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Domestic kitchen design as a tool to reduce food waste

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Abstract
This paper describes broader research undertaken for a master's degree in product and space design at IADE, Universidade Europeia, Lisbon, Portugal. It aims to define guidelines for the development of domestic kitchen projects that contribute to reducing food waste. After this research, our goal is to further develop its outcomes through future research and the implementation of the resulting guidelines in a lifesize field experiment. We departed with the hypothesis that space design may influence users' behaviour; therefore, it can be used as an active tool in favour of sustainability. We defined a methodology that informed a review of the literature, case studies and surveys. We analysed comprehensive themes regarding the problem, which enabled a holistic approach to the issue. We conclude this paper by showing the pertinence of our research proposal, a novel way of combining specific strategies from three primary areas of knowledge (design for behavioural change, food waste and interior design) to achieve our goals of reducing food waste in domestic kitchens and contributing in this way to a more sustainable society.

Keywords: Sustainability, Kitchen design, Food waste, Design for behaviour change, Interior design

Introduction
This paper presents the initial stage of a master's research project based on the hypothesis that space design, as an influencer of human behaviour (Sommer, 1969), can act as a tool to contribute to food waste reduction in the context of domestic kitchens. At the same time, we study how space can change behaviour and how it has the potential to reduce waste with these changes. We aim to define guidelines that serve as a source of information for professionals in the sector.

We defined Portugal as the study context, more specifically the area of Lisbon. This choice is supported by both the data—according to which Portugal currently wastes 17% of the food produced for human consumption, which corresponds to 1 million tonnes per year (Baptista, Campos, Pires, & Vaz, 2012)—and by the limitations in scope and time of the study, which is being developed over one year. The research is based on a deductive approach followed by a non-interventionist methodology.

At first, we point out that, as shown by Ponis, Papanikolaou, Katimertzoglou, Ntalla and Xenos (2017), food waste impacts mean land, energy and water waste. In this context, it is essential to differentiate between the concepts of loss and waste. The concept of loss is a natural result of the inefficiencies in the production and industrial system (Baptista et. al., 2012), while waste is "the decrease in the quantity or quality of food resulting from decisions and actions by retailers, food service providers and consumers" (FAO, n.d.), i.e. what could be avoided through better management and behaviour.

Considering the above, we focus on the domestic scale, with families as the main subject. FAO (n.d.) estimates that about one-third of all food produced in the world is wasted. According to the organisation's 2011 report, in 2009, Europe was responsible for 22% of this waste, 52% of which was at the consumption stage of the chain (Figure 1). These numbers show what Baptista and colleagues (2012) mean by saying that it is in families that food waste proves to be higher. Also, it justifies our choice of study, as the transition to sustainability will be a big and articulated process of social, cultural and technological innovation (Manzini & Vezzoli, 2002).

