
Consumer Knowledge and Young Consumer Purchase Behaviour towards Remanufactured products

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Abstract

Remanufacturing plays an important role in the transition towards the circular economy. Since many companies have already begun to implement remanufacturing strategies, consumer's adoption of already used products (e.g., remanufactured products) are highly essential. Hence, the consumer's acceptance of the remanufactured product is now receiving more researcher's attention. The findings of recent studies, however, indicate that consumers have a poor opinion on remanufactured products and thus remain reluctant to buy them. Moreover, these studies focus only on the adult generation and overlook the young generation which will become a new purchase power in the near future. Therefore, the main objective of the presented study is to deeply investigate how product-related knowledge influences the young generation's purchase intention towards remanufactured white goods. The author uses the theory of planned behaviour as a theoretical framework and for data collection questionnaire survey. Furthermore, the proposed model is empirically tested, using Ordinary least squares (OLS) regression, based on the responses from 234 university students. The results indicate that consumer's intention to purchase remanufactured products is positively and significantly influenced by consumer attitude, social norm and perceived behavioural control. Moreover, the presented study also demonstrates that consumer's product-related knowledge is positively associated with both consumer's attitude and consumers' intention to purchase remanufactured products. Thus, based on the presented findings, the study not only brings new insight into the purchase behaviour of the young generation towards remanufactured products but also several theoretical and practical implications.

Keywords: consumer knowledge, remanufactured products, purchase behaviour, theory of planned behaviour

Paper type – Academic Research Paper

1 Introduction

Since the 1990s, fast economic growth has escalated worldwide consumption, which subsequently led to the unprecedented levels of the produced waste and unsustainable exploitation of natural resources (Taufique et al., 2017). Thanks to it we have witnessed the rapid environmental deterioration results in increasing global warming (Satterthwaite, 2008). In response to worldwide concern about environmental especially in the recent decade (Vafadarnikjoo et al., 2018) the environmental issues in the context of business activities have become a major topic of academic research interest (Jiménez-Parra et al., 2014). Companies have been starting to implement end-of-use strategies in remanufacturing, recycling and reuse, to contribute to the transition to more sustainable production and consumption.

In the case of remanufacturing, the implementation of these practices (e.g., reused, repaired, replacing degraded, worn out and obsolete components) has been mainly driven by its environmental friendliness and thanks to it has begun play important role in reducing energy consumption and use of virgin material (Wang et al., 2018). Although many studies have already been conducted on this subject, most authors have focused primarily on the supply side of remanufactured products and dismissed the demand side i.e., the consumers' perception. Despite this little attention, the consumers' acceptance of remanufactured products is regarded as one of the most important requirements for transition to the circular economy. And thus, it becomes inevitable to understand the consumers' behaviour, especially they purchase intention towards the remanufactured product.

This paper contributes to the existing literature by the examination of consumers' purchase intention towards the remanufactured product. Specifically, it focuses on remanufactured white goods (major household electrical appliances such as fridges and washing machines), because there is a new effort from its manufacturers (e.g., in Gorenje). Moreover, since responsible consumption is at least partially depending on consumers' knowledge about the product, the author also empirically investigates how product-related knowledge influences consumers' purchase behaviours. Therefore, the key question is set up as: *“How product-related knowledge influence consumers' purchase intention towards the remanufactured product?”*. To answer this question and better understand the consumers' behaviour the author approaches the topic from two perspectives - first, the author investigates which factors play a significant role in determining the purchase intention; second, the author focus on how product-related knowledge influence the attitude-behaviour relationship. Combining both steps the author contribute the research of remanufacturing from consumer's perspective by assessing the purchase intention of Czech young consumers towards remanufactured products.

2 Theoretical framework

2.1 Remanufactured products

Remanufacturing is a production strategy, where the goal is to bring used products to at least their original quality and performance just like newly manufactured ones (Atasu et al., 2010). Therefore, remanufactured products are defined as "*one which has undertaken the process of disassembling, cleaning, inspecting, repairing, replacing and reassembling the components of a part or product to like-new condition*" (Thorn and Rogerson, 2002:35 "in" Hazen et al., 2012). Thanks to it remanufactured products are considered as the engine of closed-loop supply chain and one of the keystones of circular economy (Hazen et al., 2017). Moreover, these products bring several benefits mainly related to the environment, because its production is more sustainable - i.e., up to 70 % less raw material is required, up to 80 % less emission is produced and up to 60 % less energy is consumed (Wang et al., 2013:871).

