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Design and Sustainability: Systematic review of literature in Brazilian PhD theses

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ABSTRACT

Several processes were developed to design products, services and, more recently, more sustainable systems in the last decades, as well as studies for a transition to less aggressive lifestyles to the planet. Although there is already a certain amount of research in this field, specifically in PhD programs, there are few ones. Thus, the aim of this study was to investigate sustainability approaches in design's PhD theses in Brazil. For that, a systematic review of literature of Design and Sustainability's theses in the Industrial Design field was performed at Coordination of Improvement of Higher Level Personnel [CAPES]' data basis. As results, to understand the state of the art of PhD theses regarding Design and Sustainability in Brazil, contributing to the identification of knowledge gaps, mapping their main types and applicability, besides fomenting new PhD studies.

Key Words: Sustainability; Design; Systematic Bibliographic Review; PhD

1. INTRODUCTION

The population's augmentation coupled with the fast growth of economies and the withdrawal of resources from the planet has brought the sustainability discuss to the center of the researches. Design, historically linked to industrial production, has addressed sustainability with a variety of methods, from the redesign of existing products to the proposal of new lifestyles (Manzini & Vezzoli, 2002).

Several processes were developed to design products, services and, more recently, more sustainable systems in the last decades, as well as studies for a transition to less aggressive lifestyles to the planet. Although there is already a certain amount of research in this field, specifically in PhD programs, there are few ones.

PhD researches are developed in the long term, being able to obtain more accurate results. Based on this finding, the aim of this study was to investigate sustainability approaches in design's PhD theses in Brazil. For that, a systematic review of literature of Design and Sustainability's theses in the Industrial Design field was performed at Coordination of Improvement of Higher Level Personnel [CAPES]' data basis, since it is the foundation that plays a key role in the expansion and consolidation of *stricto sensu* postgraduate courses in the country, subordinated to the Ministry of Education. Twenty-one theses were found between 2009 and 2018. Qualification criteria were those that focus on new approaches, strategies, methods and tools to enable the development, implementation, diffusion and dissemination of sustainability for all. As a result, it is intended to understand the state of art of these theses in the country, contributing to the identification of knowledge gaps, mapping its main types and applicability, besides fomenting new PhD studies.

1.1. Research question

How do design's PhD theses in Brazil address the theme of sustainability?

1.2. Goals

- To investigate sustainability approaches in design's PhD theses in Brazil;
- To understand the state of art in Design and Sustainability's PhD theses in the country;
- To extract applications and new methods for the development of sustainability in the country;
- To foment further research on gaps in the area.

2. THEORETICAL FOUNDATION

2.1. Design and development of products and/ or services

The way the design is seen and practiced has changed over the years, the contemporary designer is no longer seen just as a draftsman, or who develops artifacts as he was seen some decades ago. The profession has covered, in addition to product development, the development of systems and methodologies. In this context, it is necessary a more complex notion of development, as expressed by Morin (2000, p.70) "is not only material, but also intellectual, affective and moral."

Rodrigues, Bellio & Alencar (2012) state that designers should practice their craft in a way that improves the world, as they are seen as transformers of society, considering that when designing, directly affect people's way of life, having the opportunity to create new social proposals influencing attitudes.

In the process of developing products and/or services it is not always necessary to use or develop new materials, what is seen is a trend of renewal, reuse and replacement of products by systems of products and services, which may generate novelties through the combination of materials, new processing media creating composites, hybrid materials and creation of new types of service.

2.2. Design and sustainability

Design is characterized by its holistic and dynamic look, in this way it has the fundamental role of being an area that articulates in the decoding of contemporaneity, in a universal character to reach a more coherent society, it is indispensable and of extreme importance that the designers think about

sustainability and apply their concepts to product and/or service project requirements (Rodrigues *et al.*, 2012).

According to Manzini (2008, p.19) "sustainability requires a systemic discontinuity" of changing thinking and behaviour at the most diverse levels of production, use and consumption. There is more and more speeches of reduction of these levels, but we do not know for sure how this will happen, yet, several initiatives have arisen. In any case, the designer has a key role in reducing levels of production and therefore, the importance of incentives for academic research in the area.

In the same way, Vezzoli (2018) affirms that the approach of "systemic innovation" should be adopted as a way of seriously treating the transition to sustainability. Such innovation is defined by the development of Product + Service Systems (PSS). Through the design of these systems, the emphasis would be on the user's ultimate satisfaction, where the limits of environmental resilience and the social demands of the environment should be respected, rather than the mere offer of products/services.

