

ANALYSIS OF THE RELATIONSHIP BETWEEN ATTITUDINAL FACTORS AND THE INTENTION TO PURCHASE REMANUFACTURED PRODUCTS

ANÁLISE DA RELAÇÃO ENTRE OS FATORES ATITUDINAIS E A INTENÇÃO DE COMPRA DE PRODUTOS REMANUFATURADOS

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ABSTRACT

Purpose – Remanufacturing is an essential strategy for implementing the concepts of the circular economy, but consumers must be willing to consume remanufactured products for this strategy to be successful. This study analyzes how the attitudinal factors environmental knowledge, environmental awareness, attitude towards sustainable products and perceived effectiveness by consumers influence the intention to purchase remanufactured products in the Brazilian market.

Design/methodology/approach – A descriptive research with quantitative methodology was developed with a sample of 289 participants, the analysis of the results was made using the statistical method of multiple linear regression. As limitations of the study, we can mention the sampling for convenience that restricts the generalization of the results.

Findings – The results indicate that the four attitudinal factors analyzed influence the intention to purchase remanufactured products. This article presents theoretical and practical contributions.

Research limitations/implications – From a theoretical point of view, this study allows a better understanding of the factors related to the intention to purchase remanufactured products by Brazilian consumers; from a practical point of view, this study provides a better understanding of the characteristics of the consumer market for remanufactured products, and can assist in the development of sustainable actions by companies.

Originality/value – This article is the first study that seeks to identify and analyze factors that influence the intention to purchase remanufactured products in Brazil and can assist organizations in implementing the circular economy more effectively.

KEYWORDS: Remanufactured Products, Sustainability, Circular Economy, Purchase Intention, Attitudinal Factors.

RESUMO

Objetivo: A remanufatura é uma estratégia essencial para a implementação dos conceitos da economia circular, porém os consumidores precisam estar dispostos a consumir produtos remanufaturados para que essa estratégia tenha sucesso. Este estudo analisa como os fatores atitudinais conhecimento ambiental, consciência ambiental, atitude em relação a produtos sustentáveis e eficácia percebida pelos consumidores influenciam a intenção de compra de produtos remanufaturados no mercado brasileiro.

Design/metodologia/abordagem: Foi desenvolvida uma pesquisa descritiva com metodologia quantitativa com uma amostra de 289 participantes, a análise dos resultados foi feita por meio da utilização do método estatístico de regressão linear múltipla. Como limitações do estudo, pode-se citar a amostragem por conveniência que restringe a generalização dos resultados.

Resultados: Os resultados indicam que os quatro fatores atitudinais analisados influenciam na intenção de compra de produtos remanufaturados. Este artigo apresenta contribuições teóricas e práticas.

Implicações da pesquisa: Do ponto de vista teórico, este estudo permite um melhor entendimento dos fatores relacionados a intenção de compra de produtos remanufaturados pelos consumidores brasileiros; do ponto de vista prático, este estudo proporciona um melhor entendimento das características do mercado consumidor de produtos remanufaturados, podendo auxiliar no desenvolvimento de ações sustentáveis pelas empresas.

Originalidade: Este artigo é o primeiro estudo que busca identificar e analisar fatores que influenciam a intenção de compra de produtos remanufaturados no Brasil e pode auxiliar as organizações na implementação da economia circular de forma mais efetiva.

Palavras-chave: Produtos remanufaturados, sustentabilidade, economia circular, intenção de compra, fatores de atitude.

1 INTRODUCTION

Consumers have become the major force to reckon with for attaining the objectives of environmental protection and sustainable development (Sharma & Bansal, 2013, p. 199). Thus, sustainability has been used by companies as a strategy to minimize their environmental impact. Sustainable practice may generate competitive advantage, as it may reduce pressures from the market and public bodies (Porter & Kramer, 2006). An example of a sustainable practice is the Circular Economy (CE) (Genovese, Acquaye, Figueroa, & Koh, 2017). This system can operate in companies and consumer markets with a focus on sustainable development, which implies the creation of environmental quality coupled with economic prosperity and social equity to benefit generations in the long run (Kirchherr, Reike, & Hekkert, 2017). CE aims to minimize the generation of waste based on the reduction, reuse and recycling of a company's resources (Genovese et al., 2017; Liu & Bai, 2014). The industrial processes are planned and executed to reduce and reuse materials throughout the manufacturing process, based on the premise of reducing material consumption (Murray, Skene, & Haynes, 2017; Kirchherr et al., 2017).

