TU Delft

Delft University of Technology

Paving the way towards circular consumption

Exploring consumer acceptance of refurbished mobile phones in the Dutch market

Weelden, E; Mugge, R; Bakker, CA

DOI
10.1016/j.jclepro.2015.11.065

Publication date
2016

Document Version
Accepted author manuscript

Published in
Journal of Cleaner Production

Citation (APA)
Weelden, E., Mugge, R., & Bakker, CA. (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. https://doi.org/10.1016/j.jclepro.2015.11.065

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.

This work is downloaded from Delft University of Technology.
For technical reasons the number of authors shown on this cover page is limited to a maximum of 10.

© 2016 Manuscript version made available under CC-BY-NC-ND 4.0 license https://creativecommons.org/licenses/by-nc-nd/4.0/

Paving the way towards circular consumption: Exploring consumer acceptance of refurbished mobile phones in the Dutch market

Eline van Weelden[a], Ruth Mugge[a,*], Conny Bakker[a]

[a]Faculty of Industrial Design Engineering, Delft University of Technology, Landbergstraat 15, 2628 CE Delft, The Netherlands

[*]Corresponding author. Tel.: +31 15 278 3801

E-mail address: R.Mugge@tudelft.nl

Abstract

In the transition towards a circular economy, refurbishment can be applied to regain value from used products, and to reduce waste. Refurbishment is a process in which a professional company collects and restores used products in order to resell these products to new consumers. Building on insights from the remanufacturing literature, this research is the first to provide a comprehensive understanding of the factors that influence consumer acceptance of refurbished products, and in specific refurbished mobile phones. We adopted a qualitative approach using in-depth interviews with consumers (n=20) of new and refurbished phones to gain rich insights into consumers' considerations that play a role in the choice of a refurbished product over a new product. This paper maps out the main factors that influence consumer acceptance of refurbished mobile phones. Our findings uncover that the majority of consumers do not take a refurbished product into consideration as a consequence of a lack of awareness and a misunderstanding of what refurbishment actually entails. In addition, refurbished products are often rejected as a consequence of a negative trade-off between perceived risks and benefits. Personal, contextual and product-related factors have been identified that influence consumers' assessment of a refurbished product's risks and benefits. Finally, the findings have been

translated into practical guidelines for designers and marketers to positively steer consumer perception of refurbished products.

Keywords

Refurbishment, circular economy, consumer behavior, consumer decision making, mobile phones, remanufacturing, consumer response

Word count: 7998

1. Introduction

The circular economy offers important opportunities to regain value from used products and to stimulate a shift towards a more sustainable consumption model in which valuable resources are reused and less waste is created (Ellen MacArthur Foundation, 2012). Within the concept of the circular economy, refurbishment is a promising strategy that enables high original value retention. Refurbishment is a process in which a professional company collects and restores used products to a functional and satisfactory state, after which these refurbished products are sold to new consumers (Rathore et al., 2011). In contrast to recycling, refurbishment does not require complete dismantling of products. Consequently, a high amount of the original energy and labor that was required for production is preserved. In the academic literature, refurbishment is often used interchangeably with remanufacturing, although it is not exactly the same. Where the remanufacturing process focuses on returning products to a like-new condition that meets at least the original specifications (Ayres et al., 2007), the condition of refurbished products should be satisfactory but not necessarily equal to the original specification (Ijomah et al., 1999). The present study will focus on refurbishment, but because of the correspondence with remanufacturing and the lack of research specifically on refurbishment, insights from the remanufacturing literature will also be used.

Academic research in the area of product life extension has mainly focused on strategic and operational aspects of remanufacturing, like influences on competition and cannibalization (Agrawal et al., 2015; Atasu et al., 2008; Debo et al., 2005; Guide & Li, 2010), remanufacturing guidelines (Hatcher et al., 2011; Ijomah et al., 2007; Subramoniam et al., 2013), and functional design tools and methods to enhance the remanufacturability of products (Allwood et al., 2011; Hatcher et al., 2011; Rose, 2000). Besides environmental considerations, these studies have shown that remanufacturing and refurbishment can be valuable strategies for many companies for economic reasons (Atasu et al., 2008; Guide & Van Wassenhove, 2001; Linton, 2008; Ovchinnikov et al., 2014). Because refurbished products attract new consumer segments that would have never bought a new product, the risk of new product cannibalization has been shown to be minimal (Atasu et al., 2010; Guide & Li, 2010). Refurbishment can be seen as cost-effective, high-quality and socially responsible alternative for developing a low-end product version. In case of neglecting this opportunity, companies will run the

risk of competing against a third party offering a refurbished version of their own product, which will definitely decrease market share and can result in brand erosion (Ferguson & Toktay, 2006).

To increase the share of refurbished products in the commercial market, there is a need for insights on how to develop refurbished products that will have a strong appeal to consumers (Guide & Van Wassenhove, 2009; Jiménez-Parra et al., 2014, Souza, 2013). A consumer perspective on refurbished products has been largely unexplored. An explanation for a lack of research on a consumer perspective may be that refurbishment has its origins in the business-to-business market, for example with copiers. Nowadays, refurbishment is gaining interest from consumer companies, for instance in personal and home electronics (e.g., mobile phones, laptops, tablets), and in clothing and baby products (e.g., prams, travel cots and car seats) (Armstrong et al., 2015; Catulli, 2012; Mont et al., 2006).

The present research contributes to the literature on product life extension by providing a comprehensive understanding of the factors that influence consumer acceptance of refurbished products, and specifically refurbished mobile phones. These insights can be used for the development and commercialization of refurbished products that will satisfy consumer needs and increase consumers' purchase intention.

The remainder of this paper is organized as follows. In section 2, we discuss the theoretical background of consumer responses towards refurbished products and describe the knowledge gap that is addressed. In section 3, we explain the used methodology. Section 4 reports and discusses the findings of our explorative study, which are translated into practical guidelines for increasing consumer acceptance in section 5. Finally, in section 6 we present our conclusions and provide opportunities for further research.

2. A consumer perspective on refurbished products

In the literature, various boundaries have been identified that try to explain the limited offer of refurbished products in the today's consumer market. First, companies do not fully acknowledge the value of refurbishment, and are put off by the idea of high investment costs (Abdulrahman et al., 2014; Hatcher et al., 2011; Govindan et al., 2015; Vasudevan, 2012). A lack of technical capabilities, skilled

people, product quality concerns and design issues also hinder companies to develop well-functioning refurbishment facilities (Sharma & Sharma, 2014; Vasudevan, 2012; Wei et al., 2015). Furthermore, there are no guidelines and standards for refurbishment, which leads to a great variety in product quality and a lack of recognition among authorities, companies and consumers (Sharma & Sharma, 2014). Uncertainty about the availability and supply of used products, which is fostered by consumer unwillingness to return used products, is another factor that prevents companies to take advantage of refurbishment opportunities (Goodall et al, 2014; Sharma & Sharma, 2014; Vasudevan, 2012). Finally, a lack of remarketing strategies and, as a consequence, a lack of consumer acceptance is a crucial boundary for companies to invest in refurbishment (Govindan et al., 2015; Sharma & Sharma, 2014; Vasudevan, 2012; Wei et al., 2015).

The current literature on consumer response towards refurbished products predominantly focuses on consumers' willingness to pay (WTP), which is elicited in an imaginary purchase situation. It has been concluded that consumers show a lower WTP for refurbished products due to a high perceived risk and low perceived quality of refurbished products (Debo et al, 2005; Guide & Li, 2010; Hamzaoui Essoussi & Linton, 2010, 2014; Hazen et al., 2012; Michaud & Llerena, 2011; Wang et al., 2013). Furthermore, researchers have started to investigate the factors that may influence consumers' evaluations of refurbished products. It has been found that consumers' low WTP is related to the ambiguity that is surrounding the refurbishment process (Hazen et al. 2012). A lack of understanding and knowledge of refurbished products fosters low quality perceptions and reduces consumers' WTP. Another study identified that low quality perceptions can be reduced by a positive brand reputation, which acts as an affirmation of product quality (Hamzaoui Essoussi & Linton, 2014). Studies based on secondary market transaction data suggest that a positive seller reputation and approval by the original manufacturer increase consumers' WTP for refurbished products (Pang et al., 2015; Subramanian & Subramanyam, 2012). From an environmental perspective, consumers' evaluation of refurbished products can be improved by providing information about the environmental benefits of refurbishment (Michaud & Llerena, 2011). Specifically, it has been demonstrated that providing eco-certification with a refurbished product can counterbalance the difference in WTP between a refurbished and a new product for certain product categories (Harms & Linton, 2015). Another stream of literature has

adopted models integrating multiple general factors to explain consumers' purchase intention for refurbished products (Jiménez-Parra et al., 2014; Wang et al., 2013). Influencing factors include consumers' attitude towards refurbished products, perceived risk, benefits and behavioral control to execute the purchase, as well as contextual factors, like the opinion of the individual's social referents and the marketing mix. Recent attempts to validate existing assumptions, concerning the influence of knowledge, price, brand, quality and green attributes on consumers' perception of refurbished products, concluded that current insights are not sufficient to fully understand how consumers perceive and evaluate refurbished products (Abbey et al., 2015; Wang & Hazen, 2015). For example, Abbey et al. (2015) propose that also negative attributes perceptions, like feelings of disgust, influence the attractiveness of refurbished products.

