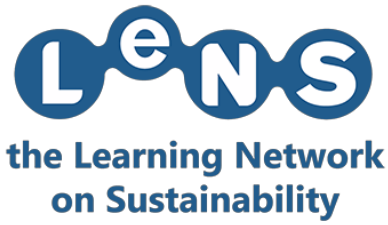

Emotional Design in Functional Economy and PSS towards behavior change

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ABSTRACT

Despite Product-Service Systems (PSS) research being largely developed lately, applications are still limited in parts by implying changes in consumer practices. One of the main barriers is in the change of perception since some types of PSS propose the satisfaction of needs without product ownership, which highlights emotional aspects and involves a change in social behavior. This paper aims to characterize the contribution of Emotional Design in the Functional Economy and PSS. We discuss the concepts of Functional Economy, PSS and Emotional Design. We developed a bibliographic research for the definition of the theoretical background and applied the content analysis method to collect and analyze data. The results show that the contribution of Emotional Design in PSS for Functional Economy is of four distinct natures: (1) Strategies in Product Design (visceral, behavioral and reflective levels); (2) Emotional, psychological and cognitive aspects; (3) Experiences; and (4) User-centered design.

Key words: Emotional Design, Functional Economy, Product-Service System, Behavior Change.

1. INTRODUCTION

Several studies related to Product-Service Systems (PSS) have already been developed in recent years, allowing a greater understanding of the advantages, guidelines and barriers of their global implementation (Afshar & Wang, 2011; Mont, 2002), but their applications are still limited, in parts by counteracting current consumer practices and implying changes in the society behavior. For consumers, one of the main barriers is in the change of perception, since some types of PSS propose the satisfaction of needs by using products without ownership (Demyttenaere, Dewit, & Jacoby, 2016). Buclet (2005) considers that the transition to a Functional Economy, focused on the function and not the possession, cannot be done without a behavior change, especially of the consumer, while Vezzoli, Ceschin, Diehl and Kohtala (2015) consider the importance not only of new models of production and provision of services but also the redesign of patterns of consumption and lifestyles.

These changes can present challenging implementations and not be accepted by the consumers, as they are contradictory to the culture of consumption of the industrial society, which links wealth and well-being with the consumption and accumulation of products (Afshar & Wang, 2011). Besides, this shift in focus introduces a new relationship between consumers and products, since in some cases the user is no longer the legal owner of an artifact. The possession of a product can generate an attachment on the part of the user, which creates an emotional bond with objects, resulting in behaviors that stimulate their responsibility with that artifact (Demyttenaere, Dewit, & Jacoby, 2016; Baxter, Aurisicchio, & Childs, 2015). Norman (2004) points out that there are three levels of Emotional Design: visceral, behavioral and reflective. They can be considered to understand the objectives of consumers and users, helping them to understand their journey by consuming products and/or services, as well as providing a structure to be used by designers in the design of new services that can promote, even partially, the dematerialization of the consumption of physical artifacts (Costa & Santos, 2016).

Thus, this article aims to characterize the contribution of Emotional Design in Functional Economy and Product-Service Systems as a way to enable behavior change. This study aims to show the relevance of Emotional Design for sustainable development, in environmental, economic and social aspects, for the possibility of promoting behavior change for more sustainable habits and in the transition from an industrial-based economy focused on the consumption of material goods, to an economy focused on the offer of functionality and value in use.

2. THEORETICAL BACKGROUND

2.1. Functional Economy and Product-Service Systems

For Stahel (1997), Functional Economy proposes to optimize the use or function of the goods and services and contribute to a better resource's management. Economically, it aims to create the highest use value possible, for as long as possible, while consuming the least amount of resources and energy. One of the main issues of the Functional Economy is the transition from an industrial economy geared to the production and sale of goods and material goods to an economy and a new consumption model centered on services and functions, where products are only means to provide functions and satisfaction (Buclet, 2005; Stahel, 1997). This involves moving to an immaterial economy, which considers intangible resources such as trust between the actors and new skills involved. Also, Functional Economy proposes a new model of consumption and disruption in the way consumer and supplier relationships are considered (Huet & Choplin, 2012).