The reuse of waste in the production process allows the creation of a new product from used material (Silva, Shibao, Kruglianskas, Barbieri, & Sinisgalli, 2019). Thus, the remanufacturing, that is the combination of new components and reused parts (Hatcher, Ijomah, & Windmill, 2011), offers opportunity for companies to improve the use of internal resources while allowing cost savings in production processes (Michaud & Llerena, 2010). The remanufacturing process includes benefits for companies in economic, social and environmental aspects, besides assists in the successful implementation of the CE by organizations (Wang & Hazen, 2016). Therefore, remanufactured products are essential for the successful adoption of the CE, since the items produced reuse materials that would be directly discarded in the manufacturing process and reduce the negative impact on the environment of the company's production processes (Wang & Kuah, 2018). Thus, these products



are considered sustainable since their manufacturing process minimizes negative impacts caused to the environment (Michaud & Llerena, 2010). Therefore, they need to be accepted by consumers for the successful adoption of CE (Singhal, Jena & Tripathy, 2019).

Consumers are more aware in relation to environmental preservation, but so far, they have not demonstrated their determination to replace new products with remanufactured ones (Hazen, Mollenkopf, & Wang, 2017). Previous studies have shown that the increased awareness of consumers in relation to the need for environmental preservation is not reflected in their purchasing behaviors (Michaud & Llerena, 2010; Masi, Kumar, Garza-Reyes, & Godsell, 2018). Consumers perceive remanufactured products as inferior compared to conventional ones (Michaud & Llerena, 2010) and have not yet shown a willingness to replace products created from new components with remanufactured products (Hazen et al., 2017). However, the development of CE depends on the consumers' willingness to buy remanufactured products. The consumer attitudes and buying behaviors related with remanufactured products must be studied in depth (Hazen et al., 2017). In this context, a better understanding of the factors that influence the intention to purchase remanufactured products is necessary.

The intention to purchase remanufactured products is influenced by several factors. Wang, Wiegerinck, Krikke and Zhang (2013) developed a conceptual framework with consumers in China composed by six factors that impacted the purchase intention of remanufactured products (i.e. product knowledge, perceived benefit, perceived risk, purchase attitude, subjective norm and perceived behavioral control). Wahjudi et al. (2018) used some factors of this framework to investigate their relationship with the intention to purchase remanufactured cell phones in Indonesia and found that purchase attitude and product knowledge have a positive impact on intention to purchase remanufactured products, on the other hand perceived benefit and perceived risk were not directly correlated with purchase intention. The relationship between the factors that influence the intention to purchase remanufactured products varies significantly from article to article, this variation may be related to cultural and geographical differences in the analyzed consumers' samples (Singhal, Jena, & Tripathy, 2019).

In this context, a better understanding of the buying behavior of remanufactured products in the Brazilian market is necessary for a better understanding of this phenomenon in this country. This article explores four attitudinal factors based on previous literature to build the research conceptual model, the factors are environmental knowledge, environmental awareness, attitude towards sustainable products and perceived consumer effectiveness (Akbar, Hassan, Khurshid, & Niaz, 2014; Chan, 2001; Dunlap, Van Liere, Mertig, & Jones, 2000; Fryxell, & Lo, 2003; Mostafa, 2008; Rodrigues, Gonçalves, Costa, Nora, & Rezende, 2013).

Remanufacturing is an essential strategy for implementing the concepts of the CE, however consumers need to be willing to consume remanufactured products for this strategy to be successful. There is little research that addresses the topic of consumer behavior of remanufactured products, especially as a challenge to the adoption of CE practices (Pisitsankhakharn & Vassanadumrongdee, 2020; Wahjudi et al., 2018). The study of the factors that influence the intention to purchase remanufactured products is important to understand what are the motivations that make consumers buy this type of product. This knowledge can be used by companies that intend to explore the remanufactured products market and for a greater understanding of the challenges of successfully implementing the CE in Brazil. Until now, it was not identified articles that covers this topic in Brazilian context. Therefore, the objective of this study is to **analyze the influence of attitudinal factors (i.e. environmental knowledge, environmental awareness, attitude towards sustainable products and perceived consumer effectiveness) in the intention to purchase remanufactured products among Brazilian consumers.**



2. THEORETICAL BACKGROUND

In this section, a theoretical background is presented. We discuss about sustainability, CE and remanufactured products and their consumption, presenting the four attitudinal factors followed by their hypothesis, developed for this study proposes.

2.1 Sustainability

The term sustainability originated in the area of ecology and represents the cyclical view of the use of resources in the processes of production, use, disposal and reuse of products (Fletcher & Grose, 2011). Sustainability aims to maintain environmental preservation combined with the transformation of social, economic and political aspects (Dias, 2014). In the business context, this concept is responsible for generating profit from environmental preservation and an increase in the quality of life of people associated with the organization (Elkington, 1998).