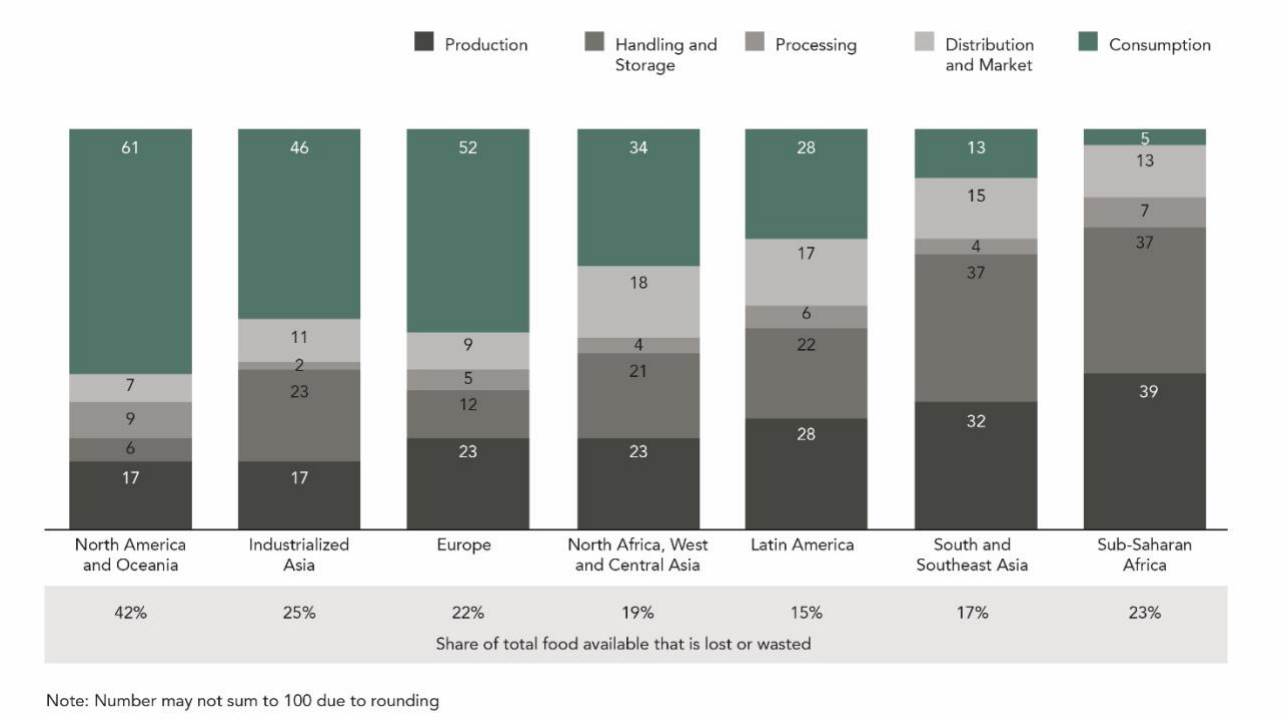

Figure 1: Food lost or wasted by region and stage in the value chain, 2009 (Percent of kcal lost and wasted) (adapted from Lipinski, Hanson, Waite, Searchinger, Lomax, & Kitinoja, 2013).

Furthermore, we pursued a bottom-up strategy: that is, consumer awareness actions have a relevant impact throughout the supply chain. Aschemann-Witzel, De Hooge, Amani, Bech-Larsen and Oostindjer (2015) recognise that there must be a synergy of action in all stages of the chain, but they state that the consumer has a crucial role in this change. They exemplify this impact by showing that "retailers apply aesthetic standards to accept or reject foods based on the assumption that consumers will only buy foods fulfilling these standards" (2015, p. 6458).

In parallel, we identified a disconnection between sustainable behaviour and environmental awareness (Junior, da Silva, Gabriel, & de Oliveira Braga, 2015; Kollmuss & Agyeman, 2002; Kraus & Emontspool, 2017). That is, there is a gulf between the information disseminated through environmental education and society's practices and choices. Considering this, we propose an innovative approach seeking to comprehend the relationship between consumers' space at the domestic scale (the kitchen) and their attitudes related to food waste. This approach is supported by the concept that space design has a significant role in behaviour change (Cummings, 2012; Montazeri, Gonzalez, Yoon & Papalambros, 2012; Scott-Webber, Konyndyk, French, Lembke & Kinney, 2017; Wu, DiGiacomo & Kingstone, 2013).
It is a promising strategy when it comes to the reduction of food waste.

Thus, we understand the kitchen as a system and not just as a set of appliances and storage spaces. Hebrock and Bocks (2017) show that the solutions currently available explore mostly smart fridge functions and packaging, with very low diversity. They conclude that “there is great potential for more innovative thinking that can challenge existing practices more profoundly” (p. 390).

Therefore, the design of a kitchen that aims to be more sustainable must consider not only its production but also how it will be used and how it can change habits. After all, as Cummings (2012) argues, it is necessary to create a favourable environment to promote sustainable behaviour, making these activities as convenient as possible.

Literature review

Design for sustainability and behavioural change

In 1963, environmental concern was marked by the launching of R. Buckminster Fuller’s work, Operating Manual for Spaceship Earth, in which we identified a call for a design revolution to guide the world towards a more sustainable future.

Later, Papanek and Fuller (1972), in Design for the Real World: Human Ecology and Social Change, highlighted the role of a tool for social and environmental change. In 1978, Gui Bonsiepe’s work, Theory and Practice of Industrial Design: Elements for a Critical Manual, established the link between the study of sustainability and industrial practice.

In Monteiro (2019), we noted a novel approach that aims to draw attention to the impact of design and its choices on the world. In Walker (2012), we identified the goal of creating a material culture with more value. Similarly, Manzini and Vezolli (2002) proposed new forms of production compatible with the environment, aimed at a new consumer society. They advocated for the need to change development parameters so that development is not measured in terms of production and consumption but according to the reduction of these.

