A sustainable step forward: Exploring factors influencing the purchase intentions towards remanufactured products using fsQCA

Nora Sharkasi [a], Peter De Maeyer [b], Houyem chaib Lababdi [c], Salma AlMansoori [d], Gomaa Agag [e,f,g,*]

[a] *Institute for International Strategy (IIS), Tokyo International University, 4 – 42 – 31 Higashi Ikebukuro, Toshima, Tokyo, 170-0013, Japan*
[b] *Faculty of Liberal Arts, Sophia University, 7-1 Kioichō, Chiyoda, Tokyo, 102-8554, Japan*
[c] *ICD business school, Paris, France*
[d] *UAE University, United Arab Emirates*
[e] *Nottingham Business School, Nottingham Trent University, Nottingham, United Kingdom*
[f] *University of Sadat City, Sadat City, Menofia, Egypt*
[g] *31 The Living Quarter, Nottingham, NG1 1QF, United Kingdom*

ARTICLE INFO

ABSTRACT

The rapid advancement of industrialization has led to a growing concern about resource shortages and environmental pollution. Sustainable manufacturing practices, particularly in the context of remanufactured products, have been extensively researched from the B2B perspective. Comparatively fewer studies have examined consumer behavior in the context of remanufactured electrical appliances. This study merges components from the Theory of Planned Behavior and Protection Motivation Theory with additional variables into a framework for predicting purchase intentions. Noting the complex, asymmetric nature of causation, an asymmetrical configurational approach using fsQCA is used for analysis. Data were collected form 411 consumers in the U.K using quota sampling technique. The findings show that both components of attitude (experiential and instrumental) as well as a high threat appraisal (perceived severity and vulnerability) are present in all configurations predicting high purchase intention. Self-efficacy and response efficacy are also important conditions present in many configurations. The paper ends with some novel insights on consumer behavior with respect to remanufactured products, and a discussion of theoretical and managerial implications.

1. Introduction

Remanufacturing is an industrial procedure that involves restoring used products or damaged components to a condition that is like-new or even better. This process utilizes a combination of reused, repaired, and new parts, whereby remanufactured products are accompanied with a warranty. Remanufactured products offer several advantages, such as lowering costs for manufacturers by eliminating the need to spend on raw materials, water, and energy. They also showcase sustainability by reducing greenhouse gas emissions and natural resource consumption. Additionally, remanufacturing allows for a quicker product turnaround since manufacturers do not have to start from scratch with raw materials. Approximately 90% of remanufacturing occurs within the business-to-business (B2B) sector, however, there is a growing presence in the business-to-consumer (B2C) sphere, particularly within the electrical and electronic appliances (Aboul-Dahab et al., 2021; Hischier et al., 2020; Sakao et al., 2024). This expansion reflects an increasing interest from consumers in environmentally friendly and sustainable products (Abdelmoety et al., 2022; Houf et al., 2024). Consumers generate significant quantities of electronic waste, while the implementation of circular economy and its associated initiatives remains constrained (Agag, 2019; Sakao et al., 2024). Consumers may hesitate to buy remanufactured products out of concerns about quality, the possibility of being misled, and their environmental impact (Agag et al., 2023a; Shashi et al., 2024). However, among younger generations, there is an observed increase in awareness of environmental issues leading to a growing trend in purchasing environmentally friendly products (Agag et al., 2020; Houf et al., 2024).

From a business standpoint, providing remanufactured products at reduced cost could be an alternative for customers with limited purchasing power and who exhibit price sensitivity to these products. Examples of remanufacturing can be found in the fashion and electrical and electronic appliance industries. For instance, H&M, Zara, and many other fashion brands have introduced a wide range of items crafted from recycled and remanufactured materials. This has inspired numerous additional companies to follow this sustainability trend. GE Healthcare, a prominent medical device company, diligently engages in the remanufacturing and refurbishing of its systems business line through the GoldSeal brand. Likewise, Cisco, a top electronic manufacturer known for routers, phones, and security products, provides remanufactured items through a program called Cisco Refresh. The shift of both consumers and businesses towards eco-friendly behavior seems well-established now and presents potential for more consumers to engage with the market of remanufactured products, therefore attracting interest in potential research in this area.

Most of the existing literature on remanufactured products take the perspective of manufacturers, focusing on topics such as procurement logistics (Nikseresht et al., 2024), capacity and inventory management (Agag et al., 2024a; Reddy and Kumar, 2021), design for remanufacturing (Agag and Eid, 2020; Lindkvist Haziri and Sundin, 2020), and marketing decision such as branding (Nascimento and Loureiro, 2024) and pricing (Chakraborty et al., 2021). While there is a budding stream of research focusing on the consumer side, this has been a relatively understudied area – as noted in an editorial on marketing remanufactured products (Agag et al., 2023b; Govindan et al., 2019). Moreover, a recent systematic literature review following the Scientific Procedures and Rationales for Systematic Literature Reviews (SPAR-4-SLR) protocol retained 53 articles addressing the purchase behavior of remanufactured products (Belbağ and Belbağ, 2023), which seems a small number given the importance of the topic.

According to Belbağ and Belbağ (2023), a number of theories have been applied to study the customer's behavior towards remanufactured products, with especially the theory of planned behavior and the theory or reasoned action often being utilized in this context. None of the studies screened by Belbağ and Belbağ (2023) have combined the theory of planned behavior with the protection motivation theory (PMT) to examine the purchase behavior of remanufactured products. In addition, most quantitative consumer studies in remanufacturing (and social science research in general) use variance- and covariance-based modeling to isolate the net effect of personal and contextual variables, or at most look at one- or two-way interactions. Only a few studies attempt to apply an alternative approach of analysis to study the consumption behavior, as in applying fsQCA method of analysis. Up to date, we are aware of only three studies that applied fsQCA to examine the purchase behavior of remanufactured products, namely Alyahya et al.(2023a), Alyahya et al. (2023b), and Wang et al. (2018). While there is of course some overlap, the framework proposed in this paper deviates from these three studies in terms of causal variables included.

Although a few decades old, fuzzy-set Qualitative Comparative Analysis fsQCA is just seeing a recent surge of adoption in the field of management research. A recent systematic review of fsQCA in business and management research by Kumar et al. (2022) shows in the ten years prior to 2014, about 20 publications used fsQCA method per year, at which point a fast rise began, with 154 publications in 2020 and 248 in 2021. Although often used with exclusively quantitative data (including in this study), fsQCA is also capable of incorporating qualitative data, making it an inherently mixed method of analysis (Agag et al., 2024b; Taheri et al., 2020).

This study applies the fsQCA method of analysis, which identifies the main configurations of antecedent variables associated with an outcome of interest, in this case remanufactured products purchase behavior (henceforth, RPPB). This study aims to identify the combinations of factors motivating consumers to purchase remanufactured household electronic appliances. Consumers behavior is highly driven by their sustainable mindsets (Agag et al., 2016; Bakış and Kitapçı, 2023; Gomes et al., 2022). Consumers believe brands must drive sustainability but don't trust businesses to do so (Agag et al., 2019; Iannuzzi, 2024). Moreover, sustainability Legislation on packaging waste in the European Union requires manufacturers to gather and process end-of-life products for recycling, refurbishing, or remanufacturing purposes. Although this is a well-implemented strategy directed at manufacturers, it is equally important to get the general population to buy into the circular economy concept. Therefore, since environmental protection issues are closely related to moral and ethical factors, our study focuses on variables obtained from the protection motivation theory PMT along with the theory of planned behavior TPB. The PMT has been applied in the context of green and sustainable products (e.g., Agag and Colmekcioglu, 2020) and in the remanufactured products context, in particular (Agag et al., 2024c; Alyahya et al., 2023a).

This study contributes to the body of literature in the area of the purchase intention of remanufactured products by following a distinct approach for studying the RPPB; firstly, it introduces different factors – that have not been explored previously in the area of remanufactured products - based on two well-established theories, namely the TPB and PMT. In keeping with La Barbera and Ajzen (2022), we split the attitude variable of the TPB into an experiential and instrumental component, which, previewing the results, leads to some interesting study implications. Lastly, to ensure construct stability and consistency, we include a residual effect variable capturing consumers' past experiences with remanufactured products (Aldossary et al., 2024; Hagger and Hamilton, 2024; Wang et al., 2018).

Secondly, this study adopts a mixed-method approach of analysis by applying the fsQCA method for analysis. However, the implementation of multi-disciplinary and mixed methods of analysis in social studies is still at its infancy (Alghamdi and Agag, 2023b; Alyahya et al., 2023a). Recently, fsQCA method of analysis, has become increasingly popular due to its case–oriented and variable–oriented nature of analysis (Alrawad et al., 2023; Alsuwaidi et al., 2022; Pappas and Woodside, 2021) which makes it an "inherently mixed" method of analysis (Alyahya et al., 2023a; Taheri et al., 2020).

The next section is a literature review on the overarching approach of model development and the main variables of the study. Section three outlines the main study propositions. This is then followed by a methodology section. Data analysis and findings in section 5, and a discussion of the results, implications and limitations in section 6.

2. Theoretical foundation

2.1. Remanufactured products

The rapid advancement of industrialization has led to a growing concern about resource shortages and environmental waste, prompting governments and scholars to promote the concept of circular economy (Dufrénot, 2023). Although it lacks a formal definition and is subject to ongoing revision, *circular economy* represents an alternative, sustainable economic concept that aims to challenge the traditional open-ended "take-make-dispose" model by promoting more efficient use of resources and balancing factors such as economy, environment, and society (Alyahya et al., 2023b; Ghisellini et al., 2016). The circular economy concept aims to minimize material consumption by redesigning products, rethinking input materials, and taking proactive steps at the end-of-life such as recycling, refurbishing and remanufacturing (Grdic et al., 2020).

Remanufacturing plays a crucial role within the closed-loop supply chain framework by facilitating efficient methods of product recovery (Luo et al., 2022). Original equipment manufacturers and third-party remanufacturers employ this approach to reclaim value from returned products. These products go through a series of tests, refurbishment if needed (including internal or external repairs), and then are marketed again (Alyahya et al., 2023c; Framinan, 2024; Guide and Van

Wassenhove, 2009). The primary remanufacturing process is known as authorized remanufacturing. In this method, the original equipment manufacturer only handles the sale of new products. Once third-party remanufacturers have paid an authorization fee, they are permitted to carry out the recycling, remanufacturing, and sale of the newly remanufactured products.

Numerous studies have posited that remanufacturing plays a key role in enhancing global sustainability and can consequently contribute to the sustainable development objectives of governments (Alzaidi and Agag, 2022; Sakao et al., 2024; Ngu et al., 2020). Compared to conventional products, remanufactured ones have the potential to reduce production costs by at least 50%, materials by at least 70%, and energy consumption by at least 60%. They can also decrease environmentally harmful substances by over 80% (Eid et al., 2020; Hunka et al., 2021; Ostojic, 2016).

2.2. Conceptual framework and study variables

The theory of planned behavior TPB seeks to understand individuals' behavioral intentions and eventual behavior, by identifying important antecedents thereof. Recent research has expanded the range of applications of the TPB to a variety of study areas, including sustainability (Alyahya et al., 2023a, 2023b; Aydin and Mansour, 2023; Agag and Colmekcioglu, 2020; Burucuoglu and Erdogan, 2019). In a recent systematic literature review by Belbağ and Belbağ (2023), the TPB is found to be the most-used theory, present in 11 out of 53 studies on consumer behavior towards remanufactured products. The impetus behind the development of the TBP was the observation by attitude researchers that attitude by itself is often a weak predictor of behavior. The TPB seeks to close this explanatory gap by adding two other predictors of behavioral intentions, namely individuals' perceived control over the outcome and the influence of social norms (Ajzen and Fishbein, 2000). According to the influential work of Conner and Armitage (1998), "subjective norm to be the weakest predictor of intention in both the theory of reasoned action TRA and the TPB ⋯ Moral norms may prove a useful addition to the TPB ⋯ Moral norms are regarded as an individual's perception of the moral correctness or incorrectness of performing a behavior." The findings of some recent studies employing the TPB also report a weak effect of subjective norms (Ma et al., 2023; Yaghoubi Farani et al., 2019). Simultaneously, there has been a long interest to extend or couple the TPB with moral variables (Alyahya et al., 2023a; Hagger and Hamilton, 2024; Wang et al., 2018; Randall and Gibson, 1991). Thereof, we attempt to follow a distinct approach to study the RPPB by:

(i) fusing the TPB with an ethics theory as in the protection motivation theory PMT. Rogers (1975) developed the Protection Motivation Theory (PMT) as a theoretical framework for health promotion. It explains how individuals are driven to respond in a protective manner when faced with a perceived threat, such as natural disasters and disease (Hsieh et al., 2017). Recent research has expanded the range of PMT applications to a variety of study areas, including sustainability (Alyahya et al., 2023a; Ibrahim and Al-Ajlouni, 2018). One of the early research projects discussing the use of PMT to study sustainability is Janmaimool (2017) which used PMT to evaluate citizens' participation in sustainable waste management practices. According to PMT, individuals make two assessments – threat appraisal and coping potential – which then results in either adaptive, maladaptive, or avoidance responses which are potentially a risk to their personal well-being (Rogers, 1983). Therefore, we consider all variables composing the threat appraisal and coping potential constructs in our configurational model.

