Journal of Cleaner Production 316 (2021) 128296

Contents lists available at ScienceDirect

Journal of Cleaner Production

journal homepage: www.elsevier.com/locate/jclepro

Seller reputation, distribution and intention to purchase refurbished products☆

Lara Agostini [a,*], Barbara Bigliardi [b], Serena Filippelli [b], Francesco Galati [b,**]

[a] Department of Management and Engineering, University of Padua, Stradella S. Nicola, 3 - 36100, Vicenza, Italy
[b] Department of Engineering and Architecture, Parco Area Delle Scienze, 181/A, 43124, University of Parma, Parma, Italy

ARTICLE INFO

Handling Editor: Dr. Govindan Kannan

Keywords:
Refurbished products
Seller reputation
Distribution
Attitude
Closed-loop supply chain
Circular economy

ABSTRACT

The effectiveness of a closed-loop supply chain strategy for a tenable circular economy heavily depends on consumers' willingness to purchase such products. However, research has documented that consumers are skeptical about these products, thus making of interest the understanding of consumers' attitude and purchase intention. The literature provides limited evidence about the role of specific contextual marketing stimuli in shaping consumers' intention to purchase products derived from a closed-loop supply chain approach. This study aims to fill this important gap by examining the effect of the importance paid by consumers to seller reputation and distribution on consumers' intention to purchase a particular type of these products, i.e. refurbished smartphones. To do so, this study combines insights deriving from the stimulus response model and prospect theory. Findings from structural equation modeling indicate that the importance paid by consumers to seller reputation and distribution are significantly related to perceived value and risk, which in turn affect attitude and the intention to purchase refurbished products. In addition, findings highlight the centrality of the attitude construct in the model. The implications of these results can be useful for closed-loop supply chain managers, remanufacturers, and sellers, as they can help to improve their marketing initiatives and policies. Eventually, our theoretical model can also help scholars to improve the understanding of consumers' mental processes when evaluating refurbished products.

1. Introduction

Concerns about the natural environment, such as waste generation, resource scarcity and sustaining economic benefits, are forcing governments, firms and consumers to try to reduce environmental damage (e.g. Gomes et al., 2019; Govindan et al., 2020; Park and Lin, 2018; Pazoki and Samarghandi, 2020; Roy et al., 2020; Sun et al., 2018; Tseng et al., 2019; Zheng et al., 2019). This pressing need has led to an increase in "closed loop" approaches where flows of dismissed products are diverted becoming new semi-finished products (Rathore et al., 2011), which in turn have stimulated the emergence of new business models such as the Circular Economy (e.g. Chen et al., 2019; Kumar et al., 2020; Pieroni et al., 2019; Rogetzer et al., 2019; Saidani et al., 2019; Song et al., 2020; Yuan and Shen, 2019). Understanding whether such reverse cycles can be translated into viable and sustainable business is a crucial question (Guide and Van Wassenhove, 2009; Liu et al., 2019; Lüdeke-Freund et al., 2019Lüdeke-Freund et al., 2019; Ma et al., 2020; Wells and Seitz, 2005). Many governments have carried out an exploratory implementation of Circular Economy (Shen et al., 2020), proposing many different policies to achieve the economic function of the environment (Fitch-Roy et al., 2020). To date, several countries, such as Germany, Japan and China, have successively formulated policies on Circular Economy (Shen et al., 2020).

Being a critical component of the Circular Economy, repaired, reconditioned/refurbished, remanufactured and recycled products have been increasingly investigated also in the scientific literature (e.g. Gaur et al., 2019; Park and Lin, 2018). Scholars claimed that although the recognized positives of closed-loop activities, consumers remain generally disinclined toward the purchase of such goods because of low quality perceptions and other undesirable attributes (Abbey et al., 2015b; Harms and Linton, 2016; Mugge et al., 2017; Phan-tratanamongkol et al., 2018). However, the profitability of closed-loop

☆ This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.
* Corresponding author.
** Corresponding author.
E-mail addresses: lara.agostini@unipd.it (L. Agostini), barbara.bigliardi@unipr.it (B. Bigliardi), serena.filippelli@unipr.it (S. Filippelli).

https://doi.org/10.1016/j.jclepro.2021.128296
Received 15 September 2020; Received in revised form 14 June 2021; Accepted 11 July 2021
Available online 13 July 2021
0959-6526/© 2021 Elsevier Ltd. All rights reserved.

supply chains heavily relies on consumer acceptance of products (Guide and Van Wassenhove, 2009; Wang and Hazen, 2016), thus it is critical to understand consumer perceptions and attitude toward this kind of transactions.

The literature addressing consumers and products derived from reverse supply chain processes in the B2C context has largely focused on the green subjective concerns for individuals (e.g. Gaur et al., 2019; Park and Lin, 2018; Sun et al., 2018), rooted in theoretical perspectives such as Theory of planned behavior (Ajzen, 1991), Norm activation theory (Schwartz, 1977), and Value-belief-norm theory (Stern, 2000). Less attention has been paid to factors affecting the demand for these products from the end consumer perspective and in particular to context-related features that were poorly integrated in consumer behavioral models (e.g., Atasu et al., 2008; Guide and Van Wassenhove, 2009; Jiménez-Parra et al., 2014; Pisitsankkhakarn and Vassanadumrongdee, 2020; Sun et al., 2018). In addition, in the last decade, researchers have started to address consumer behavior in closed-loop supply chains, and consumers' attitude was identified as one of the key influencing factors to predict consumers' adopting or switching behavior to these products (Hazen et al., 2017b). However, factors like attitude can be changed over time and sensitive to different *stimuli* (Pisitsankkhakarn and Vassanadumrongdee, 2020). Within the circular economy, refurbished products have received scant dedicated attention until 2015; however, for their not requiring a complete dismantlement, contrarily to recycled products, they allow to save energy and labor (Van Weelden et al., 2016). Indeed, refurbished products undergo "a thorough cleaning process followed by replacement or reconditioning of components […], which results in a lower performance specification and more limited warranty relative to the equivalent new product" (Gaur et al., 2017, p. 213). In this study, we will refer to the literature specifically dedicated to refurbished products, but, in line with previous research stressing the proximity of the two areas (Van Weelden et al., 2016) and the lack of research specifically on refurbishment and associated marketing factors (Bigliardi et al., 2020), we also provide insights from the remanufacturing literature (e.g. Jiménez-Parra et al., 2014; Groening et al., 2018), in particular when refurbishing is studied within the remanufacturing domain (e.g. Hamzaoui Essoussi and Linton, 2014; Wang and Hazen, 2016; Wang et al., 2018).

This study adds to the closed-loop supply chain literature by addressing the gaps mentioned above. Herein, this study examines the effect of the importance paid by consumers to contextual marketing *stimuli* on consumers' perception of a particular type of refurbished products, i.e. refurbished smartphones. In particular, this study aims to answer the following question: Do the importance paid by consumers to contextual marketing *stimuli* affect their intention to purchase refurbished smartphones?

The role of two specific contextual marketing factors, namely the importance of seller reputation and distribution for consumers, is investigated (Mugge et al., 2017; Subramanian and Subramanyam, 2012; Sun et al., 2018; Wang and Hazen, 2016). By combining insights deriving from the *stimulus* response model (Kotler, 2007) and prospect theory (Kahneman and Tversky, 2013), this study focuses on creating deeper knowledge of how contextual marketing *stimuli* affect consumers' reasoning and then intention to purchase refurbished products. This decision derives from the awareness that consumers' purchase intention depends on the type of products considered, as the effect of marketing variables on perceived value and risk are product dependent (Abbey et al., 2015b, 2017, 2017; Sun et al., 2018).

Findings from structural equation modeling, specifically meant to test multiple relationships among constructs, suggest that improving seller reputation and distribution of refurbished smartphones are paramount for firms interested in selling these products. In addition, attitude emerged as a crucial variable that need to be understood in depth in this context. This deeper understanding of consumers' behavior could boost the development of effective strategies for the implementation of the circular economy paradigm, thus contributing to inform closed-loop supply chain management decisions (Harms and Linton, 2016; Hazen et al., 2017b; Wang et al., 2018a).

2. Theoretical background

2.1. Previous literature

High-technology products, such as smartphones, are short lifecycle products due to their short life usage (Zhou and Gupta, 2020). Manufacturers release new models to chase the highest technology level and most recently fashion trend in appearance design (Aytac and Wu, 2013). Consumers often purchase new generation models while stop using the old ones even they are still purposeful. Such manufacturer's aggressive strategy and consumers throwing behavior raise substantial e-waste problem. Government legislation has ignited the spark for another business opportunity, grounded on the acquisition of end-of-use products along a circular economy perspective (Jiménez-Parra et al., 2014; Zhou and Gupta, 2020).

In this context, the refurbished product market is growing fast as new and refurbished products belonging to different model generations coexist simultaneously in several selling channels, thus requiring a deeper understanding of consumers' intention to buy refurbished products (Abbey et al., 2015a; Netoa and Dutordoira, 2020). Previous research investigates consumers' purchasing behavior from different angles. The theory of planned behavior (TPB) has dominated the literature related to consumer perception and behavior of closed-loop supply chain products (e.g. Groening et al., 2018; Jiménez-Parra et al., 2014; Wang et al., 2013). It posited that the purchase intention and behavior are determined by the collective effect of three subjective constructs, namely attitude, subjective norms and perceived behavioral control (Ajzen, 1991). Others (e.g. Bamberg et al., 2007; Bamberg and Möser, 2007) have integrated the theory of planned behavior (Ajzen, 1991) with the norm activation theory (henceforth NAT, Schwartz, 1977) to explain environmentally friendly behavior, such as the intention to purchase refurbished products. NAT poses three antecedents to predict purchase intention, namely awareness of consequences, ascription of responsibility and personal norms (Schwartz, 1977).