In the same way, we understand that one must also consider new ways of organising daily life, the sustainable aspect of the product as a cycle and consider how a product influences its users. Besides, the development of design for sustainability aims at promoting a fundamental change in user behaviour (Manzini, 2015), so to determine the strategies for this “there is a need to understand behaviour and its determinants” (Strömberg, Selvefors & Renström, 2015, p. 163).

When addressing the consumer, the works of Junior and collaborators (2015), Kraus and Emontspool (2017) and Kollmuss and Agyeman (2002) investigate the relationship between the possession of knowledge and tools for sustainable behaviour and the behaviour itself. That is, trying to understand how to reduce the gap that exists between them. These authors also point out that it is complex to understand why people choose environmentally responsible attitudes and to identify the barriers to adopting more appropriate behaviours.

In this research, we highlight one of these determinants, which is space, whose impact on its occupant has long been demonstrated by environmental psychology studies (Scott-Webber et al., 2017). The literature review shows examples of these impacts on behaviour in research related to health and well-being spaces (Petermans & Pohlmeyer, 2014; Ulrich, 1991), workspaces (Vischer, 2008) and educational/ library spaces (Campbell & Schlechter, 1979; O'Kelly, Scott-Webber, Garrison, & Meyer, 2017; Scott-Webber et al., 2017).

As far back as 1969, Sommer drew attention to the lack of emphasis given to activities developed in internal spaces and how the configuration of the latter can impact them. For Sommer (1969), "not only must form follow function, but it must assist it in every way" (p. 5). In the same sense, Augustin, Frankel and Coleman (2009) stated that the design of a physical place influences its user and, therefore, it can shape his/her attitudes and behaviour. For the latter authors, well-designed spaces, in general are compatible with the planned activity; communicate important information about their users; are comforting to the psychological needs of their users; are challenging by presenting opportunities for individual development; and are continuous in time, evolving and adapting to new needs.

In the field of sustainable interior design, Stieg (2006) points out the need for a connection between theory and practice, analysing the difficulties of the interior designer to act responsibly. In the same sense, Maté (2006), Bacon (2011), Aktas (2013) and Hayles (2015) discuss the concepts of green interior design, the difficulties related to the specification of sustainable materials and the understanding of the project in all its cycles.

In Portugal, it is relevant to mention the work of Vicente (2012), who studied furniture production processes to create information and support tools for a more sustainable practice. One of his main conclusions is that it is necessary to facilitate the work of the designer with the proposition of tools that are integrated into the product development process. In the same way, this research aims to build knowledge to give support to the professional, which is much aligned with our own goal for the development of the guidelines.

Food waste

When it comes to the food consumption chain, Bagherzadeh, Inamura and Jeong (2014) point out that, worldwide, the household scale is responsible for wasting 38 million tonnes of food per year, or 76 kg per capita per year. In Portugal, a study conducted in 2012 by Baptista and colleagues pointed out that 1 million tonnes of food produced for humans is lost or wasted per year (see Figure 2). Of this amount, it was estimated that about 314,000 tonnes are wasted on a domestic scale, i.e. about 32 kg per capita per year.

Figure 2: Food losses in Portugal by year (adapted from Baptista et al., 2012).

Several studies have sought to understand the causes of food waste in different settings, as well as the search for viable solutions to the problem (Aschemann-Witzel et. al, 2015; Ponis et al., 2017; Visschers, Wickli & Siegrist, 2016). The results reaffirm that behaviours related to food choices and food handling are major influences. Furthermore, they point out that it is essential to increase consumers' awareness of the issue and how individual choices impact the whole. Aschemann-Witzel and colleagues (2015) concluded that there are three main focuses of action for effective change: (i) date labelling; (ii) expectations and

perceptions; (iii) and consumer behaviour in food handling at the household scale. The last point is pointed out by the authors as central, being the focus of action in this investigation.

Hebrok and Boks (2017) divide the existing solutions in the field of design according to how they act, namely: information and knowledge, packaging, food risk and regulations. The authors conducted an extensive review, cataloguing and categorising studies to find potential intervention points. They show that several factors lead to waste, related both to behaviour (preferences, ideals, culture and convenience, for example) and to the physical structure of kitchens (ways of home food storing and packaging, for example). Here we propose a more comprehensive analysis of the issue by trying to understand how these various solutions interact with each other. We will update and discuss these results.

