

Is there a market for refurbished toothbrushes?

An exploratory study on consumers' acceptance of refurbishment for different product categories

Mugge, Ruth; Safari, I.; Balkenende, Ruud

DOI

[10.3233/978-1-61499-820-4-293](https://doi.org/10.3233/978-1-61499-820-4-293)

Publication date

2017

Document Version

Final published version

Published in

Plate Product Lifetimes And The Environment 2017

Citation (APA)

Mugge, R., Safari, I., & Balkenende, R. (2017). Is there a market for refurbished toothbrushes? An exploratory study on consumers' acceptance of refurbishment for different product categories. In C. Bakker, & R. Mugge (Eds.), *Plate Product Lifetimes And The Environment 2017: Conference Proceedings* (pp. 293-297). (Research in Design Series; Vol. 9). IOS Press. <https://doi.org/10.3233/978-1-61499-820-4-293>

Important note

To cite this publication, please use the final published version (if applicable). Please check the document version above.

Copyright

Other than for strictly personal use, it is not permitted to download, forward or distribute the text or part of it, without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license such as Creative Commons.

Takedown policy

Please contact us and provide details if you believe this document breaches copyrights. We will remove access to the work immediately and investigate your claim.

Is there a market for refurbished toothbrushes? An exploratory study on consumers' acceptance of refurbishment for different product categories

Mugge R.^(a), Safari I. and Balkenende R.^(a)

a) Delft University of Technology, Delft, the Netherlands

Keywords

Refurbishment
Consumer behaviour
Circular economy
Evaluations
Product category.

Abstract

Refurbishment is the process of collecting used products, assessing their condition, and replacing and/or upgrading parts in order to resell them to other consumers. Although refurbishment is increasingly seen as both economically and environmentally advantageous, it remains questionable whether consumers will accept refurbishment as a viable alternative for all sorts of product categories. In-depth interviews among 18 participants were conducted in which participants were asked to sort 30 product categories on their likelihood to accept or reject a refurbished product from this category and to elaborate on their underlying motives for this. The results revealed the following reasons for either accepting or rejecting a refurbished product for a certain category: financial, functional quality, aesthetic quality, warranty, contamination, and personalisation. Based on the type of product category (e.g., hedonic vs. functional, high vs. low involvement), these reasons are either more or less important to consumers. When designing for refurbishment, designers need to tackle the relevant reasons for the specific category in their design process to stimulate consumers to accept refurbished products.

Introduction

Many companies and scholars believe that refurbishment is a promising approach to retrieve more value from discarded products. Refurbishment is the process of collecting a used product, assessing its condition, replacing and/or upgrading parts in order to establish a satisfactory working condition and resell the product to other consumers (Pigosso et al. 2010). Contrary to recycling, the original product's functionality is preserved and products are offered a second life with only limited new resources needed.

Presently, refurbishment is implemented mainly in computers and smartphones. Considering changing market and environmental conditions (e.g., raw material prices, environmental awareness), refurbishment is gaining interest among original equipment manufacturers (OEMs) producing various consumer products. In theory, refurbishment can be implemented in many other product categories, such as furniture, home appliances (e.g., washing machines, coffee makers), baby equipment (e.g., strollers, breast pumps), and tools (e.g., drills). However, for refurbishment to work consumers need to accept refurbished products as substitutes for new ones. This raises the question how consumers respond to refurbished products for different product categories. Although prior studies have investigated a few different product categories (e.g., smartphones, printers, car tires, cameras) (Hamzaoui Essoussi and Linton 2010; Hazen et

al., 2012; Jiménez-Parra et al., 2014; Michaud and Llerena; Van Weelden et al., 2016), a comprehensive understanding is missing of consumers' motives for accepting or rejecting refurbished products for various product categories. This research aims to fill this gap.

The few consumer studies that investigated refurbishment provided participants with descriptions of what refurbishment entails, and determined their willingness to pay (WTP) and quality perceptions (Harms & Linton, 2015; (Hamzaoui Essoussi and Linton 2010, 2014; Michaud & Llerena, 2011). Their findings suggested that consumers' WTP and quality perceptions are lower for refurbished products than for new products.

