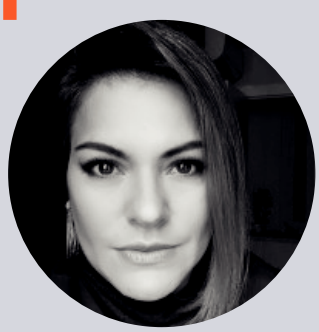
LOGO

Design for Sustainable Behaviour: Reflections on cultural cooking habits for sustainable innovation in the household appliance sector

Design para o Comportamento Sustentável: Reflexões acerca dos hábitos culturais de cocção para a inovação sustentável no setor de eletrodomésticos



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ABSTRACT

Cultural diversity in culinary practice portrays the polyphony involving a variety of aromas, flavors, people, and places. However, these cultural aspects directly influence food consumption and preparation modes, significantly impacting the habit of sustainable cooking. In this scenario, Design for Sustainable Behavior aims to support solutions oriented to influence behaviors during the use phase of products, to ensure change, lead, and inform the user to a more sustainable decision making. This study aims to present a critical, exploratory, and qualitative literature review on studies of cultural habits for sustainable cooking during the use of household appliances. Through the literature review method, it was possible to identify gaps and emphases on the themes addressed. The results point to a lack of data during the consumption of resources in the domestic environment and the existence of insipient solutions in the area of cooking with a focus on influencing the user to make more sustainable decisions. It is emphasized, thus, the need for the application of Design for Sustainable Behavior strategies in solutions that enable real-time consumption to influence the user to make more sustainable decisions.

KEYWORDS

Design 1; Sustainability 2; Design for Sustainable Behaviour – DfSB 3; Sustainable Cooking 4; Household Appliances 5

RESUMO

A diversidade cultural na prática culinária retrata a polifonia que envolve a variedade de aromas, sabores, povos e lugares. Todavia, esses aspectos culturais influenciam diretamente o consumo de alimentos e os modos de preparo, impactando significativamente o hábito da cocção sustentável. Neste cenário, o Design para o Comportamento Sustentável visa apoiar soluções orientadas a influenciar comportamentos na fase de uso de produtos, tendo por finalidade garantir a mudança, conduzir ou informar o usuário a uma tomada de decisão mais sustentável. Esse estudo visa apresentar uma análise crítica, exploratória e qualitativa da literatura, sobre estudos de hábitos culturais para uma cocção sustentável durante o uso de eletrodomésticos. A partir do método

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de Revisão Bibliográfica Sistemática, foi possível identificar lacunas e ênfases acerca dos temas abordados. Os resultados apontam para uma carência de dados referente ao consumo de recursos no ambiente doméstico e a existência de soluções insipientes na área da cocção com foco em influenciar o usuário a tomadas de decisões mais sustentáveis. Enfatiza-se, desse modo, a necessidade da aplicação de estratégias de Design para o Comportamento Sustentável em soluções que viabilizem o consumo em tempo real para influenciar o usuário a tomadas de decisão mais sustentáveis.

PALAVRAS-CHAVE

Design 1; Sustentabilidade 2; Design para o Comportamento Sustentável – DCS 3; Cocção Sustentável 4; Eletrodomésticos 5

e-Revista LOGO - v. 12, n.1, 2023 - ISSN 2238-2542 http://doi.org/1026771/e-Revista.LOGO/2023.04

1 INTRODUCTION

The broad and interrelated agenda of Sustainable Design has been consistently dominated by environmental and economic concerns, well-defined and widely understood. However, the social sphere of Sustainable Design remains less explored and deserves further investigation. In broader terms, social sustainability can encompass responsibility, quality of life, health, well-being, democratic participation, and cooperative behavior (BAINES & MORGAN, 2004; BHAMRA et al., 2011; COLANTONIO, 2007; POLESE & STREN, 2000; SINNER et al., 2004).

Notably, impacts related to resource consumption during product usage, such as household appliances, are mainly determined by user behavior. However, the actions of governmental or non-governmental organizations through informational campaigns could be more effective in promoting long-term behavioral changes necessary for reducing the impact of product use (PEATTIE & SHAW, 2007) and promoting a sustainable culture. From this perspective, Design for Sustainable Behaviour emerges as a promising approach to place individuals as the main agents of sustainability, influencing how they interact with products during the use phase and stimulating reflection on sustainable actions.

Despite the increasing development of theories to change user behavior through design, there is a lack of understanding of how different cultural contexts affect behavior (SPENCER et al., 2015). The growth of new markets and global expansion opportunities also expose a high failure rate in multinational corporations looking to implement products with global features in markets with contrasting cultures and contexts (CHAVAN et al., 2009; DELOITTE, 2009).