These theoretical models and the related empirical research have investigated the problem without taking into account other issues, such as marketing variables, which can have a crucial role in shaping consumers' purchase intention. Less attention has been paid to marketing factors affecting the demand for remanufactured products from the end consumer perspective despite their relevance in shaping consumers' behavior (e.g. Atasu et al., 2008; Guide and Van Wassenhove, 2009; Jiménez-Parra et al., 2014; Pisitsankkhakarn; Van Weelden et al., 2016; Sun et al., 2018) and this holds true in the refurbished product domain.

A stream of the literature (e.g. Abbey et al., 2015b; Hamzaoui Essoussi and Linton, 2010; Pisitsankkhakarn and Vassanadumrongdee, 2020; Wang and Hazen, 2016) has started to explore the role of such marketing variables in shaping consumers' behaviors. With particular reference to refurbished products, some marketing issues, such as price perception and quality and functionality issues, seem to be sufficiently addressed in these studies. The purchase intention of refurbished products seems to be highly related to the possibility to obtain useful products at a lower price. This because of the products' lower functionality or obsolescence (Durif et al., 2012; Hamzaoui Essoussi and Linton, 2010), consumers' low tolerance of ambiguity (Hazen et al., 2012), and disgust caused by physical contact by a previous owner (Abbey et al., 2015b). These lower price products create business opportunities for firms, which can target price-sensitive consumers who pay less attention to the products' technological frontier.

Conversely, other issues remain under investigated, such as the role of perceived seller reputation and distribution. The role of these contextual marketing *stimuli* in shaping consumers' behavior were only marginally addressed in studies dealing with remanufactured and refurbished electronic products (Jiménez-Parra et al., 2014; Pang et al.,

2015; Phantratanamongkol et al., 2018; Pisitsankkhakarn; Van Weelden et al., 2016; Subramanian and Subramanyam, 2012; Xu et al., 2017; Zhou and Gupta, 2020). Moreover, their importance was largely overlooked, their role in shaping consumers' attitude is still unclear, and they were poorly included in consumers' purchasing behavior models. In addition, previous consumers' purchasing behavior models are designed differently and the inclusion of specific constructs is still unclear. In particular, some studies addressing the role of marketing issues in shaping consumers' purchase intention toward refurbished products do not consider the role of attitude (e.g. Matsumoto et al., 2017; Wang and Hazen, 2016), while others include it in consumers' behavioral models (e.g. Harms and Linton, 2016; Jiménez-Parra et al., 2014; Pisitsankkhakarn; Van Weelden et al., 2016; Wang et al., 2018b), despite highlighting contrasting results. Through the present study, we aim at addressing these gaps by including such contextual marketing *stimuli* in a model of consumers' purchase behavior grounded on a combination of different theoretical perspectives, which is able to assess also the role of individual attitude.

2.2. Theoretical framework

The study is rooted in the combination of the *stimulus* response model (SRM) with prospect theory (PT). Based on Kotler (1997), the key concepts of the stimulus-response model provide a better understanding of consumers' buying behavior and have been used as an extension of TPB. Apart from the external environment aspects, SRM stresses that individual consumers are exposed to marketing *stimuli* (Kanagal, 2016). The model try to explain the influences that the marketing mixture and other *stimuli* produce on the so-called "buyer's black box" and how they shape given responses. The buyer's mind (the "black box") collects different *stimuli*, while the buying response remains uncertain. A large number of *stimuli* and influences can lead consumers to act differently to the marketer's expectations. Consumers' internal factors that could influence buying behavior include perceptions of the *stimuli*, their own rationale, and attitudes (Wang et al., 2018b). Therefore, consumers' perception of the product and of other marketing *stimuli* could also affect the intention to purchase or not, as perceptions and learning are critical parts of the information processing system (Quester et al., 2007).

To understand the "buyers' black box", a useful lens is Prospect theory (Kahneman and Tversky, 2013). The theory is developed for prospects, which are probabilistic alternatives that involve risk with known probabilities of outcomes (Wang and Hazen, 2016). It posits that rational individuals undervalue outcomes that are merely probable when compared to outcomes obtained with certainty. Thus, perceived value is assigned to both gains and losses rather than only to final assets and people evaluate these losses and gains using heuristics rather than optimal decisions. In addition, according to Wang and Hazen (2016), prospect theory enhances the understanding of consumers' propensity to make a choice of outcomes that involve risk, such as the purchase of a recycled product. Thus, they argued that both perceived risk and perceived value are considered crucial in outcome judgements.

According to Prospect theory, the choice process consists of two consequent phases: an early phase of "editing" and a subsequent one of "evaluation" (Kahneman and Tversky, 2013; Wang and Hazen, 2016). The former has the aim of simplifying the problem and it consists of a preliminary analysis of the offered prospects. In the latter, the consumer places a value to each prospect and chooses the preferred one, also according to the consumer's attitude.

The editing phase consists of the application of several operations that embodies the initial framing of a purchasing problem where the consumer formulates a series of prospects to simplify the problem (Wang and Hazen, 2016). According to the felt involvement perspective (Celsi and Olson, 1988), the level of an individual's felt involvement is a function of situational and intrinsic factors. Situational sources of personal relevance (SSPR) are a plethora of specific contextual *stimuli* and contingencies. The peculiarity of such factors is that they trigger self-relevant consequences and the representations of these *stimuli* are perceived to be linked with those important consequences and values (Celsi and Olson, 1988). Thus, at this stage each marketing *stimulus* is compared with the individual importance paid to each *stimulus*. The outcome of this matching process determines the impact on subsequent constructs in the model, namely, attitude, perceived value and perceived risk of a given prospect, which will be crucial in the evaluation stage.

Attitude refers to the degree to which a person has a favorable or unfavorable evaluation of the behavior in question (Ajzen, 1991), thus it can be seen as a general measure of the favorability a behavioral alternative has for an individual (Klöckner, 2013). In our framework, the attitude towards purchasing can be defined as the individual's overall positive or negative assessment of performing the purchase of a refurbished product (e.g. Gaur et al., 2019; Wahjudi et al., 2018) and is a direct antecedent of the purchase intention (e.g. Ajzen, 1991; Jiménez-Parra et al., 2014; Pisitsankkhakarn and Vassanadumrongdee, 2020). Perceived value is defined as the consumer's overall assessment of the utility of a product (or a service) based on perceptions of the trade-off between perceived benefit and perceived sacrifice (Lovelock, 2000). On the other hand, perceived risk has been defined as a function of uncertainty regarding the outcome and the expectation of losses associated with a purchase (Peter and Ryan, 1976). It includes, among the others, financial, performance, social, and physical risks (Wang and Hazen, 2016). Both perceived value and risk significantly and systemically affect decision outcomes (Rose et al., 2004).

Evidence from the editing stage shows that people normally perceive outcomes as gains and losses, rather than as final states of wealth. This information can help to frame the prospect to be evaluated. In the evaluation stage, consumers choose the best prospect according to the prospects' value, risk and the individual attitude toward that product. At this stage, gains and losses are defined relative to some reference point, which usually corresponds to the current asset position (Kahneman and Tversky, 2013). The reference point for evaluating remanufactured or refurbished products is often represented by the equivalent new product (Abbey et al., 2017). The level of similarity between the two should increase/decrease value and attitude associated with purchasing remanufactured or refurbished products (Wang and Hazen, 2016), but it is strongly affected by the individual attitude toward that product (Pisitsankkhakarn and Vassanadumrongdee, 2020). This complex process influences the decision to purchase a refurbished smartphone, together with other variables (deriving from other theoretical perspectives, such as TPB or NAT, and from other marketing *stimuli*, such as price or quality and functionalities, which were investigated in the previous literature).

As shown in Fig. 1, the hypothesized model examines how contextual marketing *stimuli* are processed by consumers, affect perceived risk, perceived value, and attitude, and subsequently influence one's intention to purchase refurbished smartphones. Each construct is further described and the relationships in this model are developed in the following section.

2.3. Hypotheses development

2.3.1. Importance paid to seller reputation

Quality perception is a critical construct in purchase intention. This refers not only to product quality issues but also to service quality ones, which can be considered by consumers as indirect quality cues.

In the remanufacturing products context, issues such as product condition and seller integrity are subject to noise and manipulation, producing an information asymmetry problem for markets, which can lead to adverse selection (Akerlof, 1970). Adverse selection is often associated with uncertainty from several sources, for example, a seller's characteristics, such as seller quality and a product's attributes, such as condition of the remanufactured product (Ghose, 2009).

