

Editorial

Product Design and Consumer Behaviour in a Circular Economy

Ruth Mugge *

Department of Product Innovation Management, Faculty of Industrial Design Engineering, Landbergstraat 15, 2628 CE Delft, The Netherlands

Received: 7 October 2018; Accepted: 8 October 2018; Published: 16 October 2018



In a circular economy, material flows are restored through closed-loop processes, due to which valuable resources are not lost, but reused, resulting in less waste. Even though circular economy is often tackled from a recycling perspective, the Ellen MacArthur Foundation (2013) proposes that stimulating closed-loop processes goes far beyond mere recycling, and that more attention should be paid to the so-called inner loops of the circular economy [1]. These inner loops suggest that products keep their initial value for a longer period of time, before eventually being recycled. For example, it is worthwhile to extend the product's first lifetime by stimulating repair and maintenance by the first user, to encourage products to have a useful second life via refurbishment/remanufacturing, and to move to alternative ownership models such as sharing or access-based consumption.

To realize the full potential of these inner loops of the circular economy, consumers should change their perceptions of and behaviours towards the circular products and services involved. Only if consumers are able and motivated to repair and maintain their products, and if their perceptions towards their own products remain positive, will they be encouraged to keep these. Correspondingly, consumers need to perceive ample benefits and limited risks in refurbished/remanufactured products, and in alternative ownership models, to see these as viable alternatives to the traditional purchase of new products. However, consumers do not currently appear to take responsibility for prolonging products' lifetimes themselves and are sometimes even unaware of the environmental problems caused by their consumption behaviour [2].

Product design may play a critical role in influencing consumers' perceptions towards circular products and services, and in influencing consumers' behaviour. By designing circular products and services in different ways, companies can either stimulate unique benefits or take away specific barriers and concerns [3]. However, more knowledge is needed to help companies and designers to tackle this important challenge.

This special issue aims to explore product design and consumer behaviour in a circular economy, in order to progress scientific knowledge on how to design for the inner loops of the circular economy. By bringing together nine articles on this important topic, this special issue contributes to the state-of-the-art knowledge and provides inspiration for future research opportunities.

The articles can be categorized into different themes. First of all, three articles present new tools that companies and designers can use when designing new circular products and services that trigger the desired behaviours from consumers. The next four articles focus on the barriers and enablers for consumers to conduct circular behaviour, purchase circular products or turn to alternative ownership models, such as access-based consumption. Uncovering and addressing these specific concerns can provide guidelines, for companies and designers, to successfully tackle these concerns in future design and marketing strategies. The subsequent article focuses on the new competencies that designers need when designing for products in a circular economy. The special issue ends with an article that provides an overview of the literature on consumer behaviour in a circular economy that offers insights into

the gaps in the literature and suggestions for the future. A more detailed description of the included articles is given in the remainder of this editorial.

The first article in this special issue presents a tool that was created by Wastling and colleagues [4]. This tool starts from an overview of key user behaviours that are required to initiate circular behaviours. Examples of these behaviours are taking care of products, repairing them when needed and the development of an emotional attachment to products. By conducting a literature review, case study analysis, and expert interviews, a theoretical framework was developed that designers could use as a guide for creating products, services, and systems that are more likely to trigger the desired circular behaviours. Specifically, the model of circular behaviour offers an overview of the desired circular behaviours and categorises them on the basis ownership (either with the user or the service provider). Furthermore, the design for circular behaviour process aids to encourage these desired behaviours through a company's products and business model.

In "Consumer Intervention Mapping—A Tool for Designing Future Product Strategies within Circular Product Service Systems", Sinclair and colleagues presented a second tool that could help designers when designing for a circular economy and validated this tool in three workshops [5]. This tool was built on the concept of Consumer Intervention Mapping to imagine and develop visions of a future, sustainable product-service systems. By visualizing the points within a product's lifecycle, such as pre-purchase, purchase, and post-purchase, where stakeholders were able to intervene in the product's journey, scenarios of future circular solutions could be rapidly constructed. Specifically, the tool presented different levels of detail to describe the stages in the lifecycle and indicated the degree of control that organisations have on influencing consumers and their behaviours.