Although existing studies provide valuable insights, these studies also illustrate the limitations of prior research in the area of consumer acceptance. First, these studies focused on the final phase in consumers' decision-making process in which consumers evaluate risks and benefits. However, consumers' decision-making process includes several phases (Engel et al., 1968) and it is likely that these other phases will influence consumer acceptance of refurbished products as well (Fig. 1). Second, prior studies predominantly used hypothetical scenarios to elicit consumer reactions, or conducted the study in an experimental setting. Under such hypothetical conditions, it is possible that participants express a more positive attitude towards a certain offer, on which they do not always act upon in reality. This attitude-behavior gap is especially apparent in situations where environmental or social considerations play a role (Boulstridge & Carrigan, 2000). Thus, more research is needed to uncover consumers' response towards refurbished products in an actual market setting. Third, due to the quantitative character of these studies, there is a lack of understanding of consumers' motives and considerations that drive consumers' choice in relation to refurbished products. As a consequence, the knowledge about consumer response is limited to a few predetermined factors. The studies that integrate multiple factors (Jiménez-Parra et al., 2014; Wang et al., 2013) only use generic models that correspond strongly to the literature on consumer response towards new products (Ajzen, 1991; Bettman et al., 1991) and provide no additional insights into consumers' considerations that are unique for refurbished product acquisition.

Our research aims to address these shortcomings by comprehensively exploring the most pertinent factors that influence consumer acceptance of refurbished products. By adopting a qualitative approach and investigating consumer response towards refurbished phones in an actual market setting, this research contributes to the literature by advancing the understanding of consumers' response towards refurbished products. In this way, this research responds to the need for a rich and integrated investigation of behavioral factors that provides insight into how firms can shape consumers' perceptions of refurbished products (Abbey et al., 2015; Guide & Li, 2010; Wang & Hazen, 2015). The main objective is to provide a substantial knowledge base to advance the analysis and development of refurbished products in the consumer market. This knowledge is of direct practical and environmental importance to encourage and support companies to implement refurbishment as an economically and environmentally viable strategy for product life extension. Rather than focusing on the limitations of refurbishment, we provide designers and marketers with guidelines to positively steer consumer perception of refurbished products and increase consumer acceptance.

2.1 Theoretical model

To provide an integrated overview of the different factors influencing consumer acceptance of refurbished products, a theoretical model has been used that breaks down the consumer decision-making process in different phases (Fig. 1).

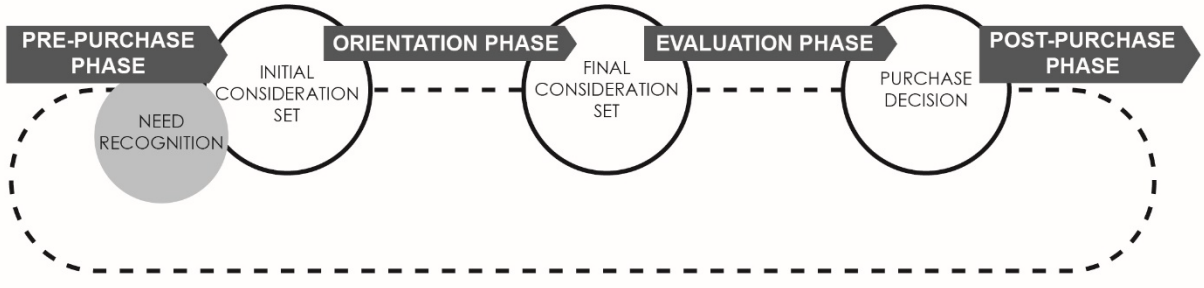


Fig. 1

Theoretical model of the consumer decision-making process used to investigate consumer acceptance of refurbished mobile phones (based on Engel et al., 1968)

This theoretical model is based on the widely used consumer decision-making model introduced by Engel, Kollat & Blackwell (1968). This EKB model characterizes consumer decision-making as a problem-solving process that takes place in different phases. The model has received criticism for its cognitive approach, which treats consumers as rational human beings investing great mental effort in product acquisition, but neglects the influence of impulse and affective purchase behavior (Mowen, 1988; Olshavsky and Granbois, 1979). However, it is also acknowledged that such a cognitive decision-making process is representative for utilitarian, high involvement products like mobile phones (Petty et al., 1983). Because of the complex and expensive nature of mobile phones and their personal importance to consumers' daily life, consumers are likely to engage in an extensive thought process during product acquisition as proposed by the EKB model.

Following the EKB model, decision-making starts with an orientation phase in which consumers decide which product alternatives are potentially suitable to satisfy an unfulfilled need. At the start of this phase, the consumer has an initial consideration set consisting of the alternatives the consumer can recall from memory and are associated with an initial favorable attitude. During the orientation phase, information search takes place and new alternatives can be discovered. At the end, a final consideration set is formed that consists of alternatives the consumer is aware of and has chosen as valuable for detailed consideration. This final consideration set will become part of the evaluation phase in which the risks and benefits of each alternative are considered in detail. Finally, the alternative with the optimal balance between risks and benefits will be selected. A refurbished product should proceed through all stages of this decision-making process to become the object of actual purchase.

3. Methodology

To investigate what drives consumers in their choice for refurbished products, a qualitative approach using semi-structured in-depth interviews was chosen, which fitted the exploratory objective of this research. In-depth interviews were preferred, because they provide rich information about personal perspectives and experiences of consumers (Patton, 2002).

3.1 Choice for product category

Our research focused on refurbished mobile phones. Nowadays, refurbishment is rapidly developing in the mobile phone industry and refurbished mobile phones are available on the consumer market. This choice made it possible to execute our research in a realistic market setting with actual buyers. Furthermore, there is a need for solutions to fight the continuous consumption of mobile devices that is resulting in a large amount of electronic waste and the loss of critical and potentially harmful materials (Rathore et al., 2011). Refurbishment is an easy and affordable way to increase the product life span of mobile phones, which has been recognized to play a crucial role in the transition towards more sustainable consumption (Cooper, 2005).

3.2 Participants

To provide an overview of the factors that influence the choice between a new and a refurbished product, a dual perspective was adopted. Interviews (n=20) were conducted with consumers who had recently bought a refurbished mobile phone; in this paper called 'refurbished buyers', and consumers who had recently bought a new mobile phone; in this paper called 'new buyers'. By comparing consumer considerations in both situations, more developed ideas could be formed about which factors stimulate or hinder consumer acceptance of refurbished products. Furthermore, by investigating consumer acceptance of refurbished products in an actual market setting, we were able to reduce the discrepancy between expressed attitude and actual behavior of the participants.

The interviews with refurbished buyers were performed in collaboration with the company Leapp, an independent Dutch company that is specialized in refurbishing and selling used personal electronics from the brand Apple. All participants in the group of refurbished buyers had recently bought a refurbished Apple iPhone from Leapp. In order to contribute to the reliability of this research and minimize brand-related influences, the group of new buyers only existed out of consumers who had recently bought a new Apple iPhone.

In total 20 individuals were interviewed (10 refurbished buyers (RB) and 10 new buyers (NB)). Participants were equally divided between men and women in the age group 20-70, and all had the Dutch nationality.

3.3 Procedure

Based on literature synthesis and our research objectives, an interview guide was developed. This interview guide acted as a flexible framework to perform individual semi-structured interviews of approximately 30 minutes. The conversation started with an introduction about the procedure, confidentiality of the data and the purpose of the study, after which participants could ask questions. The actual interview started with a question about participants' general demands during a mobile phone purchase. This question was designed to trigger prior experiences to facilitate the expression of underlying motivations later in the interview. The main part of the interview covered issues regarding personal beliefs about refurbished products, experiences with refurbished products, and motivations to buy a new or refurbished mobile phone. If interviewees were not familiar with refurbished products, the concept was explained after discussing participants' considerations to buy their current (new) phone. A refurbished phone was explained as a used phone, which is collected, restored, updated and resold by a professional company. The interview concluded with questions about the participant's knowledge and ideas about refurbishment.