Seller reputation is considered by consumers a quality cue (e.g. Pang et al., 2015; Phantratanamongkol et al., 2018; Subramanian and Subramanyam, 2012; Zhou and Gupta, 2020). However, consumers'

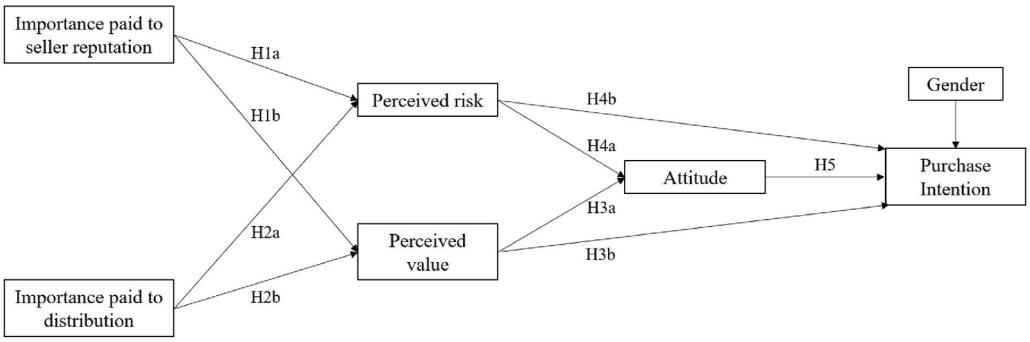


Fig. 1. Hypothesized model.

judgements and attitude toward perceived sellers' quality are very subjective (e.g. Richardson et al., 1996). Thus, their perception is very important in determining purchase intention, as the seller serves as a form of warranty (Hamzaoui-Essoussi and Linton, 2014).

In the smartphone market, products are sold by both original manufacturers and third-party resellers (e.g. Subramanian and Subramanyam, 2012; Van Weelden et al., 2016; Zhou and Gupta, 2020). Empirical results (Subramanian and Subramanyam, 2012; Van Weelden et al., 2016) show that consumers indicate to have more confidence in a refurbished product when offered via a well-known seller and that refurbished products sold by original manufacturers or large retailers are valued over refurbished products sold by a third-party resellers. However, the refurbished smartphone market is characterized by a huge number of third-party resellers if compared with original manufacturers or large retailers (Abbey et al., 2015a; IDC, 2020; Watson et al., 2017). This reflects the fact that when original equipment manufacturers or large retailers sell refurbished products, the overall brand value of the manufacturer or large retailer diminishes, while when refurbishing and selling activities were performed by a third-party the original brand does not bear the same negative impact on brand perception (Abbey et al., 2015a).

Following the theoretical perspective grounded on the stimulus response model and prospect theory, this study posits that the effect of perceived seller reputation on consumers' behavior derives from a matching process between such perception and the importance paid to seller reputation. Thus, if a consumer's perceived seller reputation and the importance paid to seller reputation are both high, the outcome of this matching process would be positive toward perceived value and attitude and negative toward perceived risk. However, given the general low level of sellers reputation operating in the current refurbished smartphone market, we contend that a high importance paid by consumers to seller reputation should trigger a negative effect on subsequent constructs in the model. More in detail, it is proposed that this matching process can affect perceived risk positively, and both perceived value and attitude toward refurbished smartphones negatively. Prospect theory suggests that consumers create a reference point from which to evaluate deviations (in the forms of gains or losses), which in this context are original manufacturers or large retailers. Thus, when consumers judged as important seller reputation and when sellers' reputation is considered generally low if compared to original manufacturers or large retailers, such consumers should perceive (i) a higher risk in terms of consequences (such as waste of money or safety issues) and (ii) a lower value of products (in terms of quality and functionalities for the required price). Therefore, the followings are proposed:

H1a. *. In evaluating refurbished smartphones, the importance paid to seller reputation is positively related to perceived risk.*

H1b. *. In evaluating refurbished smartphones, the importance paid to seller reputation is negatively related to perceived value.*

2.3.2. *Importance paid to distribution*

Another critical quality cue for consumers is distribution (e.g. Gleim and Lawson, 2014; Yoo et al., 2000). Distribution is considered intensive when products are available in a large number of stores and channels, whereas exclusive or selective distribution involves the presence of products in very few retailers (Yoo et al., 2000). Selective or exclusive distribution tends to enhance a product's image but consumers are more satisfied if products are available in several stores as they can buy products where and when they want them (intensive distribution). Products intensively distributed are related to higher time and place utility for consumers, which reduces the sacrifices consumers must make to purchase the product. They require less time for searching the stores and travelling to and from stores, thus providing convenience in purchasing (Yoo et al., 2000). Conversely, products distributed by few and selected/exclusive retailers force consumers to reach that specific place to buy products, a sacrifice that is often associated by consumers with products' uniqueness and prestige (Farris et al., 1989).

Following these arguments, it has been argued that the type of distribution strategy must fit products type (e.g. Farris et al., 1989; Smith, 1992; Yoo et al., 2000). While selective distribution is appropriate for shopping or luxury products, intensive distribution fits convenience products (e.g. Yoo et al., 2000). In convenience product markets, intensive distribution can increase consumers' satisfaction with the product. In the green products market, as stressed by Gleim and Lawson (2014), the availability of green products positively impacts consumers' purchase intention.

The remanufactured and refurbished smartphones market can be considered a convenience market, as the main driver of purchase behavior is the low price (Hamzaoui-Essoussi and Linton, 2014; Phantratanamongkol et al., 2018; Zhou and Gupta, 2020). Therefore, it can be expected that a large availability of refurbished smartphones can be positively related to consumers' perceived value and quality of products. Refurbished smartphones are sold by several retailers and through several channels, including the internet (Abbey et al., 2015a; IDC, 2020; Watson et al., 2017). Therefore, consumers can find it easy to find and acquire this type of products and in a short amount of time. This high availability should be related with perceived convenience and time savings for consumers (e.g. Aaker, 1996; Jiménez-Parra et al., 2014; Steenkamp et al., 2003).

Following the theoretical perspective grounded on the *stimulus* response model and prospect theory, this study posits that the effect of perceived distribution intensity on consumers' behavior derives from a matching process between such perception and the importance paid to the large availability of refurbished smartphones. Thus, if consumers judge products' availability issues as important and perceive refurbished smartphones as widely available, we expected that this positively affects products' perceived value. The positive impact on perceived value should be related to time and cost issues, as stressed before. We expected that this can have an effect on consumers' predisposition toward these products. Conversely, we also conjecture that the outcome of this matching process would negatively affect perceived risk, given that

consumers can ponder that, given the numerous number of sellers and channels, products can be considered sufficiently safe and functional. In short, the followings are proposed:

H2a. . *In evaluating refurbished smartphones, the importance paid to distribution is negatively related to perceived risk.*

H2b. *In evaluating refurbished smartphones, the importance paid to distribution is positively related to perceived value.*

2.3.3. Perceived value and risk

Perceived value was previously defined as "the consumer's overall assessment of the utility of a product (or service) based on perceptions of what is received and what is given" (Wang and Hazen, 2016, p. 14) and as "a customer's perceived preference for and evaluation of product attributes, attribute performance, and consequences arising from use that facilitates (or blocks) achieving the customer's goal and purposes in use situations" (Woodruff, 1997, p. 142). It was largely investigated in previous studies (e.g. Chen and Dubinsky, 2003; Wang and Hazen, 2016; Wong et al., 2014) and deals with consumers' perception of the trade-off between benefits and sacrifice (Lovelock, 2000). Perceived value has been identified as one of the main antecedents to consumers' satisfaction and behavioral intentions (Dodds et al., 1991) and includes the concurrent evaluation of several factors.

Following prospect theory, perceived value is related to purchase intention, also in the refurbished product context (Wang and Hazen, 2016). If refurbished smartphones are perceived to be high in value by consumers, this should positively affect not only their purchase intention but also their attitude toward these products (Hamzaoui-Essoussi and Linton, 2014; Wang and Hazen, 2016). Conversely, if refurbished smartphones are judged as low in value, this should be related negatively to both attitude and purchase intention toward them. Based on these argumentations, it follows that:

H3a. . *In evaluating refurbished smartphones, a high perceived value is positively related to attitude.*

H3b. . *In evaluating refurbished smartphones, a high perceived value is positively related to purchase intention (thus, this relationship is mediated by attitude).*

Perceived risk was previously defined as the uncertainty concerning the outcome of a purchase, including different risks (e.g. performance, physical, and financial), which is likely to negatively affect consumers purchase behavior (Peter and Ryan, 1976; Wang and Hazen, 2016). The literature claims that perceived risk is a critical element of perceived sacrifice, as it embodies the possibility of losses when assessing value relative to the purchase price (e.g. Ravald and Grönroos, 1996; Snoj et al., 2004). Before performing purchase decisions, consumers experience a certain degree of uncertainty regarding products safety, usefulness, and performance (Sweeney et al., 1999). These uncertainties act as deterring adoption behavior (Rogers, 2010).

In the refurbished smartphones context, perceived risk derives from asymmetric information and the difficulty in achieving products' information (Hamzaoui-Essoussi and Linton, 2014). Consumers' evaluation may include uncertainties related to products' quality, given the unknown methods used to restore the product and the unknown previous uses. This lack of information can lead consumers to ponder the consequences of purchasing, which represents a component of risk for them. For these reasons, refurbished smartphones may be related to a higher degree of perceived risk.

According to prospect theory and to the empirical evidence emerged from previous research, this study posits that a high level of perceived risk should be related to a negative impact on attitude and purchase intention toward refurbished smartphones. Conversely, a low level of perceived risk should affect positively both attitude and purchase intention.