The remanufactured products also caught the attention of media and prior business leaders in a variety range of industries. Therefore, remanufactured products can be found in the range from automobile parts to office furniture and electronics - e.g., laptops, mobile phones, cameras, mp3 players (Michaud and Llerena, 2011; Wu, 2012). Moreover, the development of remanufactured products has grown rapidly in recent years. In 2015 the remanufacturing industry even generated €30 billion in turnover and by 2030 it is expected that annual value will reach €70-100 billion (Parker et al., 2015 "in" Vafadarnikjoo et al., 2018).

Remanufactured products also bring several benefits to customers such as lower price, availability or purchase flexibility. According to Giutini and Gaudette (2003) price of remanufactured products is usually 30-40 % lower than the price of new products and their lead time is in many cases shorter than by new products. Moreover, in the context of access-based business model, which shifts the emphasis from selling product ownership to selling product use or its functions (Mont, 2008 —" Edbring et al., 2016) the remanufacturers may offer customers additional services such as leasing, take-back, upgrading, etc. (Vafadarnikjoo et al., 2018).

2.2 Theory of Planned Behaviour

The theory of planned behaviour is (TPB) proposed by Ajzen (1991) is an extension of the theory of reasoned action and assumes that the behaviour is determined by behaviour intention (Wang et al., 2013). The Theory of Planned Behaviour (TPB) is an important social a cognitive model, which stems from extensive empirical confirmations in variety contexts (e.g., environmental, social and cultural context). While TPB is one of the most influential theories in health psychology, it finds its usefulness also in the context of green purchase behaviour (e.g., organic food, Zagat, 2012; visitation of the green hotel, Chen and Tung, 2014 - Wang). Moreover, its validity was also confirmed in predicting consumers' purchase behaviour towards remanufactured products (Jiménez-Parra et al., 2014; Khor and Hazen, 2017; Wang et al., 2018).

The TPB built on the assumption that the consumers make their decisions based on rational and reasoned choice, which stems from all available information (Wang et al., 2018). Thus, behavioural intention is determined by individuals' attitude, subjective norm, and perceived behavioural controls (Ajzen, 1991).

Attitude refers to an individuals' favourable or unfavourable evaluation of self-performance of behaviour (Ajzen, 1991). The attitudes are represented by an individual's beliefs, which clarify why people hold given attitudes. Additionally, the attitudes influence the intention, and so the more positive the attitude, the stronger the intention to perform the behaviour will be (Smith, A. Paladino, 2010).

Subjective norms can be conceptualized as the social pressure exerted from people that are important in the individuals' life (family, friends, teachers, etc.) to behave in a certain way (Ajzen, 1991; Singhal et al., 2019). In other words, the greater the influence of others is, the more likely is that he/she will perform the behaviour (Jiménez-Parra et al., 2014; Wang et al., 2018).

Perceived behaviour control is described as an individual's perception of the degree of easiness or difficulty performing the behaviour (Ajzen, 1991; Singhal et al., 2019). It deals with situations where people face external factors - i.e., ability, time and money. Therefore, the fuller control over these circumstances the individuals have, the more likely they will act like that (Wang et al., 2018; Smith, A. Paladino, 2010).

Based on the aforementioned constructs of the TPB, the following hypotheses are proposed.

H1: Attitude positively influences the behavioral intention to buy remanufactured white goods.

H2: Subjective norm positively influences the behavioral intention to buy remanufactured white goods.

H3: Perceived behavioral control positively influences behavioral intention to buy remanufactured white goods.

2.3 Remanufactured knowledge

Product knowledge can be defined as consumers' awareness of specific information (i.e., the features, warranty, price, quality, etc.) related to a particular product (Brucks, 1985). Wood et al. (1995: 283) explain that all this information comes to consumers' mind when encountering a particular product and considering its purchase. Moreover, since knowledge is considered an integral part of the consumers' attitude, the product related information also influences the consumers' purchase intention. The same assumption can be applied in the case of remanufactured products. Therefore, the deeper product knowledge related to remanufactured products, the better consumers' attitudes which results in significant influence on consumers' purchasing decision (Lin and Chen, 2006; Fabrigar et al., 2006).