2.3. Design and research

Sustainability research has been advancing quickly, ranging from changing conservation ethics, the emergence of the concept of sustainable development, through technological innovations and the search for more integrated solutions (Visser, 2012). Besides the environmental demands, the social and economic ones are incorporated. The literature on design for sustainability has followed these transformations and has shown to be an important guideline for action and planning of the designers, being extremely relevant their continuity and expansion in the academic area.

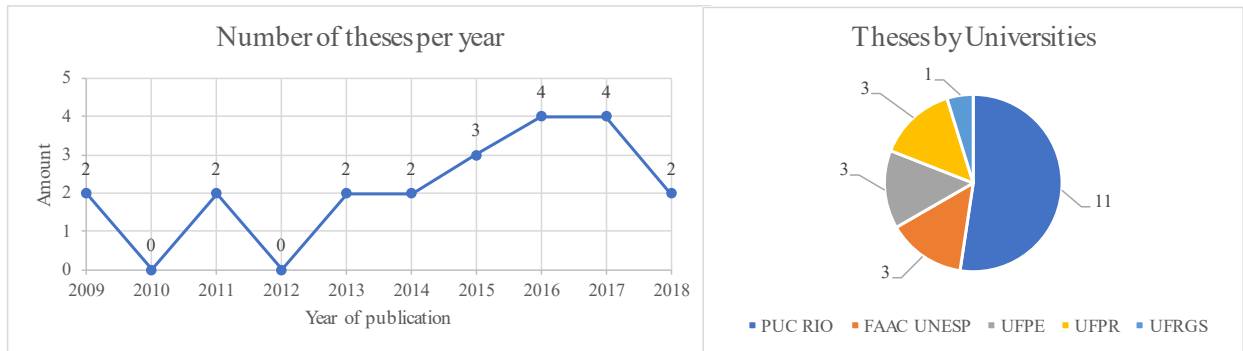
3. METHODOLOGY

This research has a theoretical and exploratory nature, has an inductive method and a basic nature. A systematic review of the literature on the Design and Sustainability's theses in the Industrial Design area in CAPES' data basis was performed. This is a systematic and rigorous bibliographic research that assists in the development of a solid foundation that contributes to the identification of gaps and new opportunities (Conforto, Amaral, & Silva, 2011). For its accomplishment, a script called methodological procedures was elaborated, described below:

1. Search for sustainability string at CAPES' catalog of theses and dissertations;
2. Refinement of PhD theses in the Industrial Design knowledge area;
3. Reading theses' abstracts, introduction and conclusions;
4. Refinement of those that approach the theme: "new approaches, strategies, methods and tools to enable the development, implementation, diffusion and dissemination of Sustainability for all";
5. Discussion of results.

4. RESULTS

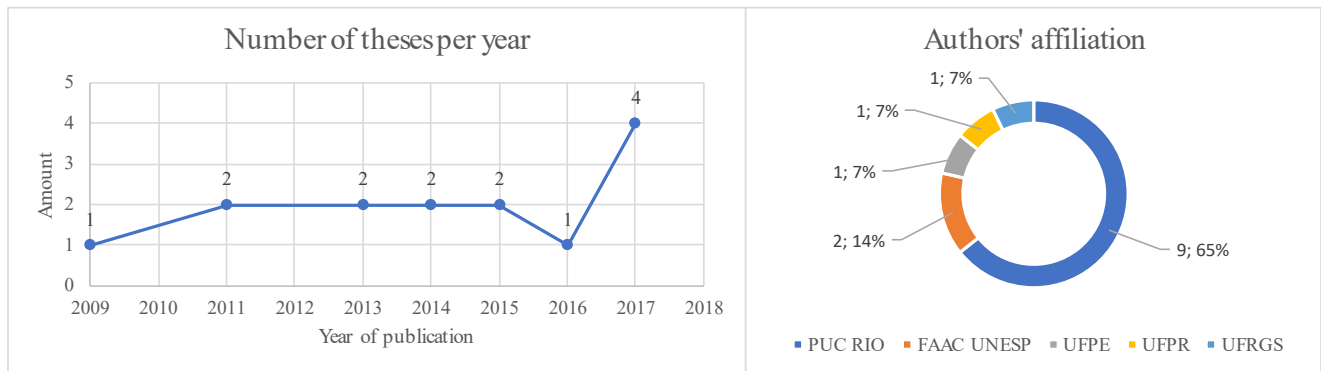
Through the search at CAPES' catalogue of theses and dissertations, 21 theses on sustainability were found belonging to Industrial Design category. Among them, the following universities were distinguished: Pontificia Universidade Católica do Rio de Janeiro [PUC Rio] has 11 theses, Faculty of Architecture, Arts and Communication of the State University of São Paulo [FAAC Unesp], Federal University of Pernambuco [UFPE] and Federal University of Paraná [UFPR] has three theses each and Federal University of Rio Grande do Sul [UFRGS] has one. Regarding to the publication years, there was a considerable increase in 2016 (4) and 2017 (4). In 2018 there were only two publications, however, this number may change due to later updates at CAPES' catalogue, since the search was performed in early 2019 as shown in figure 1.



