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The influence of information about prior use on consumers' evaluations of refurbished electronics

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Keywords

Refurbishment
Consumer behaviour
Circular economy
Evaluations

Abstract

Refurbishment – the process of collecting used products, assessing their condition, and replacing and/or upgrading parts in order to resell them to other consumers – is increasingly seen as both economically and environmentally advantageous. The present research investigates in an experimental study and with qualitative post-hoc interviews how information about prior use – offered in either a visual (signs of wear and tear) or verbal (textual description) form – influences consumers' evaluations of refurbished products. The findings show that providing consumers with information about the prior use of refurbished electronics does not have a univocal effect on consumers' evaluations of such products. Visual information about prior use, in terms of signs of wear and tear, has a negative effect on consumers' evaluations of refurbished electronics. Furthermore, presenting consumers with verbal information on prior use can negatively affect consumers' evaluations of a refurbished if no signs of wear and tear are present because it confuses consumers. If signs of wear and tear are present, verbal information about prior use will not influence consumers' evaluations.

Introduction

Refurbishment – the process of collecting used products, assessing their condition, and replacing and/or upgrading parts in order to resell them to other consumers – is increasingly seen as both economically and environmentally advantageous (Pigosso et al. 2010). Past research covers the strategic and logistic factors involved in refurbishment, acknowledging it as both economically and environmentally advantageous (e.g., Ijomah et al. 2007; Rathore et al. 2011). Nevertheless, refurbishment is only effective when consumers accept such products as a viable alternative to purchasing new products. Currently, this is questionable. Previous studies indicate that consumers display a lower willingness to pay (WTP) for refurbished products (Hamzaoui Essoussi and Linton 2010, 2014; Michaud and Llerena 2011; Tsen et al. 2006) and perceive refurbished products to be of lower quality (Ferguson and Toktay 2006; Hamzaoui Essoussi and Linton 2014). For companies engaging in refurbishment, it is therefore important to tailor their production and marketing strategies to improve consumers' evaluations to succeed with refurbished products.

The present research contributes to the extant literature on refurbishment by investigating two factors related to companies' production and marketing strategies for refurbished products, which distinguish such products from new ones. Specifically, we investigate how information about prior use – offered in either a visual (signs of wear and tear) or verbal (textual description)

form – influences consumers' evaluations of refurbished products.

With respect to visual information about prior use, in the form of signs of wear and tear, companies have different options for refurbishment (Hazen et al. 2012; Sharma et al. 2014). Manufacturers can either update the exterior or leave signs of wear and tear from prior use untouched. Previous studies on refurbishment concluded that the product appearance is not a primary criterion in consumers' purchase process of a refurbished product when the wear and tear is not severe and as long as the product still functions (Van Weelden et al. 2016). Consumers indicate that their evaluation of a refurbished product is mainly based on its functionality (Jimenez-Parra et al. 2014; Mugge et al., 2017), suggesting that wear and tear plays only a minor role. However, research on product appearance has demonstrated that consumers use the appearance of a product to draw inferences about a product's performance quality (Mugge 2011; Mugge and Schoormans 2012; Page and Herr, 2002). For example, consumers perceive products with a less attractive appearance as having lower quality. As the presence of wear and tear on (electronic) products is generally believed to be unattractive, we expect that these inferences about lower quality will negatively affect consumers' evaluations of refurbished electronics.

In addition, we investigate the effect of providing verbal

information about prior use on consumers' evaluations of refurbished electronics. Consumers generally experience a higher perceived risk and uncertainty for refurbished than for new products (Hamzaoui Essoussi and Linton 2010; Van Weelden et al. 2016). Prior studies concluded that gathering more information lowers the perceived risk when consumers purchase a new product (Derbaix 1983; Gabott 1991). In line with these findings, Van Weelden et al. (2016) concluded that consumers are more likely to purchase a refurbished product when they receive verbal information about its prior use. However, there is also research stating that providing such verbal information about the prior use can be counter-productive. A study on second-hand clothing revealed that consumers had a higher disgust rate when informed that the clothing had previously been used, cleaned, and sanitized (Ackerman and Hu 2015). To this end, we propose that verbal information about prior use will interact with the effect of visual information (in the form of signs of wear and tear) on consumers' evaluations of refurbished electronics. Prior research concluded that consumers prefer congruence between the information provided by a verbal cue and the visual product appearance (Van Rompay et al. 2009; 2010). A state of congruence is established when the visual and verbal information communicate equivalent information. When refurbished electronics show no signs of prior use, consumers are less aware of the prior use through the presented visual information. Then, verbal information about prior use is incongruent to consumers' expectations and maybe detrimental to their evaluations of refurbished electronics as the verbal information makes consumers more attentive of the prior use. However, when refurbished electronics show signs of wear and tear, consumers realize that the products have a use history. In such a situation, presenting consumers with verbal information about prior use will be congruent to their expectations, and will not influence their evaluations of refurbished electronics.