H4a. . *In evaluating refurbished smartphones, a high perceived risk is negatively related to attitude.*

H4b. . *In evaluating refurbished smartphones, a high perceived risk is negatively related to purchase intention (thus, this relationship is mediated by attitude).*

2.3.4. Attitude

Attitude was defined as a mental and neural state of readiness that affect the response of individuals toward all situations with which they are confronted and was linked to purchase intention by Irland (1993). The literature on consumer behavior considers attitude as critical for purchasing decision (e.g. Hamzaoui-Essoussi and Linton, 2014; Hini et al., 1995). When making a product choice, consumers decision is affected by their belief that a product is aesthetically, functionally, and socially valuable (Kalafatis et al., 1999). The relationship between attitude and behavior is one of the main assumption of the theory of planned behavior (Ajzen, 1991), in which attitude mainly refers to consumers pro-environmental predisposition. For example, although consumers may be aware of refurbished smartphone reduced quality or functionality, a significant degree of pro-environmental attitude may offset these negative effects on purchase intention. Attitude is the result of experience and learning, lasts a long time, but also evolves continuously as a function of contextual *stimuli*.

Finally, following previous research, we also expect that a favorable attitude toward refurbished smartphones will be positively related to purchase intention, given its strengthening effect (Ajzen, 1991; Cheng et al., 2006). Therefore, the following is proposed:

H5. *In evaluating refurbished smartphones, a high level of attitude is positively related to purchase intention.*

3. Methodology

3.1. Sample

This study randomly selected students of an Italian university as the study sample. A total of 444 participants were involved in the study. Previous scholars (e.g. Hazen et al., 2012; Wang and Hazen, 2016) have argued that college-age students tend to have a similar or a greater level of knowledge regarding remanufactured products as other consumer groups. In the literature, the use of students was considered appropriate for similar studies (e.g. Thomas, 2011; Tokar et al., 2011; Wang and Hazen, 2016). Moreover, the decision to limit the sample to students of a single university improves homogeneity of the sample in terms of age and educational background, which is important for control and internal validity reasons (Webster and Sell, 2014).

Following the approach adopted by Wang and Hazen (2016), the suitability of the sample was tested by involving 40 students and 40 non-students consumers in Italy. The result of the pilot *t*-test performed showed no significant difference between students and non-students purchase intention toward refurbished smartphones ($M_{stud} = 3475$; $M_{nonstud} = 3350$; $p = 0{,}342$), thus suggesting that the sample is a suitable proxy for the target population of consumers.

3.2. Measures

This study is based on a survey for data collection. First, a questionnaire was developed, in which scale items were included for each of the constructs represented in Fig. 1. Scale items were derived from existing literature (see Table 1 in the results). Five-point Likert-type scales were used. Participants were provided with the definition of refurbished smartphones, and we also made sure that students had a clear idea of the meaning of refurbished smartphones, in line with our definition (i.e. cleaning process followed by replacement or reconditioning of components), which was confirmed by all of them. The questionnaire was then pre-tested by asking for the functionality and flow of the instrument to colleagues and to 40 participants sampled in

Table 1
Results of CFA, convergent validity and construct reliability. *Note*: ***Significance level of 1%.

Construct	Item		Standardized factor loadings	CR	AVE	Cronbach's Alpha
Seller reputation (SR, adapted from Casaló et al., 2008)	SR_1	It is important for me that that the seller has a good reputation	0.800***	0.899	0.692	0.907
	SR_2	It is important for me that the seller has a good reputation compared to other rival ones	0.748***			
	SR_3	It is important for me that the seller has a reputation for offering good services	0.827***			
	SR_4	It is important for me that the seller has a reputation for being fair in its relationship with its customers	0.941***			
Distribution (D, adapted from Pisitsankkhakarn and Vassanadumrongdee, 2020)	D_1	It is important for me that the refurbished smartphone can be easily found	0.888***	0.743	0.501	0.704
	D_2	It is important for me that refurbished smartphones can be bought in multiple channels	0.641***			
	D_3	It is important for me that refurbished smartphones are available on internet	0.551***			
Perceived value (PV, adapted from Grewal et al., 1998; Magnier et al., 2019)	PV_1	If I bought a refurbished smartphone, I feel I would be getting my money's worth	0.905***	0.872	0.696	0.877
	PV_2	If I bought a refurbished smartphone, I think I would be getting good value for the money I spend	0.760***			
	PV_3	I feel that acquiring a refurbished smartphone meets both my quality and price requirement	0.832***			
Perceived risk (PR, adapted from Wang et al., 2018a)	PR_1	I am afraid that the safety of refurbished smartphones is not as good as that of new products, so it may present safety risks (physical risk)	0.569***	0.873	0.645	0.817
	PR_2	I am afraid that refurbished smartphones do not function as well as new smartphones (performance risk)	0.956***			
	PR_3	I am afraid that buying refurbished smartphones is not a good investment (financial risk)	0.980***			
	PR_4	I am afraid that I will have to get the refurbished smartphone repaired more frequently if compared to a new one (time risk)	0.618***			
Attitude (ATT, adapted from Wang et al., 2018b)	ATT_1	I like the idea of purchasing refurbished smartphones	0.956***	0.893	0.736	0.927
	ATT_2	I have a favorable attitude towards purchasing refurbished smartphones	0.838***			
	ATT_3	Purchasing refurbished smartphones is a good idea	0.770***			
Purchase intention (PI, adapted from Wang et al., 2018b)	PI_1	I am likely to purchase refurbished smartphones in the near future	0.899***	0.841	0.641	0.875
	PI_2	I will encourage my relatives and friends to buy refurbished smartphones	0.802***			
	PI_3	When I have to choose between new and refurbished smartphones, I will normally choose the refurbished version	0.687***			

the same manner as the primary samples. Minor amendments were made after pre-testing.

3.3. Research design and data analysis

According to Wang and Hazen (2016), we presumed that college students do not vary much in terms of age and education background, thus only gender was identified as the control variable in the analysis.

Subsequently, the participants completed the questionnaire. To preserve anonymity, no personal identifiable information was collected. During this phase, we made every effort to make sure the participants expressed their own thoughts and to control the information provided, thus avoiding undesirable bias deriving, for example, from collaborative responses (participants have had to complete the questionnaire independently) or from further explanations provided by other participants in terms of refurbished smartphones.

Data collected were analyzed following a two-step structural equation modelling (SEM) approach that allows assessing complex models and testing relevant paths directly. SEM gained popularity after the publication by Bagozzi (1980), mainly for its ability to integrate psychometric factor analytic models with econometric structural equation models and to compare theoretical models with empirical data (Terblanche and Boshoff, 2008; Mackenzie, 2001). The advantages that make this technique widely used by researchers are "the estimation of multiple interrelated dependence relationships, and the ability to represent unobserved concepts in these relationships, while accounting for measurement error in the estimation process" (Terblanche and Boshoff, 2008, p. 107). This statistical method is widely employed also in the literature dealing with the investigation of consumers' purchase behavior and remanufactured products (e.g. Hazen et al., 2017a; Wang and Hazen, 2016). AMOS 26 was used to evaluate the validity and reliability of the measurement model in the first step and, then, estimate the structural model in the second step.

4. Results

4.1. The measurement model

We performed a CFA to verify convergent and discriminant validity, as well as construct reliability. Convergent validity can be evaluated by looking at factor loadings and average variance extracted (AVE). Results show that all factor loadings of the measurement items on their respective constructs are significant (p-value < 0.001) and most exceed the threshold of 0.6 (Hair et al., 1998). Only a few exceptions are slightly below (i.e. 0.551 and 0.569) and, thus, acceptable, which confirms that the items load well on the constructs they intend to measure, as Table 1 exhibits.

Construct reliability is measured through Cronbach's alpha and composite reliability (CR) (see Table 1). Values of Cronbach's alpha are definitely higher than that minimum suggested, i.e. 0.6 (Hair et al., 1998), and the same holds true for composite reliability (Nunnally, 1994).

In Table 2, we tested discriminant validity by verifying that square root of the AVE is greater than inter-construct correlations (Hair et al., 1998).

Overall, results confirm that the theoretical constructs have good

Table 2
Discriminant validity. *Note*: In the diagonal the square root of the AVE.

	SR	D	PV	PR	ATT	PI
SR	**0.832**					
D	0.016	**0.708**				
PV	−0.253	0.396	**0.834**			
PR	0.156	−0.155	−0.464	**0.803**		
ATT	−0.163	0.677	0.782	−0.418	**0.858**	
PI	−0.116	0.393	0.819	−0.422	0.845	**0.801**

psychometric properties (Bagozzi and Yi, 1988).

The overall model fit contributes to assess unidimensionality through the comparative fit index (CFI), incremental fit index (IFI), root mean square error of approximation (RMSEA) and normed chi-square ($\chi 2$ per degree of freedom) (Bryne, 1990; Hair et al., 1998).

4.2. The structural model

Once assessed the good fit of the measurement model, we examined the structural model through the standardized path coefficients (β).