Individuals' behavior and cultural habits directly influence everyday activities such as cooking. Significant factors can impact the decision about cooking and eating home-cooked meals (MILLS et al., 2017). Within the social dimension of sustainability, cooking can offer positive outcomes regarding personal relationships, cultural identities, and better indicators for healthier eating.

2 DESIGN AND THE CULTURAL HABITS TOWARD A SUSTAINABLE COOKING

2.1 DESIGN FOR SUSTAINABLE BEHAVIOUR

e-Revista LOGO - v. 12, n.1, 2023 - ISSN 2238-2542 http://doi.org/1026771/e-Revista.LOGO/2023.04

Design for Sustainability was initially discussed by technical areas such as Mechanical Engineering, and its first efforts focused on product and life cycle aspects (WEVER et al., 2008). Several tools and strategies in this field aim to reduce environmental impacts. However, the efforts resulting from this initial work are not sufficient if the impacts produced during the use phase remain unconsidered.

How to influence sustainable behaviors from a design perspective, according to Ceschin & Gaziulusoy (2020), was a question that began to be investigated in the second half of the 2000s, considering that the Design for Behavioural Change approach does not necessarily consider sustainable dimensions. Early studies by Rodriguez & Boks (2005), Lilley (2007, 2009), and Wever et al. (2008) characterized the concept of Design for Sustainable Behaviour (DfSB). They enabled the development of approaches, strategic models, and tools applied in several research types (CESCHIN & GAZIULUSOY, 2020). Within this context, DfSB denotes an approach that places the user as the main driver of sustainable change and positions the designer as an agent of cultural transformation.

Being a human-centered study area, DfSB enables interventions in products, services, product-services systems, and social innovation, focusing on the three pillars of sustainability. Bhamra et al. (2008; 2011) argue that user-centered methodology is essential to understanding the complexity of users' interaction with artifacts and the context within which they live.

As the main actors of the systems, users require a closer look at their experiences, motivations, and needs (REDSTRÖM, 2006). By understanding current habits, DfSB allows for establishing new behaviours through applying strategies for sustainable behaviour combined with efficient design (BOKS, 2012; LOCKTON et al., 2013; MEDEIROS et al., 2018).

Recent research in this field has proven that individuals' specific actions and behaviors in their daily lives significantly affect the sustainability of a community or culture (MATSUHASHI et al., 2009; ELIZONDO, 2011; WILHITE, 1999). However, Spencer et al. (2015) point out that research on culture's effect on sustainable resource use is generally limited and disregards its influence on user behavior.

2.2 CULTURAL COOKING HABITS

Cultural context comprises one of the main factors affecting user behavior (SPENCER et al., 2015). Eating habits and food preparation are objects of significant anthropological studies (BYRD & DUNN,

e-Revista LOGO - v. 12, n.1, 2023 - ISSN 2238-2542 http://doi.org/1026771/e-Revista.LOGO/2023.04

2021). The anthropologist Lévi-Strauss (1964) - studying the behavior of different native peoples and their relationship with raw and cooked food - observed that the habit of cooking marks the transition to cultural society. Corroborating this observation, Leach (1970) emphasizes that people cook for symbolic reasons, not just out of necessity.

Cooking culture is a process of constant change that involves the development of new cooking methods, customizing preparation methods, and shaping traditions (CENTEAU et al., 1998). Considering this, Maciel (2004) argues that cooking implies representations and imaginaries, and food preparation involves choices, classifications, and symbols that organize multiple worldviews in time and space. Banerjee-Dube (2016) discusses that food and cooking - in different societies and times - result from a combination of ingredients, ideologies, creativity, and power relations. This mix makes possible the convergence of food and culinary stories that speak of being and belonging, pride, identity, hospitality, sociability, class, power, and nations.

The result of this convergence characterizes the cultural culinary values that, according to Bell & Valentine (1997), have been transmitted throughout history by sharing recipes between generations, reproducing their identities. Repeating cooking practice provides the acquisition of habit, the distinction of taste, the free imagination, and the development of identity. Each cook adds prejudices, limitations, preferences, routines, dreams, and phobias to their repertoire (CENTEAU et al., 1998). The reproduction of their identities, with their characteristic flavors, allows them to segment people into families, communities, peoples, and nations (BELL & VALENTINE, 1997).