Furthermore, Van Weelden et al. (2016) uncovered how consumers decide to choose for a refurbished smartphone. Their findings demonstrated that consumers weigh the benefits (e.g., financial, environmental) and the risks (e.g., obsolescence, performance) of a refurbished smartphone and only include a refurbished smartphone as a potential option in their consideration set if the benefits outweigh the risks. Another study on refurbished smartphones demonstrated that consumers differ in their perceptions of these benefits and risks (Mugge et al., 2017). Accordingly, different consumer groups were distinguished that are more or less likely to accept a refurbished smartphone and that have different needs with respect to the refurbishment process.

An important limitation of these two studies is that they focus only on the product category of smartphones. Even though consumers may be unwilling to purchase a refurbished smartphone, this does not imply that they would also reject refurbished products from other categories. In addition to individual differences between consumers, different product categories may thus also increase or decrease the importance of specific benefits or risks. The present research contributes to the literature by providing a comprehensive overview of the different reasons why consumers either accept or reject refurbishment for a specific product category, focusing on tangible products. Companies interested in refurbishment can use these insights when tailoring their refurbishment processes to a specific product category.

Method

In-depth interviews were conducted with 18 participants (9 males; ages ranging from 21 to 60 years) who were selected from a consumer panel to ascertain a large variety in age, income, background etc. In the interviews, participants were first explained the refurbishment concept. Subsequently, participants were presented with 30 product categories. We selected product categories that differed greatly in terms of use frequency, involvement, price, and use situation in order to obtain a comprehensive overview of the various product categories for which refurbishment would be feasible. Examples of included categories are: laptop, coffee maker, electric toothbrush, drill, office chair, microwave, washing machine, hanger, and camera. The complete list is shown in Figure 2.

All product categories were presented on individual cards in text together with an illustrative icon (see Figure 1). Illustrative icons were used to trigger participants to think of the product category in general, rather than on a specific product.

We asked participants to perform two tasks. First, participants sorted the cards based on the possibility to accept a refurbished product from this category into two groups (potentially accept vs. reject). Second, we asked participants to take the categories for which they would potentially accept refurbishment and rank those on their likelihood to do so. Participants were asked to clarify their

reasons for accepting or rejecting different refurbished product categories. Interviews took on average 60 minutes and were audio recorded. All recordings were fully transcribed. Photographs were taken from the final sorts. A qualitative content analysis was performed by the research team on the transcripts, which resulted in 16 overall themes and 46 subthemes.

Results

The categorization went well and participants spoke freely and without any problems about their motives to either accept and reject refurbished products for certain categories. Our findings demonstrated that participants' willingness to accept refurbished products depends first of all on their familiarity with and understanding of the refurbishment concept. If consumers know better what procedures are executed during refurbishment, they have greater trust in refurbished products, which positively influences acceptance. Moreover, consumers differ in their likelihood to accept refurbishment between various categories. Figure 2 represents the number of participants who indicated that buying a refurbished product was an option for each of the 30 product categories. Many participants suggested that refurbishment was an option for categories, such as, a wardrobe, a drill, a desk lamp, and a suitcase but it was not often considered a viable alternative for categories, such as a kettle, an electric toothbrush or sunglasses.

When discussing their motives to either accept or reject a refurbished product for a certain category, participants mentioned the following reasons: financial, functional quality, aesthetic quality, warranty, contamination, and personalisation.

First, participants need to see the financial benefit that refurbishment can give them. If products are relatively cheap (e.g., hangers), there is not much to gain by refurbishment and people are more likely to purchase a new item. So, the financial benefit should be large enough for refurbishment to have an appeal on consumers.

"I think for me the biggest reason not to really have bought a refurbished product was maybe that the price difference is not that much."



Figure 1. Examples of illustrative icons.