(ii) Expanding on the attitude component of TPB. Attitude is a key component of the TPB, it refers to an individual's evaluative belief towards a particular attitude object. Ajzen and Fishbein (1977) conceptualize the attitude towards a behavior as "an

evaluative response that predisposes one favorably or unfavorably towards that behavior". Tenbult et al. (2008) state that consumers' attitudes will be stronger with greater frequency of exposure to the attitude object, or when the attitude is more consistent with one's prior inter -and intra-attitudinal structure. Favorable attitudes of consumers do not always convert into actual purchasing behavior of green or sustainable products (Joshi and Rahman, 2015). Even though there could be many reasons why individuals do not act on their attitudes (for instance, social pressure, lack of resources or self-efficacy), they will often be an influence. For instance, recent papers by Wang et al. (2018) and Kabel et al., (2020) report a significant link between consumers' attitude towards sustainable products, and their intention to purchase remanufactured products. To refine our understanding of how attitudes influence purchase intentions, it is useful to decompose it in two dimensions: experiential attitude and instrumental attitude (Eid et al., 2019; La Barbera and Ajzen, 2022).

(iii) Extending the TPB to include residual effects. Residual effect derives from a person's previous actions or past experiences that might impact their inclination to engage in a specific behavior (Agag and El-Masry, 2016; Ajzen, 2002). In the context of remanufactured products consumption, this is operationalized by looking at a household's purchase history during the preceding three to five years, and observing to what extent green products or remanufactured appliances were bought (Alyahya et al., 2023e; Wang et al., 2018). Several studies have shown that adding a residual effect variable can improve the explanatory power of a prediction model of remanufactured products purchase intention (Sommer, 2011; Wang et al., 2013; Wang et al., 2020; Taheri et al., 2020; Polavarapu and Vemula, 2023; Costa et al., 2021).

2.2.1. Perceived behavioral control

Perceived behavioral control PBC describes individuals' confidence in their capacity to control the performance of a certain behavior. It is influenced by individuals' beliefs about necessary resources and opportunities for successful execution of the behavior (Ajzen, 1991). PBC has been studied in many studies on green and sustainable products (Alyahya et al., 2023d; Elbaz et al., 2018; Yadav and Pathak, 2017; Liu et al., 2020; Ruangkanjanases et al., 2020). Its three main components are: product knowledge, perceived risk, and perceived inconvenience level (Xu et al., 2020).

In terms of perceived *product knowledge* PROK, consumers with sufficient understanding of remanufactured products are more likely to have increased self-confidence and, consequently, a greater inclination to make purchases (Alghamdi and Agag, 2023a; Zhang et al., 2017). Several studies operationalize product knowledge in terms of familiarity with the idea of remanufacturing, price levels of remanufactured products, and quality of warranty (Alyahya et al., 2023f; Elbeltagi and Agag, 2016; Wang et al., 2013; Michaud and Llerena, 2011). A study conducted by Pisitsankkhakarn and Vassanadumrongdee (2020) found product knowledge along with product quality, and physical appearance, to be positively associated with purchase intention for remanufactured products. Wang and Hazen (2016) showed that perceived value is most influenced by product knowledge. A study conducted by Milios and Matsumoto (2019) showed that car owners, despite having limited knowledge about remanufactured auto parts, recognize the benefits of using such parts, without showing any significant risk aversion in their purchase decision. These studies suggest that consumers can make purchasing decisions more effectively and rationally if they have sufficient knowledge about the product, thus mitigating perceived risks.

Perceived risk relates to the potential negative outcomes of an action. Perceived risk can be the result of a lack of familiarity with remanufactured products or the remanufacturer (e.g., Elhoushy et al., 2020;

Hasan et al., 2021; Rehnan, 2020). Consumers naturally aim to prevent or alleviate negative outcomes (Zhang et al., 2017). Consumers can be expected to experience skepticism about the quality of remanufactured products, consequently reducing their inclination to make a purchase (Alyahya et al., 2023g; Confente et al., 2021; Hamdy et al., 2024; Singhal et al., 2019). A study by Chen and Chen (2019) found perceived risk to be one of the main factors in driving Chinese consumers' decision to purchase remanufactured MP4 players. Studies have operationalized perceived risk of remanufactured products in terms of security risks, quality performance gap compared to new products, frequency of repairs needed, and overall perception as a worthwhile investment (Korgaonkar, 1982; Wang et al., 2018). A study conducted by Souza et al. (2020) found perceived risk to predict 66.2% of the intention to purchase remanufactured computers for university students, along with attitudinal variables and perceived value.

Perceived inconvenience INCON can be explained as consumers' difficulty to distinguish between remanufactured and conventional products, as well as the time and effort necessary to search for information about such products (Laradi et al., 2024; Wang et al., 2018, 2020; Ibrahim and Al-Ajlouni, 2018). The perceived inconvenience linked to evaluating the performance, quality, and safety of remanufactured products has a detrimental effect on consumer purchasing behavior (Selim et al., 2022; Shaalan et al., 2022; Wang et al., 2023; Hasan et al., 2021; Souza et al., 2020).

2.2.2. Experiential and instrumental attitude

To refine our understanding of how attitudes influence purchase intentions, it is useful to decompose them in two dimensions: experiential attitudes and instrumental attitudes (La Barbera and Ajzen, 2022). An *experiential attitude* EXPA pertains to an individual's emotional disposition towards a certain behavior by considering the affective states experienced while performing the behavior (More and Phillips, 2022). In the context of remanufactured products, consumers who are actively concerned about sustainability are likely to feel satisfied in the knowledge they contributed to sustainability goals. The anticipation of this positive affective state increases the likelihood of choosing remanufactured products (positive reinforcement). Likewise, the desire to avoid anticipated negative affective states one might feel when buying conventional products (e.g., guilt, cognitive dissonance) could drive pro-environmental consumers towards remanufactured ones (negative reinforcement). Lastly, *instrumental attitudes* INSTA are based on pragmatic considerations and relate to individuals' evaluation of the net outcomes of that behavior as either positive or negative (Huart et al., 2023). To our knowledge, just 3 studies in the context of remanufactured products use this split of attitude into its experiential and instrumental components (Wang et al., 2020).

Chen and Chen (2019) and Huffman et al. (2014) operationalize experiential attitude towards remanufactured products by considering customers' affective states of feeling good, the product being useful, and the act of purchase being responsible. Instrumental attitude, on the other hand, is operationalized in terms of the positive consequences that can be obtained by purchasing remanufactured products, for instance, energy or raw material savings. Favorable attitudes of consumers do not always convert into actual purchasing behavior, and most do not make purchases of green or sustainable products (Joshi and Rahman, 2015).

2.2.3. Threat appraisal

Threat appraisal involves evaluating the following three factors: perceived severity, vulnerability, and maladaptive response rewards. In the context of remanufactured products, *perceived severity* PSEV captures the negative environmental effects that threaten one's well-being and the well-being of society (Janmaimool, 2017; Sharkasi and Agag, 2024). This includes environmental threats that degrade the quality of life or cause a further speedy depletion of scarce resources (Zheng et al., 2020). *Perceived vulnerability* PVUL captures customers' sensitivity to the possible negative experiences and consequences associated with the

purchase of environmentally unfriendly products, including conventional products (Alyahya et al., 2023a; Stuart et al., 2023). Along with the measurement of perceived severity and vulnerability, consumers will judge the perceived maladaptive response rewards PREW of a course of action. *Maladaptive response reward* refers to intrinsic and extrinsic benefits of neglecting a given protective behavior, and it is negatively related to likelihood to act (Kothe et al., 2019). We found only 4 studies implementing the three components of threat appraisal in the context of sustainable and remanufactured products (e.g., Alyahya et al., 2023b; Rodríguez-Priego and Montoro-Ríos, 2018; Shehawy et al., 2024; Hartmann et al., 2014; Lee et al., 2013).

2.2.4. Coping appraisal

Coping appraisal, the second cognitive process of the PMT, involves assessing an individual's perceived capacity to engage in risk-preventive actions (Rogers, 1983). A number of recent studies assert the pivotal role of this construct in influencing and causing a change in purchase consumer behavior (Rather et al., 2023; Shehawy et al., 2018; Fu et al., 2024; Pang et al., 2021; Wood et al., 2021). Coping appraisal has three components: self-efficacy, response efficacy and perceived response cost. Perceived *self-efficacy* PSEF relates to "an individual's confidence in determining how well he or she can take the actions necessary for producing certain results" (Bandura, 1995). Perceived *response efficacy* PRSE refers to the perceived effectiveness of preventive action. In this study, response efficacy is operationalized as consumers' belief that consumption of remanufactured products is an effective way to lessen the threat to the environment. Lastly, perceived *response costs* PCST refer to any costs resulting from adaptive coping responses, including monetary and non-monetary ones. Bockarjova and Steg (2014) operationalize response costs in terms of price, limited range, safety, maintenance, and performance issues.

3. Research propositions: complexity and configurational thinking in RPPB

Pappas and Woodside (2021) note that relationships between variables are often complex and highly non-linear (e.g., threshold effects). They recommend moving beyond traditional variational methods like regression and structural equations models, towards a more holistic configurational approach that identifies combinations of causes associated with an outcome of interest. Two theories are often invoked in the context of fsQCA are Complexity Theory and Configurational Theory (Pappas and Woodside, 2021; Kumar et al., 2022). These are closely related and provide the philosophical and methodological underpinnings of fsQCA. Originally rooted in systems theory and the study of nonlinear emergent systems, Complexity Theory in the context of social sciences "provides an alternative paradigm and set of concepts for studying the intrinsic complexity, non-linearity, and emergent qualities of social systems as opposed to traditional reductionist approaches" (Byrne, 2002). Central ideas relevant in this context are configurational causation, asymmetry and equifinality (Pappas and Woodside, 2021; Youssef et al., 2022). *Configurational causation* says that the impact of one factor may be dependent on the presence of others. This implies a holistic view of causation where the focus is on configurations of factors rather than their isolated, additive, compensatory effect. *Asymmetry* is another departure from the traditional variance-based approach in social science research, where relationships are assumed to be linear, and therefore if higher X leads to higher Y, then lower X must predict lower Y. The asymmetric view of causation says that if X predicts Y, then the absence of X does not necessarily predict the absence of Y. For instance, social pressure may result in strong compliance with recycling rules, but the absence of social pressure will not necessarily predict low compliance. Lastly, the principle of *equifinality* says that the same outcome could have multiple causes (i.e., configurations of factors). Configurational Theory is closely connected with Complexity Theory and often mentioned in the same discussion, however, is more focused on the

mechanics of identifying configurations of causal factors using the set-theoretic, case-oriented approach of fsQCA which we will discuss later.

The configurational approach has proven itself useful in the context of remanufactured products (Alyahya et al., 2023a, 2023b; Wang et al., 2020), and likewise we expect to find various configurations leading to RPPB in our data. Table I lists the potential causal conditions of our framework, each of which can be combined with others to form a configuration associated with high RPPB. Following Alyahya et al. (2023a), we use a Venn diagram to illustrate the proposed configurational model of this study (see Fig. 1).

The complexity of RPPB could be understood through examining the relationships between different variables of the study. For example, Wang et al. (2018) showed the complexity between behavioral control and past experiences with remanufactured products. The complexity of the inter-relationships within the components of the PMT is also illustrated by Alyahya et al. (2023a) who also applied fsQCA to study the RPPB. Since coping appraisal (of PMT) is made up of two main elements: self-efficacy and enabling conditions (Ajzen, 1991), a close connection between perceived behavioral control (of TPB) and the coping appraisal (of PMT) is delineated as self-efficacy pertains to an individual's evaluation of their ability to perform a particular behavior (Bandura, 1995).