[Figure 1] Search results at CAPES data basis (Font: the authors, 2019)

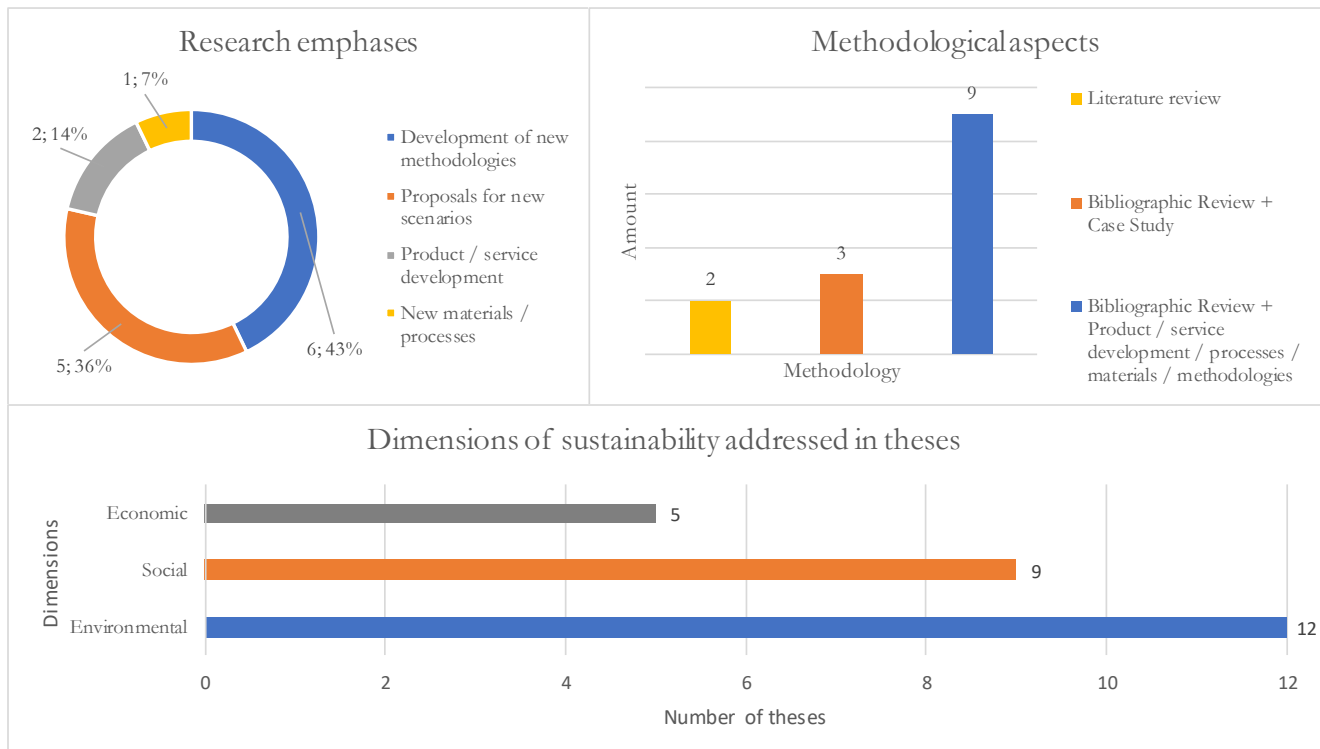
After the research, the results were refined by reading the theses’ abstracts, introduction and conclusions with the intention of selecting those that fit the theme: "new approaches, strategies, methods and tools to enable development, implementation, dissemination and dissemination of sustainability for all". At this stage, 14 theses were selected, however it is highlighted here that one of the 2018’ theses could not be analysed (Dickie, 2018), since only its summary was available at the time of conclusion of this study.

