

The Concept of Hedonomics and Kansei Engineering Method in Ergonomics: A Narrative Overview

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ABSTRACT

Hedonomics is a different perspective and a new branch of science in ergonomics, describing pleasure and satisfaction aspect in human-system interaction. Kansei Engineering (KE) method evaluates the user's emotional needs and their conversion to tangible product features or task. The purpose of this paper was to provide a brief review of the role and concept of hedonomics in ergonomics and to analyze the user's pleasure. In this review, articles were extracted from the Google Scholar, Scopus, Web of Science, and PubMed search engines. The main keywords for search were ergonomics, hedonomics, pleasure, and Kansei Engineering. Findings showed the significance of interaction of hedonomics and ergonomics, which the latter goal is to optimize human-system interaction and is central to the goal of all designs. Engineering is a method for converting cognitive and emotional needs to features of a product or a system in order to optimize it.

KEYWORDS: *Pleasure, Ergonomics, Hedonomics, Kansei engineering*

INTRODUCTION

Affective and pleasurable appreciation is not new. It is a contributing factor in many people's daily activities and choices, but these issues in the field of ergonomics and human-technology interaction are relatively new. In the past, prevention of people's pain and suffering, especially in the work setting physical problems and risk factors for human, was considered more in ergonomics domain. In recent decades, a wider set of improvement in all physical and cognitive aspects of the environment has been addressed, serving to enhance the overall quality of life. Nowadays, evaluation of the performance system is a step forward and satisfaction plays a key and important role [1-2-3].

Affective evaluations provide a new and different view in ergonomics. "It is not how to evaluate users but it is how the user evaluates"[4]. There are different ideas why experts in ergonomics should pay attention to the emergence of hedonomics. Hedonomics has been defined as a new branch of science that paves the way for pleasurable and enjoyable features of human-technology interaction [5-6].

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Hedonomics, "derived from two Greek roots, hedon, meaning joy or pleasure and nomos, meaning law or rule" [6].

Pleasure and enjoyment facilitate learning, cognitive flexibility and motivation and they significantly affect quality of life [7]. Description of pleasure is hard since it is a subjective concept that depends on our past experience, education, and all other aspects that make up our personality, indeed pleasure is opposite of pain [6]. Depending on the needs of the individual, pleasure can be divided into five groups: Physical pleasure is related to the body and the senses, for example eating, drinking, and sneezing. Social pleasures contain social interactions with family, friends, and colleagues. Psychological pleasure is a mental reflection of activities, such as the feeling of listening to music or painting. Reflective pleasure is associated with our knowledge and experiences. Normative pleasure is connected with societal values such as moral judgment or religious beliefs [8]. In the past, assessment of quality of life regarding economic issues instead of psychological concepts was considered the highest priority, but after the introduction of Maslow's Hierarchy of Needs, cognitive designs were more emphasized than the physical ones [9]. According to Maslow's

model of the optimization of human satisfaction through a hierarchy of needs that determine a higher level needs can only be performed after lower level needs are satisfied. In order to establish hedonomics, a theoretical framework is needed and a system must first be designed to be safe, functional, and usable before it can be designed to

be pleasurable and individual [1, 5] (Fig. 1). If something is not safe and is not functional or usable, then people certainly cannot be happy with it and enjoy working with it, and it is not pleasant and personal perfection. In Hedonomics, there is an individual view because each person's feelings about a design or task differ from one another.

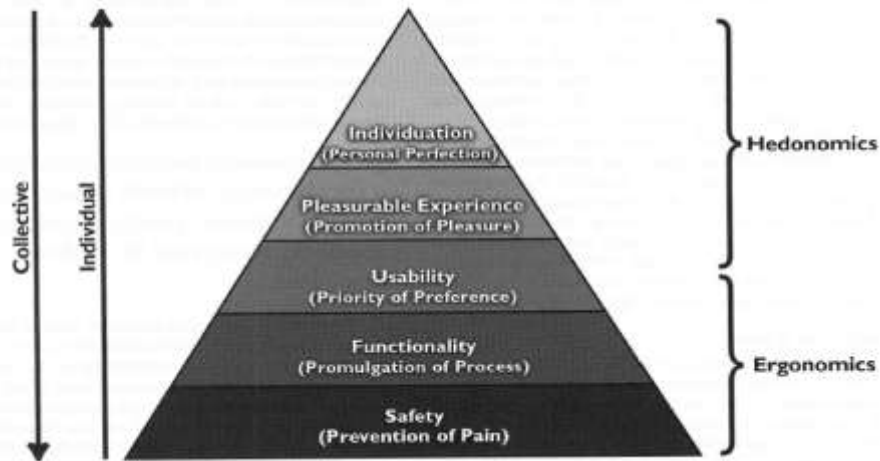


Fig.1. A hierarchy of ergonomics and hedonomic needs derived from Maslow’s conception to achieve pleasurable [1]