As shown in Fig. 1, consumers' RPPB represents a complex behavioral manifestation that is formed by the interplay between threat appraisal, coping appraisal, perceived behavioral control, and attitude-residual effect. Arrow A shows that demographic variables – age, gender, education, and income – are responsible of much explanation in the RPPB. Arrow B1 shows the interplay of perceived behavioral control variables with other variables in the system form various configurations that lead to a high and/or low level of RPPB. Threat and coping appraisal constructs are combined together (as in Alyahya et al., 2023a) due to the complexity stemming from the inter-relationships among factors, this is configured through Arrow C1. Arrow D1 serves the complex causal dynamics among the study's four causal configurations – demographics, perceived behavioral control, threat and coping appraisal, attitude, and residual effects, which lead to the outcome of interest – RPPB –.

Several studies have shown the existence of consumer segments in markets where remanufactured products are available (Abbey et al., 2015a, 2015b; Moosmayer et al., 2020). For instance, Abbey et al. (2015a) mention "only new will do consumers" and "green consumers". Other studies identify price-sensitivity as an important variable (Kabel et al., 2021). Cui et al. (2017) differentiates consumers based on whether they are more motivated by price, quality, or environmental awareness. The existence of different customer segments implies that different sets of causes may lead different consumers to the same outcome (i.e., buying remanufactured products). Likewise, the absence of a sufficient causal configuration for one consumer (e.g., price advantage and low risk perception) need not predict non-purchase in another (who might be more motivated by environmental concerns and aversion to cognitive dissonance). This leads to the following propositions, the first two of which mirror those in Alyahya et al. (2023a).

Proposition 1. (*equifinality*): *There are multiple configurations of causal conditions leading to high purchase intentions for remanufactured products.*

In fsQCA, a configuration of causes associated with an outcome of interest is referred to as a "solution".

Proposition 2. (*asymmetry*): *The relationship between causal factors and RPPB is asymmetric. Absence of a solution does not predict absence of the outcome.*

In other words, a solution is a sufficient condition, but not necessary. There may be other configurations of causes leading to the same outcome.

Proposition 3. (*specific causal factors*): *Summarizing the key factors mentioned in the literature review, we expect the following factors to be*

present in at least some configurations associated with high RPPB. The sign between brackets indicates whether they are more likely to be drivers (+) or barriers (-) towards purchase intentions.

4. Research method

4.1. Sampling and data collection

The study population comprised customers who had made purchases of remanufactured products within the previous 12 months. The cover letter provided a concise explanation of "remanufactured products", the recommended duration for completing the questionnaire, the objective of the research, and the URL link. The respondents consisted of individuals distributed throughout different locations of the United Kingdom, chosen at random by a reputable online survey company in the UK. The firm database holds information on a panel consisting of more than 1.3 million customers. Only individuals who had made purchases of remanufactured products over the past 12 months were eligible to continue. Selection of participants was made from the marketing company panel in the United Kingdom. For each participant, two screening questions were posed to assess their readiness to deliver meaningful and truthful answers, as well as their prior experience with remanufactured procurements. The online survey was conducted between December 2023 to February 2024, with two accompanying reminder emails dispatched. Fabrigar et al. (1999) highlighted that statistical findings may be biassed when the sample size is below 400 participants. Thus, a total of 411 individuals who were 18 years or older were selected as a quota sample for the purpose of collecting data for this investigation. The present study employed a quota sampling technique, a widely utilized and endorsed approach in prior studies (e.g., Kim et al., 2011; Ridderstaat et al., 2016; Zheng et al., 2021) to ensure the integrity of the gathered data.

In order to address the problems associated with unrepresentative samples, researchers have resorted to quota sampling (Smith, 2010), which utilizes predetermined proportions (quotas) for different types of potential respondents. If the sampling is constructed using population features that conform to the same distribution as the population, it is probable that other features, even those beyond the researcher's direct control, will also provide an accurate representation of the population (Cooper and Schindler, 2011). To provide a statistically sound and representative sample, a quota was calculated based on statistics from the 2023 U.K. population census (National Bureau of Statistics, 2023) about age, gender, and educational attainment (Ridderstaat et al., 2016). The distribution of 1000 questionnaires resulted in the receipt of 437 responses, indicating a response rate of 43.7%. Following the removal of outliers and short replies, a total of 411 responses were deemed suitable for further research. In total 411 fully completed questionnaires were collected in this manner, with sample demographics presented in Table II. The gender split is about 40% male and 60% female, and most participants were between 18 and 32 years of age.

4.2. Instrument and measures

All variables are measured using previously validated scales, with minor modifications for context where necessary. The full list of constructs and corresponding question items is given in Table I.

The main sections of the questionnaire are (i) the introduction, (ii) the demographics and screening questions, and (iii) the scale items presented in Table I. The introduction section of the questionnaire outlines the purpose of the study and provides a concise explanation of remanufactured products. It also affirms meticulous data handling, privacy considerations, and voluntary involvement. Following a definition of remanufactured products, a screening question was asked whether participants have bought at least one during the preceding 12 months. Those who passed the screen then moved on to filling out the

Table 1
Descriptions of study measures.

Variable	Description	Measurement Items		Source
Threat and coping appraisal variables				
Perceived Severity PSEV	"The perceived severity refers to the individuals' perception on the level of seriousness for a negative event, and indicates the level of threat that they anticipate if the event were to occur."	PSEV1	We currently face negative environmental effects	Bockarjova and Steg (2014)
		PSEV2	The current environmental status poses a threat to my well-being and the well-being of society	
		PSEV3	We face a possible depletion of the scarce resources	
		PSEV4	The current environmental status poses negative effects on the quality of life	
Perceived Vulnerability PVUL	"The perceived vulnerability of the unintended event, refers to the evaluation of the threat impact on the individual's well-being"	PVUL1	My chances of living negative experience, associated with the consequences of purchasing conventional products, are high	Bockarjova and Steg (2014)
		PVUL 2	Purchasing conventional products threats my well-being	
		PVUL 3	Purchasing conventional products will negatively affect my quality of life	
Perceived Maladaptive Response Rewards PREW	"Perceived benefits are the advantages that consumers anticipate from participating in a specific behavior, whether tangible or intangible. These perceived benefits impact consumer attitudes, choices, and their inclination to repeat the behavior."	PREW1	Conventional products are easy to find	Van Weelden et al. (2016)
		PREW2	I feel comfortable using conventional products	
		PREW3	If I purchase conventional product, I would save time, money, and effort	
Perceived Response Efficacy PRSE	"Perceived response efficacy refers to an individual's belief in the ability of a desired behavior to effectively reduce or eliminate the negative effects of current behavior."	PRSE1	I am sure that purchasing remanufactured products is effective in preventing negative environmental effects	Bockarjova and Steg (2014)
		PRSE2	I am sure purchasing remanufactured products will help prevent depletion of the scarce resources	
		PRSE3	I am sure that purchasing remanufactured products will help prevent threat to my well-being and the well-being of the society	
Perceived Self-efficacy PSEF	"Perceived self-efficacy pertains to an individual's confidence in their ability to control their own functioning and the events that impact their lives."	PSEF1	I am certain that purchasing remanufactured products will help the environment	Zhao et al. (2016)
		PSEF2	I can remain calm when facing difficulties around using a remanufactured product because I can rely on my coping abilities	
		PSEF3	I can save the environment by purchasing remanufactured products	
Perceived Cost PCST	"The perceived costs represents one's beliefs regarding costliness of engaging in protective behaviors"	PCST1	Remanufactured products have a high purchase price	Bockarjova and Steg (2014)
		PCST2	Remanufactured products suffer limited range	
		PCST3	I am uncertain about safety, maintenance, and performance aspects of remanufactured products	
Perceived behavioral control variables				
Product Knowledge PROK	"Product knowledge refers to a consumer's understanding of a product's attributes, benefits, usage, or any other relevant information that can affect their purchase intention."	PROK1	I was already familiar with the idea of remanufacturing before the 'basic introduction section' of this survey.	Wang et al. (2013)
		PROK2	I was already familiar with the price level of remanufactured products before the 'basic introduction section' of this survey.	
		PROK3	I was already familiar with the quality warranty of remanufactured products before the 'basic introduction section' of this survey.	
Perceived risk RISK	"Perceived risk involves the uncertainty that consumers experience when they are unable to predict the outcomes of their purchasing choices"	RISK1	I am afraid that remanufactured products do not perform and function as well like conventional products, so they may have security risks.	Wang et al. (2013)
		RISK2	I am afraid that buying remanufactured parts is not a good investment.	
		RISK3	I am afraid that I will spend time for repair more frequently when I use remanufactured products.	
Perceived Inconvenience INCON	"Perceived inconvenience is the level of which individuals feel products are not easily accessible or used"	INCON1	When shopping, I can't easily distinguish between remanufactured and conventional products.	Ibrahim & Al-Ajlouni, 2018
		INCON2	I need a lot of extra time to purchase remanufactured products.	
		INCON3	The cost of information search about purchasing remanufactured products is high.	
Residual effect				
Past experience PAST	"Past experience refers to the past behavior or experiences an individual had, which may affect their intentions to perform a particular behavior"	PAST1	There have been green (environmentally friendly) products in my home (such as energy efficient appliances).	Wang et al., 2018
		PAST2	My family has bought green products (environmentally friendly) during the past five years.	
		PAST3	The experience effect is good when I use green products (environmentally friendly) in my home.	
Attitude variables				
Experiential attitude EXPA	"Experiential Attitude pertains to an emotional reaction towards particular behaviors or products. Experiential attitudes are	EXPA1	Purchasing remanufactured products is good.	Huffman et al. (2014)
		EXPA2	Purchasing remanufactured products is useful.	

(*continued on next page*)

Table 1 (*continued*)

Variable	Description	Measurement Items		Source
	shaped by how enjoyable or satisfying the consumer expects the interaction with the product to be and they play a significant role in the overall evaluation of and intention to engage with it."	EXPA3	Purchasing remanufactured products is responsible.	
Instrumental attitude INSTA	"Instrumental attitude refers to an individual's assessment of the behavioral outcomes as being positive or negative"	INSTA1	Purchasing remanufactured products alleviates energy shortage issues.	
		INSTA2	Purchasing remanufactured products saves raw materials.	
		INSTA3	Purchasing remanufactured products saves money.	
Dependent Variable				
Remanufactured Products Purchase Behavior RPPB	"Intention to purchase remanufactured products refers to a consumer's decision to acquire items that have been restored to a condition that is comparable to new, typically through processes like disassembly, repair, and part replacements."	RPPB1	When I consider buying a product, I will look for a remanufactured product	Qu et al., 2018
		RPPB2	I will buy remanufactured products frequently	
		RPPB3	I will encourage my relatives and friends to buy remanufactured products	
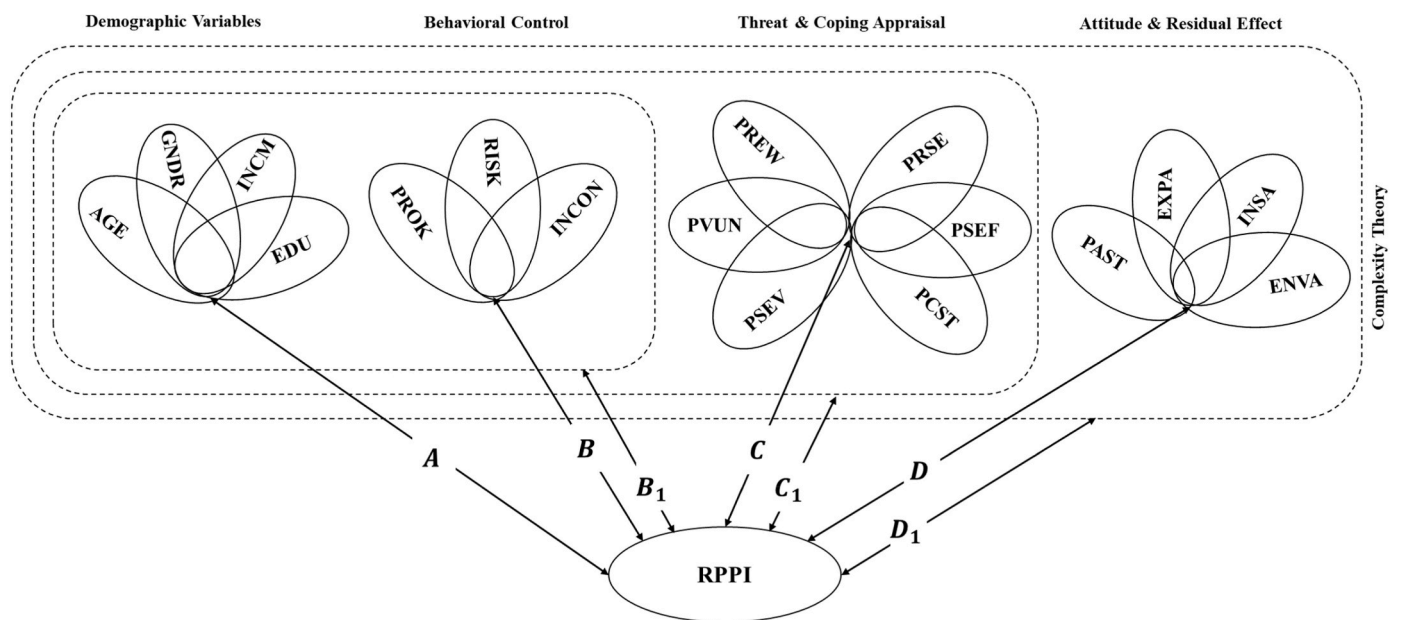
Remanufactured product purchase intention **RPPI**; Age **AGE**; Gender **GNDR**; Income **INCM**; Education **EDU**; Product knowledge **PROK**; Perceived risk **RISK**; Perceived Inconvenience **INCON**; Perceived Severity **PSEV**; Perceived Vulnerability **PVUN**; Perceived Rewards **PREW**; Perceived Response Efficacy **PRSE**; Perceived Self-efficacy **PSEF**; Perceived Cost **PCST**; Past Experience **PAST**; Experiential Attitude **EXPA**; Instrumental Attitude **INSTA**; Environmental Attitude **ENVA**.