On the other hand, there exist evidence (e.g., Wang et al., 2018; Hazen et al., 2012; Wang and Hazen et al., 2016) that the majority of consumers are not familiar with the remanufactured product and thus prefer new product before the remanufactured ones. According to Xu et al. (2017) consumers feel uncertain about remanufactured products'

characteristics (Wang et al., 2018) and even have incorrect information, because they think that remanufactured products are unusable or second-hand (Wang et al., 2018). This shows that consumers have a lack of understanding of remanufactured products and do not perceive the equivalences with new products (Thorn and Rogerson, 2002 "in" Hazen et al., 2012); although, from the definition, the remanufactured products are brought back to a new-conditions (Jiménez-Parra et al., 2014).

Hence, the level of understanding of the remanufactured product – i.e., the product knowledge – reduce uncertainty and provide a better understanding of all benefits of the remanufactured product (Wahjudi et al., 2018). Since it consequently increases consumers' acceptance and improves their purchasing decision, the author hypothesis that:

H4: Product knowledge about remanufactured white goods positively influence the consumers' attitude towards remanufactured white goods.

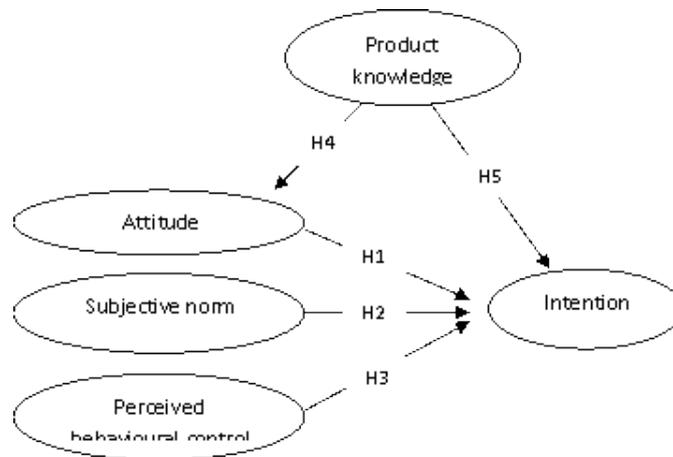
H5: Product knowledge about remanufactured white goods positively influence the consumers' purchase intention towards remanufactured white goods via attitude.

3 Methodology

3.1 The conceptual model

To investigate the reasons why consumer's purchase remanufactured white goods, the study is based on the TPB. The TPB provides more social psychology view by incorporating both social and personal factors thanks to it has very strong explanatory power in behavioural intention (Wang et al., 2013). The validity and reliability of its instruments were already confirmed by studies focusing on remanufactured products (e.g., Wang et al., 2013; Khor & Hazen, 2016; Singhal et al., 2019). Moreover, as stem from a literature review, the consumers have a lack of product knowledge about remanufactured products, and thus their perception is misleading. Therefore, the study also controls for product knowledge and integrate this factor into the conceptual model. On the other hand, since knowledge is an integral part of the consumers' attitude, it is expected that knowledge effect on purchase intention is not direct but mediated via the attitude. This two-step approach will enable us to deeper understand the customers' behavior, and the reluctance of consumer towards the purchase remanufactured white goods.

Based on the aforementioned arguments, the author proposed the following theoretical framework (Figure 1).



Source: Author

Figure 7: Proposed theoretical framework

3.2 Questionnaire development

The data for the proposed survey was collected by using a structured questionnaire, which was developed after an in-depth literature review. Moreover, the wording of single questions was taken over from previous research (see Appendix A). Thereafter, the draft of the questionnaire was sent to experts in the area of academia, psychology and remanufacturing industry to overview the framing and reading of the questions. After incorporating minor correction, the author conducted a pilot survey. As the research focus on the young generation, it was necessary to verify, if the questions are also understandable for this segment. A few questions were slightly corrected, and the final version was drafted.