3.4 Data analysis

The interviews were recorded and fully transcribed after which they were coded and analyzed. This analysis approach fitted the open and explorative character of this study and provided a structure for discovering patters and generating insights (Auerbach & Silverstein, 2003). The analysis was performed with the software program Atlas.ti. The transcribed interviews were coded to uncover similarities, themes and categories in the data. This process was executed in several sequential stages of coding, comparing codes, re-coding and grouping codes into themes. To ensure reliability and to avoid misinterpretation of the data, several meetings were organized in which codes and themes were

discussed and analyzed with the research team. The last iteration of coding resulted in a final set of 64 codes, categorized in seven themes (appendix A).

In qualitative research, the concept of saturation, the moment in coding at which no new insights and themes are uncovered, is generally used to determine a reliable sample size (Guest et al., 2006). In our research, the criterion for saturation was achieved after sixteen interviews. During coding of the four remaining interviews, no major new findings were discovered and no new codes were assigned to the data. These remaining interviews only confirmed our previous findings and ensured that this research has provided a reliable understanding of the factors that influence consumer acceptance of refurbished products.

4. Results and discussion

Using our theoretical model, this section sequentially discusses the factors that influence consumer acceptance of refurbished products throughout the different phases of the consumer decision-making process (Fig. 2). We start with consumers' initial responses, which characterize consumers' "first" impressions of refurbished products. Subsequently, the orientation phase is described in which barriers are discovered that can result in rejection of a refurbished product in an early stage of decision-making. Finally, we explain how a trade-off between perceived risks and benefits determines the final purchase decision in the evaluation phase, and discuss the factors that influence this trade-off.

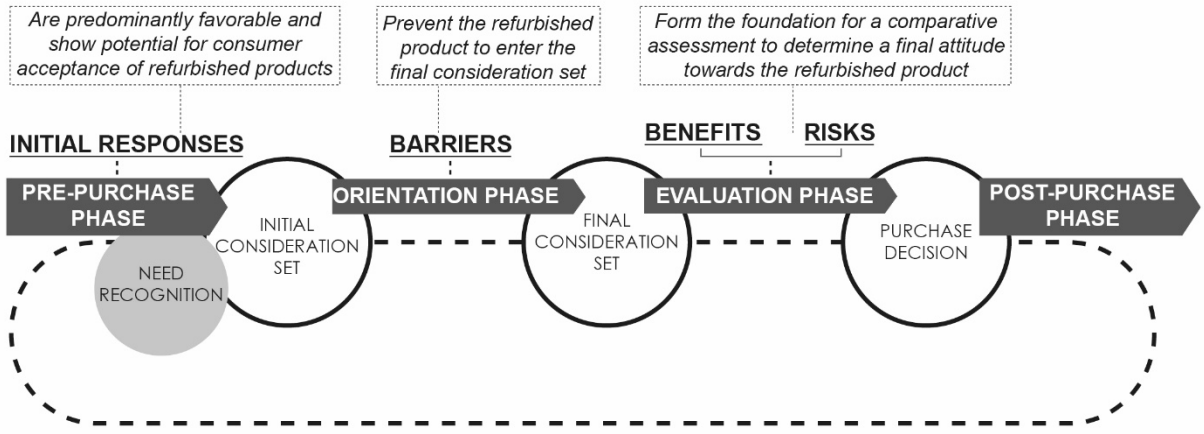


Fig. 2:

Model of the consumer decision-making-process showing the main factors influencing consumer acceptance of refurbished mobile phones

4.1 Pre-purchase phase: initial responses

At the start of the interview, participants were asked to give an initial reaction towards the opportunity of purchasing refurbished products. Before engaging into extensive consideration, interviewees responded predominantly favorable towards refurbished products, although a clear difference between refurbished and new buyers was observed. The interviewed refurbished buyers reported a high level of satisfaction and an enthusiastic attitude towards refurbished products in general. New buyers reported a positive interest in refurbished products, but also expressed their doubts resulting from an existing lack of knowledge:

"I would definitely consider a refurbished phone, but first I want to find out more about the offer, what it exactly implies, and whether some kind of guarantee is given with it." [NB10]

These reactions indicate that the potential for consumer acceptance of refurbished mobile phones is promising, but it is necessary to tackle existing doubts and a lack of knowledge during the decision-making process to turn this potential into reality.

4.2 Orientation phase: barriers towards entering the final consideration set

The study revealed that in the orientation phase, a number of barriers prevented refurbished products to enter the final consideration set (Fig. 3). It was identified that already in this early stage of decision-making the refurbished product can be rejected, or is not even considered.



Fig. 3

Overview of the barriers that prevent refurbished mobile phones to enter the final consideration set in the orientation phase

The two main barriers that were identified among participants are a *lack of awareness* and a *misconception of the refurbishment concept*. Most interviewed new phone buyers were not aware of the existence of refurbished products:

"I have chosen for a new phone, because I did not know something else was possible." [NB1]

Due to this unawareness, participants did not look for a refurbished product as an alternative to a new phone and refurbished products were not included in the consideration set.

Even if the interviewees were aware of the existence of refurbished products, knowledge about the specific characteristics of refurbishment was lacking. This resulted in a misconception of the refurbishment concept, mainly because refurbished was interpreted as similar to second-hand:

"I still link it with the phenomenon of second-hand. And what do I associate with second-hand? That it is already used by another person, and therefore, it may be damaged and consequently working inferior." [NB3]

This confusion about what refurbishment actually entails resulted in a misunderstanding and reduction of the perceived value of refurbished products. Consequently, consumers may automatically reject a refurbished product before taking it into consideration.

Because of the current *lack of availability* of refurbished products via established retail channels, consumers do not easily encounter refurbished phones, or do not know where to buy them. Habitual purchase behavior and a search for convenience lead to a situation in which many consumers do not take refurbished products into consideration when not offered by established retail channels. Furthermore, some interviewees reported that they were not willing to take extra effort to go to a special store to buy a refurbished phone:

"I find it too much of a hassle that you cannot buy the product at any store or that you specifically need to go to a website." [NB5]

The final barrier that prevents refurbished products to enter the consideration set is related to the fact that they are used before, and therefore, *lack the thrill of newness*. In our research, the lack of extra

functionalities that a new product can provide is not reported as a major barrier to take a refurbished product into consideration. However, a small part of the interviewees reported that it is mainly the emotional thrill of newness that they would miss:

"You do not have the thrill of a completely new device. A device that you can unwrap, completely fresh and packed especially for you." [NB3]

This finding indicates that it is not only the association with quality why consumers prefer new products over refurbished products (Atasu et al., 2010; Guide & Li, 2010). Hedonistic motives related to the entire consumption experience (Hirschman and Holbrook, 1982) also play an important role in consumer choice for refurbished products. Hedonistic purchase behavior is driven by emotions rather than utilitarian value. Our research shows that a lack of enjoyment related to the purchase of a new product, can be a reason to reject a refurbished product in an early stage.

4.3 Evaluation phase: balance between risks and benefits

If barriers in the orientation phase did not restrain the consumer from including the refurbished product in the consideration set, the consumer engages in a subjective, comparative assessment of the risks and benefits that a refurbished product can provide.

Although several benefits of refurbished products were mentioned, our study confirms previous findings that a high level of perceived risk is the main reason to reject a refurbished phone in the evaluation phase of the decision-making process. This rejection may be a consequence of the human tendency to reduce perceived risk rather than maximizing perceived benefit (Mitchell and Boustani, 1994). Fig. 4 summarizes the benefits and risks that consumers perceive in relation to refurbished products. As shown, the perceived risk-benefit balance is influenced by personal, contextual and product-related factors. After explaining the perceived benefits and risks, these influencing factors will be discussed to provide insight into the motives underlying consumers' final judgment of refurbished products.

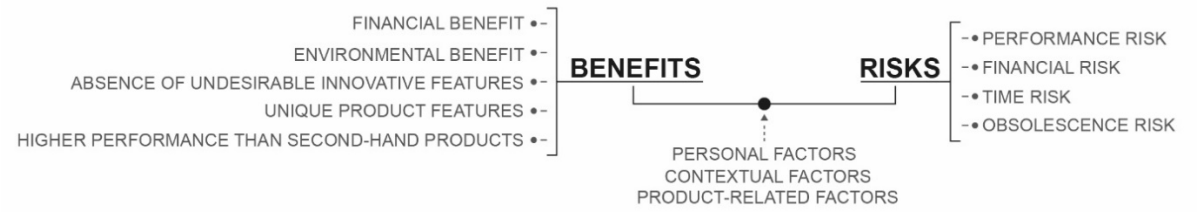


Fig. 4:

Overview of the different benefits and risks consumers associate with refurbished mobile phones

4.3.1 The perceived benefits of refurbished phones

In line with the literature (Atasu et al., 2008; Guide & Li, 2010; Jiménez-Parra et al., 2014; Michaud & Llerena, 2011), the two main benefits that interviewees related to refurbished products were the *financial benefit* and the *environmental benefit*.