The two tools mentioned above take a general approach to consumer behaviour in a circular economy, however, the third tool that was presented in this special issue focussed exclusively on extending the psychological lifetime of products. Haines Gadd and colleagues presented the "Emotional Durability Design Nine" as a tool to develop stronger relationships between users and products [6]. Through a series of workshops, design factors were identified that influence a person's tendency to retain their products for longer. The Emotional Durability Design Nine presented thirty-eight strategies that relate to one of the nine overarching themes of relationships, narratives, identity, imagination, conversations, consciousness, integrity, materiality, and evolvability. Companies could use this framework in the new product development process to develop new circular propositions that provide emotional value to their users.

In "Marketing Approaches for a Circular Economy: Using Design Frameworks to Interpret Online Communications", Chamberlin and Boks presented an exploratory study to uncover the general concerns that consumers have when encountering circular products and services, and how these have been addressed via companies' marketing and communication efforts [7]. Ten groups of concerns, such as contamination, convenience, and warranty were identified. Next, examples of web communications from four retailers of circular products and services were analysed using rhetorical analysis to understand how these communications addressed the concerns raised. The findings showed that extrinsic factors (e.g., warranty), could be addressed by hedonic dimensions, such as rewards and encouragement, whereas more intrinsic factors (e.g., contamination) were served by eudaimonic dimensions, such as meaning and empathy.

The second article that investigated consumers' concerns when encountering circular products and services, focussed on access-based consumption as a means to change consumer behaviour in a circular economy. Particularly, Poppelaars and colleagues aimed to uncover the barriers that consumers perceive with respect to the adoption of access-based consumption [8]. The access-based offering of a smartphone service was investigated as a case and compared to the more accepted car access services. In-depth interviews were conducted among consumers who either adopted or rejected these access-based offerings. The main reasons for rejecting smartphone access services were lack of awareness, misunderstanding of terms and conditions, and unsatisfactory compensation for their

sacrifice of not owning the smartphone. Companies could use these insights to successfully create new access-based offerings, and thereby stimulate the desirable shift from ownership to access.

The article “Why is Ownership an Issue? Exploring Factors that Determine Public Acceptance of Product-Service Systems” by Cherry and Pidgeon explored pay-per-use product-service systems (PSS) as a special case of access-based consumption [9]. Pay-per-use PSS suggest that consumers pay for each time they make use of a product (e.g., for each wash of a washing machine). A series of workshops demonstrated that consumers have concerns related to the ownership and responsibility of these circular offerings. Specifically, they encounter fears concerning the risks and responsibilities of such contract-based service agreements. The authors argued that the transition towards pay-per use PSS will only be successful if companies have a cultural understanding of ownership and if careful consideration is given to, not only price and convenience, but also to deeply-held values of consumers related to trust and responsibility, while designing the new offerings.

Laitala and Grimstad Klepp investigated the mending and making practices of clothing as a specific circular behaviour [10]. A longitudinal quantitative survey was conducted to explore how common different mending and making activities were, whether this had changed over time, and which consumers were more likely to do these activities. The results showed that many consumers occasionally perform simple mending tasks and that women and elderly were more inclined to mend clothing, whereas younger consumers were more likely to re-make their old clothing into something new. These insights could be beneficial in clothing design, home economics, and crafts education in order to lower the environmental impact of clothing consumption.

In their article, Sumter and colleagues contributed to the literature by proposing that circular products and services do not only imply different designs and business models, but also require different competencies from the designers [11]. A longitudinal in-depth case study on a lease and refurbishment pilot of a baby stroller manufacturer was conducted to explore the specific competencies that are required, of designers, when addressing the inner loops of the circular economy. A framework was developed that related the functional, coordinating, and strategic roles that designers need to play. Competencies that were considered more important were, (1) the ability to concurrently develop the design and the business model of the circular product/service, and (2) the ability to foresee how the circular offering would evolve over multiple lifecycles. Understanding these new competencies of designers could provide tips for future design education.

