more than transferring knowledge in the conditions of classical university practice, it is a challenge that is being set up every day by professors who prepare young engineers for a modern knowledge market and the acquisition of new products.

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CORRESPONDANCE



Biljana MARKOVIĆ, Prof. D.Sc. Eng.
University of East Sarajevo
Mechanical Engineering Faculty
Vuka Karadžića 30,
71000 East Sarajevo, B&H
E-mail: biljana46m@gmail.com



Lozica IVANOVIĆ, Full Prof PhD,
University of Kragujevac,
Faculty of Engineering,
Sestre Janjić 6,
34000 Kragujevac, Serbia,
E-mail: lozica@kg.ac.rs



Aleksija ĐURIĆ, M.Sc. ass
University of East Sarajevo
Mechanical Engineering Faculty
Vuka Karadžića 30,
71000 East Sarajevo, B&H
E-mail: aleksijadjuric@gmail.com