Our study revealed that the *financial benefit* was the main reason to buy a refurbished product for all refurbished buyers:

"I have chosen for a refurbished product, because I think a new phone is too expensive" [RB4]

The majority of new buyers confirmed that financial motivations would be most evident when considering a refurbished mobile phone. Results indicated that the combination of financial considerations and specific brand preferences serve as important motivation to buy refurbished products. It is assumed that this brand-driven motive will especially play a role for iconic, premium brands like Apple.

Our results tentatively indicated that the *environmental benefit* of refurbished products currently plays a minor role in consumer decision-making. Only one of the interviewed refurbished buyers mentioned the role of environmental concerns when purchasing a refurbished mobile phone. Moreover, the results indicated that most refurbished buyers were not even aware of the environmental benefit of refurbished phones. This lack of awareness may result from a lack of communication about the environmental benefit in the current consumer market for refurbished products. However, new buyers reported the environmental benefit as a motivation to choose for a refurbished product:

"The raw materials needed for new phones, are of course not really very kosher. So, the less materials that have to be extracted from rainforests and whatsoever, the better of course." [NB4]

Corresponding with Michaud & Llerena (2011), this finding indicates that there is potential in informing consumers about environmental benefits to attract environmentally conscious consumers. Especially the combination of the environmental and financial benefits can be exploited to increase consumer acceptance of refurbished products. Our results confirm the prevailing assumption that environmental concerns are rarely the driving purchase argument (Hughner et al., 2007; Meyer, 2001; Young et al., 2010). This notion became especially apparent when the majority of both new and refurbished buyers reported that they would choose for a new phone when money did not matter. However, a refurbished product provides consumers a unique opportunity to match environmental values with limited monetary resources.

Complementary to the financial and environmental benefits, three other benefits of refurbished phones were discovered, which were not yet identified in the literature. The interviews revealed that some consumers see the *absence of undesirable innovative features* as a benefit of refurbished products. Innovations can, for example, suffer from start-up problems, or require acquisition of new accessories, change in behavior, or extra learning effort:
"That new gadget first has to prove itself, to see whether it indeed has an added value, because that is not always the case. It can also become more complicated again." [NB1]

It has been acknowledged that ongoing expansion of new features, defined as feature fatigue, can lead to consumer dissatisfaction (Thompson, Hamilton & Rust, 2005). Because refurbished phones are used models that generally are on the market for some time, consumers are usually familiar with the product and know its value.

In contrast, interviewees appreciate that refurbished products can be equipped with *unique product features* that are not available with new alternatives for sale at the moment of purchase. One

refurbished buyer reported extra memory capacity as a characteristic that made his refurbished phone superior in relation to new alternatives available:

"The advantage is the amount of extra gigabytes. I bought the 4S, at that moment Apple did not offer this phone with 16 gigabytes anymore and in the refurbished version they were still available." [RB10]

In the situation explained above, the extra gigabytes were already incorporated in the original phone, but this version was not available on the new market anymore. Although this is not yet applied in practice, there are various opportunities to add such unique features during refurbishment. For example, by changing or adding components and offering possibilities for personalization, added value can be created that makes the refurbished product more attractive.

Finally, refurbished products were praised for their *high performance quality in comparison with second-hand products*, which were often used as a reference by refurbished buyers. In contrast with second-hand products bought via a private person, refurbished products are believed to offer the consumer a baseline level of performance as a result of the professional check, recovery and sale:

"You know that the product is checked thoroughly, there is also a note with the phone that confirms this. So you know you buy something reliable and that is not always the case with second-hand products." [RB5]

Also, among new buyers, the knowledge that the product is offered and checked by a professional company contributes to trust in the performance quality of the refurbished product.

4.3.2 The perceived risks of refurbished phones

Building on the theory of risk categorization (Mitchell, 1992), the study revealed that the overall risk perception of consumers in relation to refurbished products is the result of four components of perceived risk. The most mentioned component of perceived risk in relation to refurbished mobile phones was *performance risk*. Performance risk refers to the fear that a refurbished phone will have an inferior functionality or short lifetime:

"I think I would be more afraid that it would break down more quickly, or that it just stops working more quickly than expected." [NB8]

The second component of perceived risk was *financial risk*. Financial risk refers to a fear that the relatively high amount of money paid for the refurbished phone is not spent well and will have a negative influence on the consumer's monetary resources:
"Whichever you look at it, it is obviously still a lot of money. In that way a little bit of risk is involved." [RB7]

The third component of perceived risk was *time risk*, which was in this context related to the fear of losing time when the refurbished phone fails to deliver the promised possibilities, or has to be returned for maintenance:
"Regarding Leapp, the only thing I regret is that I find it annoying that people do not understand that I cannot miss my phone for a week." [RB10]

The last component of risk that was associated with refurbished mobile phones was defined as *obsolescence risk*. This component of risk refers to the fear that the phone will become obsolete too soon, and consequently will have its limitations with respect to technological capabilities:
"I see how quickly mobile phones become outdated, and therefore, I would like to have the most up-to-date version at the moment of purchase. Otherwise, the obsolescence will begin even faster." [NB3]

This risk is believed to be especially high for fast developing, technology-based markets. Consequently, there will be specific consumer segments that will not accept this type of refurbished products because of their high obsolescence risk. Contrarily, fast innovation results in early replacement of still well-functioning products. As a result, there is a considerable offer of used products with a high recovery value, which offers valuable opportunities for refurbishment.

4.4 Factors influencing the risk-benefit balance

To provide additional insights into the means to steer consumers' final judgment of refurbished products, we uncovered twelve factors that influence consumers' perception of benefits and risks. These 12 factors have been categorized into personal (2), contextual (6) and product-related (4) factors (Fig. 5).

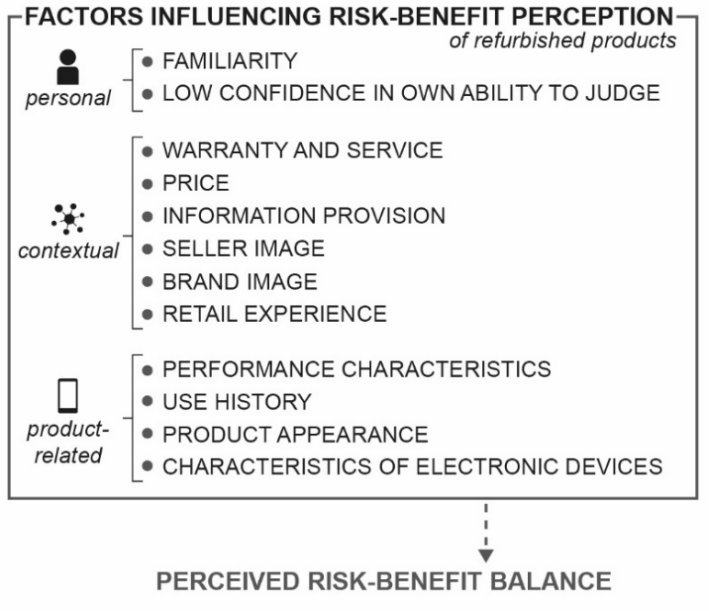


Fig. 5:

Overview of the factors that influence consumer risk-benefit perception in relation to refurbished products

4.4.1 Personal factors

Personal factors are related to beliefs, characteristics or experiences of an individual consumer that result in expectations about the consequences of purchasing a refurbished phone. The *level of familiarity* with refurbished products is found to be an important determinant in consumers' evaluation of risks and benefits. Refurbished buyers expressed a remarkably lower level of perceived risk, because they had gained trust in the quality and performance of refurbished products through positive prior experiences. It has also been found that consumers rely on other persons' beliefs in their evaluation of alternatives. The fact that refurbished products are not yet widely used in the consumer

market created suspicion among new buyers and contributed to a lack of confidence in refurbished mobile phones:

"I would trust it more when more and more people will use it, when it becomes increasingly popular." [NB2]

Furthermore, interviewees who reported a *low confidence in their own ability to judge* the quality of a phone displayed a higher level of perceived risk, because they fear to overlook disadvantages of a refurbished phone in their judgment:

"We are really into second-hand products, but not with electronics. But that is also because I have very little knowledge about it." [NB4]

4.4.2 Contextual factors

Contextual factors include tangible and intangible elements that surround the physical refurbished product offer in the market. The *warranty and service* are found to be major determinants of the perceived risk-benefit balance when considering a refurbished mobile phone. New buyers reported a fear that there is no possibility to find assistance, or to go back to the provider when the product functions inferior. In this respect, the existence of a physical store as a safe point of return is expressed as desirable and can be a means to decrease the perceived risk associated with refurbished products:

"I just looked up whether there were shops, that is something I experience as pleasant. Because if there is something wrong, I can go somewhere." [RB7]

The *price of the refurbished product* was found to have a twofold influence on the perceived risk-benefit balance. Based on earlier studies on WTP for refurbished products (Guide & Li, 2010; Hamzaoui Essoussi & Linton, 2010; Michaud & Llerena, 2011; Wang et al., 2013), a high perceived financial risk will result in rejection of a refurbished product when the price is high. Furthermore, our findings demonstrate that the financial benefit is the main consumer driver to buy a refurbished product, and a low price is therefore advisable to increase consumer acceptance. However, decreasing

the price of refurbished products can also be detrimental, because a low price creates suspicion about the quality of refurbished products, and consequently, a high level of risk perception. This indicates that consumer acceptance has an inverted U-shaped relationship with price and finding the optimal price balance is essential for eliciting the preferred consumer response towards refurbished products.

Consistent with the work of Michaud & Llerena (2011) and Wang (2013), it is argued that comprehensive and accessible *information provision* can reduce uncertainty and increase consumers' understanding of the benefits that refurbished products can provide. Furthermore, people tend to choose a known risk over an ambiguous risk and avoid situations of which the probability of the outcome is uncertain (Camerer & Weber, 1992; Ellsberg, 1961). It is suggested that consumers would more easily accept risks and imperfections associated with refurbished products if they are properly informed about them. Our findings show a need for information on both a generic level, including the refurbishment procedure and benefits of extending the product life cycle, and a product-specific level, including product status and use history. A report about product status includes information like product age, possible damages, battery condition, and results of performance tests. Information about the use history could give insight on how the product was used, for example use intensity (average hours per day), reason of discarding, and use of protective accessories. By providing background insights, consumers can make a more deliberate assessment of what to expect from the refurbished phone.

To increase the credibility of provided information, support by means of independent testimonials, for example, through online user reviews and quality certification, is of major importance for consumer acceptance:

"In case there is a kind of standard, a minimum qualification so to say, how a refurbished phone should be build up or that there are minimum requirements for such a device. That would act as a kind of quality mark or something." [NB9]

An industry wide quality label would assure consumers that a refurbished product meets a set of stipulated criteria.

Furthermore, interviewees used the *seller image* of the company Leapp and the *brand image* of the original phone brand Apple when evaluating the risks and benefits of a refurbished product. For example, unfamiliarity with the seller increases the fear that a company swindles consumers or does not deliver high-quality products. Interviewees indicate to have more confidence in a refurbished product when offered via a well-known company:

"But if you look at Telfort (large Dutch telecommunication company), who has a name or something, that gave me a sort of trusted feeling." [NB5]

These findings extend the work of Hamzaoui Essoussi & Linton (2014) by demonstrating that not only a brand, but also a seller, serves as a form of warranty.

Although seller image has been shown to affect consumers' perceived risk-benefit balance, the direct effect of seller influence remains ambiguous. Our research provides no direct evidence for the assumption made by Subramanian & Subramanyam (2012) that refurbished products offered by an original manufacturer are valued over refurbished products offered by a third-party reseller. However, when the third-party reseller was relatively unknown, participants perceived a higher level of risk. Therefore, we propose that consumers' risk perception depends on the specific name and reputation of the seller, rather than its identity as third-party reseller or original manufacturer.

The *retail experience* influences consumers' risk perception in two ways. First, participants used store appearance, communication materials and store personnel as criteria for seller expertise. Furthermore, the retail experience determines the extent to which the consumer can try and experience the product before purchase. As Rogers (2003) identified in relation to new products, personal experience with the product in a store reduces the perceived risk by providing direct evidence of product performance.

4.4.1 Product-related factors

Finally, it has been found that four characteristics of the physical product itself play a role in consumer perception of refurbished products. Factors like *performance characteristics*, *use history*, *product*

appearance, and *specific characteristics of electronic devices* influence the consumer in forming an idea about the quality and value of a refurbished phone.

Performance characteristics are reported to be most important in the assessment of a refurbished mobile phone. This emphasis on functionality may be driven by the fear for functional failure, which is strengthened by *uncertainty about the use history* of the product. The absence of functional deterioration as a result of prior use is found to be of essential importance:
"A small dent in the edge or some very light scratches on the back, is not that exciting in my opinion. But technically the product should just be completely blameless." [RB6]

In line with earlier academic work (Atasu et al., 2010; Guide & Li, 2010; Jiménez-Parra et al., 2014; Yalabik et al., 2014), this quote suggests that consumers interested in refurbished products primarily seek for functionality instead of newness or outstanding appearance. However, it could be argued that product characteristics related to appearance or innovation, were overruled by high risk related considerations on top of consumers' mind. Following the findings of Luchs et al. (2012), consumers should first be convinced that refurbished products meet a minimum functional threshold before other characteristics will be taken into account.

Although *product appearance* has not been reported as a primary criterion, appearance characteristics influence consumers' perception of risks and benefits. For example, interviewees reported that a refurbished phone should experience as new and severe damages are not accepted. Research on consumers' perception of new products has shown that consumers are inclined to use product appearance as an indicator for a product's quality, ease of use and performance (Bloch, 1995; Creusen & Schoormans, 2005; Mugge & Schoormans, 2012a, 2012b). Therefore, product appearance may also have an indirect influence on the perception of refurbished products.

The absence of an expressed need to change the product appearance during refurbishment in combination with the distinctive and timeless design of the Apple phones involved in this research can be seen as a confirmation of the power of aesthetic durability to extend the product life cycle (Bakker

et al., 2014; Chapman, 2005; Mugge et al., 2005; Van Nes, 2003). In this context, it is argued that a good and timeless initial design can contribute to consumer acceptance of refurbished products.

It has been identified that *specific characteristics of electronic devices* increase the level of risk associated with refurbished mobile phones. First, interviewees reported that product quality and functionality of a phone are difficult to judge from its exterior, which caused a fear that the product contains internal damages the consumer cannot identify. Second, interviewees reported a feeling that consumer electronics are purposively designed to break down after a couple of years, in the literature identified as 'planned obsolescence' (Bakker et al., 2014). Because refurbished products are already used for some time, this idea caused the fear that the product may break down quickly. Third, interviewees indicated that the phone market is innovating continuously and products go out of date simultaneously. Consequently, consumers displayed a fear that a refurbished phone will become technically obsolete quickly.

Based on our results, an extended model of the consumer decision-making process has been developed (Fig. 6).