We checked Regression Weights and Standardized Regression Weights, finding significant p-values as hypothesized. However, since we noticed goodness-of-fit indices could be improved (see Table 3), we examined modification indices for potentially omitted paths. Modification indices, computed for any parameter not free to be estimated, denote the expected drop in overall Chi-Square value if a parameter was to be freed in the model (Gallagher et al., 2008; Joreskog and Sorbom, 1988). In principles, values higher than 4.0 suggest that adding the path could improve the model fit (Hair et al., 1998). Within our hypothesized model (i.e. Model 1), high modification indices suggested adding two main paths, namely from perceived risk to perceived value and from importance paid to distribution to attitude (See Fig. 2a, Model 2 in Table 3). Therefore, we followed the recommendations by Anderson and Gerbing (1988), who support model re-specification based on empirical results and theoretical plausibility, and examined the alternative model (i.e. Model 2) with the two additional paths, prior verifying the theoretical justification behind this change suggested by modification indices (Hair et al., 1998), in line with other previous studies (e.g. Schlaegel and Koenig, 2014). Actually, the importance of perceived risk in consumers' value perceptions was hypothesized and tested by Wang et al. (2018a); the positive effect of the importance paid to distribution on attitude reflects the intuition made by Abbey et al. (2015a) on the necessity to improve consumers' awareness regarding remanufactured products. This brought to a significant improvement of overall model fit that was enhanced further by eliminating the not significant path between seller reputation and perceived risk, based on a parsimony principle, thus arriving to the final model depicted in Fig. 2b, i.e. Model 3, as Table 3 exhibits.

Table 3
Results of the structural models (standardized regression weights). *Note*: ***Significance level of 1%, **Significance level of 5%.

	Model 1 (Hypothesized model)	Model 2	Model 3 (Final model)	Hypothesis testing
SR > PR	0.056	0.056		H1a not supported
D > PR	−0.128***	−0.128***	−0.130***	H2a supported
SR > PV	−0.183***	−0.163***	−0.164***	H1b supported
D > PV	0.327***	0.282***	0.283***	H2b supported
PR > PV		−0.350***	−0.351**	
PV > ATT	0.608***	0.443***	0.442***	H3a supported
PR > ATT	−0.161***	−0.157***	−0.156***	H4a supported
D > ATT		0.436***	0.436***	
PV > PI	0.705***	0.689***	0.688***	H3b supported
PR > PI	−0.077**	−0.075**	−0.075**	H4b supported
ATT > PI	0.085**	0.086**	0.086**	H5 supported
GEND	−0.414***	−0.414***	−0.414***	
CMIN/DF	32.842	2.194	1.890	
GFI	0.849	0.985	0.995	
NFI	0.707	0.978	0.992	
IFI	0.714	0.983	0.996	
CFI	0.711	0.982	0.996	
RMSEA	0.268	0.059	0.045	

Results of the final model show that perceived risk is significantly predicted by distribution, but not by seller reputation, thus supporting hypothesis H2a, but not H1a. Instead, perceived value is significantly influenced by both distribution and seller reputation, which confirms H1b and H2b. In turn, perceived value and perceived risk significantly affect both attitude and purchase intention, thus supporting H3a, H4a, H3b and H4b. Finally, attitude significantly influences purchase intention, as hypothesized in H5.

As for the two new relationships, perceived risk negatively and significantly impacts perceived value and distribution has a positive and significant impact on attitude.

To check for mediation relationships, we used the bootstrap resampling method (Cheung and Lau, 2008), adjusted to 500 repetitions.

Based on Baron and Kenny (1986), partial mediation occurs when an independent variable has a direct influence on the dependent variable, as well as an indirect effect on it through a mediating variable. Results exhibited in Table 4 highlight that, firstly, perceived risk partially mediates the relationship between distribution and perceived value, as well as the relationship between distribution and attitude. Secondly, perceived value partially mediates the relationship between perceived risk and attitude, as well as perceived risk and purchase intention. Thirdly, attitude partially mediates the relationship between perceived risk and purchase intention and between perceived value and purchase intention.

5. Discussion

This paper developed and tested a model to examine if and how contextual marketing *stimuli* are processed by consumers and affect consumers' intention to purchase refurbished smartphones. Several insights can be inferred from the findings.

The overall validity of the model seems to be corroborated, as only one of the several hypotheses is not confirmed (H1a). Conversely, all the others hypothesized relationships resulted to be significant. In a nutshell, both the importance paid to seller reputation and to distribution contribute to shape perceived value, even if with different signs, whereas only the importance paid to distribution (negatively) contributes to shape perceived risk. Perceived value and risk are partially mediated by attitude in their relationship with purchase intention. Finally, attitude positively affects consumers' purchase intention.

However, we also noticed some slight differences with the hypothesized model. The positive relationship between the importance paid to distribution and attitude is partially mediated by perceived value and risk. This is an interesting result, as the positive effect on individual attitude should derive from the fact that consumers can perceive that the large products' availability can be related to a shift in the society purchase behavior (a green shift, for example) and a signal of products' quality, given the numerous number of people buying this kind of products deriving from the numerous sellers offering refurbished smartphones. Another difference emerged refers to the relationship between perceived risk and perceived value. Although we did not

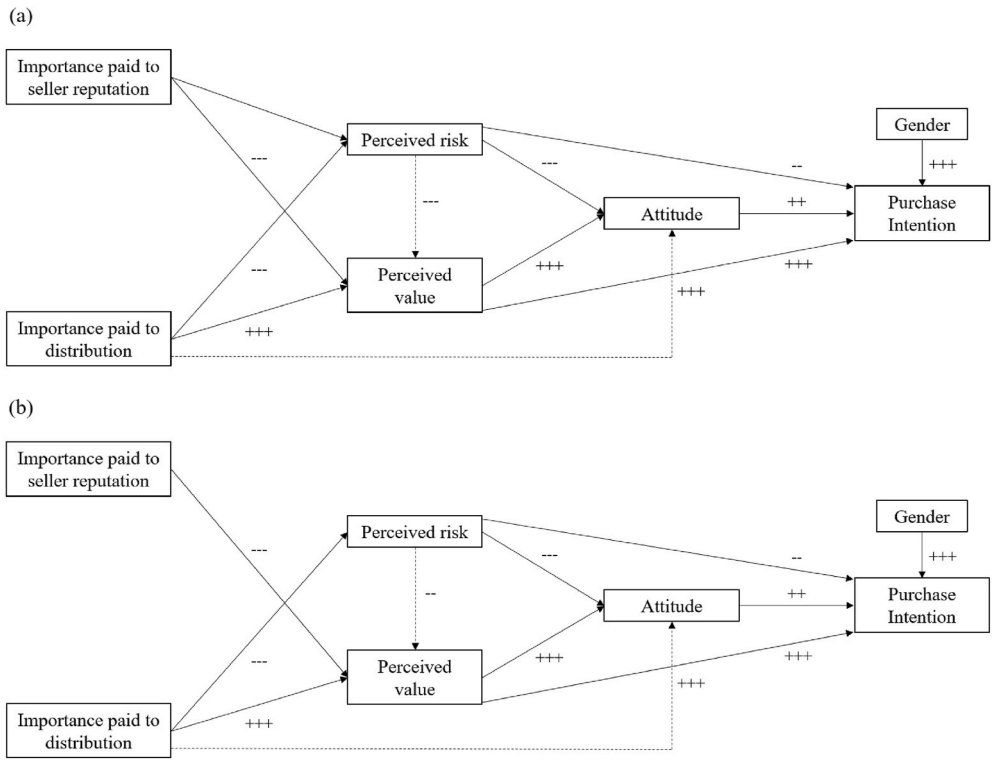


Fig. 2. (a) Intermediate and (b) Final models. *Note*: $^{+++}$Positive and significant level of 1%, $^{++}$Positive and significant level of 5%, $^{---}$Negative and significant level of 1%, $^{--}$Negative and significant level of 5%.

Table 4
Testing mediation through bootstrapping in AMOS. *Note*: Method used for bootstrap confidence intervals: bias-corrected percentile; ***Significance level of 1%, **Significance level of 5%.

	Distribution		
	Direct effect	Indirect effect	Total effect
Perceived risk	−0.130**		−0.130**
Perceived value	0.283***	0.046**	0.328***
Attitude	0.436***	0.166***	0.602***
	Perceived risk		
	Direct effect	Indirect effect	Total effect
Perceived value	−0.351***		−0.351***
Attitude	−0.157***	−0.155***	−0.312***
Purchase intention	−0.075**	−0.269***	−0.344***
	Perceived value		
	Direct effect	Indirect effect	Total effect
Attitude	0.442***		0.442***
Purchase intention	0.688***	0.038**	0.726***

include this effect in the hypotheses, it is in line with previous studies (e.g. Wang et al., 2018a), which stressed the importance of risk in consumers' value perceptions and it is expected to play a significant role in lowering consumers' perceptions of products' value. Finally, we also noticed the emergence of a new relationship between the importance paid to distribution and attitude in the refurbished smartphone context, which follows one of the claims raised by Abbey et al. (2015a) on the necessity to improve consumers' awareness regarding remanufactured products.

5.1. Theoretical and practical implications

A stream of literature (e.g. Abbey et al., 2015b; Hamzaoui Essoussi and Linton, 2010; Mugge et al., 2017; Pisitsankkhakarn; Van Weelden et al., 2016; Subramanian and Subramanyam, 2012; Sun et al., 2018) has started to explore the role of marketing variables in shaping consumers' intention to purchase products derived from a closed-loop supply chain strategy. Although some marketing issues seem to be sufficiently addressed in the past, other issues have remained under investigated, such as the role of perceived seller reputation and distribution. Our findings help to fill this research gap by highlighting their role in shaping consumers' processes in the context of refurbished smartphones.