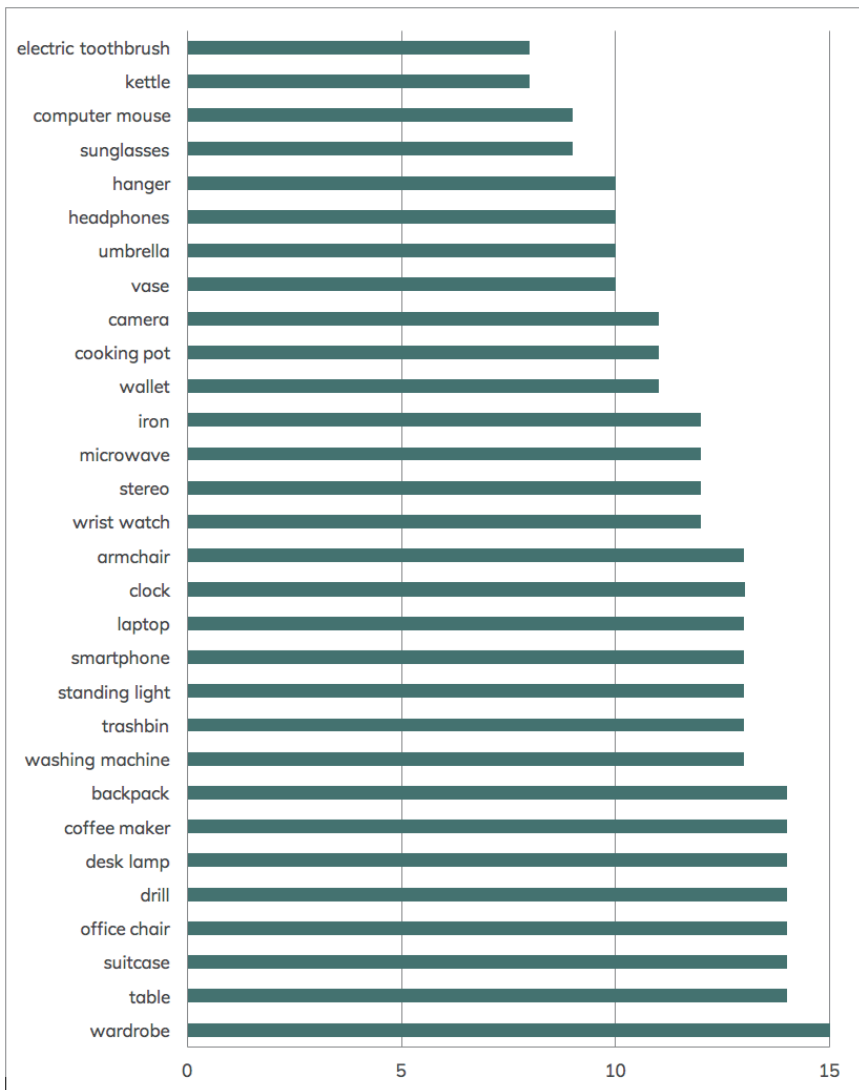


Figure 2. Number of participants (n = 18) who indicated to potentially accept refurbishment for a specific product category.

Second, participants mentioned quality reasons related to either the product's functionality and aesthetics to either accept or reject refurbished products. Functional quality reasons relate to how easy it is to check a product's quality or repair it. Participants mentioned that they can easily check the functional quality for furniture but that this is more difficult for electronics, due to which they see more risks with these refurbished products.

"I think things like furniture I would doubt least because usually what you see it's what you get"

The importance of the product's function was also mentioned in this respect. If the function a product fulfils has little importance to a consumer (e.g., because it is not needed frequently), (s)he is more likely to accept

a refurbished product as an alternative than when it has great importance.

Another issue related to functional quality that was mentioned is the speed in which the product's functionality will become obsolete due to technological changes (e.g., smartphone, laptop).

Aesthetic quality relates to the significance of aesthetics. For certain product categories (e.g., watch, sunglasses, wallet), it is imperative that the product looks new because it is used to express one's identity or is regularly visible to others. However, for product categories that serve a primary utilitarian purpose (e.g., drill, iron) and are generally hidden away in a closet, participants indicated that they would consider refurbished, even if these were

visually damaged. Furthermore, for certain product categories (e.g., furniture) visual wear and tear can give a 'vintage look' to the product, thereby enhancing its appeal to consumers.

"This one [desk lamp] because it's a working place and then it's okay but if I go for living room stuff [referring to the icon of the standing light] then I expect that I'll have to be a little bit picky."