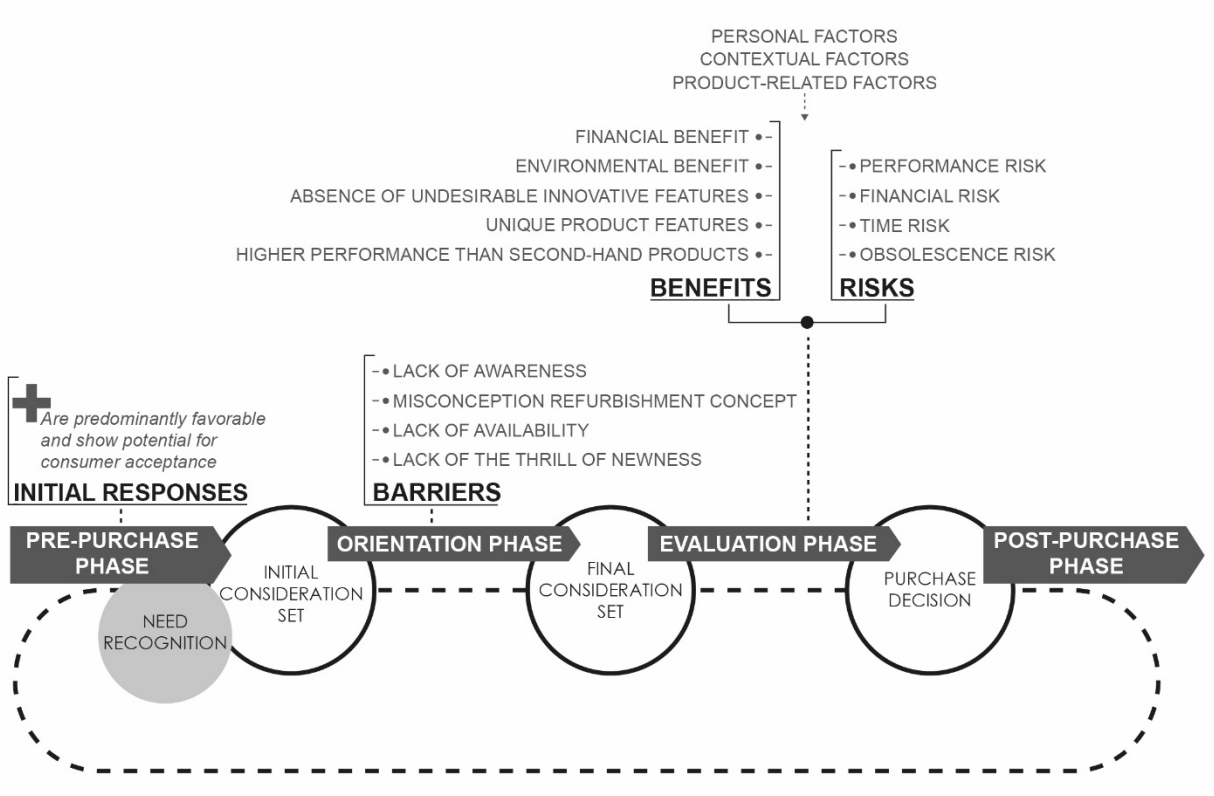


Fig. 6:

Model of the consumer decision-making process showing the main factors influencing consumer acceptance of refurbished mobile phones

5. Towards increasing consumer acceptance: practical guidelines

To increase consumer acceptance of refurbished products, an integral approach is developed to stimulate consumers' awareness and understanding of refurbishment and position refurbished products as a unique and suitable alternative for new products.

The starting point is building a strong product basis, which is the essence of any refurbished market offer. Building a strong product basis implies both optimizing the original product design for multiple lifecycles, by including design for circularity in the design objectives, and integrating product design in the refurbishment process. Combining these two perspectives is essential to develop an efficient refurbishment process that enables easy maintenance, recovery and modification of products. Product design during refurbishment is primarily aimed at optimizing functional attributes that have a high chance of deterioration because of prior use. Subsequently, possibilities to add value during

refurbishment can be investigated and exploited. For example, innovative parts can be integrated in refurbished products (Gehin et al., 2007). A product appearance update can give the refurbished product a distinctive character that evokes an 'as new' experience, acts quality signal and provides unique aesthetic value. A slightly deviating product design can also be used as a tool to communicate the unique benefits of refurbished products and to trigger consumers' curiosity. However, it can be questioned if consumers will buy a product that actively shows evidence of refurbishment. Motivated by status concerns and the desire to meet social norms, consumers may prefer refurbished products that look just like new.

With a strong product as foundation, we propose an approach towards increased consumer acceptance in three steps: attract, convince and involve (Fig. 7).

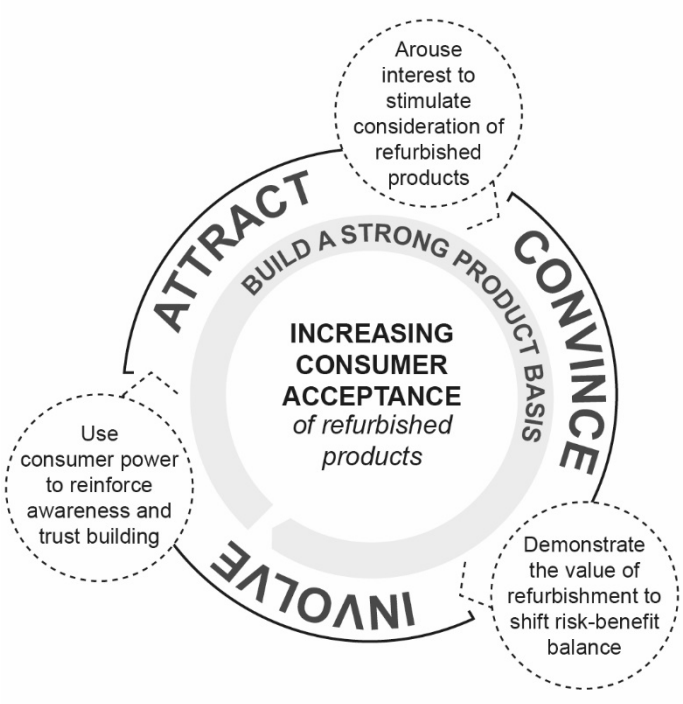


Fig. 7:

Increasing consumer acceptance of refurbished products in three steps

First, it is crucial to *attract consumers* when still in the orientation phase, by tackling the identified barriers and triggering consumers' interest to take refurbished products into consideration. Attracting consumers starts with building awareness and making refurbished products widely known as a high-quality alternative for new products. Promotional activities should be developed that arouse

consumers' curiosity and communicate the distinctive properties of refurbishment. Furthermore, companies and distribution partners should collaborate to improve accessibility and offer refurbished products via different online and offline stores close to the consumer. Extrinsic product characteristics, like store interior, advertising, product presentation and packaging, can be used to develop a shopping experience that evokes emotional appeal and a thrill of newness (Enneking et al., 2007, Moskowitz, 1994). Such an effort is also important to eliminate negative associations with second-hand products.

After attracting the consumer, the consumer should be *convinced of the value of a refurbished product* during the in-depth evaluation of risks and benefits. Because the evaluation phase comprises of a more rational assessment of risks and benefits, consumers should be provided with extensive, transparent and accessible information about both the refurbishment process and specific product properties. This information provision should communicate the functional, financial, and environmental benefits of refurbished products to attract environmentally conscious consumers. To significantly reduce the perceived risk related to refurbished products, companies should strengthen their product offer with high-quality service and warranty programs that relieves consumers from any product performance-related risks. Finally, to gain consumers' trust, companies should strive to support their offer with independent confirmations, such as consumer reviews or quality labels.

The last step in working towards increased consumer acceptance of refurbished products, is to *involve consumers in the use and growth of refurbishment*. Companies should invest in building strong relationships with customers and use customers as ambassadors of refurbished products. Positive word of mouth and increased familiarity will be crucial to build awareness and convince consumers of the value of refurbished products.

6. General discussion

Driven by a growing commercial and environmental interest in refurbishment, this research is the first to explore the factors influencing consumer acceptance of refurbished products. By investigating consumer acceptance from a decision-making perspective, this research has revealed that a refurbished product can be accepted or rejected at different moments in the run-up to product acquisition. We suggest that the prevailing consumer response to a refurbished mobile phone offer can be

characterized by the sentence “Yes, but ... ”. The “yes” follows from the positive initial responses reported in this research, which uncovers a high potential for consumer acceptance of refurbished mobile phones. However, the “but” characterizes the variety of obstacles consumers perceive during decision-making that results in rejecting the refurbished product as final purchase alternative. This rejection can already take place in the orientation phase, due to barriers that prevent the refurbished product to enter consumers’ final consideration set, or during the succeeding assessment of perceived risks and benefits (Fig. 6).

Where previous research has focused on the high level of perceived risk as key obstacle for consumer acceptance of refurbished products, our findings reveal that current low consumer acceptance of refurbished products can be explained by a lack of familiarity and weak image associated with refurbished products. The insights and guidelines provided can be used to develop and commercialize refurbished products that best satisfy consumer needs and are perceived as more than a low-cost alternative for new products. This last remark is of crucial importance, because only when consumers accept and purchase refurbished products as substitutes for new products, refurbishment can contribute to a sustainable society. In case the majority of consumers considers refurbished products only as a supplement to new products, like a second mobile phone as backup, refurbishment cannot be an answer to the waste problem of our current society.

6.1 Future research

Research on the consumer response to refurbished products is still in an initial stage. We have identified various pertinent issues that need further verification to extend the theory on consumers’ response towards refurbished products. Consumers’ responses towards refurbished products are complex and diverse. We assume that this diversity can be explained by individual differences and the existence of market segments. Future research should address this issue by investigating the influence of individual differences and identifying consumer segments that are interesting as a target audience for refurbished products. It would also be interesting to explore consumer acceptance of refurbished products in different cultural contexts, where refurbishment is more or less common. Because our research focused only on refurbished mobile phones from a premium, iconic brand, it would be

valuable to investigate the relevance of our findings for other product categories and explore which product categories are suitable for refurbishment from a consumer perspective. Furthermore, future research can investigate the specific influence of the brand and develop an understanding of the value of refurbishment for low-end markets. It could be argued that consumer acceptance will be more difficult in these markets, because the financial benefit and brand appeal play a less significant role and risk perception may be high because the brand lacks the ability to act as quality assurance. Finally, our study identified the importance of information provision and product design to make refurbished products a satisfying substitute for new products. To accelerate commercialization of refurbished products, future research should investigate issues like the influence of the type and source of information provided, the influence of wear and tear, or the impact of appearance updates.