Organizations are already looking for a more sustainable solution through their production processes, which generates beneficial behavior for the company and for all its stakeholders, including the consumer (Zambon & Ricco, 2010). However, although there are companies that adopt sustainable strategies in their production processes, many still do not prioritize sustainability and do not know how to act in an integrated manner with the business (Pinsky, 2013). According to Munck and Souza (2009) the motivation for sustainable development lies in the human potential, in the social responsibility of companies and in caring for the planet. With this, an organization that values sustainability seeks to build an economically viable, socially just and environmentally friendly society for the future (Diniz & Callado, 2017).

Organizations should invest in sustainable actions to improve their image before stakeholders, reduce costs, increase the capacity for innovation, generate competitive advantage, among others (Oliveira, Melo, Silva, & Polo, 2019). The transition from a traditional product management model to a model focused on sustainability requires leadership and the establishment of goals compatible with sustainable development objectives (Pinsky, 2013).

2.2 Circular Economy and Remanufactured Product

CE is a theoretical concept that proposes the creation of an industrial system focused on the restoration and maintenance of environmental quality. Companies that are concerned with the negative impacts of their activities on the environment could use this concept to generate competitive advantage (Genovese et al., 2017). Kirchherr et al. (2017) found the existence of 114 different definitions of CE, based on this bibliographic survey, the authors define this concept as an economic system that reduces the production of waste based on the reuse, recycling or recovery of materials in the production, distribution and consumption processes. CE contributes to sustainability to the extent that it promotes beneficial relationships between companies and the environment, in order to minimize the generation of waste and preserve natural resources (Silva et al., 2019). These relationships are concerned with reducing waste disposal in the environment and creating a sustainable production system in which materials can be reused several times (Genovese et al., 2017).

The decrease in the generation of waste by reducing, reusing and recycling (3Rs) resources and energy are premises of the CE. In this context, the materials are used cyclically. The vision of a closed cycle in the use of resources reduces the level of environmental pollution, as well as repairs the negative impacts caused to the environment by the industrial activity, based on the reuse of discarded waste (Liu & Bai, 2014; Murray et al., 2017). However, the implementation of CE without



prioritizing the reduction and reuse of resources may result in the generation of an unsustainable business model (Kirchherr et al., 2017).

The remanufactured product is made from a combination of new components and reused parts (Hatcher et al., 2011). Remanufacturing can reduce costs in the purchase and processing of raw materials. For this reason, companies recognized in this process an opportunity to improve the use of their resources with cost savings (Michaud & Llerena, 2010). The reduction in the cost of raw materials and the decrease in the amount of waste disposed of are examples of benefits associated with the production of remanufactured products.

Remanufactured products are relevant to CE as it has economic, social and environmental benefits (Wang & Hazen, 2016; Wang & Kuah, 2018). In this context, remanufacturing represents a key CE practice since remanufactured products are made through the reuse of materials directly in the production process, thus this strategy is more environmental friendly when compared to other sustainable production techniques such as recycling (Wahjudi et al., 2018; Wang & Kuah, 2018). However, these products need to be accepted by consumers for the successful adoption of CE (Singhal, Jena, & Tripathy, 2019).

2.3 Determining factors for the consumption of remanufactured products

In order to encourage a sustainability behavior is necessary identify at least one of those factors that influence such behavior (i. e. locus of control; sense of responsibility; knowledge; and attitude); attitude is considered one of the most important (Newhouse, 1990; Chan, 1996). Consumer attitude is a psychology tendency expressed from a positive or negative evaluation about something related to consumption (Eagly & Chaiken, 1993), which a specific consumer context links personal values to consumption behaviors (Ajzen & Fishbein, 1977).

Environmental attitudes, environmental awareness and environmental knowledge are some of the variables which have been used by researchers to explain the nuances in the pro-environmental behaviour of consumers. In contrast, perceived consumer effectiveness determines an individual's willingness to engage in environmentally conscious consumption behavior (Sharma & Bansal, 2013). The study of the purchasing behavior of sustainable products is already well consolidated in the scientific literature. In contrast, the study of factors that affect the consumption of remanufactured products is a recent topic (Pisitsankhakarn & Vassanadumrongdee, 2020; Wahjudi et al., 2018).