A concept that can be related to the Functional Economy is the Product-Service Systems (PSS), characterized by the sale of the use of a product instead of the product itself, in a system of products, services, networks of actors and supporting infrastructure that seeks to meet consumer needs and remain competitive, with fewer impacts than traditional models (Mont, 2002). Thus, we can relate it with the Functional Economy, in which the user pays for the use of the solution or the function of the product, and not for its ownership. Tukker (2004) proposes three types of PSS, differentiated between them by the property issue: (i) product-oriented - ownership remains with the consumer and the provider sells

additional services; (ii) use-oriented - the ownership is the provider's, and the consumer's rights of use are sold; (iii) results-oriented - the functions of the product are sold, which meet directly the demands of the consumer. In these definitions, the issue of commercial transactions is not the delivery of goods and/or services, but the production of value-for-use (Gidel, Huet, & Bisiaux, 2016).

For Vezzoli, Kohtala and Srinivasan (2014), PSS are design strategies for sustainability, which aim to integrate a system of products, services, and communication based on new forms of organization and reconfiguration of the roles of consumers and other stakeholders, with medium and long-term sustainable objectives. In this context, the design process should broaden its approach, not only considering functional issues, but also terms of satisfaction and emotional aspects, shifting the focus of a product to a broader system that satisfies a specific demand (Vezzoli, Kohtala, & Srinivasan, 2014).

2.2. Emotional Design

Emotional Design is a field that emerged in the international Design scene in the late 1990s. For Norman (2004), Emotional Design consists of projecting beyond the mere functional performance, exploring the relationship between the logical and emotional aspects of a product, considering usability and emotional appeal issues (Beltagui, Candi, & Riedel, 2012). Although Emotional Design is more addressed in Product Design projects, services involve more emotional contact points, because of the higher and more frequent interaction with clients (Beltagui, Candi, & Riedel, 2012). Therefore, the importance of positive experiences of use should be considered to fully satisfy the consumers´ functional and emotional demands (Demyttenaere, Dewit, & Jacoby, 2016).

In his studies on emotion, Norman (2004) suggests that human behavior results from three different levels of brain processing, each playing a specific role: visceral, behavioral, and reflective. The first level, visceral, is automatic and immediate. Related to direct perception, it is responsible for quick judgments of what is bad or good, dangerous or safe, and sends signals to the motor system and alerts the rest of the brain, initiating affective processing. The second level corresponds to the part that controls the processes of daily behavior and learned responses, called behavioral. It is where most human behavior is concentrated, and its actions may stimulate or inhibit the lower (visceral) layer, but at the same time, it also has its actions stimulated or inhibited by the above layer. The highest layer is that of reflective thought, the contemplative and conscious part of the brain. What Norman (2004) proposed is that these three levels correspond to three different design strategies: design for appearance (visceral); design for comfort and ease of use (behavioral); design with reflective (reflective) meaning. These three levels influence human behavior and can be considered in the development of projects, for marketing and use of products.

Vezzoli, Kohtala, and Srinivasan (2014) relate the concept of product attachment to Norman's (2004) reflective level of Emotional Design since this link between product and user can be created by memories, positive emotions, and special meanings at the reflective level. Norman (2004) also considers that people create attachments to artifacts that have a significant personal association, but mainly if they refer to moments of pleasure, satisfaction, and comfort. In some cases, an attachment may not necessarily be with an object, but with the meanings and feelings it represents. Baxter, Aurisicchio and Childs (2015) consider the concept of psychological ownership, in which there is an attachment without necessarily having the physical possession, that can occur with shared objects or abstract feelings.

For Demyttenaere, Dewit, and Jacoby (2016), the feeling of being emotionally attached to an object causes the consumer to postpone their substitution and take better care of the object. These authors consider the importance of adding special meanings to new PSS models, including in their design emotional and non-purely functional characteristics, and stimulating recurrent interactions, so that attachment is also present between a consumer and an PSS, even if as a temporary attachment (Demyttenaere, Dewit, & Jacoby, 2016). For Zhou, Ji, and Jiao (2012), by incorporating affective and cognitive needs that can be described as perceptual user preferences, designers can enhance and increase the added value of experience (Zhou, Ji, & Jiao, 2012).

Lilley (2009) considers that design can be used to influence users' behavior towards the adoption of more sustainable practices. Identifying and evaluating the use of a product, as well as the designer's intentionality in designing new products, can prevent potential or predictable consequences resulting from misuse. For Beltagui, Candi, and Riedel (2016), PSS designers are increasingly recognizing and signaling the importance of emotion in projects. Companies can no longer rely solely on the provision of core products as a way of delivering superior value but should consider mastery of the management of

consumer experience by creating long-term emotional links through the co-creation of memorable experiences involving a set of goods and services. Beltagui, Candi, and Riedel (2016) point out that memorable experiences have the potential to create an emotional bond and encourage the consumer to become loyal, which is why it is vital to design services that offer symbolic and emotional value. To this end, these authors consider the importance of a service economy with a focus on experience, and even an experience economy.