Besides reproducing their family traditions, some individuals seek in the practice of cooking an opportunity to express themselves creatively, following elaborate recipes, reflecting their cultural capital, elitism, and personal identities that distinguish them from others. In contrast to this lifestyle, the growth of small-scale producers in many cities suggests cultural trends related to individuals seeking more sustainable diets and healthier foods (GATLEY et al., 2014).

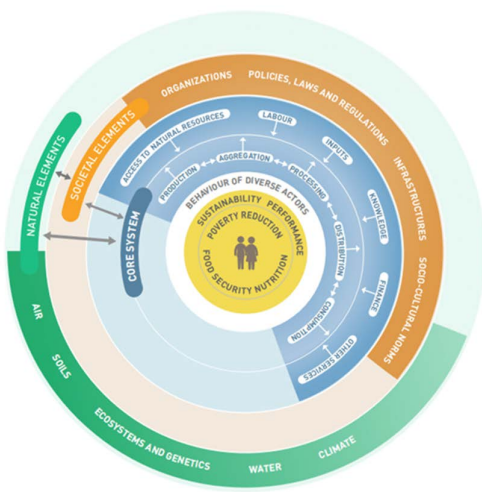
Cultural diversity in cooking reveals the polyphony surrounding the variety of smells, tastes, people, and places. The attempt at global homogenization often impacts the reduction or elimination of this cultural contrast, a fundamental element in characterizing identities and social distinction (Banerjee-Dube, 2016; Pilcher, 1998).

e-Revista LOGO - v. 12, n.1, 2023 - ISSN 2238-2542 http://doi.org/1026771/e-Revista.LOGO/2023.04

2.3 SUSTAINABLE COOKING

The Food and Agriculture Organization of the United Nations (FAO) defines sustainable cooking as one of the final stages of the Sustainable Food System. Figure 1 illustrates the stage of cooking food included in the consumption phase. It involves socioeconomic and cultural aspects, nutrition, cooking methods, energy sources, and appliances that directly affect the dimensions of sustainability: environmental, social, and economic, including public policies (FAO, 2014).

Fig. 1. Sustainable Food System



Source: FAO (2014)

Among the main pillars of sustainable cooking are using technologies that reduce water, gas, and electricity consumption, conscious food consumption, and improving preparation techniques and reuse (BRASIL, 2013).

Sustainable cooking habits are linked to environmental rationality that emerges from the potentialities and possibilities of different material processes, ontological orders, and symbolic formations: ecological potentials, cultural meanings, technological developments, political strategies, and social changes (LEFF, 2006). These processes of building a sustainable society are mobilized by knowledge, in this case, the activity of cooking and the principles of sustainability, constituted by actors responsible for social change and the transition to sustainability (DIAS, 2016).

Considering the impacts on sustainable dimensions, the contribution of home cooking to sustainability is rarely assessed due to the scarcity of

e-Revista LOGO - v. 12, n.1, 2023 - ISSN 2238-2542 http://doi.org/1026771/e-Revista.LOGO/2023.04

data on cooking practices in the home environment (FRANKOWSKA et al., 2020). Food is estimated to account for up to 37% of global greenhouse gas emissions (ROSENZWEIG et al., 2020). The estimates, however, mainly cover the retail/purchasing stages of the food supply chain, excluding food preparation and cooking that can effectively contribute to reducing GHG emissions. According to Frankowska et al. (2020), cooking food at home with more sustainable methods can reduce negative impacts compared to consuming ready meals.

From a food safety and quality perspective, cooking practice is crucial for healthier and more nutritious food. However, household energy use changes considerably according to preparation and mastery of cooking techniques (HAGER & MORAWICKI, 2013). Maréchal & Holzemer (2015) argue that the cook's experience, culture, resources, and goals directly impact energy and water consumption during cooking practice.

Water use information for common kitchen processes, such as cooking, is even scarcer (RICHTER & STAMMINGER, 2012). A EUROSTAT report (2007) states that household water consumption during food preparation accounts for about 10% of residential consumption when taking into account usage applied to cooking and utensil cleaning methods. Hager & Morawicki (2013) corroborate this information by describing a water consumption equivalent to 13% for food preparation.

Another factor that impacts sustainability is the decision made when choosing the ingredients used in the cooking process. This decision is intrinsically related to the economic dimension impacts. Seasonal foods, for example, are a more sustainable choice. They are locally produced, fresher, toxically safer, and cheaper (ANDRÉ, 2013).