Fig. I. Configurational model.

Table 2
Sample profile.

Variable	Categories	Frequency	Percentage
Gender	Male	162	39.42
	Female	249	60.58
Age	18–22	159	38.69
	23–27	189	45.99
	28–32	44	10.71
	33–40	19	4.36
Education	Bachelor's degree	272	66.18
	Master's degree	88	21.41
	Diploma	50	12.17
	Other	1	0.24
Discretionary monthly income in dollars	<500	166	40.39
	500–1000	91	22.11
	1000–1500	154	37.47

scale items measuring the model constructs.

4.3. Common method bias and normality assumption check

To address the potential threat of common method bias, we undertook both procedural and statistical remedies. In terms of procedural remedy, participants' anonymity and confidentiality were assured, comprehensible and simplified questions were used, and items were presented to participants in a random order. As for the statistical remedy, a common latent factor was used as a marker variable to assess possible bias. Common method bias is diagnosed by comparing the fit indices of two nested models, one of which connects the marker variable to the observed items of the study's other constructs (Lindell and Whitney, 2001). This approach controls common method bias at the individual item level. The unstandardized path coefficients of the common latent factor (CLF) model with the added marker variable were below that of the coefficients resulting from the basic model without the marker variable. Both models demonstrated almost identical model fit indices (model with "CLF: $\chi2/df$" = 1.5072; model without "CLF: $\chi2/df$" = 1.7604). The interactions among the marker variable and the study's factors were insignificant. Thus, we conclude that common method bias

is not problematic in the data.

As a last data inspection step, we observed the skewness and kurtosis statistics of the variables in Table III. Utilizing a reference range of −2 to +2 for skewness and −7 to +7 for kurtosis (Hair et al., 2010), there is no indication of severe non-normality in any of the variables.

4.4. Analysis technique: fuzzy set qualitative comparative analysis FsQCA

FsQCA, or fuzzy set qualitative comparative analysis, is a method for studying complex causal relationships using qualitative data and fuzzy sets. FsQCA is seeing increasing use due to its flexibility to handle different data types and its holistic approach to causation whereby the focus is on constellations of causes rather than isolated ones (Pappas and Woodside, 2021; Diwanji, 2023). Based on the concept of equifinality, fsQCA produces multiple different configurations of antecedent variables and levels that are associated with an outcome of interest. Rather than isolating the net effect of individual variables as in variance-based approaches, fsQCA looks for sets of variables (and variable levels) associated with an outcome (Pappas and Woodside, 2021; Kumar et al., 2022). While it is possible to do some configurational analysis with regression by including two- and three-way interaction terms, fsQCA allows for more complex configurations to be detected and is less data-demanding. This makes fsQCA a powerful method for identifying sufficient conditions for causality involving multiple antecedent variables (Cao et al., 2022). Moreover, in contrast to symmetrical methods as in PLS-SEM and regression analysis, where the goal is to generalize results, and the interpretations of results are made around the general population of the sample, fsQCA predicts outcomes by producing alternative templates from vector mixtures (subpopulations within an overall population) called causal recipes (Farmaki et al., 2021). These causal recipes consist of different combinations of conditions that consider contrarian opinions on the subject under investigation. In summary, fsQCA is particularly useful when studying complex social phenomena where the relationship between factors is not linear and multiple causes can combine to product an outcome of interest as in studying RPPB (Pappas and Woodside, 2021; Geremew et al., 2024).

5. Data analysis and findings

5.1. Discriminant and convergent validity

Table III displays the measurement statistics of the study's constructs, which we evaluated using standard benchmarks (e.g., Hair et al., 2019). The construct loadings are significant at the 0.01 level. The Cronbach's alpha reliability coefficients and the composite reliability values exceed the acceptable threshold of 0.70. Regarding sample adequacy, the chi-square value is 1305 ($p < 0.001$) and the Kaier-Meyer-Olkin estimate 0.880. We conclude that the data can be used for factor analysis.

As for convergent validity, the AVE values are above the threshold of 0.50. Table IV shows that the AVE values exceed the squared among-construct correlations and the HTMT values are all less than 0.80 (see Table IV). The variables' VIF values are below the 0.30 threshold.

5.2. Calibration

To perform fsQCA, variables must first go through a calibration step where they are mapped onto a fuzzy set. Variable values at the individual case level (i.e., survey respondents) are then transformed into fuzzy membership scores with the corresponding fuzzy set. To do so, we need to choose three threshold values for each variable to indicate full non-membership, intermediate membership (as much in as out), and full membership of the fuzzy set, with respective membership scores of 0, 0.5, and 1 (Pappas and Woodside, 2021). Upon reviewing the distribution of responses across the 5-point Likert scales in the data, we decided on 1 and 5 as thresholds for full non-membership and full membership,

respectively, and the mean of each variable as the threshold for intermediate membership (We also inspected the median and decided it would make no substantive difference). With these three threshold values set, everything is ready for the fsQCA program to transform variable values into fuzzy-set membership scores. This is done by means of a log-odds calculation, but the pertinent part of this is that the three threshold values are used to anchor some function (usually S-shaped, as in this case) relating variable values to membership scores (Ragin, 2008; Pappas and Woodside, 2021).

5.3. Necessary and sufficient conditions analysis

The fsQCA 3.0 software was used to conduct necessary and sufficient conditions analysis. We follow the steps described in Pappas and Woodside (2021) and refer to this article for the details.

First, a truth table is created containing all possible combinations of the causal conditions. A condition is taken to be present for a specific case in the sample if its fuzzy membership score is greater than 0.5. With n conditions, this creates 2^n possible configurations, many of which will have low frequency of occurrence in the data. Pappas and Woodside (2021) recommend a frequency threshold of at least 3 for larger samples, so we dropped configurations with frequency below 3 from the truth table. The tradeoff made here is between being more inclusive on the one hand (lower frequency), and robustness on the other (higher frequency), by ensuring that each configuration occurs in several cases in the sample. Furthermore, we set a raw consistency[1] threshold of 0.80, deleting all configurations with value below that value from the truth table. The choice of 0.80 was informed by a combination of criteria. Rihoux and Ragin (2009) recommend a threshold value of at least 0.75, although values of 0.80 and 0.90 are also common. Pappas and Woodside (2021) furthermore recommend sorting the truth table and inspecting the raw consistency scores for a breakpoint in where a gap occurs in the distribution. Taking all this into account, we chose a cut-off value of 0.80 and went to the next step of using the fsQCA software to compute the solution sets.

In Table V, the presence of a condition is signaled by a filled circle (●), and its absence by a circle with a superimposed cross (⊗). Note that "absence" means negation of the condition, i.e., it affirms that the condition is absent, and is not to be confused with indifference. A blank space means that the condition may be present or absent. Larger circles represent core conditions while smaller circles (almost dots in Table V) indicate peripheral ones. Core conditions demonstrate strong evidence of causal association with the outcome and are considered essential ingredients towards the outcome, while peripheral conditions exhibit weaker evidence of causal association with the outcome and might be contributory or complementary factors (Rihoux and Ragin, 2009).

The rows in Table V indicate the conditions, along with their consistency and coverage values. Conditions with consistency value close to 1 can be said to be "necessary". In fsQCA, necessary conditions are defined as those that must be present for the outcome to occur (Dul, 2016). Where to draw the line for the consistency value is subjective and depends on one's preference for avoiding false negatives or false positives. Rihoux and Ragin (2009) recommend a consistency value of at least 0.75, or as high as 0.9. All variables in our model have consistency values over 0.8 and over 0.9 in many cases, so they are all necessary in at least some of the solutions. *Coverage* indicates how much of the outcome set is "covered" by cases that are also a member of a condition/configuration set, and one can think of it as analogous to R-square in regression (Pappas and Woodside, 2021). Most coverage values for the conditions are high (rightmost column), with even the

---

[1] Raw consistency of a configuration is a set-theoretic measure between 0 and 1 indicating to what extent the configuration set (i.e., row in the truth table) is a subset of the outcome set. It measures the extent to which cases that agree with the configuration in question also agree with the outcome.

Table 3
Measurement statistics of construct scales.

Constructs/Observed Items	Standardized Loadings	Mean	Standard Deviation	Cronbach's α	CR	AVE	t-value	Skewness	Kurtosis
Attitude and residual effect				0.928	0.950	0.582			
EXPA: Experiential attitude	0.908	2.773	1.403				23.109	−1.34	1.78
INSTA: Instrumental attitude	0.933	3.008	1.167				11.982	−1.17	1.49
PAST: Residual effect	0.909	2.689	1.093				10.347	−1.26	1.12
Threat appraisal				0.938	0.960	0.517			
PSEV: Perceived severity	0.973	3.150	1.214				29.430	−1.23	1.02
PVUN: Perceived vulnerability	0.897	2.873	1.026				19.430	−1.23	1.83
PREW: Perceived rewards	0.953	2.374	1.132				22.375	−1.64	1.83
Coping appraisal				0.946	0.941	0.607			
PRSE: Perceived response efficacy	0.907	2.669	1.753				18.438	−1.64	1.08
PSEF: Self-efficacy	0.928	3.072	1.891				25.208	−1.20	1.34
PCST: Perceived cost	0.955	2.826	1.234				21.209	−1.74	1.78
Perceived behavioral control				0.978	0.931	0.570			
PROK: Product knowledge	0.942	2.318	1.503				27.209	−1.43	1.21
RISK: Perceived risk	0.913	3.002	1.123				10.283	−1.20	1.90
INCON: Perceived inconvenience	0.890	2.329	1.603				23.029	−1.19	1.47

Table 4
Discriminant validity of the correlations between constructs.

Constructs	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) Remanufactured Products	**0.744**	0.464	0.567	0.489	0.461	0.496	0.691	0.465	0.490	0.489	0.461	0.496	0.507
(2) Moral obligation	0.562	**0.806**	0.629	0.691	0.679	0.640	0.642	0.629	0.691	0.679	0.640	0.642	0.679
(3) Moral accountability	0.717	0.705	**0.827**	0.676	0.691	0.661	0.817	0.642	0.629	0.691	0.679	0.640	0.642
(4) Moral outrage	0.624	0.780	0.775	**0.781**	0.741	0.725	0.750	0.691	0.661	0.817	0.642	0.629	0.691
(5) Perceived severity	0.570	0.642	0.717	0.805	**0.903**	0.709	0.750	0.640	0.642	0.629	0.691	0.642	0.629
(6) Perceived venerability	0.611	0.724	0.787	0.756	0.603	**0.867**	0.702	0.709	0.752	0.640	0.642	0.709	0.652
(7) Perceived Rewards	0.633	0.713	0.756	0.774	0.757	0.750	**0.842**	0.661	0.817	0.642	0.629	0.691	0.661
(8) Perceived cost	0.624	0.780	0.715	0.624	0.787	0.656	0.717	**0.802**	0.642	0.496	0.507	0.465	0.490
(9) Response efficacy	0.605	0.704	0.787	0.756	0.803	0.742	0.797	0.742	**0.742**	0.461	0.496	0.507	0.465
(10) Self-efficacy	0.751	0.704	0.717	0.766	0.853	0.740	0.627	0.722	0.782	**0.903**	0.461	0.661	0.507
(11) Altruistic value	0.755	0.640	0.707	0.660	0.858	0.645	0.722	0.602	0.701	0.870	**0.880**	0.642	0.496
(12) Egoistic value	0.645	0.743	0.723	0.788	0.755	0.845	0.627	0.728	0.781	0.770	0.830	**0.742**	0.401
(13) Attitude	0.720	0.743	0.753	0.681	0.778	0.734	0.730	0.709	0.623	0.624	0.743	0.709	**0.758**

* The diagonal values are the squared root of the (AVE) of the latent variables and indicates the highest in any column or row.

