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The complexity of ergonomic in product design requirements

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Abstract

Within the Product Design Process, much information are loosed when they aren't properly managed. One of the most difficulties found in the information management process occurs when the complex situations appears, especial at ergonomic parameters. So, the present paper discusses the difficulties confronted, by students of industrial design, on the construction of ergonomic design requirements of a new product. The main idea of these research is focused on define how the complex situations on ergonomic analysis may be overcome. When clarified these difficulties, the possibilities of understanding the interaction phenomenon between product and user must be easier for a industrial design student. The new understood information, that includes ergonomic data, could be clearly used to define the product design requirements in conceptual stage at product development process. The methodology used to develop the research includes analysis of theory of complexity in ergonomics, compared with industrial design methodology approach, and students' behavior while developing the product design process at Conceptual Stage. All information is analyzed and compared with some product examples developed by the students. The results will provide a new way of understanding the human behavior through ergonomic perspective and its usefully information on product development process. This will provide more resources for teaching industrial design methodology and make easier the understood of intangible ergonomic requirements. Some test must be done to explore the new possibilities of understanding made by the students of industrial design.

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1. Introduction

When considering the subjective aspects within Product Development Process – PDP, they are associated to human qualities, such as the wills and expectations of the target audience. The subjectivity is inevitable, because people manage every decision made, and this will affect the whole process.

The engineering methodologies are based on quantitative aspect, procedures that provide a way to check its reliability that is important within many design requirement approaches. But, to attempt this level, the information passes through a filter process based on the human capabilities of the people who develop the project, team led by a person, in this case the specialist [1]. Then, the “translation” of the information depends on the team skills. Therefore, the fact of learning ways of dealing with subjective aspects is very important, to attempt the transposition of information instead of the interpretation of information, allowing the correct qualities of the product at the interface between this and the user [2]. From other perspective, the macro-classification of the information also helps to organize the desired qualities, like technical, ergonomic and aesthetic attributes [3]. Then, the exercise of the methodologies of industrial design, that has a resource of knowledge based on the applied social area [4], will complement a rational approach when analyze the client (or future user of the product). However, remains a gap in the knowledge that defines a complete and interactive definition of the human needs.

The organization of the necessities expressed, inside product requirements, becomes an important reference to the success of a new product, and Kano client satisfaction Diagram [5] [6] is a good example of this. By including the analysis of the market demand.

However, the way that information is incorporated into the process remains subjective and generic, calling the “client language”, without an organized way of working, staying the personal way of dealing this information inside the PDP. Some tools exist to lead with this situation like qualitative research, direct observation [6] and others that have been added to a real important component, the target audience [7].

For the successful of a new product is important to understand the relationships between human beings and their environment (persons versus objects) on the daily basis. And to achieve this successful, the ergonomic has an important participation, over all when addressed the elements that generate complexity consequence of the human being as a dynamic system.

2. The dynamic within the user and the product relationships

When the students of industrial design begin to learn the PDP, the attention is focused on fixed linear a rational management process of data that concludes with a proposals of a new product. The conditions of academic time, limited by a calendar, provide the false sense of security of laboratory conditions, without environments interferences. This situation, limits a further exercise of dynamic situations in projects, and a hard comprehension of the activities from a ergonomic perspective. So, is important to understand that the relation of work between human vs. product, that involves task, activity and behavior.

The work is an activity beyond the compensation by material stimulus, but it need to achieves personal wishes. Then, is relevant to add to product aspects beyond the rational and quantifying functional elements. This kind of elements considers attributes that depend on the future human behavior. This does not mean a continuously modification of functional attributes to the development process, it is just the need to understand that is a constant changing situation. The ergonomic approach considers this relationship as Dynamic Situation Management – DSG, which could increase the PDP of complex data. Remembering that the project’s requirements do not fix the interaction between the parts, and the dynamic situation intends to achieve a proper management inside the team who develops the project. For the PDP, understanding and handling skills of the product offer the user the possibilities of safe interaction and satisfying its wills without conditions, just completing him. Therefore, understanding that interaction means comprehend the three parts of the product’s structure: the work area, the manipulation area and the information area [8]. These aspects are relevant in order to define the complexity level of a product, depending of the attributes defined for it, creating different conditions that could facilitate or complicate the identification of those three parts, unified or dissociated and clarified or diffused.

The actual technologies state of art provides a vision beyond the “form and function” proposal, requiring other possibilities to develop the human – product relationship. Therefore, “interface” is a word that places the design

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