Wang et al. (2013) developed a framework with six factors that impact the intention to purchase this type of product, these factors are product knowledge, perceived benefit, perceived risk, purchase attitude, subjective norm and perceived behavioral control. Wahjudi et al., 2018 conducted a survey of some of these factors (i.e. purchase attitude, product knowledge, perceived benefit, perceived risk) and found that they impact the purchase intention of remanufactured cell phones differently. The impact of factors on the intention to purchase remanufactured products varies significantly between studies and this may cause "hindrance in understanding the degree of impact of various factors on purchase intention" (Singhal, Jena, & Tripathy, 2019, p. 7290).

The intention to purchase remanufactured products can be impacted differently by different factors depending on the cultural and geographical particularities of consumers, however the attitude and perceived green benefit seem to have a strong relationship with the intention to purchase this type of product. (Singhal, Jena, & Tripathy, 2019). Some examples of attitudinal factors are environmental knowledge (Fryxell & Lo, 2003; Mostafa, 2008), environmental awareness (Dunlap et al., 2000; Mostafa, 2008), attitude towards sustainable products (Akbar et al., 2014; Chan, 2001; Mostafa, 2008) and perceived consumer effectiveness (Mostafa, 2008; Rodrigues et al., 2013).



2.4 Hypothesis Development

Environmental knowledge

According to Gould, Houston and Mundt (1997), behavioral actions can be influenced by impediments. These impediments can be barriers, that is, something that interrupts the behavior, or an obstacle, that is, something that affects the likelihood of an action occurring. Examples of impediments are ignorance and lack of knowledge, which can occur if an individual does not know about a problem, how to acquire information about potential solutions or how to access the market to acquire the solution itself.

Environmental knowledge is defined by Fryxell and Lo (2003, p. 45) as “a general knowledge of facts, concepts and relationships related to the natural environment and its main ecosystems”. This knowledge contributes to form the attitude towards environment (Mohiuddin, Al Mamun, Syed, Mehedi Masud, & Su, 2018), and technological change, being the key to success in preventing pollution (Ashford 1993).

Previous research shows positive relationships between environmental knowledge and the intention to purchase sustainable products, but not specifically for remanufactured products. Hines et al. (1987), for example, noted an average correlation of 0.30 between environmental knowledge and behavior, this association being positive and moderate, but statistically significant. When individuals more actively engaged in environmental issues were compared with less engaged individuals, the only factor that clearly stood out between groups was knowledge about the problem (Stern, 1992). Similarly, Simmons and Widmar (1990) concluded that the lack of knowledge was a barrier to recycling among people with positive preservation attitudes. Furthermore, Mohiuddin et al. (2018) found that environmental knowledge and awareness have a significant influence on favorable attitudes toward green vehicles. Based on this context, the first hypothesis is presented:

H1: Environmental knowledge significantly affect the consumer’s intention to purchase remanufactured products.

Environmental awareness

Environmental awareness, a mental state variable, is the degree of appreciation of the environment and the act on their environmental values. A multi-dimensional construct varying from low general level to high product-specific level (Bansal & Roth, 2000; Sharma & Bansal, 2013). It is closely linked to environmentally responsible purchasing behaviour, although the strength of the relationships varies according to sample type and the particular product category at issue (Schlegelmilch, Bohlen, & Diamantopoulos, 1996). Over time, this factor has proved to be an important in consumers’ buying decisions (Kwon, Englis, & Mann, 2016). According to Yeung (2004), this attribute “can represent people’s concerns, likes and dislikes about the environment”. (p.101).

Due to this fact, there have been developed and improved scales to measure environmental awareness, to evaluate people attitude related to sustainability (Maloney & Ward, 1973; Maloney et al., 1975; Arbuthnot, 1977; Weigel & Weigel, 1978; Kuhn & Jackson, 1989; Dunlap & Van Liere, 1978; Dunlap et al., 2000).

Based on the New Environmental Paradigm (NEP), initially developed in 1978 by Dunlap and Van Liere and later adapted in 2000 by Dunlap, Van Liere, Mertige Jones, the environmental awareness attribute was associated with three aspects: beliefs about humanity’s ability to upset the balance of nature; the existence of limits to the growth of human societies; and humanity’s right to rule over the rest of nature (Dunlap et al., 2000).



Previous studies have found that environmental awareness has a positive and significant relationship with the consumers' intention to buy sustainable products (Mostafa, 2008; Jaiswal & Kant, 2018; Kim & Choi, 2005). Based on this context, the following hypothesis is presented:

H2: Environmental awareness significantly affect the consumer's intention to purchase remanufactured products.