To investigate the effects of visual and verbal information about prior use, we performed an experimental study in which both types of information were manipulated. Furthermore, we conducted post-hoc interviews in order to gain a contextualized understanding of the experimental findings.

Experimental study

Method

Study design and participants

The experimental study used a 2 (verbal information about prior use: present vs. absent) \times 2 (visual information about prior use: wear and tear present vs. wear and tear absent) between-subjects design. One hundred and ten members from a consumer panel participated in the study (52% male, mean age = 46 years; response rate = 55%). They were approached by e-mail and received a small compensation (€3.45) for their participation.

Stimuli

An Apple iPhone 5 was selected as the stimulus product.

At the time of the study, refurbished iPhone 5s in different conditions were sold on the Dutch consumer market by such retailers as Leapp and Iused. To create stimuli for the manipulation of the visual information about prior use, a picture of an iPhone 5 showing no wear and tear was digitally altered. Scratches were added on the backside of the phone together with a small scratch and a dent on the front (see Appendix A).

To create stimuli for the verbal information about prior use, a pre-test was conducted among eight respondents who were asked to report on their recently discarded smartphones. Based on these responses, a text was created to provide a realistic prior use scenario for a refurbished smartphone (see Appendix B). All stimuli were accompanied by general information about the price, warranty, aesthetic and technical state of the smartphone.

Procedure and measures

In the online questionnaire, participants first received a brief explanation that refurbishment is the process in which a used product is refurbished to a proper working condition by disassembling, checking, and cleaning it, and by replacing or upgrading parts that do not meet the standard. Subsequently, they were shown one of the four conditions and were asked to respond to a series of questions.

Consumers' evaluation of the refurbished smartphone was measured using four 7-point scale items anchored by bad/good; dislike/like; unfavourable/favourable; negative/positive ($\alpha=0.95$). To assess the success of the manipulations of verbal and visual information about prior use, multi-item measures for the perceived wear and tear (e.g., This phone is visibly damaged; $\alpha=0.96$) and participants' knowledge of the smartphone's prior use (e.g., I know how the previous user used this phone; $\alpha=0.76$) were included. To control for attitudinal and trait differences in participants, we also included multi-item measures for environmental concern, novelty seeking, and their attitude towards the Apple brand.

Results and Discussion

Manipulation checks

To test whether the manipulations were successful, a 2 \times 2 ANOVA with perceived wear and tear as the dependent variable and both visual (i.e., wear and tear) and verbal information about prior use as the independent variables was performed. A significant main effect was found for visual information about prior use, which showed that this manipulation was successful ($M_{\text{wear absent}}=2.40$ vs. $M_{\text{wear present}}=5.74$; $F(1,106)=198.17$ $p<0.001$).

A 2 \times 2 ANOVA on participants' knowledge of prior use revealed a significant main effect for the independent variable verbal information about prior use, again providing support for the manipulation ($M_{\text{Info absent}}=1.96$ vs. $M_{\text{Info present}}=3.91$; $F(1,106)=49.51$, $p<0.001$).

Main findings

To test the effects of visual and verbal information about prior use on consumers' evaluations of refurbished electronics, a 2x2 ANCOVA was performed on attitude towards the product. Environmental concern, novelty seeking, and attitude towards the Apple brand were included as covariates.