Beltagui, Candi and Riedel (2016) also consider that to understand services and experiences one must understand a change in the perception of the concept of value. Value can no longer be understood as created by companies and consumed by customers, but it is co-created when the resources of consumers are combined with the value propositions of the companies, to form an experience. These authors believe that services should be co-created with consumers, resulting in experiences that are unique to each customer (Beltagui, Candi, & Riedel, 2016).

3. METHODOLOGY

The methodology conducted in this study was based on bibliometric research for an initial survey of scientifically indexed publications, followed by systemic analysis to identify the authors to form the theoretical background. For data analysis, we used the categorical and thematic analysis based on the content analysis method from Bardin (2011).

The preliminary bibliographic survey was carried out based on bibliometric research, suggested by Ensslin, Ensslin and Pinto (2013), to deepen studies in the area and verify the state of the scientific production, through a process that allows a search for relevant articles, besides finding the more cited authors in the field.

The analysis techniques adopted were based on the categorical and thematic analysis, based on the Content Analysis method and the contributions from Bardin (2011). Content analysis consists of an empirical and mixed method, involving quantitative and qualitative approach. The quantitative analysis essentially considers the frequency of certain elements in the content, while the qualitative analysis focuses on the presence or absence of a characteristic in a message fragment. It aims at inference, through interpretive attitudes based on raising evidence and indicators, supported by a technical validation framework (Bardin, 2011).

Content analysis process can be detailed in three stages: pre-analysis, content exploitation (categorization) and results analysis. The first phase, of pre-analysis, consists in organizing the material. In this research, it consisted of the collection of documents and the critical reading that helped in the article's selection.

The phase of content exploitation consists of a categorization, which is subdivided into 4 groups:

- Context Categories: encompasses the content, as they are broader and related to the research objectives;
- Analysis Categories: subdivision of context categories into smaller parts to allow the analysis;
- Registration Units: words/word that explain the category of analysis;
- Context Units: phrase or fragment that explains the registration units.

In this research, to assist with defining the categories analysis and the registration and context units, we conducted a quantitative and qualitative analysis for each of the selected references from the theoretical background. The quantitative analysis was carried out by determining the five most frequent words present in each article, thus identifying the most cited words in all articles. Next, we carried out a qualitative analysis based on reading the documents, considering expressions in common which did not necessarily appear in the word frequency. The words and expressions resulting from the quantitative and qualitative analyzes, were grouped considering frequency, as well as associations and equivalences. After this grouping, we set out to define the analysis categories, based on the definition of the registration units and context units (words that explain the analysis categories). We made several groupings and exclusions, considering that the final categories come from the progressive regrouping of categories with a weaker generality and that a good set of categories should have the qualities: mutual exclusion; homogeneity; relevance; objectivity and fidelity and productivity (Bardin, 2011).

Considering the objectives of this research, we defined Emotional Design as main the Context Category, since it´s the broader expression that encompasses the whole content. The final categories are shown in the Results section.

4. RESULTS

After the definition of the final Categories, we were able to perform the results analysis. We compared the defined Analysis Categories with the Functional Economy and PSS literature, thus being able to suggest strategies for PSS in the Functional Economy that consider Emotional Design in their conception and development. Based on this analysis, we understand that the contribution of Emotional Design to Functional Economy and PSS is of four distinct natures: (1) Strategies in Product Design (visceral, behavioral and reflective levels); (2) Emotional, psychological and cognitive aspects; (3) Experiences; and (4) User-centered design.

(1) The three Emotional Design strategies (visceral, behavioral and reflective) suggest by Norman (2004) should be considered because they contribute to incorporate not only aesthetic and functional aspects but also user's emotional aspects. Although the visceral level is significant, allowing a first response to the attributes of design, we consider that the behavioral and reflective levels of Emotional Design can contribute to propose conditions of emotionally pleasant and positive experiences, as an alternative to fill the lack of property (Vezzoli, Kohtala, & Srinivasan, 2014).

(2) Addressing the emotional, psychological and cognitive aspects, Emotional Design can contribute to the satisfaction of needs and desires (Norman, 2004) when offering a proposal of psychological possession, and not necessarily physical (Baxter, Aurisicchio, & Childs, 2015). Also, temporary ownership can result in greater flexibility for users, according to the type of PSS (Tukker, 2004). The Functional Economy proposes a new consumption model (Huet & Choplin, 2012), and Emotional Design can encourage the change of consumer behavior by emphasizing aspects of flexibility, reduce costs, maintenance and after-use solutions.