Warranty was mentioned as a way to reduce the potential worry accompanying refurbished products for certain categories. In this respect, warranty is considered to be an important differentiator from second-hand products.

Contamination suggests that participants perceived certain product categories as being 'contaminated' by the previous user. Baxter et al. (2016) have defined contaminated interaction as "the idea that an interaction with an object can differ from its natural or intended condition due to another interaction by someone or something." Contamination can involve hygienic concerns as refurbished products were considered less clean than new ones. In this respect, participants were not likely to accept a refurbished toothbrush. Also, reservations were raised about food-related categories, such as a refurbished microwave.

"I'm gonna slide the kettle and the coffee maker as something I would buy new. A bit the same as with the toothbrush. You see it's stuff that you eat from. I don't wanna - I wouldn't buy that second-hand or refurbished. I need those new and clean for some reason... because I'm consuming out of it."

In addition, participants mentioned a potential problem of digital contamination for digital devices, such as the laptop and the smartphone. Participants suggested that they had little trust whether traces of the prior owner were sufficiently wiped out from the memory of the product during the refurbishment process.

Finally, participants were less likely to accept refurbished products for categories that they need to personalize, such as sunglasses with a prescription. This personalization may also take place for objects that are worn close to the person and used every day due to which the object is shaped by the personality of the owner.

"A wallet so it's kind of personal, though I can't really say why... I would kind of feel weird having somebody else's wallet because I would probably ... yeah you could see the usage marks and stuff like that."

Design recommendation for refurbishment

Based on our findings, we were able to distinguish eight types of product categories: hedonic products (e.g., watch, vase), utilitarian products (e.g., suitcase, drill), high involvement (e.g., laptop, smartphone), low involvement (e.g., hanger, kettle), dynamic (laptop, smartphone),

static (e.g., iron, kettle), hygienic (electric toothbrush, microwave), and personalised (wallet, sunglasses).

Depending on the product categories at hand, companies selling tangible products should pay attention to specific reasons in order to encourage consumers' acceptance of refurbished products. Based on our findings, we can provide some preliminary strategies on how to tackle this.

For hedonic products, consumers especially value the product for its aesthetic quality. Consequently, companies should focus the product design and refurbishment process on possibilities to enhance the aesthetic quality or to provide a brand new aesthetic quality for example, by making use of durable and gracefully aging materials or by designing for resurfacing.

For utilitarian products, functional quality is essential. Consequently, companies should implement their design and promotion activities in such a way that consumers gain reassurance about the product durability and long use. Furthermore, companies should try to mitigate negative connotations on the functional quality of a refurbished product. Potential strategies would be to design for upgradability, adaptability, and ease of repair.

High involvement categories usually imply a great financial investment and thus companies need to convince consumers that the refurbished product is worth their money by emphasizing its satisfactory functional and aesthetic qualities through either its product design, promotion or service activities. For example, warranty, certifying product quality control and more transparency on the refurbishment process can help to give consumers this assurance.

A potential issue of refurbishing low involvement products is that the financial benefit is usually considered to be too low. To encourage consumers to choose a refurbished product, it is beneficial to make consumers more aware of the environmental benefit. Then, the refurbished product gains additional value for consumers.

Dynamic product categories are products that are subject to great technological advancement. Consumers may then see potential obsolescence as a risk for refurbished products. Consequently, companies need to focus on reassuring consumers about the product durability and taking away the negative connotations on functional quality. Potential strategies would be to design for upgradability, adaptability, and ease of repair.

Opposite to dynamic products, static product categories do not easily lose their functionality and are less vulnerable to obsolescence. However, for many of these products consumers do not see the financial benefit and thus it is important for companies to make consumers aware of the additional environmental benefits of refurbished products.

Personalised products are categories that are considered to be very personal and therefore unsuitable for refurbishment. A potential design direction for companies interesting in pursuing refurbishment for such categories would be to add customization opportunities to the refurbishment process by making use of a modular product design.