* Values below the diagonal represents the constructs' (HTMT) ratios.

lowest of 0.562 for perceived rewards. If a condition were to have very low coverage it would indicate a redundant variable in the model, but this is not that case here. Very low values aside, the coverage statistic is more insightful when inspecting entire solutions, which follows next.

The columns in Table V display eight configurational solutions generated by the fsQCA software. All but one have very high consistency values over 0.90, and the lowest is 0.89, confirming that the eight configurational solutions generated by the software each are sufficient for the outcome to occur. The overall solution consistency remains high at 0.871, and the overall solution coverage of 0.880 suggests that a substantial proportion of the outcome is covered by the eight solutions. The raw coverage value for each solution indicates how much of the outcome set is "covered" by cases in the solution set. Because of equifinality, a case in the outcome set can be a member of multiple solution sets. Although not as often reported, the unique coverage values are a measure of the cases in the outcome set that are exclusively in that one solution.

In Table V, the top three sufficient solutions in terms of consistency are solutions 5, 2 and 1. Configuration 5 (EXPA*INSTA + PAST*PSEV*PVUN* ~PREW *~PRSE *PSEF *PCST + PROK *RISK *INCON *Age + Gender *income*~Education) has the highest consistency value of 0.953. Next is configuration 2 which is made up of the presence of all perceived behavioral control variables, and all coping appraisal variables and the possible presence of all attitude and residual effect variables and the presence of threat appraisal variables except for PREW and finally, the possible presence of all demographic variables except for Gender. Configuration 1 is in the third place with a consistency of 0.945, this sufficient solution is made up of the possible presence of all demographic variables and the threat appraisal variables,

along with the presence of all attitude variables except for residual effect and the presence of coping appraisal variables with the absence of perceived cost. As per perceived behavioral control, all variables are present except for perceived risk.

5.4. Propositions testing

The first two propositions developed in the earlier section on complexity theory are each supported by the results of the fsQCA analysis. First, the findings in Table V describe eight different configurational solutions representing different causal recipes, each of which can lead to the same outcome of purchase intention. The presence of multiple paths leading to the same outcome of purchase intentions supports the equifinality principle described in proposition 1.

Second, proposition 2 (asymmetry) says that absence of a condition or a solution need not imply absence of the outcome. A glance at Table V shows this to be the case. For instance, perceived response efficacy is absent in solutions 3 and 5, strongly present in solutions 1, 2, 4 and 8, and weakly present in solution 7. In fact, out of the 16 variables (conditions), there are 12 that are simultaneously present in some conditions, and absent in others.

Third, evident from the solutions reported in Table V, propositions P3.1-P3.13 are partially supported. Each of the variables/conditions are present in at least some of the solutions, but in some solutions their role goes against our expectations of their role as a driver or barrier. For instance, the residual effect is present in only 2 solutions, and absent in 3. Other conditions that are alternatingly present in some and absent in other solutions are: perceived response efficacy, self-efficacy, perceived cost, product knowledge, perceived risk, perceived inconvenience, and

demographics. We will address this in the discussion section.

5.5. Predictive validity

This is a crucial step of the analysis and aims to confirm how well the model performs out-of-sample. One might wonder if the high consistencies are a result of overfitting the solutions to the sample. However, fsQCA is designed to cope with complexity and the influence of context (Kumar et al., 2022). Therefore, the resulting solutions could be generalizable within the scope of the study's context to predict the RPPB.

To further validate the predictive ability of the fsQCA solutions, we split the sample into 10 different subsamples and keep corresponding holdout samples in a random manner resembling the machine learning k-fold cross-validation technique. Table VI shows different configurations of antecedent conditions reported for an illustrative subsample. All models in this subsample exhibit a high consistency of 0.883 in predicting the purchase intention and a reasonably high coverage of 0.453. All models with high consistency in the subsample have a high predictive power in the holdout sample too. This suggests that the results can be generalized beyond the sample used for running the model.

6. Discussion, implications, and conclusion

6.1. Key findings

This study explores how demographic variables, the residual effect of past behavior, and variables from PMT and the TPB combine to create causal recipes predicting the purchase of remanufactured products. The results indicate that experiential attitude, instrumental attitude, perceived severity, and perceived vulnerability are present in all solutions. As predicted by the TPB, attitude was found to be a key variable in this study. Furthermore, it proved beneficial to have separate measures for its experiential and instrumental components (La Barbera and Ajzen, 2022), and it is worth noting that high instrumental attitude or high experiential attitude on their own are insufficient. This confirms earlier research, for example, by Wang et al. (2020) who found that both experiential and instrumental attitudes are critical motivating factors in the context of remanufactured products. These findings are also consistent with the literature on Affective-Cognitive Consistency ACC, which articulates that people will seek to align the attitudinal and cognitive components of their attitudes, and where this fails to be the case, the link between attitude and behavior will be weaker. In other words, ACC is a moderator of the impact of attitude on behavior (Norman, 1975; Schleicher et al., 2004).

As mentioned, two threat appraisal variables (perceived severity and perceived vulnerability) are present in all solutions. In other words, when people purchase remanufactured products, these are always present as a motivating factor. Similar findings were reported by Alyahya et al. (2023a) who found the condition "threat and coping appraisal" to be present in 5 out of 8 solutions.

Another important factor that was highlighted by the results is self-efficacy, which is present in five solutions regardless of the presence or absence of other configurational components and could be either present or absent in two solutions, and only absent in one solution. This indicates that the ability or disability to control one's own functioning also plays a major role in RPPB. Similarly, response efficacy is present in 5 solutions.

The results also highlight the vital role of demographic variables in predicting the purchase intention of remanufactured products. At least one demographic variable is present for each solution in Table V. This finding is consistent with prior work in this area (Karman and Lipowski, 2024; Wallner et al., 2024).

Interestingly, perceived cost (monetary and non-monetary such as more limited range and uncertainty about performance) and perceived inconvenience in the purchase process (e.g., effort to find information,

effort to compare to regular products) are present in 7 of the 8 solutions. This indicates respondents who agree there are some costs and inconveniences associated with RPPB, but who are nevertheless undeterred by them. A recent fsQCA study on refurbished products also found perceived cost to be present in 4 of 8 solutions (Alyahya et al., 2023a). More research would be useful to elucidate how consumers navigate these tradeoffs. Perhaps these are indeed present on consumers' minds as disadvantages, but minor ones in the big picture, with the positives far outweighing the negatives. We also note that the maladaptive response rewards condition PREW is absent in 5 of the 8 solutions, suggesting consumers who are proactive and willing to deviate from past behavioral patterns. It is also possible that causality goes the other way, in that greater experience with remanufactured products makes one more aware of the costs and inconveniences involved. Or perhaps there is a sense of pride and fulfillment in being willing to make some sacrifices. These are obviously speculations, and more research regarding how consumers perceive the downsides and integrate them in their overall decision would be useful.

6.2. Theoretical implications

This study offers a number of theoretical implications that help better understand the behavioral factors affecting the purchase intention of remanufactured home electronics in the U.K. market. Prior studies emphasized the importance of reconfirming findings through developing alternative configurational models and ways of analysis to improve our understanding of RPPB. In response, this study contributes through the following; first, this study creates a comprehensive framework of causal variables leading to high levels of intention to purchase remanufactured products, by combining concepts from PMT and TPB. The PMT, which long focused on risk in the context of health care, and the TPB which is extended by many scholars to improve its performance in predicting consumer behavior. We extended the use of the TPB by (i) incorporating the residual effect variable in line with previous research that found it a useful predictor (Wang et al., 2018). Our resulting solutions shows that residual effect or past experience with remanufactured products plays a core role in solution 3 (see Table 5) and a peripheral one in solution 4. It is also absent in three solutions (1, 6, and 8) which all have the following in common: (a) the absence or presence of perceived rewards, and (b) the presence of perceived inconvenience as a core condition. Additionally, (ii) we expanded the definition of attitude to include both experiential and instrumental attitudes, both are found to be core conditions in all resulting solutions necessary for RPPB, suggesting that future studies should have adequate measurements of both, not just one or the other.

Second, this study adds to the small base of existing studies using FsQCA for predicting RPPB (e.g., Alyahya et al., 2023a; Alyahya et al., 2023b). In doing so, it adds to the empirical base of a small but important field with a comprehensive framework and demonstrates the usefulness of the configurations resulting from the fsQCA approach in this context. We incorporated the complexity theory to account for the complexity of the intra (within) and inter-relational (between constructs) effects to predict the purchase intention. To address such complexity, we used the FsQCA method to uncover diverse factors driving consumers behavior in the context of sustainability (Chakraborty et al., 2021; Diwanji, 2023).

6.3. Managerial implications

This study offers several implications for practitioners, especially those involved in brand management and marketing communications. First, it is notable that instrumental and experiential attitudes are both present in all solutions. This is consistent with the aforementioned literature on affective-cognitive consistency, which notes a significantly stronger impact of attitudes on behavior when its affective and cognitive components are aligned (Norman, 1975). This has implications when

Table 5
Configurations for achieving high level of purchase behavior.

Configurations	Solutions								Outcome Conditions	
	1	2	3	4	5	6	7	8	Consistency	Coverage
Attitude and residual effect										
EXPA: Experiential attitude	●	●	●	●	●	●	●	●	0.953	0.890
INSTA: Instrumental attitude	●	●	●	●	●	●	●	●	0.981	0.882
PAST: Residual effect	⊗		●	•		⊗		⊗	0.995	0.812
Threat appraisal										
PSEV: Perceived severity	●	●	●	●	●	●	●	•	0.907	0.650
PVUN: Perceived vulnerability	●	●	●	●	●	•	●	●	0.986	0.878
PREW: Perceived rewards		⊗	⊗	⊗	⊗		⊗		0.836	0.562
Coping appraisal										
PRSE: Perceived response efficacy	●	●	⊗	●	⊗		•	●	0.876	0.894
PSEF: Self-efficacy	●	●	•		•	⊗	•		0.910	0.732
PCST: Perceived cost	⊗	●	●	•		●	●	●	0.889	0.685
Perceived behavioral control										
PROK: Product knowledge	•	●	●			●	⊗	⊗	0.989	0.880
RISK: Perceived risk	⊗	●	●	⊗	●				0.884	0.873
INCON: Perceived inconvenience	●	●	•	●	●	⊗	●	●	0.872	0.625
Demographic Variables										
Age	●	•	●	●		•		⊗	0.809	0.866
Gender		⊗						•	0.811	0.765
Income	●	●	⊗		●	●	●		0.854	0.809
Education		•		⊗	⊗			⊗	0.890	0.788
Consistency	0.945	0.950	0.907	0.890	0.953	0.906	0.925	0.916		
Raw coverage	0.329	0.306	0.218	0.413	0.219	0.216	0.318	0.336		
Unique coverage	0.015	0.006	0.026	0.002	0.037	0.014	0.002	0.017		
Overall solution consistency	0.871									
Overall solution coverage	0.850									

Consistency >0.90 designates necessary conditions.

Table 6
Complex configurations indicating high intention to purchase for subsample.

Models from a subsample	Raw Coverage	Unique Coverage	Consistency
1. EXPA* INSTA * PSEV *~PREW*~PCST* PROK * RISK * PAST	0.531	0.012	0.856
2. EXPA * INSTA * ~PSEV *~PREW* PROK * PAST	0.312	0.037	0.921
3. EXPA * INSTA * PSEV *~PREW*~ PCST * PROK * PAST	0.309	0.028	0.901
4. EXPA * INSTA * PSEV *~PREW* PCST * PROK * RISK	0.147	0.035	0.869
5. EXPA * PSEV * ~PVUN * PROK *~ PCST * PROK * RISK	0.458	0.016	0.845
Overall solution consistency	0.883		
Overall Solution coverage	0.453		

EXPA: Experiential attitude; INSTA: Instrumental attitude; PSEV: Perceived severity; PVUN: Perceived vulnerability; PREW: Perceived maladaptive response rewards; PCST: Perceived cost; PROK: Product knowledge; RISK: Perceived risk.

crafting a positioning or creating persuasive messages to convince consumers to buy remanufactured products. Marketing and sales messages should adopt a two-pronged approach whereby both experiential benefits (such as feeling good about oneself for making sustainable choices) and practical benefits (such as energy, money and raw materials saving) are communicated, and follow up to make sure that this is understood by the target market. Likewise, market research in this area needs to measure both attitude components, so that misalignments can be identified and addressed if present.