First, a main effect was found for visual information about prior use (i.e., wear and tear) on consumers' attitude, indicating that participants evaluated refurbished electronics more positively when no signs of wear and tear were present compared with when it had signs of wear and tear ($M_{\text{wear absent}}=4.65$ vs. $M_{\text{wear present}}=3.84$; $F(1,98)=9.16$, $p<0.01$). Furthermore, a significant interaction effect was found ($F(1,98)=4.69$, $p<0.05$), which suggests that the effect of visual information about prior use on the evaluation of refurbished electronics depends on the presence of verbal information about how the product was used before. Two separate ANCOVAs showed that when the refurbished electronics had no signs of wear and tear, participants evaluated it more positively when no verbal information about prior use was provided ($M_{\text{verbal absent}}=5.11$ vs. $M_{\text{verbal present}}=4.18$; $F(1,42)=5.91$, $p<0.05$). In contrast, when signs of wear and tear were present, participants' attitude towards the refurbished electronics did not differ depending on the presence or absence of verbal information about prior use ($M_{\text{verbal info absent}}=3.72$ vs. $M_{\text{verbal info present}}=3.99$; $F(1,53)<1$).

These findings suggest that the role of wear and tear is more prominent than previously assumed in the refurbishment literature. Wear and tear may first of all reduce the aesthetic and symbolic qualities of electronics. Furthermore, it may influence its perceived functional value. As it is difficult for consumers to judge the performance quality of refurbished electronics, consumers may use the product appearance as a quality cue and, accordingly, evaluate these less positively in the presence of signs of wear and tear.

Qualitative post-hoc interviews

We devised qualitative post-hoc interviews to obtain a contextualized understanding about how consumers evaluate refurbished electronics. We performed 12 focused interviews with a convenience sample of Dutch adults between 20 and 65 (mean age=40.4, seven males). All interviews were audio recorded and transcribed for further analysis. We started the interview by explaining the concept of refurbishment. Next, we presented them with one of the two pictures that we had used for the wear and tear conditions in the experimental study. After having inspected their assigned picture, they were asked to state their immediate thoughts and opinions about this refurbished smartphone, followed by specific questions probing the risk they perceived in purchasing the product and their overall evaluation. Following this first (visual) evaluation of the product, we presented them with the verbal information about prior use from the experimental study and asked them to reassess their first evaluation.

We analysed the interviews through two stages of thematic coding. For the first stage of coding, we familiarized ourselves with the data through open coding. We inductively extracted a first set of themes (topics) covering what had been discussed during the interviews. For the second stage, we deductively analysed the interviews further through closed coding, iteratively refining our analysis as we reviewed and compared the different reasoning patterns in the transcripts.

Findings

The interviewees spoke freely and without any problem about the refurbished smartphone during the interviews, often elaborating on their reasoning without a need for additional probing. The presence/absence of visual wear and tear was immediately commented upon at the beginning of each interview. The interviewees who first had been given the phone with wear and tear were initially more hesitant, frequently stating that the phone was too expensive given its current condition (e.g., "For this price, I wouldn't buy a phone that is still damaged," F41). In contrast, interviewees who first had been given the refurbished phone without wear and tear typically expressed more interest in buying the phone before reading the verbal information.

Having access to the verbal information elicited different responses about the refurbished smartphones from the interviewees. Specifically, and corresponding to the results of the experimental study, access to verbal information about prior use did not change consumers' evaluations for the refurbished phone with wear and tear but resulted in more negative evaluations for the refurbished phone without wear and tear. When the interviewees had been presented with the smartphone with wear and tear, the verbal information about prior use typically confirmed the interviewees' prior assessment of the phone and was thus considered congruent:

"Cosmetically, I can see for myself how it looks. Then, it doesn't matter what happened to it earlier. Furthermore, it doesn't influence the way I think about this phone's functionality." (F41)

In contrast, when the interviewees had been presented with the phone without wear and tear, the impact of verbal information on their initial responses can best be described as confusing and incongruent. In fact, a number of the interviewees immediately asked for reassurance that the verbal and visual information were about the same phone:

"Because it says here that it is like-new. Of course that doesn't have to be contradictory, because maybe they changed the casing. I mean they made sure it looked like new again, so it's confusing this way." (M26)

In probing into the need for providing verbal information about the product and the refurbishment process, none of the interviewees that had seen a smartphone without

wear and tear expressed an interest in information about prior use. Instead, they explained how it tempered their enthusiasm about the phone and raised some doubts about whether the phone would look like-new or be damaged.