Kitchen-focused interior design

In this research, we address the kitchen as a dynamic and central space in the daily life of the Western family. Despite historical differences between contexts, it is possible to say that, today, this environment is the stage for technological revolutions and new activities that reconfigure domestic dynamics. Considering this, Bell and Kaye (2002, p. 46) call attention to the need to think of it "not just as a collection of wires, appliances, and Internet points, but as a space in which people live."

Freeman (2004) points out that kitchen space is a very rich field of exploration between the past and the future of our society, illustrating the potential of design in understanding man as a social creature. Bell and Kaye (2002) agree with this point of view and add that the kitchen space, the act of cooking and food itself constitutes a set of cultural icons, being employed as metaphors for more complex meanings and actors throughout history.

The understanding of the kitchen space as home, as centre and the result of social relations, is a subject treated by Bell and Kaye (2002), Freeman (2004), Bech-Danielsen (2012) and Shove (2007). In Freeman (2004), we realise how the kitchen space has become determinant to the development of modern society; in Bech-Danielsen (2012), we see how everyday life has changed the way people see residential architecture, with a focus on the kitchen. For that reason, in this research, we seek to understand the dynamics of the kitchen in our context to add a new layer to the functionalities of this space, to combine rationalism with the fight against food waste.

Methodology

As mentioned, this research aims to develop guidelines that support kitchen design towards more sustainable behaviour, focusing on food waste reduction. This study consists of a mixed methodology with two phases: deductive and analytical. First, in the deductive phase, we will consolidate knowledge about the subject, which will then serve as the basis for the second phase, which will result in the formulation of interior design guidelines. To this end, we seek to answer the following research questions:

a. How can interior design contribute to more sustainable behaviour when preventing food waste?
b. What are the factors that influence users' behaviour regarding food waste in a domestic kitchen?
c. How are users' food consumption and handling habits related to the design of the kitchen?

To answer question a, we carried out an extensive literature review, which sought themes related to "design for sustainability", "design to combat food waste" and "design for behaviour change". We intended to expand and consolidate the state of the art on the subject. Also, we sought to understand what solutions exist in the field of design, identifying opportunities for action.

On the relationship between behaviour and the environment, Wu and colleagues (2013), Cummings (2012) and Montazeri and collaborators (2012) investigated the impact and influence of space on sustainable decisions to identify how design can act to promote sustainable behaviour. In this sense, Lilley and collaborators (2006) identified three possible approaches to design for behaviour change: eco-feedback (information provision), behaviour direction (user incentive) and intelligence (imposition of limitations and directing actions). In this research, we will focus on the latter two to structure our proposed guidelines. We will work in constraining or affording actions through the space design and non-perceived solutions that guide the users.

In addition, we aim to understand how interior design can change behaviour. We selected case studies that intend to understand how space, even in other contexts, influences behaviour. From studies related to workspaces, we identified aspects that interfere with task performance, approaching our problem as a domestic task. In educational environments and libraries, we identified attributes that corroborate engagement with space and with the problem. Here are the most relevant to our investigation:

- Spatial organisation;
- Design details;
- Ambient conditions and resources;
- View and visual access of the workspace;
- Flexibility of the space divisions and furniture (to empower the user and support different needs);
- Environmental messages (to be symbolic and inspiring);
- Core connectedness (to give a sense of belonging); and
- Adaptability (to be able to change over time).

In question b, we focused on food waste at the household scale to understand the causes and potentials for action. We researched and analysed previous studies that addressed the theme in several countries, including Portugal, to identify strategic paths to solve our problem.

Question c relates to Portuguese cuisine and habits and will be answered by reviewing studies that have carried out extensive research with the population. Whitehead (2005) points out that to understand what goes on in each space, it is necessary to perceive some categories of human interaction phenomena. Amongst these, we selected the essential ones for this research:

- Space: the nature of the environment where the interaction takes place;
- Objects: what they are and how they are organised;
- Actors: who they are;
- Behaviours: acts, activities and events;
- Patterns of interaction between the actors;
- Ideational elements: beliefs, attitudes, values and significant symbolisms;
- Broader social systems: behaviours and ideations found in the specific social system; and
- Goals, motivations and agenda of the individual and the group of the actors in the social setting.