6.1 Conclusion

To conclude, we aimed to catalyze the process towards a wider consumer acceptance of refurbished products in the consumer market. We have given an initial impetus to encourage and support consumer companies to set up a strong, high-quality market for refurbished products that is commercially attractive and simultaneously contributes to a more sustainable society. The future is about doing more with less and this research shows how refurbishment can be used to make that possible.

References

Abbey, J. D., Meloy, M. G., Guide Jr, V. D. R., & Atalay, S. (2015). Remanufactured products in closed-loop supply chains for consumer goods. *Production and Operations Management, 24*(3), 488-503.

Abdulrahman, M. D. A., Subramanian, N., Liu, C., & Shu, C. (2014). Viability of remanufacturing practice: A strategic decision making framework for Chinese auto-parts companies. *Journal of Cleaner Production, 105*, 311 - 323.

Agrawal, V. V., Atasu, A., & Van Ittersum, K. (2015). Remanufacturing, third-party competition, and consumers' perceived value of new products. *Management Science, 61*(1), 60-72.

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*(2), 179-211.

Allwood, J. M., Ashby, M. F., Gutowski, T. G., & Worrell, E. (2011). Material efficiency: A white paper. *Resources, Conservation and Recycling, 55*(3), 362-381.

Armstrong, C. M., Niinimäki, K., Kujala, S., Karell, E., & Lang, C. (2015). Sustainable product-service systems for clothing: Exploring consumer perceptions of consumption alternatives in Finland. *Journal of Cleaner Production, 97*, 30-39.

Atasu, A., Guide Jr, V. D. R., & Van Wassenhove, L. N. (2010). So what if remanufacturing cannibalizes my new product sales. *California Management Review, 52*(2), 56-76.

Atasu, A., Sarvary, M., & Van Wassenhove, L. N. (2008). Remanufacturing as a marketing strategy. *Management Science, 54*(10), 1731-1746.

Auerbach, C. F., & Silverstein, L. B. (2003). *Qualitative data: An introduction to coding and analysis*. New York: New York University Press.

Ayres, R., Ferrer, G., & Van Leynseele, T. (1997). Eco-efficiency, asset recovery and remanufacturing. *European Management Journal, 15*(5), 557-574.

Bakker, C., Wang, F., Huisman, J., & den Hollander, M. (2014). Products that go round: Exploring product life extension through design. *Journal of Cleaner Production, 69*, 10-16.

Bettman, J. R., Johnson, E. J., & Payne, J. W. (1991). Consumer decision making. In T. S. Robertson & H. H. Kassarijan (Eds.), *Handbook of Consumer Behavior* (pp. 50-84). New York: Prentice-Hal.

Bloch, P. H. (1995). Seeking the ideal form: Product design and consumer response. *Journal of Marketing, 59*(3), 16-29.

Boulstridge, E., & Carrigan, M. (2000). Do consumers really care about corporate responsibility? Highlighting the attitude-behaviour gap. *Journal of Communication Management, 4*(4), 355-368.

Camerer, C., & Weber, M. (1992). Recent developments in modeling preferences: Uncertainty and ambiguity. *Journal of Risk and Uncertainty, 5*(4), 325-370.

Catulli, M. (2012). What uncertainty? Further insight into why consumers might be distrustful of product service systems. *Journal of Manufacturing Technology Management, 23*(6), 780-793.

Chapman, J. (2005). *Emotionally durable design: Objects, experiences and empathy*. London: Earthscan.

Cooper, T. (2005). Slower consumption: Reflections on product life spans and the "throwaway society". *Journal of Industrial Ecology*, *9*(1-2), 51-67.

Creusen, M. E., & Schoormans, J. P. L. (2005). The different roles of product appearance in consumer choice. *Journal of Product Innovation Management, 22*(1), 63-81.

Ellen MacArthur Foundation (2012). *Towards the circular economy: Economic and business rationale for an accelerated transition*. Retrieved 22-07-2014, from http://www.ellenmacarthurfoundation.org/business/reports/ce2012.

Ellsberg, D. (1961). Risk, ambiguity, and the Savage axioms. *Quarterly Journal of Economics, 75*(4), 643-669.

Engel, J. F., Kollat, D. T., & Blackwell, R. D. (1968). *Consumer behavior*. New York: Holt, Rinhart & Winston.

Enneking, U., Neumann, C., & Henneberg, S. (2007). How important intrinsic and extrinsic product attributes affect purchase decision. *Food Quality and Preference, 18*(1), 133-138.

Debo, L. G., Toktay, L. B., & Van Wassenhove, L. N. (2005). Market segmentation and product technology selection for remanufacturable products. *Management Science, 51*(8), 1193-1205.

Gehin, A., Zwolinski, P., & Brissaud, D. (2008). A tool to implement sustainable end-of-life strategies in the product development phase. *Journal of Cleaner Production, 16*(5), 566-576.

Goodall, P., Rosamond, E., & Harding, J. (2014). A review of the state of the art in tools and techniques used to evaluate remanufacturing feasibility. *Journal of Cleaner Production, 81*, 1-15.

Govindan, K., Shankar, K. M., & Kannan, D. (2015). Application of fuzzy analytic network process for barrier evaluation in automotive parts remanufacturing towards cleaner production–a study in an Indian scenario. *Journal of Cleaner Production*. Advance online publication. doi: 10.1016/j.jclepro.2015.06.092

Guest, G., Bunce, A., & Johnson, L. (2006). How many interviews are enough? An experiment with data saturation and variability. *Field Methods*, *18*(1), 59-82.

Guide Jr, V. D. R., & Li, J. (2010). The potential for cannibalization of new products sales by remanufactured products. *Decision Sciences, 41*(3), 547-572.

Guide, V. D. R., & Wassenhove, L. N. (2001). Managing product returns for remanufacturing. *Production and Operations Management, 10*(2), 142-155.

Hamzaoui Essoussi, L., & Linton, J. D. (2010). New or recycled products: How much are consumers willing to pay? *Journal of Consumer Marketing, 27*(5), 458-468.

Hamzaoui-Essoussi, L., & Linton, J. D. (2014). Offering branded remanufactured/recycled products: At what price? *Journal of Remanufacturing, 4*(1), 24.

Harms, R., & Linton, J. D. (2015). Willingness to pay for eco-certified refurbished products: The effects of environmental attitudes and knowledge. *Journal of Industrial Ecology*. Advance online publication. doi: 10.1111/jiec.12301

Hatcher, G., Ijomah, W., & Windmill, J. (2011). Design for remanufacture: A literature review and future research needs. *Journal of Cleaner Production, 19*(17-18), 2004-2014.

Hazen, B. T., Overstreet, R. E., Jones-Farmer, L. A., & Field, H. S. (2012). The role of ambiguity tolerance in consumer perception of remanufactured products. *International Journal of Production Economics, 135*(2), 781-790.

Hirschman, E. C., & Holbrook, M. B. (1982). Hedonic consumption: Emerging concepts, methods and propositions. *Journal of Marketing, 46*(3), 92-101.

Hughner, R. S., McDonagh, P., Prothero, A., Shultz, C. J., & Stanton, J. (2007). Who are organic food consumers? A compilation and review of why people purchase organic food. *Journal of Consumer Behaviour, 6*(2-3), 94-110.

Ijomah, W. L., Bennett, J. P., & Pearce, J. (1999, February). Remanufacturing: Evidence of environmentally conscious business practice in the UK. In *Proceedings of the First International Symposium On Environmentally Conscious and Inverse Manufacturing* (pp. 192-196). IEEE.

Ijomah, W. L., McMahon, C. A., Hammond, G. P., & Newman, S. T. (2007). Development of design for remanufacturing guidelines to support sustainable manufacturing. *Robotics and Computer-Integrated Manufacturing, 23*(6), 712-719.

Jiménez-Parra, B., Rubio, S., & Vicente-Molina, M.-A. (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.

Linton, J. D. (2008). Assessing the economic rationality of remanufacturing products. *Journal of Product Innovation Management, 25*(3), 287-302.

Luchs, M. G., Brower, J., & Chitturi, R. (2012). Product choice and the importance of aesthetic design given the emotion-laden trade-off between sustainability and functional performance. *Journal of Product Innovation Management, 29*(6), 903-916.