The measurement of emotion is difficult; the assessment should be based on an understanding of how emotions occur in the context of daily life and how they can be measured [5]. A variety of methods has been put forward to support the evaluation of the user’s satisfaction, for instance, Kansei Engineering (KE) [10]. KE is a concept that focuses on the needs and aspirations of individuals and provides the perfect product based on ergonomics principles since Kansei converts the user needs into tangible features of ergonomics product. KE is one way that considers perceptions, feelings, and needs in relation to a product and

design as a parameter [11]. Kansei is a Japanese term, deeply rooted in Japanese culture. Direct translation of Kansei to other languages is rather difficult and the nearest interpretation of KE is psychological feeling the individual has with a design, product, situations or surroundings. Kansei is a mental condition in which knowledge and emotion are harmonized. An individual with rich Kansei is an individual who is rich in emotion, adaptive and responsive. The process of Kansei begins by collecting data through the five senses. Fig. 2 provides the process of Kansei and five senses inside the structure of the brain.

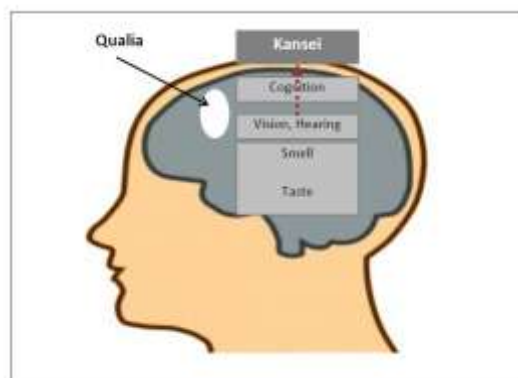


Fig. 2. The process of Kansei [10]

Kansei can only be *measured indirectly* by sensory activities, internal factors, and psychophysiological and behavioral responses. Sense activities are measured by assessing the

effect of a particular sense stimulus on brain activity. Physiological or behavioral responses are measured by methods such as electromyography (EMG), heart rate variability,

electroencephalography (EEG), event-related potential (ERP), or functional magnetic resonance imaging (fMRI). Psychological measures perform by personality tests, semantic differential scales methods or other questionnaires [10, 12].

Hedonomi is a new topic in ergonomics created a new perspective; its application as a new vision by considering emotion and pleasure in addition to the physical aspects and relationship between them [5-6]. The present is a short review that describes recent achievements in the field of hedonomics and its aim was to provide a brief review of the role and concept of hedonomics and KE method in ergonomics.

MATERIALS AND METHODS

The main keywords, i.e. ergonomics, hedonomics, pleasure, and KE were used to do a search in the scientific databases. The authors performed a search of the literature during last 20 years (1995-2015), using Web of Science, PubMed, Scopus and Google scholar search engines. Considering the title and abstract of the articles, the most relevant articles were studied and summarized. Finally, the best articles related to the context of the subject were selected.

RESULTS

The authors tried to find a relationship between ergonomic, pleasurable design of products and tasks, and application of the concept of hedonomi to ergonomics, and KE method for pleasure evaluation. Data were grouped in two categories, including the role of hedonomics and its relation with ergonomics and KE and ergonomics relations. In what follows each of these categories are addressed:

The role of hedonomics and its relation with ergonomics: Various researches have been carried out on hedonomics such as them, a review article that reported the newest concept hedonomics. Findings outlined the importance of interaction of ergonomics and hedonomics to get the functionality of pleasure and pleasant emotion in product design. Naeini and Mostowfi suggested a model for pleasurable product design according to an integrated approach to ergonomics and hedonomics, a triple model (design-product-consumer) concerning about importance of ergonomics, hedonomics and the necessity of joy in use and product pleasure in interaction between product design and the user [5]. Another study illustrates a systematic framework to conceptualize effective ergonomics design or hedonomics. Hedonomics focuses on pleasurable design of products and tasks. Individuals have emotional responses to the tasks, products, and designs. These responses are due to design features that operate

through their perceptual characteristics or experience [2]. This approach introduces a new term into the ergonomics. Hedonomics is defined as a branch of science and design devoted to the promotion of pleasurable human-technology interaction [1]. Hence, there is a tightly coupled relationship between hedonomics and ergonomics and this interaction, particularly after the formation of new domains contains cognitive ergonomics, cultural and social ergonomics became more important and deeper [5].