Second, this research found threat appraisal to be a central motivating factor, with two related measures (perceived severity and perceived vulnerability) present in all solutions. This points to the potential use of fear-based appeals in advertising and other marketing communications. Research on fear appeals has been conducted regarding sustainable products (Talebi et al., 2024; Mostafa, 2020) and climate change (Skurka et al., 2018), alongside numerous studies in the broader academic advertising literature (Tellis, 2004). The consensus is that it is an effective tactic, but that there is an inverse-U shaped response between the fear stimulus level and advertising response (Tellis, 2004; Henthorne et al., 1993). At excessive levels, consumers become more likely to counterargue with the central message, hence it is more effective to remind consumers of the threat while keeping the overall tone pleasant (Keller and Block, 1996). The latter can be achieved in several ways, such as humor or the use of ennobling emotions. For instance, a reminder of the need for more sustainable consumption choices could be joined with the above-mentioned experiential attitude components, to keep the overall message tone positive and inspiring, rather than preachy. For a good summary on fear and other emotions in advertising, see Tellis (2004), pages 146–173.

Third, response efficacy and self-efficacy are present in 5 out of 8 solutions. Clearly it is a motivating factor in cultural contexts where people feel like they have the capability to make more sustainable choices, and they believe these alternative choices to be effective. Numerous other studies indicate that for consumers to consider sustainable choices, they need to feel assured about their ability to make a difference (Schutte and Bhullar, 2017; Hanss and Böhm, 2010; Lam, 2006). In terms of managerial implications, both types of efficacies could lay the basis for communication campaigns.

7. Limitations and future research directions

In order to avoid respondent fatigue and safeguard the data quality, we made tradeoffs in the number of variables included in the model. Some that would have been useful to include are deontic variables (moral obligation, moral accountability, and moral outrage) such as done by Alyahya et al. (2023a), as well as additional personal variables such as environmental awareness, personality, and price sensitivity (Abbey et al., 2015a). Moreover, for practical reasons, we used a snowball sample. While we don't expect the studied relationships to be significantly influenced by demographic variables, additional studies are needed to improve the generalizability of the results. We targeted mainly the 18–32 age range in this study, which represents a key target

market, and in doing so we minimize potential age-related heterogeneity inside the sample. However, it is not inconceivable that there are generational differences, and the only way to investigate this is by sampling a wider age range. Furthermore, it would be useful to conduct similar studies in other geographic regions, especially Asia as called for in the editorial note by Govindan et al. (2019), which states that Asian consumers especially are more reluctant to purchase remanufactured products. Lastly, while our study focused on electrical or electronic products in general (by far the most common category as reported in the systematic literature review by Belbağ and Belbağ (2023) there are, however, potential product category effects to consider. For instance, Gong et al. (2022) revealed insightful distinctions in the optimal approach to integrating sustainability attributes for hedonic and functional product categories. Additional research of this type is warranted, particularly in industries with a stronger hedonic orientation such as apparel.

CRediT authorship contribution statement

Nora Sharkasi: Writing – review & editing, Writing – original draft, Visualization, Validation, Software, Methodology, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Peter De Maeyer:** Writing – review & editing, Writing – original draft, Visualization, Software, Resources, Project administration, Investigation, Formal analysis, Data curation, Conceptualization. **Houyem chaib Lababdi:** Conceptualization, Data curation, Investigation, Methodology, Project administration, Software, Validation, Visualization, Writing – original draft, Writing – review & editing. **Salma AlMansoori:** Conceptualization, Data curation, Investigation, Project administration, Resources, Software, Supervision, Validation, Writing – original draft, Writing – review & editing. **Gomaa Agag:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Resources, Project administration, Methodology, Investigation, Conceptualization.

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.

Data availability

Data will be made available on request.

Acknowledgements

References

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. https://doi.org/10.1525/cmr.2015.57.4.26.

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. https://doi.org/10.1111/poms.12238.

Abdelmoety, Z.H., Aboul-Dahab, S., Agag, G., 2022. A cross-cultural investigation of retailer's commitment to CSR and customer citizenship behaviour: the role of ethical standard and value relevance. J. Retailing Consum. Serv. 64, 102796.

Aboul-Dahab, S., Agag, G., Abdelmoety, Z.H., 2021. Examining the influence of cultural and ethical ideology on consumers' perceptions about the ethics of online retailers and its effects on their loyalty. J. Retailing Consum. Serv. 61, 102559.

Agag, G., 2019. E-commerce ethics and its impact on buyer repurchase intentions and loyalty: an empirical study of small and medium Egyptian businesses. J. Bus. Ethics 154 (2), 389–410.

Agag, G., Colmekcioglu, N., 2020. Understanding guests' behavior to visit green hotels: the role of ethical ideology and religiosity. Int. J. Hospit. Manag. 91, 102679. https://doi.org/10.1016/j.ijhm.2020.102679.

Agag, G., Brown, A., Hassanein, A., Shaalan, A., 2020. Decoding travellers' willingness to pay more for green travel products: closing the intention-behaviour gap. J. Sustain. Tourism 28 (10), 1551–1575.

Agag, G., El-Masry, A.A., 2016. Understanding consumer intention to participate in online travel community, efects on consumer intention to purchase travel online, WOM: an integration of innovation difusion theory. TAM with Trust. Comput. Hum. Behav. 60 (3), 97–111.

Agag, G., Durrani, B.A., Shehawy, Y.M., Alharthi, M., Alamoudi, H., El-Halaby, S., Hassanein, A., Abdelmoety, Z.H., 2023b. Understanding the link between customer feedback metrics and firm performance. J. Retailing Consum. Serv. 73, 103301.

Agag, G., Durrani, B.A., Abdelmoety, Z.H., Daher, M.M., Eid, R., 2024a. Understanding the link between net promoter score and e-WOM behaviour on social media: the role of national culture. J. Bus. Res. 170, 114303.

Agag, G., Eid, R., Lababdi, H.C., Abdelwahab, M., Aboul-Dahab, S., Abdo, S.S., 2024b. Understanding the impact of national culture differences on customers' online social shopping behaviours. J. Retailing Consum. Serv. 79, 103827.

Agag, G., Eid, R., 2020. Which consumer feedback metrics are the most valuable in driving consumer expenditure in the tourism industries: a view from macroeconomic perspective. Tourism Manag. 80 (3), 104–109.

Agag, G., Shehawy, Y.M., Almoraish, A., Eid, R., Lababdi, H.C., Labben, T.G., Abdo, S.S., 2024c. Understanding the relationship between marketing analytics, customer agility, and customer satisfaction: a longitudinal perspective. J. Retailing Consum. Serv. 77, 103663.

Agag, G., Abdelmoety, Z., Eid, R., 2023a. Understanding factors affecting travel avoidance behaviour during the COVID-19 pandemic: findings from a mixed method approach. J. Trav. Res. 34 (8), 67–93.

Agag, G.M., Khashan, M.A., Colmekcioglu, N., Almamy, A., Alharbi, N.S., Eid, R., Shabbir, H., Abdelmoety, Z.H.S., 2019. Converting hotels website visitors into buyers: how online hotel web assurance seals services decrease consumers' concerns and increase online booking intentions. Inf. Technol. People 31 (70), 63–90.

Ajzen, I., 1991. The theory of planned behavior. Organ. Behav. Hum. Decis. Process. 50 (2), 179–211. https://doi.org/10.1016/0749-5978(91)90020-T.

Ajzen, I., 2002. Residual effects of past on later behavior: habituation and reasoned action perspectives. Pers. Soc. Psychol. Rev. 6 (2), 107–122. https://doi.org/10.1207/S15327957PSPR0602_02.

Ajzen, I., Fishbein, M., 1977. Attitude-behavior relations: a theoretical analysis and review of empirical research. Psychol. Bull. 84 (5), 888. https://doi.org/10.1037/0033-2909.84.5.888.

Ajzen, I., Fishbein, M., 2000. Attitudes and the attitude-behavior relation: reasoned and automatic processes. Eur. Rev. Soc. Psychol. 11 (1), 1–33. https://doi.org/10.1080/14792779943000116.

Aldossary, M., Alyahya, M., Agag, G., 2024. How and when does engaging customers in environmental sustainability pay of? The Role of Business Strategy. Sustainability 16 (12), 4924.

Alghamdi, O.A., Agag, G., 2023a. Boosting innovation performance through big data analytics powered by artificial intelligence use: an empirical exploration of the role of strategic agility and market turbulence. Sustainability 15 (19), 14296.

Alghamdi, O.A., Agag, G., 2023b. Unlocking the power of reporting: exploring the link between voluntary sustainability reporting, customer behavior, and firm value. Sustainability 15 (21), 15584.

Alrawad, M., Lutf, A., Alyatama, S., Al Khattab, A., Alsoboa, S.S., Almaiah, M.A., Ramadan, M.H., Arafa, H.M., Ahmed, N.A., Alsyouf, A., Al-Khasawneh, A.L., 2023. Assessing customers perception of online shopping risks: a structural equation modelling–based multigroup analysis. J. Retailing Consum. Serv. 71, 103188. https://doi.org/10.1016/j.jretconser.2022.103188.

Alsuwaidi, M., Eid, R., Agag, 2022. Tackling the complexity of guests' food waste reduction behaviour in the hospitality industry. Tourism Manag. Perspect. 42, 100963.

Alyahya, M., Agag, G., Aliedan, M., Abdelmoety, Z.H., 2023a. Understanding the factors affecting consumers' behaviour when purchasing refurbished products: a chaordic perspective. J. Retailing Consum. Serv. 75, 103492. https://doi.org/10.1016/j.jretconser.2023.103492.

Alyahya, M., Agag, G., Aliedan, M., Abdelmoety, Z.H., Daher, M.M., 2023b. A sustainable step forward: understanding factors affecting customers' behaviour to purchase remanufactured products. J. Retailing Consum. Serv. 70, 103172. https://doi.org/10.1016/j.jretconser.2022.103172.

Alyahya, M., Agag, G., Aliedan, M., Abdelmoety, Z.H., 2023c. Understanding the factors affecting consumers' behaviour when purchasing refurbished products: a chaordic perspective. J. Retailing Consum. Serv. 75, 103492.

Alyahya, M., Agag, G., Aliedan, M., Abdelmoety, Z.H., Daher, M.M., 2023d. A sustainable step forward: understanding factors affecting customers' behaviour to purchase remanufactured products. J. Retailing Consum. Serv. 70, 103172.

Alyahya, M., Agag, G., Aliedan, M., Abdelmoety, Z.H., Daher, M.M., 2023e. A sustainable step forward: understanding factors affecting customers' behaviour to purchase remanufactured products. J. Retailing Consum. Serv. 70, 103172.

Alyahya, M., Agag, G., Aliedan, M., Abdelmoety, Z.H., 2023f. A cross-cultural investigation of the relationship between Eco innovation and customers boycott behaviour. J. Retailing Consum. Serv. 72, 103271.

Alyahya, M., Agag, G., Aliedan, M., Abdelmoety, Z.H., 2023g. Understanding the factors affecting consumers' behaviour when purchasing refurbished products: a chaordic perspective. J. Retailing Consum. Serv. 75, 103492.

Alzaidi, M.S., Agag, G., 2022. The role of trust and privacy concerns in using social media for e-retail services: the moderating role of COVID-19. J. Retailing Consum. Serv. 68, 103042.

Aydin, R., Mansour, M., 2023. Investigating sustainable consumer preferences for remanufactured electronic products. J. Eng. Res. 11 (1), 100008. https://doi.org/10.1016/j.jer.2023.100008.

Bakış, S., Kitapçı, H., 2023. Why do consumers purchase green clothing? Investigating symbolic meanings beyond social status and the role of consumer mindset. J. Fash. Mark. Manag. Int. J. 27 (4), 710–738. https://doi.org/10.1108/JFMM-02-2022-0032.

Bandura, A., 1995. Perceived self-efficacy. In: Manstead, A.S.R., Hewstone, M. (Eds.), Blackwell Encyclopedia of Social Psychology. Blackwell, Oxford, UK, pp. 434–436.

Belbağ, A.G., Belbağ, S., 2023. Remanufactured products: a systematic review from the consumer perspective. J. Remanufact. 13 (2), 207–241. https://doi.org/10.1007/s13243-023-00125-0.

Bockarjova, M., Steg, L., 2014. Can Protection Motivation Theory predict pro-environmental behavior? Explaining the adoption of electric vehicles in The Netherlands. Global Environ. Change 28, 276–288. https://doi.org/10.1016/j.gloenvcha.2014.06.010.