Meyer, A. (2001). What's in it for the customers? Successfully marketing green clothes. *Business Strategy and the Environment, 10*(5), 317-330.

Michaud, C., & Llerena, D. (2011). Green consumer behaviour: An experimental analysis of willingness to pay for remanufactured products. *Business Strategy and the Environment, 20*(6), 408-420.

Mitchell, V.-W., & Boustani, P. (1994). A preliminary investigation into pre-and post-purchase risk perception and reduction. *European Journal of Marketing, 28*(1), 56-71.

Mont, O., Dalhammar, C., & Jacobsson, N. (2006). A new business model for baby prams based on leasing and product remanufacturing. *Journal of Cleaner Production, 14*(17), 1509-1518.

Moskowitz, H. R. (1994). *Food concepts and products: Just in time development*. Trumbull CT: Food and Nutrition Press.

Mowen, J. C. (1988). Beyond consumer decision making. *Journal of Consumer Marketing, 5*(1), 15-25.

Mugge, R., Schoormans, J. P. L., & Schifferstein, H. N. (2005). Design strategies to postpone consumers' product replacement: The value of a strong person-product relationship. *The Design Journal, 8*(2), 38-48.

Mugge, R., & Schoormans, J. P. L. (2012a). Newer is better! The influence of a novel appearance on the perceived performance quality of products. *Journal of Engineering Design, 23*(6), 469-484.

Mugge, R., & Schoormans, J. P. L. (2012b). Product design and apparent usability. The influence of novelty in product appearance. *Applied Ergonomics, 43*(6), 1081-1088.

Olshavsky, R. W., & Granbois, D. H. (1979). Consumer decision making-fact or fiction? *Journal of Consumer Research, 6*(2), 93-100.

Ovchinnikov, A., Blass, V., & Raz, G. (2014). Economic and environmental assessment of remanufacturing strategies for product+ service firms.*Production and Operations Management, 23*(5), 744-761.

Pang, G., Casalin, F., Papagiannidis, S., Muyldermans, L., & Tse, Y. K. (2015). Price determinants for remanufactured electronic products: a case study on eBay UK. *International Journal of Production Research*, *53*(2), 572-589.

Patton, M. Q. (2002). *Qualitative research & evaluation methods*. Thousand Oaks: SAGE Publications.

Petty, R. E., Cacioppo, J. T., & Schumann, D. (1983). Central and peripheral routes to advertising effectiveness: The moderating role of involvement. *Journal of Consumer Research, 10*(2), 135-146.

Rathore, P., Kota, S., & Chakrabarti, A. (2011). Sustainability through remanufacturing in India: A case study on mobile handsets. *Journal of Cleaner Production*, *19*(15), 1709-1722.

Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). New York: Free Press.

Rose, C. M. (2000). *Design for environment: A method for formulating product end-of-life strategies.* Stanford University.

Sharma, V., Garg, S. K., & Sharma, P. B. (2014). Identification of major drivers and roadblocks for remanufacturing in India. *Journal of Cleaner Production*. Advance online publication. doi: 10.1016/j.jclepro.2014.11.082

Souza, G. C. (2013). Closed-loop supply chains: A critical review, and future research. *Decision Sciences, 44*(1), 7-38.

Subramoniam, R., Huisingh, D., Chinnam, R. B., & Subramoniam, S. (2013). Remanufacturing Decision-Making Framework (RDMF): research validation using the analytical hierarchical process. *Journal of Cleaner Production, 40*, 212-220.

Subramanian, R., & Subramanyam, R. (2012). Key factors in the market for remanufactured products. *Manufacturing & Service Operations Management*, *14*(2), 315-326.

Thompson, D. V., Hamilton, R. W., & Rust, R. T. (2005). Feature fatigue: When product capabilities become too much of a good thing. *Journal of Marketing Research*, *42*(4), 431-442.

Van Nes, C. N. (2003). *Replacement of durables: Influencing product lifetime through product design.* Erasmus University Rotterdam, the Netherlands.

Vasudevan, H., Kalamkar, V., & Terkar, R. (2012). Remanufacturing for sustainable development: Key challenges, elements, and benefits. *International Journal of Innovation, Management and Technology*, *3*(1), 84-89.

Wang, Y., & Hazen, B. T. (2015). Consumer product knowledge and intention to purchase remanufactured products. *International Journal of Production Economics*. Advance online publication. doi: 10.1016/j.ijpe.2015.08.031

Wang, Y., Wiegerinck, V., Krikke, H., & Zhang, H. (2013). Understanding the purchase intention towards remanufactured product in closed-loop supply chains: An empirical study in China. *International Journal of Physical Distribution & Logistics Management, 43*(10), 866-888.

Wei, S., Cheng, D., Sundin, E., & Tang, O. (2015). Motives and barriers of the remanufacturing industry in China. *Journal of Cleaner Production, 94*, 340-351.

Yalabik, B., Chhajed, D., & Petruzzi, N. C. (2014). Product and sales contract design in remanufacturing. *International Journal of Production Economics, 154*, 299-312.

Young, W., Hwang, K., McDonald, S., & Oates, C. J. (2010). Sustainable consumption: Green consumer behaviour when purchasing products. *Sustainable Development, 18*(1), 20-31.

Appendix A – List of codes and themes

Code	Corresponding factors discussed in the article
Theme: Initial responses	
1. Satisfaction and enthusiasm (refurbished buyers) 2. Positive interest (new buyers) 3. Doubts as a result of knowledge lack (new buyers) 4. Demand for newness (new buyers)	**Initial responses**
Theme: Barriers	
5. Lack of awareness (new buyers)	**Lack of awareness**
6. Misconception refurbishment concept (refurbished buyers) 7. Misconception refurbishment concept (new buyers) 8. Perception second hand products (new buyers)	**Misconception refurbishment concept**
9. Lack of availability conflicts with need for convenience 10. Lack of availability conflicts with habitual purchase behavior 11. Lack of availability results in unfamiliarity with retail channels	**Lack of availability**
12. Lack of the thrill of newness	**Lack of the thrill of newness**
Theme: Benefits	
13. Financial benefit	**Financial benefit**
14. Environmental benefit not considered 15. Environmental benefit as purchase motivation	**Environmental benefit**
16. Absence of undesirable consequences of innovative features 17. Absence of undesirable learning effort innovations	**Absence of undesirable consequences of innovative features**
18. Unique product features	**Unique product features**
19. Higher performance quality than second-hand products	**Higher performance quality than second-hand products**
Theme: Risks	
20. Perceived risk refurbished buyers relatively low	
21. Performance risk	**Performance risk**

22. Financial risk	**Financial risk**
23. Time risk	**Time risk**
24. Obsolescence risk	**Obsolescence risk**
Theme: Influencing personal factors	
25. Lack of familiarity 26. Familiarity through experience 27. Familiarity through positive word of mouth 28. Public familiarity	**Familiarity**
29. Confidence in own ability to judge	**Low confidence in own ability to judge**
Theme: Influencing contextual factors	
30. Warranty and service as risk reliever 31. Warranty and service as trust builder 32. Warranty and service via physical store provides safe point of return 33. Warranty and service as added value 34. Warranty and service needs convenience and speed 35. Warranty and service deficiency	**Warranty and service**
36. Price as a source of risk 37. Price as quality indicator	**Price**
38. Information provision general characteristics and benefits 39. Information provision product specific aspects 40. Use of independent testimonials 41. Certification and regulation	**Information provision**
42. Seller image as indicator of seller expertise and quality 43. Seller image as trust builder 44. Seller image deficiency unknown company 45. Seller image OEM vs. IRBC 46. Seller image professional company as trust builder	**Seller image**

47. Brand image as trust builder	**Brand image**
48. Retail experience provides possibility to try the product 49. Retail experience as indicator of seller expertise	**Retail experience**
Theme: Influencing product-related factors	
50. Performance is valued over newness and appearance 51. Performance demands: no functional deterioration 52. Performance demands: no (data) traces previous user 53. Performance demands: long lifetime 54. Performance demands: good working battery 55. Performance demands: up to date software 56. Performance demands: Replace parts sensitive to hygienic problems	**Performance characteristics**
57. Uncertainty about use history	**Use history**
58. Product appearance as quality indicator 59. Product appearance damages 60. Product appearance change 61. Aesthetic durability	**Product appearance**
62. Specific characteristic electronic devices: quality cannot be judged on exterior 63. Specific characteristic electronic devices: planned obsolescence 64. Specific characteristic electronic devices: fast developing technology	**Characteristics of electronic devices**