Finally, the choice of appliances and the type of fuel for cooking are also responsible for sustainability impacts. The use of LPG stoves adds advantages regarding cleanliness, time efficiency, tree preservation, and ease of use. However, in several countries, the high cost of the equipment and fuel, as well as challenges related to technical assistance, make their use unviable (IRIBAGIZA et al., 2020).

3 METHODS

This research adopted a quantitative approach with an exploratory nature and a critical literature analysis with a descriptive focus. The method employed for data collection was initially a Non-systematic Literature Review (N-SLR), followed by a Systematic Literature Review (SBR). The N-SLR carried out between August and September 2022

e-Revista LOGO - v. 12, n.1, 2023 - ISSN 2238-2542 http://doi.org/1026771/e-Revista.LOGO/2023.04

allowed the structuring of the theoretical foundation presented in the previous section and identified the main themes and possible keywords for the systematic search.

After concluding the N_SLR, the SLR was carried out between September and December 2022, enabling map research conducted in the last decade. This research was driven based on the roadmap proposed by Conforto et al. (2011), including steps spread over 3 phases: input, processing, and output. For the input phase, the problem and objectives were defined, in addition to the primary sources in the Capes, Science Direct, and Scopus databases, due to their relevance and indexing accuracy.

The first group of selected descriptors referred to cooking habits, which were: cooking habits AND design; cooking habits AND culture; sustainable cooking; cooking AND sustainable behavior; cooking AND food consumption; cooking AND sustainable food; cooking impacts AND sustainability; sustainable cooking AND appliances; behavior OR habits AND cooking appliances; sustainability AND cooking appliances.

The second group concerns Design for Sustainable behaviour: design for sustainable behaviour; design strategies AND sustainable behaviour; design AND cooking AND sustainability; design AND cooking behaviour. In the search process, these two groups of descriptors were cross-searched. Furthermore, it was decided to use only words in English that cover a larger scope of global research on the theme, integrating works in Portuguese that include abstracts and keywords in English.

4 Results & Analysis

From the database searches, it was possible to identify a total of 1,169 peer-reviewed articles. The largest number of papers resulted from the descriptors “cooking” AND “food consumption” (760 articles) and “cooking” AND “Sustainable food” (178 articles). After the Pre-filtering, which excluded repeated articles, 962 publications proceeded to Filter 1 (F1), including the reading of titles, abstracts, and keywords, passing 41 publications to Filter 2 (F2).

In filter 2 the introductions and conclusions of these articles were read. Finally, in the last filter (F3), the articles were read in their entirety, resulting in 17 papers. Among the selected articles, 2 works stand out, one has effectively connected cultural habits to the Design for Sustainable Behaviour, even without contemplating the home cooking habit, and the other has investigated the impacts of cooking for sustainability.

e-Revista LOGO - v. 12, n.1, 2023 - ISSN 2238-2542 http://doi.org/1026771/e-Revista.LOGO/2023.04

The study by Spencer et al. (2015) investigates the influence of cultural habits on individual behaviour and how they should be considered by design prior to the selection of Design for Sustainable Behaviour strategies to intervene in the development of products and systems. This article is the closest to the research question of the present study.

The second article, by Frankowska et. al (2020) presents an observational study conducted in Brazil, the UK, and India about the foods selected for the cooking process and the impacts caused by the consumption of energy and water resources, as well as the impacts caused by the emission of greenhouse gases that aggravate the current climate scenario. The authors presented several comparisons between the cooking processes of different food categories. They showed, in the end, the opportunities that more sustainable home cooking can offer to the individual's health and to the reduction of resource use during cooking, causing immediately a reduction of negative impacts for sustainability.

A total of 10 of the 17 articles focus on sustainability through influencing behaviour. The studies discuss models, strategies, and perspectives under the lens of Design for Sustainable Behaviour. From these, only the article by Zong et al. (2019) proposes guidelines for sustainable cooking through household appliances, even disregarding cultural aspects and inducing global standardization.

5 DISCUSSION

The first discussion raised from the results corresponds to the almost inexistence of scientific literature exploring the definitions and concepts of sustainable cooking. Regarding the issues intersecting cooking impacts and sustainability, it was not found studies developed in the last 10 years. Evidencing this gap, Frankowska et al. (2020) point out how difficult it is to measure the impacts of greenhouse gas emissions and their implications for climate issues due to the scarcity of data on cooking practices in the domestic environment.