Looking for information related to actors (demographic data) and the broader social systems, we will use statistical data collected by national demographic institutes, such as PORDATA (Base de Dados Portugal Contemporâneo [Contemporary Portugal Data Basis]) and INE (Instituto Nacional de Estatística [National Institute of Statistics]).

Looking for information related to behaviours, ideational elements, goals, motivations and agenda, we will look at the results of the report Do Campo ao Garfo, Desperdício Alimentar em Portugal (From the Fields to

the Tables, Food Waste in Portugal), made by Baptista and colleagues, in 2012. Also, we will carry out surveys to obtain more specific information related to kitchens, daily habits and the relationships between users and space. In this way, it will be possible to complement the available data.

Conclusions

The research efforts have focused on the deductive phase, with an extensive literature review that sought to establish an overview of the issue. It was possible to strengthen the initial hypothesis that interior design can act as a tool for changing behaviour towards more sustainable practices. Furthermore, we were able to define strategies and justify the relevance of the research both in terms of the study setting (Portugal) and the scale of the intervention (domestic).

There is currently much media coverage on the issue of food waste, with increased concern and a sense of guilt regarding both environmental impacts and social inequalities (Baptista et. al, 2012). However, the disconnection between behavioural intentions and the attitudes themselves means that the problem needs to be approached holistically. It is of utmost importance to better understand social, demographic and cultural factors if we are to propose solutions to make this link.

In the literature review, we found several solutions in the field of product design, e.g. smart fridge, grocery list, fridge cam, smartphone connection, colour coding, apps, online advice, awareness campaigns, storage guidance, smart data labelling and edible coatings. These seek to combat the problem based on new forms of planning, stocking, packaging and informing. We sought to approach the issue from the perspective of interior design, understanding the kitchen space as a holistic system in which we can integrate innovative solutions with existing ones.

We can state that the relevant numbers regarding food waste in Portugal, presented by Baptista and collaborators (2012), firmly justify the relevance of the research. Also, the same authors state that in industrialised countries, food waste is concentrated at the distribution and final consumption levels, which reaffirms the importance of action at the household scale. Moreover, we believe that the obtained results can be considered, with appropriate adaptations, for other Western countries, with similar cultures and habits.

It is also important to add that the COVID-19 pandemic crisis has created new challenges to the academy, and introducing new tools to reduce losses and waste of food is one of them (Galanakis, 2020). According to Kantar (2020b), two trends are observed: (i) the growth of food delivery and takeaway; (ii) and the increase in the number of meals made at home, probably because of the growth of teleworking. Eurofound (2020) states that in the European Union, it is estimated that 39.6% of paid work by dependent employees was carried out at home during the pandemic. The study conducted by Kantar (2020a), comparing the months of January to August 2020 with those of 2019, showed that in Portugal, there was a 23% drop in out-of-home consumption and a 3% growth in in-home consumption (delivery and takeaway). It also showed that in France, the number of family meals per week rose from 18 to 24 during the lockdown period of 2020.

In brief, we have identified the working strategies that will guide us to our proposed outcome. Using behavioural direction and intelligence as our main approaches, we will define our guidelines. Considering who our actors are, how their actual kitchen space is, how they behave and interact, and to which social system they belong, we can propose a new type of scenario. To complete this proposition, we will need to define how to organise the space, what the main design details are, what the necessary ambient conditions

and resources are, what the visual strategies are, how to be flexible, what the main environmental messages are, how to create a core connectedness and how to be democratic and adaptable.

Finally, it is possible to conclude not only that there are solid grounds to justify the pursuit of this research but also that our main objective can be achieved, contributing to solving the problem of food waste through innovative solutions. Furthermore, it is our goal to test the proposed guidelines on a full-scale field experiment in future research.

References

Aktas, G. G. (2013). Design parameters and initiatives for ecological and green design in interior architecture. WSEAS Transactions on Environment and Development, 9(2), 57–67. Retrieved from http://www.wseas.us/journal/pdf/environment/2013/56-366.pdf

Aschemann-Witzel, J., De Hooge, I., Amani, P., Bech-Larsen, T., & Oostindjer, M. (2015). Consumer-related food waste: Causes and potential for action. Sustainability, 7(6), 6457–6477. https://doi.org/10.3390/su7066457

Augustin, S., Frankel, N., & Coleman, C. (2009). Place advantage: Applied psychology for interior architecture. John Wiley & Sons.