In so doing, we designed and tested a novel theoretical model rooted in the combination of the Stimulus Response Model with Prospect Theory. According to the findings, it is possible to support the theoretical rationale proposed with reference to consumers' internal factors that could influence buying intention. These include perceptions of the *stimuli*, consumers' rationale, and attitude (Kumar, 2010). Therefore, consumers' perception of the product and of other marketing *stimuli* should have an impact on the intention to purchase or not a given product, as perceptions and learning are critical parts of the information processing system (Lantos, 2011; Quester et al., 2007).

In this direction, our results also confirm those of Wang and Hazen (2016) in terms of Prospect Theory. Its usefulness as a theoretical lens able to investigate consumers' behavior when assessing remanufactured products is supported by our findings specifically related to refurbished smartphones. In particular, this theory enhances the understanding of consumers' propensity to make a choice of outcomes that involve risk.

Another theoretical implication of our study refers to the role of attitude in the model. While previous literature investigating marketing variables in the remanufactured and refurbished products context largely overlooks the attitude construct, this study is among the first ones to affirm its centrality in consumer behavioral models including marketing issues. Attitude is important because it can mediate the effect of perceived value and risk on purchase intention. This mediation effect, confirmed through different hypotheses, reflects the rationale that purchase intention cannot be explained by considering only perceived

value and risk. Perceived value and risk, in our view, represent the product and contextual perceived aspects of purchasing, but fail to consider other issues inherent to individuals (including issues such as pro-environmental and innovative behavior). These issues are represented by consumers' attitude toward specific products, which should mediate the relationships between perceived value and risk and purchase intention. We believe that different consumers, having the same perceived value and risk in assessing refurbished smartphones, would show different purchase intentions when possessing different levels of attitude toward such products. This could be of importance for scholars as the inclusion of attitude in consumer behavioral models in the refurbished products context represents, in our perspective, the conjunction between theories referring to individual or social environmentalisms (e.g. TPB, NAT) and theories including product and marketing issues (e.g. SRM, PT). Extension to other contexts could be tested.

Eventually, given that the remarketing process is considered a bottleneck (Guide and Li, 2010) that hinders the appropriation of value for the entire closed-loop supply chain, our results could contribute to this stream of the literature by helping to explain how consumers perceive contextual *stimuli*. In fact, the insights highlighting the significance of seller reputation and distribution of refurbished products in shaping purchase intention imply that firms need to understand that consumers are concerned not only with price, green benefits, and quality but also with such variables in their overall valuation of refurbished products. These insights could help to develop a more comprehensive theory of purchase intention in the context of refurbished products.

In addition, previous studies (e.g. Atasu et al., 2008; Wang et al., 2018a) stressed that practitioners know very little about consumers' purchase intention toward products derived from a closed-loop supply chain strategy. This study adds knowledge about how and why consumers value contextual marketing *stimuli* related to refurbished products by suggesting the role played by seller reputation, distribution, and attitude in consumers' mental models. In so doing, this study can inspire specific remarketing strategies to increase consumers' acceptance of these kind of products that can be of interest for firms' managers and policy-makers. Along this managerial perspective, findings suggest that, when consumers have positive attitudes toward refurbished products, they are more prone to buy these products. Therefore, to improve consumers' attitude toward such products, refurbishers should use the media to detail the characteristics of refurbished products, stressing the technical similarities to original products compared to a lower price and the possibility to take advantage of warranties that secure their purchase.

In the same line, given that consumers do not know the steps of refurbishing, refurbishers and sellers could work to improve process transparency. For example, consumers can be invited to visit the refurbishing facilities, thus increasing their level of trust toward refurbished products and subsequently spreading positive word-of-mouth to other consumers. As for the sellers, they can decide to allow consumers to freely use refurbished products for a given amount of time (this can be easily done, for example, in the context of refurbished smartphones), thus improving consumers' awareness about these products performances and value.

Finally, our findings suggest that seller reputation is important for refurbished products. Therefore, in refurbished product markets, it is important for sellers to build and communicate their reputation. Online marketplaces, as eBay or Amazon, can provide reputation signals about product or service quality, which can reduce uncertainties faced by potential buyers of refurbished products. However, both online and traditional offline markets should work harder to educate consumers about refurbished products, also by collaborating with governments. For example, it could be useful to establish refurbishing quality certifications, sellers certifications, or to work to build refurbishers and sellers brand. Only the creation of such risk-mitigating mechanisms could improve the chances of success of refurbished products and, more in general, of closed-loop supply chain initiatives.

6. Conclusions, limitations and future research

Understanding consumer perceptions of refurbished products and contextual marketing stimuli represents a growing area of study in sustainability and close loop supply chain. The literature addressing consumers and products derived from closed-loop supply chain processes in the B2C context has largely focused on the green subjective concerns for individuals (e.g. Gaur et al., 2019; Park and Lin, 2018; Sun et al., 2018), whereas less attention has been devoted to factors affecting the demand for refurbished products from the end consumer perspective. The present study is different from previous ones (e.g., Atasu et al., 2008; Guide and Van Wassenhove, 2009; Jiménez-Parra et al., 2014; Pisitsankkhakarn; Van Weelden et al., 2016; Sun et al., 2018) as it investigates the effect of the importance paid by consumers to contextual marketing stimuli on consumers' perception of refurbished products. Findings suggest that improving seller reputation and distribution of refurbished products are paramount for firms interested in selling these products. In addition, attitude emerged as a crucial variable that need to be understood in depth in this context.

The present study has several limitations, which offer rich opportunities for future research. First, the sample used limits generalizability, as the average age and the country of participants may disallow generalizing the findings of this study. More in detail, even if we have followed the approach adopted by Wang and Hazen (2016) to understand whether the sample could be considered a suitable proxy for the target population of consumers and that the result of the *t*-test performed shows no significant differences, findings should be cautiously managed. It can be possible that the involvement of a different and larger sample could show different results and that it can appear a relationship between the purchase intention of individuals, their country and their age. Therefore, future research can use other samples and in different economic/market/country settings to examine, among the others, the effects of such settings on the importance paid to seller reputation and distribution, as well as on the other variables of the model. This could be of importance because different responses to marketing stimuli due to such variances should impose different remarketing strategies and policies. This effort could help to understand if findings could be extended to other contexts or not. Along the same line, the two relationships between perceived risk and perceived value and between the importance paid to distribution and attitude emerged from the empirical analyses would benefit from further investigation to verify they can be extended to other contexts.

Second, another issue that could help to improve the generalizability is the investigation of additional product types. While in this study we focused on a specific kind of product (i.e., refurbished smartphones), future research could investigate the validity of our findings when considering other types of products, such as refurbished auto parts or additional electronic devices. This because, as suggested by several authors (Abbey et al., 2015b, 2017, 2017; Sun et al., 2018), the effect of marketing variables on consumers' behavior is product dependent.

Third, our study adopted a common survey based method, while it could be useful to design and implement a more dynamic experimental environment based on the direct observation of potential consumers who are in a retail store and faced the decision to purchase or not a refurbished product. We believe that this approach could capture some additional insights that is difficult to grasp through surveys.

Fourth, our study does not include another marketing stimuli that was indicated by some scholars (Bigliardi et al., 2020) as of interest for the closed-loop supply chain context, namely promotion. This is due to the fact that the investigation of the role of promotion deserves a dedicated study with a different approach. In fact, to understand the role of promotion there is the need to include price and advertising considerations, which together shape the effect of promotion. In addition, it is necessary to distinguish the effect of the advertising made for the refurbished product from that of the new product, which can produce a combined (positive or negative) effect.

Fifth, in our study we hypothesized and verified a low reputation of sellers. This reflects the fact that in the refurbished mobile-phone market there is a large portion (the vast majority) of third-party sellers whose reputation is low. However, it must be noted that in the same market there are also OEMs or large retailers who sell refurbished smartphones, whose reputation should not be low. It would be interesting to study the effect of these distinct reputations on the variables investigated in our study, as results could vary according to the level of reputation of the sellers.

Finally, given the importance recognized to the attitude construct by this study, it could be of interest to understand how attitude towards refurbished products is shaped over time. More in detail, it could be of interest to identify the learning and reinforcing mechanisms that help to establish a positive or negative attitude towards these products, which includes issues such as the media, social networks, electronic markets, and personal experiences and beliefs.

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgement

We, as co-authors, we would like to pay a special tribute to our colleague and friend Francesco Galati who conceptualized this article and worked dedicatedly on it until his last days.