Attitude towards sustainable products

Attitudes show a person's assessment, based on their values, feelings and tendencies, about a particular object. Thus, the attitude of buying sustainable products is related to the intention to buy them (Chan, 2001; Akbar et al., 2014; Wei et al., 2017; Jaiswal & Kant, 2018). Likewise, consumers who have a positive attitude towards sustainable products may have a positive attitude towards the purchase of remanufactured products (Wei, Chiang, Kou, & Lee, 2017).

Previous studies have shown that a positive attitude towards the environment results in the purchase and use of ecologically responsible products (Mostafa, 2008). Pisitsankhakarn and Vassanadumrongdee (2020) found that the attitude towards sustainable products is positively correlated with the intention to purchase remanufactured products in the automotive market. According to Akbar et al. (2014), a positive attitude towards environmental preservation increases the probability of consuming sustainable products. Consumer attitudes influence their buying behavior, so it is important to study them in relation to sustainable products. Based on this context, the third hypothesis is presented:

H3: The attitude towards sustainable products significantly affect the consumer's intention to purchase remanufactured products.

Perceived consumer effectiveness

The perceived consumer effectiveness is the consumer belief that the efforts of an individual acting alone can make a difference. It determines an individual's willingness to engage in environmentally conscious consumption behaviour (Kinnear et al., 1974). According to Rodrigues et al. (2013, p. 12) is "the individual's ability to believe that their effort will make a difference", that is, the buying attitudes of a consumer in the present may positively influence the future of the environment and the next generations.

Portilho (2009) brings in her study the view of a consumer who is not a passive victim of the marketing advertisements promoted by the companies, and treats consumers as being politicized and responsible for their consumption choices. She brings to light the role of consumers who need to support themselves, supply their home, take care of their family and for that these consumers become politicized, that is, they start having a clear perception that their consumption has not only momentary impacts, but in the long run, also impacts the environmental and economic relations.

Thus, consumers have a responsible role and are aware of their buying attitude. Eden (1993) explains the connection between self-attribution of responsibilities and the perceived effectiveness of the individual as the perceived control over the results of their behavior. Thus, the individual would have a greater belief in the effectiveness of their behavior where greater control can be exercised, which would reinforce the self-attribution of responsibility.

For Wesley, Lee and Kim (2012), when it comes to responsible consumer behavior, a per-



son's attitude can influence their buying behavior based on their motivations. Thus, we can understand that in relation to the sustainable consumer, the perceived effectiveness will have a strong relation to environmental appeals.

Previous studies show a positive and significant impact of perceived consumer effectiveness on the attitude and intention to purchase sustainable products in India (Jaiswal & Kant, 2018), Egypt (Mostafa, 2008), Malaysia (Tan, 2011), the United States, South Korea and China (Kang et al., 2013). Based on this context, the following hypothesis is presented:

H4: Perceived consumer effectiveness significantly affect the consumer's intention to purchase remanufactured products.

Intention to purchase remanufactured products

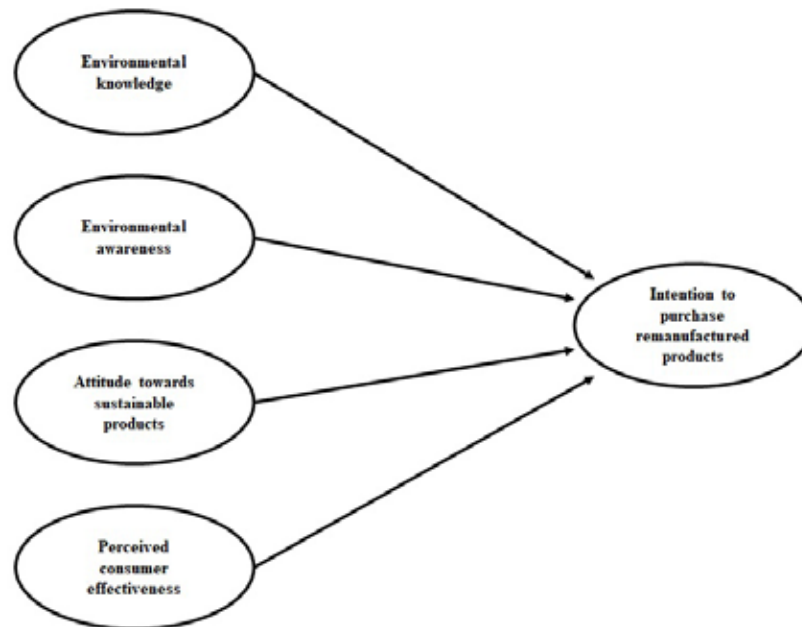
Sustainable products have the purpose of preserving natural environmental resources and reduce pollutants (Ottman, Stafford, & Hartman, 2006). According to Ajzen's Theory of Planned Behavior (1991), the intention to purchase sustainable products is perceived between the combination of behavioral attitudes towards the purchase intention, legislative norms of the manufacturing companies and the environmental concern. The central factor of this theory is the individual's purchase intention, which comes from the premise of doing something good for themselves and for the environment. Rachid (2009) refers to the intention to purchase sustainable products as the likelihood and willingness of a person to give preference to products with ecologically correct characteristics over other conventional products in their purchase. For Chen and Chang (2012), the intention to purchase sustainable products can be positively affected by the sustainable value perceived by the consumer.