A point requiring attention in the crossing of descriptors on cooking and food consumption focuses on the small number of research addressing the relevance of environmental impacts generated by cooking practices. Most of the research oriented to sustainable food measure the negative effects caused by food until its commercialization, disregarding the consumption and behaviors involved in food preparation (FRANKOWSKA et al., 2020).

e-Revista LOGO - v. 12, n.1, 2023 - ISSN 2238-2542 http://doi.org/1026771/e-Revista.LOGO/2023.04

Cooking consists of a complex activity involving significant factors that can impact an individual's decision to cook and eat home-cooked meals, as well as represent significant impacts on the pillars of sustainability (MILLS et al., 2017). Frankowska et al. (2020) assess in their observational studies that cooking food at home, aiming for more sustainable methods, can reduce negative impacts on sustainability compared to consuming ready meals.

The second point to be discussed notes that the practice of cooking denotes a prehistoric activity and is widely investigated within gastronomy and nutrition, however, finds little intersection with studies within the field of Design for Sustainable Behaviour. There are growing studies that suggest the use of Design for Sustainable Behaviour strategies interventions in cooking appliances, however, without characterising what defines sustainable cooking and ignoring the cultural aspects that influence the user's decision-making in the cooking activity.

Spencer et al. (2015) reiterate that cultural factors, for instance, can be used by designers to understand how changes in behavior occur and to study the feasibility of implementing a project within a given context that may be appropriate to one region and inappropriate to another. In the same direction, Lilley (2009) corroborates with the importance of considering habits and cultural contexts and also highlights that designers can positively influence product use if decisions are made at a strategic level, before the development of the artifact.

However, when implementing a strategy of Design for Sustainable Behaviour, Lilley (2009) points out that manufacturers must voluntarily accept some responsibility for product impacts beyond the life cycle, but the author emphasizes the importance of government interventions through legislation that characterizes behaviours considered socially unacceptable for companies to accept their responsibility with less resistance.

The need to understand cultural behaviours, particularly in the context of designing new products and systems is evident in previous research (PINK, 2004, 2005; SHOVE, 2003; LAITALA ET AL., 2012; PAKULA & STAMMINGER, 2010). Pink (2005) suggests the reconstitution of new cultural values will change sensory practices, while Shove (2003), questions whether devices are standardising important variations in product interactions by people from different cultures. She argues that culture plays a crucial role in the energy impact of household practices and that it is an area that has been neglected in research. Such an issue is central to a discussion of sustainable household consumption (SHOVE,

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2003).

In the broad context of the literature review conducted in this study, evidence is concentrated on the topic of cooking and food system based on food consumption. However, there are significant gaps in the dimensions of sustainability presenting themselves as opportunities for future analysis in cooking. Another relevant opportunity finds space in the gap present between cultural habits and design strategies for sustainable behavior.

6 FINAL CONSIDERATIONS

By surveying the state of the art through RBA and RBS, the theoretical intersections between Design for Sustainable Behaviour, cultural habits of cooking, and sustainable cooking were demonstrated. It was thus observed that, despite the substantial increase in the number of studies on the themes concerning design, sustainable behaviour and cooking, when these terms are researched together, the results are practically non-existent.

Other main gaps presented in the research refer to: the lack of convergence on the use of terms and names related to sustainable cooking; the incipience of definitions of sustainable cooking; the low investigation of cooking as a promoter of sustainability-relevant impacts; the scarcity of data on household consumption of resources during the activity of cooking and the absence of application of strategies for sustainable behaviour that consider the challenges of cultural habits, diverging regionally and globally.

It is therefore fundamental that companies play an active role in supporting their design department by developing skills and qualifications in the field of Design for Sustainable Behaviour and cultural habits, specific to each type of activity. In particular, it matters that individuals adopt a proactive approach to their own learning, and that governments also create an enabling environment to support these efforts.

It is emphasized in this context the understanding of the authors regarding the need for academic production, and development of strategies and models for the feasibility of the designer's interdisciplinary work. Some authors also highlight that the habit of cooking has complex characteristics due to cultural influences to which it is submitted, but that can be supported by the appropriate use of strategies of Design for Sustainable Behavior oriented to the practice of cooking, considering the cultural aspects. However, the ethical issue and the designer's

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professional responsibility to influence behaviors consists in one more deficiency in the literature, since there is little discussion about it, although the demand for a policy in favor of sustainable changes is necessary and observed by some authors.

Facing such gaps observed, a possible consequence of this study would be the investigation of the application of strategies for sustainable behaviors in cooking appliances, its implications, and repercussions, which may suggest guidelines for the development of products for sustainable domestic cooking. The contribution presented here is limited to its theoretical aspect. Given the facts exposed, it is also recommended future research to provide elucidation in the practical or empirical field of these themes.

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