A final questionnaire comprises of three parts. The first part contains questions prepared in accordance with the TPB. The second part captured the respondents' knowledge about the remanufactured products, especially as regards cost, quality, and environmental impact. The last part describes the respondents' characteristics such as age, gender, education, income, etc. Based on Ajzen's (1985) recommendations, each construct was measured by multiple items on a seven-point Likert scale – ranging from 1 = strongly disagree to 5 = strongly agree.

3.3 Sample and data collection

The study was designed as a cross-sectional survey and thus the data was obtained by surveying undergraduate, graduated and postgraduate students from the second biggest university in the Czech Republic - Masaryk University. The young adults (20-30 years) were chosen primarily because they represent new purchase power and hold new unexamined buying habits. Moreover, they have a higher ability to reflect their attitudes in purchase decision making (Yadav and Pathak, 2016). Data were gathering during February and March 2019, when the questionnaire was spread by snowball methods

through Facebook - most widely used social network by the young generation Eger (2015).

The responsive rate was 46 %, and the survey yielded 234 completed questionnaires. Since some responses were unusable (i.e., contained incomplete responses or was filled by older generation or were outliers), the final sample size was reduced to 197 surveys. Based on Kline's (2011) recommendation (i.e., the number of responses should be at least 10 cases per parameter), the final size is enough to satisfy.

Subsequently, to measure the strength of product-related knowledge, the final sample had to be reduced a second time. This was because some respondents did not know what the refurbished products were (i.e., they had no knowledge of remanufactured products and the definition had to be provided to them). Thus, the second final sample included 109 surveys.

4 Data analysis and results

Testing for the data was carried out with confirmatory and regression approach. First of all, Cronbach's alpha values and consequently confirmatory factor analyses were chosen to measure the reliability and inner consistency was chosen. Although the validity of used questions was confirmed by previous studies, in case of perceived behavioural control, the Cronbach's alpha value did not meet the proposed benchmark - i.e., the value should be greater than 0,70. Therefore one question had to be omitted. Thereafter the ordinary least squares (OLS) regression was run for the model fit and hypothesis testing. Moreover, the author also estimates the effect of control variables – i.e., gender, age, education background, nationality, income, and product-related knowledge¹.

The final regression model has following equation:

$$\text{Purchase Intention} = \beta_0 + \beta_1 \text{Attitude} + \beta_2 \text{Subjective norm} + \beta_3 \text{Perceived behavioural control} + \beta_4 \text{Age} + \beta_5 \text{Education} + \beta_6 \text{Nationality} + \beta_7 \text{Income} + \beta_7 \text{Knowledge}$$

Moreover, as the literature indicates, the effect of product-related knowledge on purchase intention is mediated via attention. Therefore, the author follows Baron and Kenny's (1986) approach and set up the following regression analyses:

$$\text{Purchase Intention} = \beta_0 + \beta_1 \text{Product related knowledge} + \beta_4 \text{Age} + \beta_5 \text{Education} + \beta_6 \text{Nationality} + \beta_7 \text{Income}$$

$$\text{Purchase Attitude} = \beta_0 + \beta_1 \text{Product related knowledge} + \beta_4 \text{Age} + \beta_5 \text{Education} + \beta_6 \text{Nationality} + \beta_7 \text{Income}$$

$$\text{Purchase Intention} = \beta_0 + \beta_1 \text{Attitude} + \beta_4 \text{Age} + \beta_5 \text{Education} + \beta_6 \text{Nationality} + \beta_7 \text{Income}$$

¹ Product-related knowledge means, whether respondents know remanufactured product or not.

$$\text{Purchase Intention} = \beta_0 + \beta_1 \text{Product related knowledge} + \beta_2 \text{Attitude} + \beta_4 \text{Age} + \beta_5 \text{Education} + \beta_6 \text{Nationality} + \beta_7 \text{Income}$$

4.1 Measurement model: confirmatory factor analysis

First, follow Fornell and Larcker's (1981) recommendation, the inner reliability of each construct was measured by Cronbach's alfa score. All constructs excepted perceived behavioural control meet the recommended value of 0,7 (Hair et al., 2010). Therefore, one question from the construct of perceived behavioural control had to be excluded. Afterward, the benchmark for this construct was also met. The value of factor loading for each construct exceeds 60 %. Hence measures have good internal consistency and lay within the recommended boundary, the new factors representing the overall value of constructs were created. Consequently, the author uses confirmatory factor analyses (CFA) to measure the validity of the model.