The intention to purchase remanufactured products seems to be "positively and strongly influenced by attitude and subjective norm, whereas it is moderately influenced by perceived green benefits and perceived behaviour control" (Singhal, Jena, & Tripathy, 2019, p. 7289). Wang et al. (2013) indicates that purchase intention of remanufactured automotive items is influenced too by attitude and perceived green benefits, among other factors. Wahjudi et al. (2018) indicates that perceived benefit has only an indirect impact on purchase intention of remanufactured products.

Based on the four attitudinal factors (i.e. environmental knowledge, environmental awareness, attitude towards sustainable products and perceived consumer effectiveness) and the hypotheses presented above, we present in Figure 1 the research conceptual model



Figure 1 - Research Conceptual Model



3. METHODOLOGY

An descriptive research was developed using quantitative methodology characterized by the quantification and measurement of the collected data (Martins & Theóphilo, 2009) generating a set of data collected by a survey applied in online format, carried out through Google Forms, with Brazilian consumers.

For the analysis of the survey results, the statistical method of multiple linear regression was used, which is an adequate method to analyze the relationship existing between a dependent variable with a set of independent variables (Hair, Anderson, Tatham, & Black, 2005). This technique also makes it possible to analyze the influence of control variables in the dependent variable. To use the multiple linear regression an exploratory factor analysis was performed on the questions to extract the value that represents each factor studied. The data were reduced based on this statistical method to a single value per factor and this allowed calculating the relationship between independent variables and dependent variables.

3.1 Questionnaire development and data collection

This article is going to use four attitudinal factors (i.e. environmental knowledge, environmental awareness, attitude towards sustainable products and perceived consumer effectiveness) based on previous articles to create the research conceptual model (Akbar et al., 2014; Chan, 2001; Dunlap et al., 2000; Fryxell & Lo, 2003; Mostafa, 2008; Rodrigues et al., 2013). These four factors represent the independent variables (IV). The assertions were developed based on previous studies, as shown in Table 1.

Table 1 - Attitudinal Factors

Attitudinal Factors	Theoretical Framework	Number of questions
Environmental knowledge	Fryxell & Lo, 2003	5
Environmental awareness	Dunlap et al., 2000	13
Attitude towards sustainable products	Akbar et al., 2014; Chan, 2001	5
Perceived consumer effectiveness	Rodrigues et al., 2013	7

In addition to these, questions related to the intention to purchase remanufactured products, dependent variable (DV), were included, with assertions developed based on the study conducted by Mostafa (2008). The scale used for IVs and DV was the Likert scale with a 7-point semantic differential (where 1 – totally disagree and 7 – totally agree).

Questions related to demographic variables were also included, namely: gender, education and work area. These variables were used as control variables (CV) in the regression model.

The questionnaire was pre-tested with 10 respondents to evaluate the proposed instrument. Based on the pre-test responses, changes were made on the statements to reflect better readability. Subsequently, the final version was sent over the Internet from May 31, 2019 to June 9, 2019.

The collection comprises 289 valid respondents. The study was carried out mostly in the city of São Paulo in Brazil. Therefore, the sample is a sample of regional convenience. To ensure accurate answers, respondents were promised complete secrecy.

3.2 Characteristics of the sample

Table 2 shows the demographic characteristics of the sample, where it is possible to see a predominance of female respondents (57.1%) over male respondents (42.9%). Most participants have college degree (45.0%) and postgraduate degree (32.9%). Thus, there is a high concentration of respondents with at least college degree, which may be related to the questionnaire's disclosure for convenience. In the sample respondents belong to different areas of work, most participants work in business (30.1%) and education (20.8%) areas.