Burucuoglu, M., Erdogan, E., 2019. Evaluation of young consumers' remanufactured products purchase intention within context of extended planned behavior theory. In: The Circular Economy and its Implications on Sustainability and the Green Supply Chain. IGI Global, pp. 246–264. https://doi.org/10.4018/978-1-5225-8109-3.ch014.

Byrne, D., 2002. Complexity Theory and the Social Sciences: an Introduction. Routledge.

Cao, D., Wang, Y., Berkeley, N., Tjahjono, B., 2022. Configurational conditions and sustained competitive advantage: a fsQCA approach. Long. Range Plan. 55 (4), 102131. https://doi.org/10.1016/j.lrp.2021.102131.

Chakraborty, K., Mukherjee, K., Mondal, S., Mitra, S., 2021. A systematic literature review and bibliometric analysis based on pricing-related decisions in remanufacturing. J. Clean. Prod. 310, 127265. https://doi.org/10.1016/j.jclepro.2021.127265.

Chen, Y., Chen, F., 2019. On the competition between two modes of product recovery: remanufacturing and refurbishing. Prod. Oper. Manag. 28 (12), 2983–3001. https://doi.org/10.1111/poms.13082.

Confente, I., Russo, I., Peinkofer, S., Frankel, R., 2021. The challenge of remanufactured products: the role of returns policy and channel structure to reduce consumers' perceived risk. Int. J. Phys. Distrib. Logist. Manag. 51 (4), 350–380. https://doi.org/10.1108/IJPDLM-03-2020-0089.

Conner, M., Armitage, C.J., 1998. Extending the theory of planned behavior: a review and avenues for further research. J. Appl. Soc. Psychol. 28 (15), 1429–1464. https://doi.org/10.1111/j.1559-1816.1998.tb01685.x.

Cui, L., Wu, K.J., Tseng, M.L., 2017. Selecting a remanufacturing quality strategy based on consumer preferences. J. Clean. Prod. 161, 1308–1316. https://doi.org/10.1016/j.jclepro.2017.03.056.

Diwanji, V.S., 2023. Fuzzy-set qualitative comparative analysis in consumer research: a systematic literature review. Int. J. Consum. Stud. 47 (6), 2767–2789. https://doi.org/10.1111/ijcs.12889.

Dufrénot, G., 2023. New thinking on sustainable development and growth. In: New Challenges for Macroeconomic Policies: Economic Growth, Sustainable Development, Fiscal and Monetary Policies. Springer International Publishing, Cham, pp. 147–191. https://doi.org/10.1007/978-3-031-15754-7_4.

Dul, J., 2016. Identifying single necessary conditions with NCA and fsQCA. J. Bus. Res. 69 (4), 1516–1523. https://doi.org/10.1016/j.jbusres.2015.10.134.

Eid, R., El-Kassrawy, Y.A., Agag, G., 2019. Integrating destination attributes, political (in) stability, destination image, tourist satisfaction, and intention to recommend: a study of UAE. J. Hospit. Tourism Res. 43 (6), 839–866.

Eid, R., Abdelmoety, Z., Agag, G., 2020. Antecedents and consequences of social media marketing use: an empirical study of the UK exporting B2B SMEs. J. Bus. Ind. Market. 35 (2), 284–305.

Elbaz, A.M., Agag, G.M., Alkathiri, N.A., 2018. How ability, motivation and opportunity influence travel agents' performance: the moderating role of absorptive capacity. J. Knowl. Manag. 22 (1), 119–141.

Elbeltagi, I., Agag, G., 2016. E-retailing ethics and its impact on customer satisfaction and repurchase intention: a cultural and commitment-trust theory perspective. Internet Res. 26 (1), 288–310.

Elhoushy, S., Salem, I.E., Agag, G., 2020. The impact of perceived benefits and risks on current and desired levels of outsourcing: hotel managers' perspective. Int. J. Hospit. Manag. 91, 102419.

Farmaki, A., Olya, H., Taheri, B., 2021. Unpacking the complex interactions among customers in online fan pages. J. Bus. Res. 125, 164–176. https://doi.org/10.1016/j.jbusres.2020.11.068.

Framinan, J.M., 2024. An analysis of the supply chain dynamics of remanufacturing with multiple collectors. Int. J. Prod. Econ. 267, 109071. https://doi.org/10.1016/j.ijpe.2023.109071.

Geremew, Y.M., Huang, W.J., Hung, K., 2024. Fuzzy-set qualitative comparative analysis as a mixed-method and analysis technique: a comprehensive systematic review. J. Trav. Res. 63 (1), 3–26. https://doi.org/10.1177/00472875231168619.

Ghisellini, P., Cialani, C., Ulgiati, S., 2016. A review on circular economy: the expected transition to a balanced interplay of environmental and economic systems. J. Clean. Prod. 114, 11–32. https://doi.org/10.1016/j.jclepro.2015.09.007.

Gomes, G.M., Moreira, N., Ometto, A.R., 2022. Role of consumer mindsets, behaviour, and influencing factors in circular consumption systems: a systematic review. Sustain. Prod. Consum. 32, 1–14. https://doi.org/10.1016/j.spc.2022.04.005.

Gong, S., Wang, L., Peverelli, P., Suo, D., 2022. When is sustainability an asset? The interaction effects between the green attributes and product category. J. Prod. Brand Manag. 31 (6), 971–983. https://doi.org/10.1108/JPBM-06-2021-3534.

Govindan, K., Jiménez-Parra, B., Rubio, S., Vicente-Molina, M.A., 2019. Marketing issues for remanufactured products. J. Clean. Prod. 227, 890–899. https://doi.org/10.1016/j.jclepro.2019.03.305.

Grdic, S.Z., Krstinic Nizic, M., Rudan, E., 2020. Circular economy concept in the context of economic development in EU countries. Sustainability 12 (7), 3060. https://doi.org/10.3390/su12073060.

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. https://doi.org/10.1287/opre.1080.0628.

Hagger, M.S., Hamilton, K., 2024. Longitudinal tests of the theory of planned behaviour: a meta-analysis. Eur. Rev. Soc. Psychol. 35 (1), 198–254. https://doi.org/10.1080/10463283.2023.2225897.

Hair, J.F., Risher, J.J., Sarstedt, M., Ringle, C.M., 2019. When to use and how to report the results of PLS-SEM. Econ. Bus. Rev. 31 (1), 2–24. https://doi.org/10.1108/EBR-11-2018-0203.

Hair, J., Black, W.C., Babin, B.J., Anderson, R.E., 2010. Multivariate Data Analysis, seventh ed. Pearson Educational International, Upper Saddle River, New Jersey.

Hamdy, A., Zhang, J., Eid, R., Agag, G., 2024. Is warmth more critical than competence? Understanding how destination gender affects destination identification and destination advocacy. J. Prod. Brand Manag. 23 (6), 23–51.

Hanss, D., Böhm, G., 2010. Can I make a difference? The role of general and domain-specific self-efficacy in sustainable consumption decisions. Explaining sustainable consumption. Findings from cross-sectional and intervention approaches.

Hartmann, P., Apaolaza, V., D'souza, C., Barrutia, J.M., Echebarria, C., 2014. Environmental threat appeals in green advertising: the role of fear arousal and coping efficacy. Int. J. Advert. 33 (4), 741–765. https://doi.org/10.2501/IJA-33-4-741-765.

Hasan, R., Shams, R., Rahman, M., 2021. Consumer trust and perceived risk for voice-controlled artificial intelligence: the case of Siri. J. Bus. Res. 131, 591–597. https://doi.org/10.1016/j.jbusres.2020.12.012.

Henthorne, T.L., Latour, M.S., Nataraajan, R., 1993. Fear appeals in print advertising: an analysis of arousal and ad response. J. Advert. 22 (2), 59–69. https://doi.org/10.1080/00913367.1993.10673404.

Hischier, R., Reale, F., Castellani, V., Sala, S., 2020. Environmental impacts of household appliances in Europe and scenarios for their impact reduction. J. Clean. Prod. 267, 121952. https://doi.org/10.1016/j.jclepro.2020.121952.

Houf, L., Szymkowiak, A., Shepherd, L.A., 2024. Promotion of sustainable products: can sustainability labels promote user selection of environmentally friendly products? Sustainability 16 (13), 5390. https://doi.org/10.3390/su16135390.

Hsieh, H.L., Kuo, Y.M., Wang, S.R., Chuang, B.K., Tsai, C.H., 2017. A study of personal health record user's behavioral model based on the PMT and UTAUT integrative perspective. Int. J. Environ. Res. Publ. Health 14 (1), 8. https://doi.org/10.3390/ijerph14010008.

Huffman, A.H., Van Der Werff, B.R., Henning, J.B., Watrous-Rodriguez, K., 2014. When do recycling attitudes predict recycling? An investigation of self-reported versus observed behavior. J. Environ. Psychol. 38, 262–270. https://doi.org/10.1016/j.jenvp.2014.03.006.

Hunka, A.D., Linder, M., Habibi, S., 2021. Determinants of consumer demand for circular economy products. A case for reuse and remanufacturing for sustainable development. Bus. Strat. Environ. 30 (1), 535–550. https://doi.org/10.1002/bse.2636.

Iannuzzi, A., 2024. Greener Products: the Making and Marketing of Sustainable Brands. CRC press.

Ibrahim, H., Al-Ajlouni, M.M.Q., 2018. Sustainable consumption: insights from the protection motivation (PMT), deontic justice (DJT) and construal level (CLT) theories. Manag. Decis. 56 (3), 610–633. https://doi.org/10.1108/MD-05-2016-0323.

Janmaimool, P., 2017. Application of protection motivation theory to investigate sustainable waste management behaviors. Sustainability 9 (7), 1079. https://doi.org/10.3390/su9071079.

Joshi, Y., Rahman, Z., 2015. Factors affecting green purchase behaviour and future research directions. Int. Strateg. Manag. Rev. 3 (1–2), 128–143. https://doi.org/10.1016/j.ism.2015.04.001.

Kabel, D., Elg, M., Sundin, E., 2021. Factors influencing sustainable purchasing behaviour of remanufactured robotic lawn mowers. Sustainability 13 (4), 1954. https://doi.org/10.3390/su13041954.

Karman, A., Lipowski, M., 2024. Switching to sustainable products: the role of time, product and customer characteristics. Psychol. Market. 41, 1082–1099. https://doi.org/10.1002/mar.21974.

Keller, P.A., Block, L.G., 1996. Increasing the persuasiveness of fear appeals: the effect of arousal and elaboration. J. Consum. Res. 22 (4), 448–459. https://doi.org/10.1086/209461.

Korgaonkar, P.K., 1982. Consumer preferences for catalog showrooms and discount stores-the moderating role of product risk. J. Retailing 58 (3), 76–88.

Kothe, E.J., Ling, M., North, M., Klas, A., Mullan, B.A., Novoradovskaya, L., 2019. Protection motivation theory and pro-environmental behaviour: a systematic mapping review. Aust. J. Psychol. 71 (4), 411–432. https://doi.org/10.1111/ajpy.12271.

Kumar, S., Sahoo, S., Lim, W.M., Kraus, S., Bamel, U., 2022. Fuzzy-set qualitative comparative analysis (fsQCA) in business and management research: a contemporary overview. Technol. Forecast. Soc. Change 178, 121599. https://doi.org/10.1016/j.ijinfomgt.2021.102310.

La Barbera, F., Ajzen, I., 2022. Instrumental vs. experiential attitudes in the theory of planned behaviour: two studies on intention to perform a recommended amount of physical activity. Int. J. Sport Exerc. Psychol. 1–13. https://doi.org/10.1080/1612197X.2022.2161107.

Lam, S.P., 2006. Predicting intention to save water: theory of planned behavior, response efficacy, vulnerability and perceived efficiency of alternative solutions. J. Appl. Soc. Psychol. 36 (11), 2803–2824. https://doi.org/10.1111/j.0021-9029.2006.00129.x.

Laradi, S., Alrawad, M., Lutf, A., Agag, G., 2024. Understanding factors affecting social commerce purchase behavior: a longitudinal perspective. J. Retailing Consum. Serv. 78, 103751.

Lindell, M.K., Whitney, D.J., 2001. Accounting for common method variance in cross-sectional research designs. J. Appl. Psychol. 86 (1), 114. https://doi.org/10.1037/0021-9010.86.1.114.

Lindkvist Haziri, L., Sundin, E., 2020. Supporting design for remanufacturing-A framework for implementing information feedback from remanufacturing to product design. J. Remanufacturing 10 (1), 57–76. https://doi.org/10.1007/s13243-019-00074-7.

Liu, M.T., Liu, Y., Mo, Z., 2020. Moral norm is the key: an extension of the theory of planned behaviour (TPB) on Chinese consumers' green purchase intention. Asia Pac. J. Mark. Logist. 32 (8), 1823–1841. https://doi.org/10.1108/APJML-05-2019-0285.