References

Aaker, D.A., 1996. Measuring brand equity across products and markets. Calif. Manag. Rev. 38 (3), 102–120.
Abbey, J.D., Kleber, R., Souza, G.C., Voigt, G., 2017. The role of perceived quality risk in pricing remanufactured products. Prod. Oper. Manag. 26 (1), 100–115.
Abbey, J.D., Meloy, M.G., Blackburn, J., Guide Jr., V.D.R., 2015a. Consumer markets for remanufactured and refurbished products. Calif. Manag. Rev. 57 (4), 26–42.
Abbey, J.D., Meloy, M.G., Guide Jr., V.D.R., Atalay, S., 2015b. Remanufactured products in closed-loop supply chains for consumer goods. Prod. Oper. Manag. 24 (3), 488–503.
Ajzen, I., 1991. The theory of planned behavior. Organ. Behav. Hum. Decis. Process. 50 (2), 179–211.
Akerlof, G.A., 1970. The market for" lemons": quality uncertainty and the market mechanism. Q. J. Econ. 84 (3), 488–500.
Anderson, J.C., Gerbing, D.W., 1988. Structural equation modeling in practice: a review and recommended two-step approach. Psychol. Bull. 103 (3), 411–423.
Atasu, A., Sarvary, M., Van Wassenhove, L.N., 2008. Remanufacturing as a marketing strategy. Manag. Sci. 54 (10), 1731–1746.
Aytac, B., Wu, S.D., 2013. Characterization of demand for short life-cycle technology products. Ann. Oper. Res. 203 (1), 255–277.
Bagozzi, R.P., 1980. Causal Models in Marketing. Wiley, New York.
Bagozzi, R.P., Yi, Y., 1988. On the evaluation of structural equation models. J. Acad. Market. Sci. 16 (1), 74–94.
Bamberg, S., Hunecke, M., Blöbaum, A., 2007. Social context, personal norms and the use of public transportation: two field studies. J. Environ. Psychol. 27 (3), 190–203.
Bamberg, S., Möser, G., 2007. Twenty years after Hines, Hungerford, and Tomera: a new meta-analysis of psycho-social determinants of pro-environmental behaviour. J. Environ. Psychol. 27 (1), 14–25.
Baron, R.M., Kenny, D.A., 1986. The moderator–mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations. J. Pers. Soc. Psychol. 51 (6), 1173.
Bigliardi, B., Campisi, D., Ferraro, G., Filippelli, S., Galati, F., Petroni, A., 2020. The intention to purchase recycled products: towards an integrative theoretical framework. Sustainability 12 (22), 9739.
Casaló, L., Flavián, C., Guinalíu, M., 2008. The role of perceived usability, reputation, satisfaction and consumer familiarity on the website loyalty formation process. Comput. Hum. Behav. 24 (2), 325–345.
Celsi, R.L., Olson, J.C., 1988. The role of involvement in attention and comprehension processes. J. Consum. Res. 15 (2), 210–224.
Chen, Z., Dubinsky, A.J., 2003. A conceptual model of perceived customer value in e-commerce: a preliminary investigation. Psychol. Market. 20 (4), 323–347.
Chen, W., Kucukyazici, B., Saenz, M.J., 2019. On the joint dynamics of the economic and environmental performances for collective take-back systems. Int. J. Prod. Econ. 218, 228–244.
Cheng, S., Lam, T., Hsu, C.H., 2006. Negative word-of-mouth communication intention: an application of the theory of planned behavior. J. Hospit. Tourism Res. 30 (1), 95–116.
Cheung, G.W., Lau, R.S., 2008. Testing mediation and suppression effects of latent variables: bootstrapping with structural equation models. Organ. Res. Methods 11 (2), 296–325.
Dodds, W.B., Monroe, K.B., Grewal, D., 1991. Effects of price, brand, and store information on buyers' product evaluations. J. Market. Res. 28 (3), 307–319.
Durif, F., Roy, J., Boivin, C., 2012. Could perceived risks explain the 'green gap'in green product consumption? Electron. Green J. 1 (33), 1–15.
Farris, P., Olver, J., De Kluyver, C., 1989. The relationship between distribution and market share. Market. Sci. 8 (2), 107–128.
Fitch-Roy, O., Benson, D., Monciardini, D., 2020. All around the world: assessing optimality in comparative circular economy policy packages. J. Clean. Prod. 125493.
Gallagher, D., Ting, L., Palmer, A., 2008. A journey into the unknown; taking the fear out of structural equation modeling with AMOS for the first-time user. Market. Rev. 8 (3), 255–275.
Gaur, J., Amini, M., Rao, A.K., 2017. Closed-loop supply chain configuration for new and reconditioned products: an integrated optimization model. Omega 66, 212–223.
Gaur, J., Mani, V., Banerjee, P., Amini, M., Gupta, R., 2019. Towards building circular economy: a cross-cultural study of consumers' purchase intentions for reconstructed products. Manag. Decis. 57 (4), 886–903.
Ghose, A., 2009. Internet exchanges for used goods: an empirical analysis of trade patterns and adverse selection. MIS Q. 263–291.
Gleim, M., Lawson, S.J., 2014. Spanning the gap: an examination of the factors leading to the green gap. J. Consum. Market. 31 (6/7), 503–514.
Gomes, P.J., Silva, G.M., Sarkis, J., 2019. Exploring the relationship between quality ambidexterity and sustainable production. Int. J. Prod. Econ. 224, 107560.
Govindan, K., Shankar, K.M., Kannan, D., 2020. Achieving sustainable development goals through identifying and analyzing barriers to industrial sharing economy: a framework development. Int. J. Prod. Econ. 227, 107575.
Grewal, D., Krishnan, R., Baker, J., Borin, N.A., 1998. The effect of store name, brand name and price discounts on consumers' evaluations and purchase intentions. J. Retailing 74 (3), 331.
Groening, C., Sarkis, J., Zhu, Q., 2018. Green marketing consumer-level theory review: a compendium of applied theories and further research directions. J. Clean. Prod. 172, 1848–1866.
Guide Jr., V.D.R., Li, J., 2010. The potential for cannibalization of new products sales by remanufactured products. Decis. Sci. J. 41 (3), 547–572.
Guide Jr., V.D.R., Van Wassenhove, L.N., 2009. OR forum—the evolution of closed-loop supply chain research. Oper. Res. 57 (1), 10–18.
Hair, J.F., Black, W.C., Babin, B.J., Anderson, R.E., Tatham, R.L., 1998. Multivariate Data Analysis, vol. 5. Prentice hall, Upper Saddle River, NJ, pp. 207–219, 3.
Hamzaoui Essoussi, L., Linton, J.D., 2010. New or recycled products: how much are consumers willing to pay? J. Consum. Market. 27 (5), 458–468.
Hamzaoui Essoussi, L., Linton, J.D., 2014. Offering branded remanufactured/recycled products: at what price? Journal of Remanufacturing 4 (1), 9.
Harms, R., Linton, J.D., 2016. Willingness to pay for eco-certified refurbished products: the effects of environmental attitudes and knowledge. J. Ind. Ecol. 20 (4), 893–904.
Hazen, B.T., Boone, C.A., Wang, Y., Khor, K.S., 2017a. Perceived quality of remanufactured products: construct and measure development. J. Clean. Prod. 142, 716–726.
Hazen, B.T., Mollenkopf, D.A., Wang, Y., 2017b. Remanufacturing for the circular economy: an examination of consumer switching behavior. Bus. Strat. Environ. 26 (4), 451–464.
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. Int. J. Prod. Econ. 135 (2), 781–790.
Hini, D., Gendall, P., Kearns, Z., 1995. The link between environmental attitudes and behaviour. Market. Bull. 6 (3), 22–31.
IDC, 2020. Worldwide market for used smartphones. Available at: https://www.idc.com/getdoc.jsp?containerId=prUS45865720. (Accessed 12 April 2020).
Irland, L.C., 1993. Wood producers face green marketing era: environmentally Sound Products. Wood Technol. 120 (2), 34–36.
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. J. Clean. Prod. 85, 488–496.
Joreskog, K.G., Sorbom, D., 1988. A Guide to the Program and Applications. SPSS, Chicago.
Kahneman, D., Tversky, A., 2013. Prospect theory: an analysis of decision under risk. In: Handbook of the Fundamentals of Financial Decision Making: Part I, pp. 99–127.
Kalafatis, S.P., Pollard, M., East, R., Tsogas, M.H., 1999. Green marketing and Ajzen's theory of planned behaviour: a cross-market examination. J. Consum. Market. 16 (5), 441–460.
Kanagal, N.B., 2016. An extended model of behavioural process in consumer decision making. Int. J. Market. Stud. 8 (4), 87–93.
Klöckner, C.A., 2013. A comprehensive model of the psychology of environmental behavior-A meta-analysis. Global Environ. Change 23 (5), 1028–1038.
Kotler, P., 2007. Marketing Management. Pearson Italia Spa.
Kumar, M., Tsolakis, N., Agarwal, A., Srai, J.S., 2020. Developing distributed manufacturing strategies from the perspective of a product-process matrix. Int. J. Prod. Econ. 219, 1–17.
Liu, Z., Diallo, C., Chen, J., Zhang, M., 2019. Optimal pricing and production strategies for new and remanufactured products under a non-renewing free replacement warranty. Int. J. Prod. Econ. 107602.