4.2 Ordinary least squares (OLS) regression

Based on the characteristics of the data the author uses ordinary least squares regression model to test the proposed hypotheses. To deal with heteroscedasticity in the presented sample the author uses robust (HAC) standard errors. Moreover, the values of variance inflation factors (VIFs) are well below 10 (range from 1.050 to 1.894), which signal no problems with multicollinearity.

Firstly, the effect of all three factors determining the purchase intention is tested. The findings show that the proposed model accounts for 56 % of the variance in purchase intention towards the remanufactured product. As Figure 2 shows, attitude ($\beta=0.385$, $p < 0.001$), subjective norm ($\beta=0.379$, $p < 0.001$) and perceived behavioural control ($\beta=0.121$, $p < 0.025$) positively influence the purchase intention. Moreover, since the effect of all TPB constructs is significant, the results support H1, H2, and H3.

Figure 8: Analysis of hypothesis (n= 197)

Determinants			coefficient	p-value	
Attitude	→	Intention	0.385	0.000***	Supported H1
Subjective norm	→	Intention	0.379	0.000***	Supported H2
Perceived behavior control	→	Intention	0.121	0.025**	Supported H3

Note: p-values in parentheses: ** $p < 0.05$; *** $p < 0.01$

Secondly, it was investigated, how product-related knowledge influence purchase intention towards remanufactured products. As the mediation effect is expected, the author follows Baron and Kenny's (1986) approach. In Figure 3, the author reports the results of each regression analysis: Model 1 shows the relationship between product-related knowledge and purchase intention; Model 2 reports the effect of product-related knowledge on attitude; Model 3 shows the association between purchase intention and attitude. Since all models indicate significant relationships, the author proceeds to another

step and run Model 4 including both product-related knowledge as well as attitude. The results confirm partial mediation, i.e., supporting H4 and H5.

Figure 9: Analysis of the mediation hypothesis (n=109)

Independent		Dependent	coefficient	p-value	
Product knowledge	→	Intention	0.347	0.000***	Supported in Model 1
Product knowledge	→	Attitude	0.318	0.001***	Supported in Model 2
Attitude	→	Intention	0.650	0.000***	Supported in Model 3
Product knowledge	→	Intention	0.153	0.059*	Supported in Model 4
Attitude			0.611	0.000***	

Note: p-values in parentheses: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

5 Discussion

This paper uses the well-established social-psychological model (TPB) to examine the purchase intention of the young generation towards remanufactured white goods. Consistent with TPB, the results shown that all key predictor (i.e., attitude, subjective norm and perceived behavioural control) are positively and significantly associated with the young consumer's purchase intention. Moreover, the author highlights the importance of product-related knowledge, which influences consumer's attitude and consequently also determinates the purchase intention.

In this respect, the consumer's attitude has shown as a key element (with the strongest effect) in the process of purchasing remanufactured white goods (also confirm by Jiménez-para et al., 2014; Khor and Hazen, 2017). Moreover, since the attitude is also positively influenced by product-related knowledge (support by e.g., Singhal et al., 2019), the more educated consumers are about the remanufactured products, the more favourable the attitude towards these products they hold. Based on these findings, the author states that if the consumer has a higher level of knowledge related to remanufactured white goods, especially as regards their benefits, his/her purchase intention will also increase.

Additionally, the young consumer's purchase intention is also significantly influenced by subjective norm (i.e., social pressure exerted from people that are important in the individuals' life such as family, friends, teachers, etc.). This finding supports the results of Jiménez-para et al. (2014) and Khor and Hazen (2017). Moreover, the strength of the effect indicates, that this factor also significantly influences young consumer's purchase intention. For this reason, young consumers are intensively influenced by social media, where they stay in contact with close people to them (Seemiller & Grace, 2016). Thus, it is not surprising, that the opinion of these people is important for them.