Table 2 – Demographic characteristics of the sample

	Category	Frequency	Percentage
Gender	Female	165	57,1%
	Male	124	42,9%
	I do not wish to inform	0	0,0%
Education	Complete primary education	5	1,7%
	Complete high school	59	20,4%
	College degree	130	45,0%
	Postgraduate degree	95	32,9%
Work area	Health	22	7,6%
	Education	60	20,8%
	Environmental	13	4,5%
	Business	87	30,1%
	Technology	28	9,7%
	Others	79	27,3%

n = 289



3.3 Assessment of construction validity

The answers obtained were exported to the IBM SPSS® Statistics 23 software for data treatment. Cronbach's alpha test was performed to assess the internal consistency of the scale; this coefficient is widely used in academic research and makes it possible to measure the reliability of a multi-item scale (Peterson, 1994). Nunnally (1967) proposes that preliminary research on topics that have not been deeply studied, as is the case here, indicate an acceptable value of Cronbach's alpha from 0.5; the authors Hair et al. (2005) consider a value from 0.6 for this coefficient to be appropriate in exploratory research.

The test was performed on the attitudinal factors surveyed, namely: environmental knowledge, environmental awareness, attitudes towards sustainable products and perceived consumer effectiveness. Thus, some questions were removed to increase the internal consistency of the factors perceived consumer effectiveness and environmental awareness. In the first factor, 4 questions were removed, and in the second, 6 questions. Table 3 shows the result of the Cronbach's alpha of the attitudinal factors studied.

Based on it, it can be seen that most of the measures showed results above 0.60 except for the factor related to the perceived consumer effectiveness, which had Cronbach's alpha of 0.565. Thus, this variable indicated internal consistency at the limit of what is considered acceptable for exploratory research and, therefore, was maintained in the model.

Table 3 – Reliability of the scale

Variables	Cronbach's α
Environmental knowledge	0,834
Environmental awareness	0,635
Attitude towards sustainable products	0,927
Perceived consumer effectiveness	0,565
Intention to purchase remanufactured products	0,843

4. ANALYSIS OF RESULTS

4.1 Correlation between attitudinal factors and purchase intention

Table 4 shows the correlation between the attitudinal factors and the intention to purchase remanufactured products. It is possible to see a strong positive correlation between the attitude towards these products (Attitude) and the intention to purchase them. It is worth noting that perceived consumer effectiveness (Effectiveness) indicated a negative correlation with the intention to purchase remanufactured products. Although this does not prove causality, the correlation can serve as a predictor of causal link (Sekaran, 2000).



Table 4 – Correlation Matrix

	Intention	Attitude	Knowledge	Awareness	Effectiveness
Intention	1	0.747	0.401	0.439	-0.262
Attitude	0,747	1	0.307	0.364	-0,184
Knowledge	0.401	0.307	1	0.277	-0.110
Awareness	0.439	0.364	0.277	1	-0.980
Effectiveness	-0.262	-0.184	-0.110	-0.980	1

The environmental knowledge (Knowledge) is positively correlated (0.401) to the consumer's intention to purchase remanufactured products. This finding is aligned with Hines et al. (1987) study that affirms that there is a significant correlation between environmental knowledge and environmental behavior.

The relation between the factors environmental awareness and purchase intention is also positive (0.439) and this finding corroborates with several previous studies that identified that the intention to purchase sustainable products is positive among individuals who demonstrated environmental awareness (Mostafa, 2008; Jaiswal & Kant, 2018; Kim & Choi, 2005).

The attitude towards sustainable products was the factor that showed the highest correlation with the intention to purchase remanufactured products, with a value of 0.747. This result was also found in previous articles that related the attitude to the intention to purchase green products (Akbar et al., 2014; Jaiswal & Kant, 2018; Mostafa, 2008).

The factor perceived consumer effectiveness has a negative correlation in relation to purchase intention. This result corroborates previous research studies such as Michaud and Llerena (2010) and Hazen et al., (2017), who show a low willingness to consume remanufactured products even when the consumer know the benefits that this type of product bring to the environment.

4.2 Regression model

In the regression model, the DV is the intention to purchase remanufactured products and the IVs are environmental knowledge (Knowledge); environmental awareness (Awareness); attitude towards sustainable products (Attitude); and perceived consumer effectiveness (Effectiveness). No IV was rejected in the model. Thus, the four factors are significantly related to the intention to purchase remanufactured products and all the hypotheses were confirmed.

Previous research studies have shown that purchase intention can be influenced by demographic variables: gender and education; thus, these variables were included in our statistical model (Mostafa, 2008). The variable work area proved to be significant for the regression and was, therefore, also used as CV.

The estimation of the linear regression model was made using the stepwise method, which permit the researcher to examine the contribution of each independent variable for the regression model (Hair et al., 2005). Based on this method, all factors are considered in the regression, but only the most significant ones are maintained in the statistical model. In this study all the independent variables were significant in the statistical model. Table 5 shows the summary of the regression model of the study with the IVs and CVs.