Regarding the authors' affiliation PUC Rio has 9 publications, FAAC Unesp has 2, UFPE, UFPR and UFRGS has one thesis each, stands out again. In relation to publication years, 2017 was the year that had the highest number (4), 2016 had only 1 publication, the years 2011 to 2015 presented 2 publications each and 2009 with one, as shown in figure 2.



[Figure 2] Selected theses information (Font: the authors, 2019)

Considering the methodological aspects, the great majority (9) of the researchers opted to develop new products, services, methodologies or materials and processes that would be more sustainable. The adoption of the methodologies can be seen in figure 3 below. In relation to the approaches used related to sustainability, the theses were classified according to the emphasis given in the surveys and in relation to the dimensions of sustainability (environmental, social and economic), with most addressing more than one, however, the largest number still refers to the environmental aspect (12), as shown in figure 3.



[Figure 3] *Emphasis, methodological aspects and dimensions of sustainability addressed in theses (Font: the authors, 2019)*

5. DISCUSSIONS

Although the sustainability theme has been recurrent for some decades, especially after the report of the World Commission on Environment and Development entitled *Our Common Future* (United Nations, 1987), the first thesis on sustainability in the Industrial Design area was published only in 2009 (Xavier, 2009), indicating a very recent research field. Most of the theses on the subject were defended at PUC Rio, which is the pioneering institution, both in the master's degree (1994) and PhD (2003) at design in Brazil (Pontifícia Universidade Católica do Rio de Janeiro - Teaching and Research - Graduate Studies, 2019). This predominance indicates the maturity of the institution in relation to the theme, which may indicate that in the future other institutions will follow the same path, increasingly covering the theme of sustainability.

Also, publications of only 5 educational institutions were found, showing that there is a need for a greater diversification of research in the area and a greater adherence by HEIs in research in this area, considering that Brazil currently has 25 post-graduation programs in the Design area, among them 12 with PhD course (Coordination of Improvement of Higher Level Personnel, 2019).

In relation to the methodologies adopted, the majority of the researches is of a qualitative nature applied (Xavier, 2009; Santos, 2015; Santos, 2011; Oliveira, 2013; Castro, 2014; Silva, 2014; Sóter, 2016; Albach, 2017; Ashton, 2017), seeking to develop proposals for solutions that allow a step towards greater sustainability, by its products, services, systems or processes.

According to the classification of design interference fundamental levels in relation to sustainability (Manzini & Vezzoli, 2002), most of the theses are found in the environmental redesign levels of the existing one or the design of new products or services that replace the current ones. Of the 14 theses, only five apply to the level of proposals for new scenarios (Schulte, 2011, Ripper, 2015, Junior, 2017, Pantaleão, 2017, Bezerra, 2013), which correspond to the sustainable lifestyle, which indicates the need for more researches on this level.

It can also be verified that the most contemplated dimension of sustainability is environmental, however, several theses approach more than one dimension, which is favorable and desirable to the research, as it is known to a project to be truly sustainable, it must address all dimensions (Vezzoli, 2018).

6. FINAL CONSIDERATIONS

Through the Systematic Review of Literature, it was possible to identify 14 theses that discuss sustainability with focus on "new approaches, strategies, methods and tools to enable the development, implementation, diffusion and dissemination of sustainability for all" in the CAPES thesis catalogue. The analysis of these publications demonstrated that although sustainability has been a recurring theme in academic research for some decades, in Design field, researches are still very recent and requires further studies.

After analysing the data of these publications, it was possible to identify emphases and gaps in the surveys. There are gaps for research in the levels of interference of the design in projects of new products-services intrinsically sustainable and proposals of new scenarios that correspond to the sustainable lifestyle.

The emphasis occurred on environmental and social aspects, predominantly, with few theses addressing the economic aspect. The ideal, as explained above, would be the comprehensiveness of all dimensions of sustainability.

In this context, the research was basically divided into four categories: a) Development of new methodologies; b) Proposals for new scenarios; c) Development of products / services and; d) New materials / processes.

Most of the theses propose specific solutions for sustainability, which, however, can be generalized and transferred to other localities, indicating that their disclosure is extremely important.

Finally, it is emphasized that this research was limited to the Brazilian context and the theses published in the CAPES catalogue, without considering researches in other databases and journals for the state of art presented here. However, the theses analysed allowed us to understand the state of art of sustainability in Industrial Design PhD research in the country, indicating that a greater diversification is necessary in relation to approaches, methodologies and also in quantity.

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