The findings also reveal that purchase behavioural control has a positive impact on young customer's purchase intention. This result is in contradiction with the findings of Khor and Hazen (2017) and Singhal et al. (2019). This can be partly explained by the fact that young customers use the internet on the daily base, so there is no problem for them to find needed information, such as a place, where to buy remanufactured products.

Moreover, we are living in a world where consumers can buy goods online in seconds, which saving time.

6 Conclusion

In response to new the effort of white goods producers to sell remanufactured version of these products, the main purpose of this study was to investigate how product-related knowledge influences the young generation's purchase intention towards remanufactured white goods. The presented survey is conducted on a sample of 234 students attending the seconds biggest university in the Czech Republic – Masaryk University. Based on the presented results, the study leads to two major findings. First, the author concludes that the purchase intention of the young generation is positively influenced by the consumer's attitude, subjective norm and perceived behavioural control. Secondly, the author states that purchase intention is also influenced by product-related knowledge, however, via the consumer's attitude.

Moreover, this paper contributes to the current research in many areas of the circular economy. First, it provides a deeper understanding of the young generation, which becomes a new purchase power and its habits considerably differ from the habit of the older generation. Secondly, the study brings several practical and theoretical implications. Since the knowledge positively influences the attitude, which is decisive for consumer's acceptance of remanufactured products, the remanufactures and marketing managers should put more attention to promoting information about benefits, specifications and warranty of remanufactured products. Moreover, they may provide educational materials to help consumers to eliminate their negative perception of these products. Thirdly, the study also contributes to the existing literature by confirming the applicability of TPB in the context of remanufactured products.

The presented study also has several limitations. First, the generalizability of the chosen sample is limited. Although the university students are potential consumers of the remanufactured product, in 2017 only 20 % of the Czech population were university graduates (Báčová, 2018). This leads to non-random convenience sampling errors. Therefore, future studies may focus on the young population which finishes its education at high school. Secondly, the study focusses only on the purchase intention towards remanufactured white goods (i.e., fridges, washing machines and household electrical appliances). Since the remanufactured products exist in a wide range, the future research can investigate the consumer's purchase intention towards remanufactured automobile parts, office furniture or electronics (e.g., laptops, mobile phones, cameras, mp3 players). Thirdly, the author uses only the basic TPB model, although Ajzen (1991) recommends incorporating additional variables. Since the remanufactured products bring environmentally benefits the inclusion of new constructs (e.g., environmental concern) in the TPB would be more than desirable.

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Appendix

A: Questionnaire items and their source of adoption.

Constructs	Items	Source
<i>Product-related knowledge</i>	<ol style="list-style-type: none"> 1. I am familiar with the environmental impact of remanufactured white goods. 2. I am familiar with the quality of remanufactured white goods. 3. I am familiar with the price level of remanufactured white goods. 	Wang et al. (2013);
<i>Attitude</i>	<ol style="list-style-type: none"> 1. In general, I think that buying remanufactured white goods is a good idea. 2. Buying remanufactured white goods is a wise choice. 3. I have a favorable attitude toward buying remanufactured white goods. 4. I like the idea of buying remanufactured white goods. 	Wang et al. (2013); Wang et al. (2018);
<i>Subjective norms</i>	<ol style="list-style-type: none"> 1. Those who are important to me (such as families and friends) would support me to buy remanufactured white goods. 2. Those who have important influences on me (such as my boss and teachers) think that I should buy remanufactured white goods. 3. People whose opinion I value would agree with my decision to buy remanufactured white goods. 	Wang et al., (2013); Singhal et al. (2019)
<i>Perceived behavioral control</i>	<ol style="list-style-type: none"> 1. If I decide to buy remanufactured white goods, I know where I can go to buy them. 2. I have the resources (i.e., time and money) to buy remanufactured white goods. 3. Whether or not I buy remanufactured white goods is entirely up to me. 	Wang et al. (2018); Singhal et al. (2019)
<i>Purchase intention</i>	<ol style="list-style-type: none"> 1. I am likely to purchase remanufactured products in the near future. 2. I will encourage my relatives and friends in their decision to buy remanufactured products. 3. When I have to choose between new and remanufactured products, I will choose the remanufactured version. 	Wang et al. (2018); Singhal et al. (2019)