The Special Issue “Product Design and Consumer Behaviour in A Circular Economy” ended with the article ‘Consumption in the circular economy—A literature review by Camacho-Otero, Boks, and Nilstad Pettersen [12]. The authors presented a literature review of the consumption considerations that arise when moving towards a circular economy. Particularly, insights from one hundred and eleven articles demonstrate that most research attention have been focused on identifying factors that drive or hinder consumers to accept circular offerings as viable alternatives. However, in order to truly realise a circular economy, it is interesting to move beyond mere acceptance and explore diffusion of circular solutions. Furthermore, opportunities initiated by digitalisation might provide new possible research directions. The article could serve as an inspiration for a future research agenda.

In summary, one of the major challenges for today’s society is to keep the present welfare level attainable for future generations, which implies that the harmful effects of acquiring this welfare level on the environment, need to be minimized. By encouraging closed-loop processes, in which products keep their values longer, the harmful effects of consumption on the environment can be diminished. However, the success of such a circular economy depends on consumers’ behaviour and perceptions. This special issue presents several perspectives on the critical role of consumer behaviour and product design for tackling the inner loops of a circular economy. I hope that this special issue will inspire and motivate companies and researchers to further explore this important research field and create new circular products and services.

Conflicts of Interest: The author declares no conflict of interest.

References

1. MacArthur, E. *Towards a Circular Economy—Economic and Business Rationale for an Accelerated Transition*; Ellen MacArthur Foundation: Cowes, UK, 2013.
2. Cox, J.; Griffith, S.; Giorgi, S.; King, G. Consumer understanding of product lifetimes. *Resour. Conserv. Recycl.* **2013**, *79*, 21–29. [[CrossRef](#)]
3. Mugge, R. A consumer's perspective on the circular economy. In *Routledge Handbook of Sustainable Product Design*; Routledge: Abingdon, UK, 2017; pp. 396–412.
4. Wastling, T.; Charnley, F.; Moreno, M. Design for Circular Behaviour: Considering Users in a Circular Economy. *Sustainability* **2018**, *10*, 1743. [[CrossRef](#)]
5. Sinclair, M.; Sheldrick, L.; Moreno, M.; Dewberry, E. Consumer Intervention Mapping—A Tool for Designing Future Product Strategies within Circular Product Service Systems. *Sustainability* **2018**, *10*, 2088. [[CrossRef](#)]
6. Haines-Gadd, M.; Chapman, J.; Lloyd, P.; Mason, J.; Aliakseyeu, D. Emotional Durability Design Nine—A Tool for Product Longevity. *Sustainability* **2018**, *10*, 1948. [[CrossRef](#)]
7. Chamberlin, L.; Boks, C. Marketing Approaches for a Circular Economy: Using Design Frameworks to Interpret Online Communications. *Sustainability* **2018**, *10*, 2070. [[CrossRef](#)]
8. Poppelaars, F.; Bakker, C.; van Engelen, J. Does Access Trump Ownership? Exploring Consumer Acceptance of Access-Based Consumption in the Case of Smartphones. *Sustainability* **2018**, *10*, 2133. [[CrossRef](#)]
9. Cherry, C.E.; Pidgeon, N.F. Why Is Ownership an Issue? Exploring Factors That Determine Public Acceptance of Product-Service Systems. *Sustainability* **2018**, *10*, 2289. [[CrossRef](#)]
10. Laitala, K.; Klepp, I.G. Care and Production of Clothing in Norwegian Homes: Environmental Implications of Mending and Making Practices. *Sustainability* **2018**, *10*, 2899. [[CrossRef](#)]
11. Sumter, D.; Bakker, C.; Balkenende, R. The Role of Product Design in Creating Circular Business Models: A Case Study on the Lease and Refurbishment of Baby Strollers. *Sustainability* **2018**, *10*, 2415. [[CrossRef](#)]
12. Camacho-Otero, J.; Boks, C.; Pettersen, I.N. Consumption in the Circular Economy: A Literature Review. *Sustainability* **2018**, *10*, 2758. [[CrossRef](#)]



© 2018 by the author. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<http://creativecommons.org/licenses/by/4.0/>).