Conclusions

Refurbishment provides an interesting strategy for consumer electronics companies to contribute to a circular economy but its success depends on consumers' acceptance of refurbished products as an alternative to purchasing new ones. Companies thus need knowledge on how to tailor their production and marketing strategies to increase the success of their refurbishment practices. This study contributes to this stream of research by investigating in two studies how information about prior use – in either a visual (signs of wear and tear) or a verbal (textual description) form – influences consumers' evaluations of refurbished electronics. The findings show that providing consumers with information about the prior use of refurbished electronics does not have a univocal effect on consumers' evaluations of the refurbished product. In general, consumers evaluate refurbished products with visual information about prior use (i.e., wear and tear)

more negatively. Furthermore, presenting consumers with verbal information on prior use will only be appreciated by consumers if a refurbished product shows signs of wear and tear and there is congruence between the visual and verbal information. If no signs of wear and tear are present, incongruent verbal information confuses consumers, thereby negatively affecting their evaluations.

Our research findings suggest that from a consumer's perspective, it is best to update the exterior to a like-new condition. Consumers evaluate refurbished products more positively if no signs of prior use are visible. In this situation, companies should not remind consumers of the product's first life by providing verbal information about its prior use because this will lower consumers' evaluations.

When a manufacturer decides not to upgrade the exterior (e.g., due to high costs), it can be interesting to provide verbal information about the prior use of a refurbished product. Consumers then consider this information "nice to know" and it may help them in trusting the functionality of the refurbished product.

References

- Ackerman, D. and J. Hu. 2015. Assuring me that it is as 'good as new' just makes me think about how someone else used it. Consumer reaction toward secondhand goods from an information processing perspective. In *Ideas in Marketing: Finding the New and Polishing the Old* (pp. 716-719). Springer International Publishing.
- Derbaix, C. 1983. Perceived risk and risk relievers: An empirical investigation. *Journal of Economic Psychology* 3(1): 19-38.
- Ferguson, M. E. and L. B. Toktay. 2006. The effect of competition on recovery strategies. *Production and Operations Management* 15(3): 351-368.
- 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.
- 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. 2011. The effect of a business-like personality on the perceived performance quality of products. *The Design Journal* 5(3): 67-76.
- Mugge, R. and J. P. L. Schoormans. 2012. 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., 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.
- Page, C., and P. M. Herr. 2002. An investigation of the processes by which product design and brand strength interact to determine initial affect and quality judgments. *Journal of Consumer Psychology* 12(2): 133-147.
- 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.
- Sharma, V., S. K. Garg, and P. B. Sharma. 2016. Identification of major drivers and roadblocks for remanufacturing in India. *Journal of Cleaner Production* 112(3): 1882-1892.
- Tsen, C. H., G. Phang, H. Hasan, and M. R. Buncha. 2006. Going green: A study of consumers' willingness to pay for green products in Kota Kinabalu. *International Journal of Business and Society* 7(2): 40-54.
- Van Rompay, T. J., A. T. Pruyn, and P. Tieke. 2009. Symbolic meaning integration in design and its influence on product and brand evaluation. *International Journal of Design* 3(2).
- Van Rompay, T. J., P. W. De Vries, and X. G. Van Venrooij. 2010. More than words: on the importance of picture-text congruence in the online environment. *Journal of Interactive Marketing* 24(1): 22-30.
- 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.

Appendix A
Manipulation of visual information about prior use: wear
and tear present (left) vs. absent (right)



iPhone 5, refurbished

Aesthetic condition:	Visibly used
Technical condition:	Like-new
New-price:	€599,-
Price refurbished:	€367,-
Warranty:	1 year



iPhone 5, refurbished

Aesthetic condition:	Like-new
Technical condition:	Like-new
New-price:	€599,-
Price refurbished:	€367,-
Warranty:	1 year

Appendix B

Manipulation of verbal information about prior use

Previous use

For how long did you use this product?

2 years

How frequently did you use it?

Several times a day

What did you use it for?

The phone was my main source of communication. Furthermore it was used to check the news, plan my trips, listen to music, watch videos, gaming and taking photos.

Why did you dispose of the product?

The phone was not sufficient anymore. It was too slow and the battery life had decreased a lot. Besides that, the software was malfunctioning, not running some apps anymore.

Can you give an explanation of the wear and tear on the product (when present)?

There are some scratches on the back. These were mostly caused by my keys being in the same pocket or bag. The dent in the corner was the result of dropping my phone on the street during cycling.