(3) Emotional Design also presents its role by focusing on experiences, where Functional Economy solutions offer complete services that meet the demands (Beltagui, Candi, & Riedel, 2012). Focusing on positive and differentiated usage experience (Zhou, Ji, & Jiao, 2012) can provide better consumer satisfaction by offering a complete package of solutions that the user would not find or would not have their needs fully met just by purchasing a product.

(4) At last, Emotional Design also contributes to show the importance of including the user, in a process of co-creation of new solutions of Functional Economy and PSS (Beltagui, Candi, & Riedel, 2016). By applying a user-centered Design, designers are provided with more information to contribute as one of the stakeholders in the network of stakeholders. Besides, the existence of a well-established network of partners contributes to complementing their skills and offering a complete solution. Table 1 shows the summary of the results of the analysis.

[Table 1] *Analysis of Strategies for PSS in Functional Economy based on the Emotional Design Analysis Categories (Font: The Authors, 2019).*

ANALYSIS CATEGORY	REGISTRATION UNITS	PSS STRATEGIES IN THE FUNCTIONAL ECONOMY
Product Design Strategies	Visceral Design	Visceral appeal perceived in the first contact, not only in the design of the products involved in the PSS but also in the other supports.
	Behavioral Design	Meet the functionality demand not only in the products involved but in all the artifacts that make up the PSS.
	Reflective Design	Allow awareness and contribute to users with more conscious habits. Feelings of accomplishment when using cleaner models. New status, modernity related to awareness.
Emotional, Psychological and	Needs and Desires	Seek to meet the demand when solving the need (ex.: mobility, practicality, results). Desires may vary according to culture, country, age group (young people more flexible and open to new proposals).

Cognitive Aspects	Psychological Ownership	Ownership is temporary and occurs at the level of shared objects. Encourage users to take care of artifacts not only to allow use by other users but also because they can use again, also allowing customer loyalty.
	Consumption Behavior	PSS proposals should encourage users to change their attitudes and propose new consumer behaviors. Offer advantages and differentials such as savings, flexibility.
	Attachment	Attachment does not have to be by ownership and physical attachment, it can be the result of an experience and a felt emotion when using a PSS, creating a user bond with the brand.
Experiences	Emotional and functional aspects	Provide positive experience addressing the functional aspects related to needs (mobility, practicality, results). Also consider emotional aspects (safety, comfort, flexibility, happiness).
	Products + Services	In PSS, experiences are felt by the combination of the Product + Service Systems, which can be in three modalities: Product Oriented; Use Oriented; Result Oriented.
	Added value	Complete solutions that offer beyond the obvious, not just the use of a PSS, all the supports also uphold the offer.
User-centered Design	User evaluation	User participation in the development process. Meet the interests expected by the individual, to be well evaluated by him, besides offering feedback and constant implementations.
	Stakeholder Network	Partner network working together to deliver customer satisfaction. Multidisciplinary team.

As indicated in the table, each category points out strategic approaches that aim to consider Emotional Design in the design of new PSS. Thus, it can contribute to a change in consumer behavior concerning product acquisition, by proposing new functional and emotional experiences which maintain attachment, even if temporary and psychological, but also bring more conscious and sustainable attitudes.

5. DISCUSSION

This paper aimed to characterize the contributions of Emotional Design in the Functional Economy and PSS. Based on the definition of the analysis categories, performed through the content analysis method, we understand that the contribution of Emotional Design to Functional Economy and PSS is of four distinct natures: (1) Strategies in Product Design (visceral, behavioral and reflective levels); (2) Emotional, psychological and cognitive aspects; (3) Experiences; and (4) User-centered design.

We understand that Design has the potential to contribute to people's behavior change, especially in promoting attitudes that allow more conscious and sustainable consumption. One of the strategies that can be used is Emotional Design. The change in user behavior in adopting more sustainable practices can come from the experiences felt in the PSS, which, even offering temporary ownership, are capable of allowing an emotional bond. They show us that it is possible to maintain the emotional attachment without physical ownership and products purchase, and still be able to offer a memorable experience that satisfies the users' needs and can allow consumer loyalty. By applying these concepts in PSS projects, they can contribute to the adoption of more sustainable practices by consumers and users, besides contributing with the generation of complete solution that offer added-value experience to consumers.

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