Lovelock, C.H., 2000. In: Service Marketing, fourth ed. Prentice Hall, Upper Saddle River, NJ.
Lüdeke-Freund, F., Gold, S., Bocken, N.M., 2019. A review and typology of circular economy business model patterns. J. Ind. Ecol. 23 (1), 36–61.
Ma, P., Gong, Y., Mirchandani, P., 2020. Trade-in for remanufactured products: pricing with double reference effects. Int. J. Prod. Econ. 107800.
Mackenzie, S.B., 2001. Opportunities for improving consumer research through latent variable structural equation modelling. J. Consum. Res. 28 (1), 159–166.
Magnier, L., Mugge, R., Schoormans, J., 2019. Turning ocean garbage into products–Consumers' evaluations of products made of recycled ocean plastic. J. Clean. Prod. 215, 84–98.
Matsumoto, M., Chinen, K., Endo, H., 2017. Comparison of US and Japanese consumers' perceptions of remanufactured auto parts. J. Ind. Ecol. 21 (4), 966–979.
Mugge, R., Jockin, B., Bocken, N., 2017. How to sell refurbished smartphones? An investigation of different customer groups and appropriate incentives. J. Clean. Prod. 147, 284–296.
Netoa, J.Q.F., Dutordoira, M., 2020. Mapping the market for remanufacturing: an application of "Big Data" analytics. Int. J. Prod. Econ. 107807.
Nunnally, J.C., 1994. Psychometric Theory 3E. Tata McGraw-Hill Education.
Pang, G., Casalin, F., Papagiannidis, S., Muyldermans, L., Tse, Y.K., 2015. Price determinants for remanufactured electronic products: a case study on eBay UK. Int. J. Prod. Res. 53 (2), 572–589.
Park, H.J., Lin, L.M., 2018. Exploring attitude–behavior gap in sustainable consumption: comparison of recycled and upcycled fashion products. J. Bus. Res.
Pazoki, M., Samarghandi, H., 2020. Take-back regulation: remanufacturing or eco-design? Int. J. Prod. Econ. 227, 107674.
Peter, J.P., Ryan, M.J., 1976. An investigation of perceived risk at the brand level. J. Market. Res. 13 (2), 184–188.
Phantratanamongkol, S., Casalin, F., Pang, G., Sanderson, J., 2018. The price-volume relationship for new and remanufactured smartphones. Int. J. Prod. Econ. 199, 78–94.
Pieroni, M.P., McAloone, T.C., Pigosso, D.C., 2019. Business model innovation for circular economy and sustainability: a review of approaches. J. Clean. Prod. 215, 198–216.
Pisitsankkhakarn, R., Vassanadumrongdee, S., 2020. Enhancing purchase intention in circular economy: an empirical evidence of remanufactured automotive product in Thailand. Resour. Conserv. Recycl. 156, 104702.
Quester, P., Neal, C., Pettigrew, S., Grimmer, M.R., Davis, T., Hawkins, D., 2007. Consumer Behaviour: Implications for Marketing Strategy. McGraw-Hill.
Rathore, P., Kota, S., Chakrabarti, A., 2011. Sustainability through remanufacturing in India: a case study on mobile handsets. J. Clean. Prod. 19 (15), 1709–1722.
Ravald, A., Grönroos, C., 1996. The value concept and relationship marketing. Eur. J. Market. 30 (2), 19–30.
Richardson, P.S., Jain, A.K., Dick, A., 1996. Household store brand proneness: a framework. J. Retailing 72 (2), 159–185.
Rogers, E.M., 2010. Diffusion of Innovations. Simon and Schuster.
Rogetzer, P., Silbermayr, L., Jammernegg, W., 2019. Sustainable sourcing including capacity reservation for recycled materials: a newsvendor framework with price and demand correlations. Int. J. Prod. Econ. 214, 206–219.
Rose, J.M., Rose, A.M., Norman, C.S., 2004. The evaluation of risky information technology investment decisions. J. Inf. Syst. 18 (1), 53–66.
Roy, V., Silvestre, B.S., Singh, S., 2020. Reactive and proactive pathways to sustainable apparel supply chains: manufacturer's perspective on stakeholder salience and organizational learning toward responsible management. Int. J. Prod. Econ. 227, 107672.
Saidani, M., Yannou, B., Leroy, Y., Cluzel, F., Kendall, A., 2019. A taxonomy of circular economy indicators. J. Clean. Prod. 207, 542–559.
Schwartz, S.H., 1977. Normative influences on altruism. Adv. Exp. Soc. Psychol. 10 (1), 221–279.
Schlaegel, C., Koenig, M., 2014. Determinants of entrepreneurial intent: a meta–analytic test and integration of competing models. Enterpren. Theor. Pract. 38 (2), 291–332.
Shen, K.W., Li, L., Wang, J.Q., 2020. Circular economy model for recycling waste resources under government participation: a case study in industrial waste water circulation in China. Technol. Econ. Dev. Econ. 26 (1), 21–47.
Smith, D.C., 1992. Brand extensions and advertising efficiency: what can and cannot be expected. J. Advert. Res. 32 (6), 11–20.
Snoj, B., Korda, A.P., Mumel, D., 2004. The relationships among perceived quality, perceived risk and perceived product value. J. Prod. Brand Manag. 13 (3), 156–167.
Song, M., Zhu, S., Wang, J., Zhao, J., 2020. Share green growth: regional evaluation of green output performance in China. Int. J. Prod. Econ. 219, 152–163.
Steenkamp, J.B.E., Batra, R., Alden, D.L., 2003. How perceived brand globalness creates brand value. J. Int. Bus. Stud. 34 (1), 53–65.
Stern, P.C., 2000. New environmental theories: toward a coherent theory of environmentally significant behavior. J. Soc. Issues 56 (3), 407–424.
Subramanian, R., Subramanyam, R., 2012. Key factors in the market for remanufactured products. Manuf. Serv. Oper. Manag. 14 (2), 315–326.
Sun, H., Teh, P.L., Linton, J.D., 2018. Impact of environmental knowledge and product quality on student attitude toward products with recycled/remanufactured content: implications for environmental education and green manufacturing. Bus. Strat. Environ. 27 (7), 935–945.
Sweeney, J.C., Soutar, G.N., Johnson, L.W., 1999. The role of perceived risk in the quality-value relationship: a study in a retail environment. J. Retailing 75 (1), 77–105.
Terblanche, N.S., Boshoff, C., 2008. Improved scale development in marketing: an empirical illustration. Int. J. Mark. Res. 50 (1), 105–119.
Thomas, R.W., 2011. When student samples make sense in logistics research. J. Bus. Logist. 32 (3), 287–290.
Tokar, T., Aloysius, J.A., Waller, M.A., Williams, B.D., 2011. Retail promotions and information sharing in the supply chain: a controlled experiment. Int. J. Logist. Manag. 22 (1), 5–25.
Tseng, M.L., Wu, K.J., Chiu, A.S., Lim, M.K., Tan, K., 2019. Reprint of: service innovation in sustainable product service systems: improving performance under linguistic preferences. Int. J. Prod. Econ. 217, 159–170.
Wahjudi, D., Gan, S.S., Anggono, J., Tanoto, Y.Y., 2018. Factors affecting purchase intention of remanufactured short life-cycle products. International Journal of Business & Society 19 (2), 415–428.
Wang, Y., Hazen, B.T., 2016. Consumer product knowledge and intention to purchase remanufactured products. Int. J. Prod. Econ. 181, 460–469.
Wang, Y., Hazen, B.T., Mollenkopf, D.A., 2018a. Consumer value considerations and adoption of remanufactured products in closed-loop supply chains. Ind. Manag. Data Syst. 118 (2), 480–498.
Wang, S., Wang, J., Yang, F., Wang, Y., Li, J., 2018b. Consumer familiarity, ambiguity tolerance, and purchase behavior toward remanufactured products: the implications for remanufacturers. Bus. Strat. Environ. 27 (8), 1741–1750.
Wang, Y., Wiegerinck, V., Krikke, H., Zhang, H., 2013. Understanding the purchase intention towards remanufactured product in closed-loop supply chains. Int. J. Phys. Distrib. Logist. Manag. 43 (10), 866–888.
Watson, D., Gylling, A.C., Tojo, N., Throne-Holst, H., Bauer, B., Milios, L., 2017. Circular Business Models in the Mobile Phone Industry, vol. 2017560. Nordic Council of Ministers.
Webster, M., Sell, J. (Eds.), 2014. Laboratory Experiments in the Social Sciences. Elsevier.
Wells, P., Seitz, M., 2005. Business models and closed-loop supply chains: a typology. Supply Chain Manag.: Int. J. 10 (4), 249–251.
Wong, W.P., Tseng, M.L., Tan, K.H., 2014. A business process management capabilities perspective on organisation performance. Total Qual. Manag. Bus. Excel. 25 (5–6), 602–617.
Woodruff, R.B., 1997. Customer value: the next source for competitive advantage. J. Acad. Market. Sci. 25 (2), 139.
Van Weelden, E., Mugge, R., Bakker, C., 2016. Paving the way towards circular consumption: exploring consumer acceptance of refurbished mobile phones in the Dutch market. J. Clean. Prod. 113, 743–754.
Xu, X., Zeng, S., He, Y., 2017. The influence of e-services on customer online purchasing behavior toward remanufactured products. Int. J. Prod. Econ. 187, 113–125.
Yoo, B., Donthu, N., Lee, S., 2000. An examination of selected marketing mix elements and brand equity. J. Acad. Market. Sci. 28 (2), 195–211.
Yuan, Q., Shen, B., 2019. Renting fashion with strategic customers in the sharing economy. Int. J. Prod. Econ. 218, 185–195.
Zheng, X., Govindan, K., Deng, Q., Feng, L., 2019. Effects of design for the environment on firms' production and remanufacturing strategies. Int. J. Prod. Econ. 213, 217–228.
Zhou, L., Gupta, S.M., 2020. Value depreciation factors for new and remanufactured high-technology products: a case study on iPhones and iPads. Int. J. Prod. Res. 1–32.