Bacon, L. (2011). Interior designer's attitudes toward sustainable interior design practices and barriers encountered when using sustainable interior design practices. Retrieved from https://digitalcommons.unl.edu/archthesis/104/

Bagherzadeh, M., Inamura, M., & Jeong, H. (2014). Food waste along the food chain. OECD Food, Agriculture and Fisheries Papers, No. 71. OECD Publishing. Retrieved from https://doi.org/10.1787/5jxrcmftzj36-en

Baptista, P., Campos, I., Pires, I., & Vaz, S. (2012). Do Campo ao Garfo, Desperdício Alimentar em Portugal. Cestras.

Bech-Danielsen, C. (2012). The kitchen: An architectural mirror of everyday life and societal development. Journal of Civil Engineering and Architecture, 6(4), 457–469.

Bell, G., & Kaye, J. (2002). Designing technology for domestic spaces: A kitchen manifesto. Gastronomica: The Journal of Critical Food Studies, 2(2), 46–62. https://doi.org/10.1525/gfc.2002.2.2.46

Bonsiepe, G. (1978). Teoria y practica del diseno industrial: elementos para una manualistica critica [Theory and practice of industrial design: elements for a critical manualistic - in Spanish]. Gustavo Gili.

Campbell, D. E., & Shlechter, T. M. (1979). Library design influences on user behaviour and satisfaction. Library Quarterly, 49(1), 26–41. https://doi.org/10.1086/600899

Cummings, N. (2012). Fostering sustainable behaviour through design: A study of the social, psychological, and physical influences of the built environment. (Master's dissertation, University of Massachusetts Amherst). Retrieved from https://bit.ly/3tBY5DS

Eurofound (2020). Living, working and COVID-19. COVID-19 series, Publications Office of the European Union, Luxembourg. Retrieved from https://bit.ly/316Ftjc

FAO. (n.d.). Food lost and waste database. Retrieved from http://www.fao.org/food-loss-and-food-waste/flw-data

Freeman, J. (2004). The making of the modern kitchen: A cultural history. Berg Publishers.

Fuller, R. B. (1963). Operating manual for spaceship earth. E. P. Dutton.

Galanakis, C.M. (2020). The food systems in the era of the coronavirus (COVID-19) pandemic crisis. Foods 9(4), 523. https://doi.org/10.3390/foods9040523

Hayles, C. S. (2015). Environmentally sustainable interior design: A snapshot of current supply of and demand for green, sustainable or fair-trade products for interior design practice. International Journal of Sustainable Built Environment, 4(1), 100–108. https://doi.org/10.1016/j.ijsbe.2015.03.006

Hebrok, M., & Boks, C. (2017). Household food waste: Drivers and potential intervention points for design–An extensive review. Journal of Cleaner Production, 151, 380–392. https://doi.org/10.1016/j.jclepro.2017.03.069

Junior, S. B., da Silva, D., Gabriel, M. L. D., & de Oliveira Braga, W. R. (2015). The effects of environmental concern on purchase of green products in retail. Procedia-Social and Behavioral Sciences, 170, 99–108. https://doi.org/10.1016/j.sbspro.2015.01.019

Kantar (2020a).Out-of-home food and drinks landscape. COVID-19 impact and the road to recovery. Retrieved from https://kantar.turtl.co/story/covid-19-impact-in-out-of-home-food-and-drinks-p/page/3/1

Kantar (2020b). How COVID-19 is impacting our eating and drinking habits. Retrieved from https://www.kantar.com/inspiration/coronavirus/how-covid-19-is-impacting-our-eating-and-drinking-habits

Kollmuss, A., & Agyeman, J. (2002). Mind the gap: Why do people act environmentally and what are the barriers to pro-environmental behavior? Environmental Education Research, 8(3), 239–260. https://doi.org/10.1080/13504620220145401

Kraus, K., & Emontspool, J. (2017). Guilt and loathing in the kitchen: Why sustainable consumers waste food. ACR North American Advances. Retrieved from http://www.acrwebsite.org/volumes/1024618/volumes/v45/NA-45

Lilley, D., Bhamra, T., & Lofthouse, V. A. (2006). Towards sustainable use: An exploration of designing for behavioral change. DeSForM, 84–97. Retreived from https://bit.ly/3cbOPRn

Lipinski, B., Hanson, C., Waite, R., Searchinger, T., Lomax, J., & Kitinoja, L. (2013). Reducing food loss and waste. Retrieved from https://www.wri.org/publication/reducing-food-loss-and-waste

Manzini, E., & Vezzoli, C. A. (2002). O desenvolvimento de produtos sustentáveis. Os requisitos ambientais dos produtos industriais (pp. 89–345). Edusp.