Luo, R., Zhou, L., Song, Y., Fan, T., 2022. Evaluating the impact of carbon tax policy on manufacturing and remanufacturing decisions in a closed-loop supply chain. Int. J. Prod. Econ. 245, 108408. https://doi.org/10.1016/j.ijpe.2022.108408.

Ma, J., Yin, Z., Hipel, K.W., Li, M., He, J., 2023. Exploring factors influencing the application accuracy of the theory of planned behavior in explaining recycling behavior. J. Environ. Plann. Manag. 66 (3), 445–470. https://doi.org/10.1080/09640568.2021.2001318.

Michaud, C., Llerena, D., 2011. Green consumer behaviour: an experimental analysis of willingness to pay for remanufactured products. Bus. Strat. Environ. 20 (6), 408–420. https://doi.org/10.1002/bse.703.

Milios, L., Matsumoto, M., 2019. Consumer perception of remanufactured automotive parts and policy implications for transitioning to a circular economy in Sweden. Sustainability 11 (22), 6264. https://doi.org/10.3390/su11226264.

Moosmayer, D.C., Abdulrahman, M.D.A., Subramanian, N., Bergkvist, L., 2020. Strategic and operational remanufacturing mental models: a study on Chinese automotive consumers buying choice. Int. J. Oper. Prod. Manag. 40 (2), 173–195. https://doi.org/10.1108/IJOPM-12-2018-0684.

Mostafa, M.M., 2020. Neural correlates of fear appeal in advertising: an fMRI analysis. J. Market. Commun. 26 (1), 40–64. https://doi.org/10.1080/13527266.2018.1497680.

Nascimento, J., Loureiro, S.M.C., 2024. Mapping the sustainability branding field: emerging trends and future directions. J. Prod. Brand Manag. 33 (2), 234–257. https://doi.org/10.1108/JPBM-02-2023-4349.

Ngu, H.J., Lee, M.D., Osman, M.S.B., 2020. Review on current challenges and future opportunities in Malaysia sustainable manufacturing: remanufacturing industries. J. Clean. Prod. 273, 123071. https://doi.org/10.1016/j.jclepro.2020.123071.

Nikseresht, A., Golmohammadi, D., Zandieh, M., 2024. Sustainable green logistics and remanufacturing: a bibliometric analysis and future research directions. Int. J. Logist. Manag. 35 (3), 755–803. https://doi.org/10.1108/IJLM-03-2023-0085.

Norman, R., 1975. Affective-cognitive consistency, attitudes, conformity and behavior. J. Pers. Soc. Psychol. 32 (1), 83. https://doi.org/10.1037/h0076865.

Ostojic, P., 2016. Pumps and circular economy. World Pumps 2016 (1), 30–33. https://doi.org/10.1016/S0262-1762(16)30032-3.

Pang, S.M., Tan, B.C., Lau, T.C., 2021. Antecedents of consumers' purchase intention towards organic food: integration of theory of planned behavior and protection motivation theory. Sustainability 13 (9), 5218. https://doi.org/10.3390/su13095218.

Pappas, I.O., Woodside, A.G., 2021. Fuzzy-set qualitative comparative analysis (fsQCA): guidelines for research practice in information systems and marketing. Int. J. Inf. Manag. 58, 102310. https://doi.org/10.1016/j.ijinfomgt.2021.102310.

Pisitsankkhakarn, R., Vassanadumrongdee, S., 2020. Enhancing purchase intention in circular economy: empirical evidence of remanufactured automotive product in Thailand. Resour. Conserv. Recycl. 156, 104702. https://doi.org/10.1016/j.resconrec.2020.104702.

Ragin, C.C., 2008. User's guide to fuzzy-set/qualitative comparative analysis. Department of Sociology. University of Arizona.

Randall, D.M., Gibson, A.M., 1991. Ethical decision making in the medical profession-an application of the theory of planned behavior. J. Bus. Ethics 10, 111–122. https://doi.org/10.1007/BF00383614.

Rather, R.A., Parrey, S.H., Gulzar, R., Rehman, S.U., 2023. COVID-19-based threat vs coping appraisal: effect of psychological risk on customer engagement and behavioral intentions. J. Hospit. Tour. Insights 6 (5), 2093–2114. https://doi.org/10.1108/JHTI-01-2022-0010.

Reddy, K.N., Kumar, A., 2021. Capacity investment and inventory planning for a hybrid manufacturing–remanufacturing system in the circular economy. Int. J. Prod. Res. 59 (8), 2450–2478. https://doi.org/10.1080/00207543.2020.1734681.

Rihoux, B., Ragin, C.C. (Eds.), 2009. Configurational Comparative Methods: Qualitative Comparative Analysis (QCA) and Related Techniques, vol. 51. Sage.

Rodríguez-Priego, N., Montoro-Ríos, F.J., 2018. How Cultural beliefs and the response to fear appeals shape consumer's purchasing behavior toward sustainable products. Sustainability in Innovation and Entrepreneurship: Policies and Practices for a World with Finite Resources, pp. 47–62. https://doi.org/10.1007/978-3-319-57318-2_4.

Rogers, R.W., 1975. A protection motivation theory of fear appeals and attitude change. J. Psychol. 91 (1), 93–114. https://doi.org/10.1080/00223980.1975.9915803.

Rogers, R.W., 1983. Cognitive and physiological processes in fear appeals and attitude change: a revised theory of protection motivation. Soc. Psychol.: A Source Book 153–176.

Ruangkanjanases, A., You, J.J., Chien, S.W., Ma, Y., Chen, S.C., Chao, L.C., 2020. Elucidating the effect of antecedents on consumers' green purchase intention: an

extension of the theory of planned behavior. Front. Psychol. 11, 1433. https://doi.org/10.3389/fpsyg.2020.01433.

Sakao, T., Bocken, N., Nasr, N., Umeda, Y., 2024. Implementing circular economy activities in manufacturing for environmental sustainability. CIRP Annals. https://doi.org/10.1016/j.cirp.2024.06.002.

Schleicher, D.J., Watt, J.D., Greguras, G.J., 2004. Reexamining the job satisfaction-performance relationship: the complexity of attitudes. J. Appl. Psychol. 89 (1), 165. https://doi.org/10.1037/0021-9010.89.1.165.

Schutte, N.S., Bhullar, N., 2017. Approaching environmental sustainability: perceptions of self-efficacy and changeability. J. Psychol. 151 (3), 321–333. https://doi.org/10.1080/00223980.2017.1289144.

Selim, H., Eid, R., Agag, G., Shehawy, Y.M., 2022. Cross-national differences in travellers' continuance of knowledge sharing in online travel communities. J. Retailing Consum. Serv. 65, 102886.

Shaalan, A., Agag, G., Tourky, M., 2022. Harnessing customer mindset metrics to boost consumer spending: a cross-country study on routes to economic and business growth. Br. J. Manag. 34 (7), 67–81.

Sharkasi, N., Agag, G., 2024. How does risk interplay with trust in pre-and post-purchase intention to engage: PLS-SEM and ML classification approach. Journal of Marketing Analytics 1–35.

Shashi, Centobelli, P., Cerchione, R., Jhamb, D., 2024. What makes people hesitant from circularity: an analysis of risk, marketing mix, cost and inconvenience. J. Consum. Behav. 23 (1), 43–60. https://doi.org/10.1002/cb.2165.

Shehawy, Y.M., Elbaz, A., Agag, G.M., 2018. Factors affecting employees' job embeddedness in the Egyptian airline industry. Tour. Rev. 73 (4), 548–571.

Shehawy, Y.M., Agag, G., Alamoudi, H.O., Alharthi, M.D., Brown, A., Labben, T.G., Abdelmoety, Z.H., 2024. Cross-national diferences in consumers' willingness to pay (WTP) more for green hotels. J. Retailing Consum. Serv. 77, 103665.

Singhal, D., Jena, S.K., Tripathy, S., 2019. Factors influencing the purchase intention of consumers towards remanufactured products: a systematic review and meta-analysis. Int. J. Prod. Res. 57 (23), 7289–7299. https://doi.org/10.1080/00207543.2019.1598590.

Skurka, C., Niederdeppe, J., Romero-Canyas, R., Acup, D., 2018. Pathways of influence in emotional appeals: benefits and tradeoffs of using fear or humor to promote climate change-related intentions and risk perceptions. J. Commun. 68 (1), 169–193. https://doi.org/10.1093/joc/jqx008.

Souza, J.D.L., Tondolo, V.A.G., Sarquis, A.B., Longaray, A.A., Tondolo, R.D.R.P., Costa, L.M.D., 2020. Effect of perceived value, risk, attitude and environmental consciousness on the purchase intention. Int. J. Bus. Environ. 11 (1), 11–31. https://doi.org/10.1504/IJBE.2020.105466.

Taheri, B., Olya, H., Ali, F., Gannon, M.J., 2020. Understanding the influence of airport servicescape on traveler dissatisfaction and misbehavior. J. Trav. Res. 59 (6), 1008–1028. https://doi.org/10.1177/0047287519877257.

Talebi, A., Mukherjee, S., Das, G., 2024. Unmasking the pivotal role of ad–target ethnic congruence in driving consumers' response to fear appeals. Psychol. Market. 41 (6), 1346–1362. https://doi.org/10.1002/mar.21984.

Tellis, G.J., 2004. Effective Advertising: Understanding when, How and Why Advertising Works. Sage Publications. https://doi.org/10.4135/9781452229379.

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. https://doi.org/10.1016/j.jclepro.2015.11.065.

Wallner, T.S., Haslbeck, J.M., Magnier, L., Mugge, R., 2024. A network analysis of factors influencing the purchase intentions for refurbished electronics. Sustain. Prod. Consum. 46, 617–628. https://doi.org/10.1016/j.spc.2024.03.009.

Wang, L., Zhu, S., Evans, S., Zhang, Z., Xia, X., Guo, Y., 2023. Automobile recycling for remanufacturing in China: a systematic review on recycling legislations, models and methods. Sustain. Prod. Consum. 36, 369–385. https://doi.org/10.1016/j.spc.2023.01.016.

Wang, S., Wang, J., Yang, F., Li, J., Song, J., 2020. Determinants of consumers' remanufactured products purchase intentions: evidence from China. Int. J. Prod. Res. 58 (8), 2368–2383. https://doi.org/10.1080/00207543.2019.1630767.

Wang, S., Wang, J., Yang, F., Wang, Y., Li, J., 2018. Consumer familiarity, ambiguity tolerance, and purchase behavior toward remanufactured products: the implications for remanufacturers. Bus. Strat. Environ. 27 (8), 1741–1750. https://doi.org/10.1002/bse.2240.

Wang, Y., Hazen, B.T., 2016. Consumer product knowledge and intention to purchase remanufactured products. Int. J. Prod. Econ. 181, 460–469. https://doi.org/10.1016/j.ijpe.2015.08.031.

Wang, Y., Wiegerinck, V., Krikke, H., Zhang, H., 2013. Understanding the purchase intention towards remanufactured product in closed-loop supply chains: an empirical study in China. Int. J. Phys. Distrib. Logist. Manag. 43 (10), 866–888. https://doi.org/10.1108/IJPDLM-01-2013-0011.

Wood, B.P., Eid, R., Agag, G., 2021. A multilevel investigation of the link between ethical leadership behaviour and employee's green behaviour in the hospitality industry. Int. J. Hospit. Manag. 97, 102993.

Yadav, R., Pathak, G.S., 2017. Determinants of consumers' green purchase behavior in a developing nation: applying and extending the theory of planned behavior. Ecol. Econ. 134, 114–122. https://doi.org/10.1016/j.ecolecon.2016.12.019.

Yaghoubi Farani, A., Mohammadi, Y., Ghahremani, F., 2019. Modeling farmers' responsible environmental attitude and behaviour: a case from Iran. Environ. Sci. Pollut. Res. 26, 28146–28161. https://doi.org/10.1007/s11356-019-06040-x.

Youssef, M.A.E.A., Eid, R., Agag, G., 2022. Cross-national differences in big data analytics adoption in the retail industry. J. Retailing Consum. Serv. 64, 102827.

Zhang, J.H., Yang, B., Chen, M., 2017. Challenges of the development for automotive parts remanufacturing in China. J. Clean. Prod. 140, 1087–1094. https://doi.org/10.1016/j.jclepro.2016.10.061.

Zhao, G., Cavusgil, E., Zhao, Y., 2016. A protection motivation explanation of base-of-pyramid consumers' environmental sustainability. J. Environ. Psychol. 45, 116–126. https://doi.org/10.1016/j.jenvp.2015.12.003.