Finally, hygienic products are products that are used for preparing food or are in contact to consumers' skin. For these categories, refurbishment will trigger contamination issues. Companies thus need to minimize these contamination concerns by enhancing ease of cleaning and by communicating the effort of cleaning and disinfection done during the refurbishment.

Discussion

To establish a circular economy and reduce the negative impact of the present consumption patterns, refurbishment provides an important strategy to retrieve more value from used products. However, consumers will not easily accept these as viable alternatives. Our research contributes to the literature on refurbishment by providing insights in the specific product categories for which consumers are more or less likely to be accept a refurbished product. In addition to the existing strategies for designing for refurbishment (e.g., Ijomah et al., 2007), companies can use these insights to tailor their design and communication strategies to address the specific issues of a product category.

References

- Baxter, W. L., M. Aurisicchio, M., and P. R. Childs. 2016. Materials, use and contaminated interaction. *Materials & Design* 90: 1218-1227.
- Hamzaoui Essoussi, L. and J. D. Linton. 2010. New or recycled products: how much are consumers willing to pay? *Journal of Consumer Marketing* 27(5): 458-468.
- Hamzaoui Essoussi, L. and J. D. Linton. 2014. Offering branded remanufactured/recycled products: at what price? *Journal of Remanufacturing* 4(1): 1-15.
- Harms, R., and J. D. Linton. 2015. Willingness to pay for eco-certified refurbished products: The effects of environmental attitudes and knowledge. *Journal of Industrial Ecology* 20(4), 893-904.
- Hazen, B. T., R. E. Overstreet, L. A. Jones-Farmer, and H. S. Field. 2012. The role of ambiguity tolerance in consumer perception of remanufactured products. *International Journal of Production Economics* 135(2): 781-790.
- Ijomah, W. L., C. A. McMahon, G. P. Hammond, and S. T. Newman. 2007. Development of design for remanufacturing guidelines to support sustainable manufacturing. *Robotics and Computer-Integrated Manufacturing* 23(6): 712-719.
- Jiménez-Parra, B., S. Rubio, and M. A. Vicente-Molina. 2014. Key drivers in the behavior of potential consumers of remanufactured products: a study on laptops in Spain. *Journal of Cleaner Production* 85: 488-496.
- Michaud, C. and D. Llerena. 2011. Green consumer behavior: an experimental analysis of willingness to pay for remanufactured products. *Business Strategy and the Environment* 20(6): 408-420.
- Mugge, R., B. Jockin, and N. Bocken. 2017. How to sell refurbished smartphones? An investigation of different customer groups and appropriate incentives. *Journal of Cleaner Production* 147: 284-296.
- Pigosso, D. C., E. T. Zanette, A. Guelere Filho, A. R. Ometto, and H. Rozenfeld. 2010. Eco-design methods focused on remanufacturing. *Journal of Cleaner Production* 18(1): 21-31.
- Rathore, P., S. Kota, and A. Chakrabarti. 2011. Sustainability through remanufacturing in India: A case study on mobile handsets. *Journal of Cleaner Production* 19(15): 1709-1722.
- Van Weelden, E., R. Mugge, and C. Bakker. 2016. Paving the way towards circular consumption: exploring consumer acceptance of refurbished mobile phones in the Dutch market. *Journal of Cleaner Production* 113: 743-754.

The research described here focused on tangible products as such. If these products are offered as part of a product-service system, the balance between perceived benefits and risks is likely to change for a number of the product categories. This will also affect the design strategies and deserves further attention.

Another limitation of our research is that we did not provide participants during the interview discussions with specific examples of refurbished products. It is likely that depending on how the refurbishment is executed, consumers may be more or less persuaded to purchase these. Future research should investigate specific refurbishment strategies to uncover the actual value of refurbishment.

Conclusions

Our research provides insights in the potential value of refurbishment for various product categories. Although our findings suggest that it may be challenging to implement refurbishment for certain categories due to potential financial, functional quality, aesthetic quality, contamination, and personalization issues, this does not necessarily imply that companies producing these products should not pursue refurbishment. By providing specific services, changing the product design, or by communicating important information about the refurbishment process, it may be possible to resolve these issues and evoke positive consumer responses. Our insights provide a first step to help companies to successfully achieve this difficult challenge.