Manzini, E. (2008). Design para a inovação social e sustentabilidade: Comunidades criativas, organizações colaborativas e novas redes projetuais. Editora E-papers.

Manzini, E. (2015). Design, when everybody designs: An introduction to design for social innovation. MIT Press.

Maté, K. J. (2006). Champions, conformists and challengers: Attitudes of interior designers as expressions of sustainability through material selection. In Design Research Society International Conference, Wonderground (pp. 1–4). Retrieved from https://bit.ly/3vNdVNZ

Montazeri, S., Gonzalez, R., Yoon, C., & Papalambros, P. Y. (2012). Color, cognition, and recycling: How the design of everyday objects prompt behavior change. In DS 70: Proceedings of DESIGN 2012, the 12th International Design Conference, Dubrovnik, Croatia (pp. 1363–1368). Retrieved from https://bit.ly/3cUhTf9

Monteiro, M. (2019). Ruined by design: How designers destroyed the world, and what we can do to fix it. Mule Design.

O'Kelly, M., Scott-Webber, L., Garrison, J., & Meyer, K. (2017). Can a library building's design cue new behaviors? A case study. Portal: Libraries and the Academy, 17(4), 843–862. https://doi.org/10.1353/pla.2017.0049

Papanek, V., & Fuller, R. B. (1972). Design for the real world. Thames and Hudson.

Petermans, A., & Pohlmeyer, A. E. (2014, October). Design for subjective well-being in interior architecture. In Proceedings of the Annual Architectural Research Symposium in Finland (pp. 206–218). Retrieved from https://journal.fi/atut/article/view/45378

Ponis, S. T., Papanikolaou, P. A., Katimertzoglou, P., Ntalla, A. C., & Xenos, K. I. (2017). Household food waste in Greece: A questionnaire survey. Journal of Cleaner Production, 149, 1268–1277. https://doi.org/10.1016/j.jclepro.2017.02.165

Scott-Webber, L., Konyndyk, R., French, R., Lembke, J., & Kinney, T. (2017). Spatial design makes a difference in student academic engagement levels: A pilot study for grades 9-12. European Scientific Journal, 13(16), 5. http://dx.doi.org/10.19044/esj.2017.v13n16p5

Shove, E. (2007). The design of everyday life. Berg.

Sommer, R. (1969). Personal space. The behavioral basis of design. Prentice-Hall.

Stieg, C. (2006). The sustainability gap. Journal of Interior Design, 32(1), vii–xxi.

Strömberg, H., Selvefors, A., & Renström, S. (2015). Mapping out the design opportunities: Pathways of sustainable behaviour. International Journal of Sustainable Engineering, 8(3), 163–172. https://doi.org/10.1080/19397038.2014.1001469

Ulrich, R. S. (1991). Effects of interior design on wellness: Theory and recent scientific research. Journal of Health Care Interior Design, 3(1), 97–109. Retrieved from https://bit.ly/3c7vgcB

Vicente, J. M. A. N. (2012). Contributos para uma metodologia de design sustentável aplicada à indústria do mobiliário. O caso português. Retrieved from https://bit.ly/38ZOn6I

Vischer, J. C. (2008). Towards an environmental psychology of workspace: How people are affected by environments for work. Architectural Science Review, 51(2), 97–108. https://doi.org/10.3763/asre.2008.5114

Visschers, V. H., Wickli, N., & Siegrist, M. (2016). Sorting out food waste behaviour: A survey on the motivators and barriers of self-reported amounts of food waste in households. Journal of Environmental Psychology, 45, 66–78. https://doi.org/10.1016/j.jenvp.2015.11.007.

Walker, S. (2012). Sustainable by design: Explorations in theory and practice. Routledge.

Whitehead, T. L. (2005). Basic classical ethnographic research methods. Cultural Ecology of Health and Change, 1, 1–29. Retrieved from https://www.academia.edu/download/52882268/classicalethnomethods.pdf

Wu, D. W. L., DiGiacomo, A., & Kingstone, A. (2013). A sustainable building promotes pro-environmental behavior: an observational study on food disposal. PloS One, 8(1). https://doi.org/10.1371/journal.pone.0053856.