Traditionally, ergonomics approaches have tended to focus on usability. In hedonomics, identifying the features of a product and task that influence how much the user enjoys what he/she wants to use. The ergonomics specialists should consider many other factors in order to ensure that the user's experience of product use is maximum [13]. Hedonomics is "the branch of science which facilitates the pleasant or enjoyable aspects of human-technology interaction". It is a new approach in research and ergonomics, human factors and usability. During the last decade, there has been a rapid growth about affect and pleasure [4].

The relationship between KE and ergonomics: Various studies describe the concept of Kansei and its status in ergonomics. Ergonomics in the past decades have mainly focused on physical aspects of human body, while with the development of sciences, human mental characteristics are undergoing change in terms of physical to cognitive, aesthetic and recently effective domains and there is relationship between ergonomics and KE. Kansei Engineering, have focused on emotional and cognitive values instead of micro-ergonomics and physical human body aspects. The meaning of Kansei is mental ability to experience emotional values that stems from right brain process [12]. Nagamachi demonstrated KE has raised 30 years ago as a concept of ergonomics and consumer-oriented technology. Users will have a sense of a new product or design. When the users' feeling is considered in the production of a new product, they would be more satisfied it. KE aims at translation sense and feeling to product mechanical function [14].

Today, the trend of the development of products and systems indicates that considering the user's needs in addition to technical aspects when designing a product or system is a determining factor in the success of the product or system. Explicit needs are clear and easy to describe. However, the implicit ones such as emotional experience are difficult to quantify. KE evaluated the relationship between the individual's psychological experience of a particular product and its design features. KE evaluation requires

some skills, experts, and tools. Some of these skills and tools require great resources, consume a long time and have high costs [10]. KE is a unique ergonomic method to product or design a new product that fits user's feeling and demand. It is a method based on the user mind. KE employs psychological methods to perception of the user's feeling and the data gathered by KE are analyzed and ultimately transferred to the design features [15]. KE is a consumer-oriented technology for a new product development developed first in Japan and then in other countries. KE is "a translating technology of a consumer's feeling and image for a product into design elements". KE is a public method for a new product or task [16]. Many studies on product design have focused on the user's needs related to functionality and usability [8, 14, 17-18]. Traditionally, cognitive approaches conducted to minimize the importance of the user's feeling. Feeling affects the interaction between user and product. Subjective and objective methods commonly used in evaluating customer emotion, the evaluation of feeling may be difficult because of the undetermined interaction sense and behavioral expression. KE is a subjective method for feeling evaluation, which Kansei defined as sense, sensibility, feeling, aesthetics, emotion, affection and intuition, in Japanese, KE refers to all conceived as mental response to external stimuli or psychological feelings [17].

The relation between KE and ergonomics indicated that KE has been defined as a continuation of ergonomics. Ergonomics is concerned with the analysis of the main physiological aspects common between people and machine while KE refers to the human heart and considers senses. Nowadays KE is a novel sight in ergonomics. Man emotions find a special place in quantitative research and gradually attract greater extent of the world attention [19].

Therefore, hedonomics and micro ergonomics involving reducing damage, injuries and physical symptoms are not related to each other. In micro ergonomics, it is tried to provide the minimum requirement of the users, including physical structure of the body and issues such as anthropometry and metabolism and other main parameters needed to buy and utilize a product, these are beyond micro ergonomics and are connected with cognitive and social-cultural ergonomics. From this view to the development of the ergonomics characterizes lead to hedonomics that state the pleasure [5]. At first physical issues were paid more attention, but 20 years ago a significant growth in human mental characteristic occurred developing from physical to cognitive, aesthetic and recently affective domains. Emotional and cognitive aspects of human beings were considered in addition to the safety requirements and micro ergonomics. One of the methods used to

identify emotional needs is KE [12]. KE has gained generality in ergonomics domain and development to find interaction between product experience and features in relation to a task or system [20]. In recent years, ergonomics have focused on cognitive and emotional criteria instead of micro ergonomics and human body aspects and KE is the mental ability for evaluation of emotions and feelings and refers to mental concepts. Despite the various studies conducted in the field of hedonomics, it is still a new area and recommended for future researches.

CONCLUSION

Ergonomics has two goals: physical and psychological aspects and is not limited to prevention of work related musculoskeletal injuries but considering more scopes contains human machine interaction design, environment and physical and emotional needs, perceptual- cognitive issues and other analogue cases. Hedonomics is a new concept in ergonomics and KE is a tool for evaluation of emotional needs and changes them into product or task features. KE translates the user's emotional needs into tangible features from an ergonomics perspective indeed; hedonomics is the continuation of ergonomics.

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The authors declare that there is no conflict of interests.

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