Table 5 - Summary of the regression model

Model	R	R-square	Adjusted R-square	Durbin-Watson
1	0.747	0.559	0.557	
2	0.769	0.591	0.588	
3	0.783	0.613	0.609	
4	0.793	0.629	0.623	
5	0.799	0.639	0.633	
6	0.803	0.644	0.637	
7	0.806	0.65	0.642	2.059

1 - Predictors: (Constant), Attitude

2 - Predictors: (Constant), Attitude, Knowledge

3 - Predictors: (Constant), Attitude, Knowledge, Awareness

4 - Predictors: (Constant), Attitude, Knowledge, Awareness, Gender

5 - Predictors: (Constant), Attitude, Knowledge, Awareness, Gender, Effectiveness

6 - Predictors: (Constant), Attitude, Knowledge, Awareness, Gender, Effectiveness, Work Area

7 - Predictors: (Constant), Attitude, Knowledge, Awareness, Gender, Effectiveness, Work Area, Education Dependent Variable: Intention

The summary of the regression model shows that the first factor inserted in the model was attitude towards remanufactured products, which indicated an R-square of 0.559; which indicates that 55.9% of the intention to purchase remanufactured products is explained only by this variable. The second factor inserted in the model was environmental knowledge, which increased the R-square of the model to 0.591, which means an increase of 3.2% in the explanation of the DV. The factor environmental awareness was the third inserted and contributed to explain 61.3% of the DV. The last model, model 7, shows that all IVs and CVs can explain 65% of the DV.

The factor attitude towards remanufactured products had the greatest relation with the DV and in the regression model it is the IV that most explains the DV. This result is in line with previous studies, which also found a strong relationship between attitude and intention to purchase sustainable products (Mostafa, 2008; Jaiswal & Kant, 2018; Kim & Choi, 2005).

The four attitudinal factors studied were relevant for determining the regression model. Thus, all variables studied influence the intention to purchase remanufactured products. It is worth noting that the factor perceived consumer effectiveness indicated a negative correlation with the consumer's purchase intention, which may show a low willingness towards the consumption of remanufactured products, as found in previous studies (Hazen et al., 2017; Michaud & Llerena, 2010).

5. CONCLUSIONS

CE can only be implemented in a sustainable manner by organizations if there is a reduction in the consumption of resources through the reuse of materials throughout its production chain (Kirchherr et al., 2017). Consumers have to be willing to consume remanufactured products, otherwise, the implementation of the CE may not be successful (Singhal, Jena, & Tripathy, 2019). This study analyzed how four attitudinal factors influence the intention to purchase remanufactured products and allowed a better understanding of this consumer market.

The results showed the influence that environmental knowledge, environmental awareness, attitude towards sustainable products and perceived consumer effectiveness have on intention to purchase remanufactured products. The four hypotheses presented were confirmed, in this



sense all the factors presented influence the intention to purchase remanufactured products and were significant in the regression model. The variables gender, education and work area acted as control variables in the statistical model. In addition, the attitude towards sustainable products, environmental knowledge and environmental awareness are positively correlated with the consumer's intention to purchase remanufactured products, this results are aligned with previous studies (Akbar et al., 2014; Mostafa, 2008; Jaiswal & Kant, 2018; Kim & Choi, 2005). On the other hand, the factor perceived consumer effectiveness presented a negative correlation with the intention to purchase remanufactured products. This result corroborates previous research that found that consumers have a low willingness to buy remanufactured products in relation to new products, even when they know the benefits that remanufactured products bring to the environment (Hazen et al., 2017; Michaud and Llerena, 2010).

The contribution of this study allows a better understanding of the factors related to the purchase attitudes towards remanufactured products by Brazilian consumers. This knowledge can help companies that operate in the remanufactured market or that plan to start producing this type of product. As the factors that affect the intention to purchase remanufactured products are highlighted, companies can define more appropriate strategies for the consumer of that product. In addition, understanding the buying behavior of remanufactured products is important to ensure the successful implementation of the CE concepts, this debate affects the whole society and can be important in the development of actions that encourage the consumption of this type of product. Summing up, this study shows both theoretical-empirical and managerial contributions. From the academic standpoint, we can consider the fact that this is the first study that seeks to identify and analyze factors that influence the intention to purchase remanufactured products in Brazil. From a managerial perspective, this study provides a better understanding of the Brazilian consumer market for this type of product, being able to support the development of actions by the strategical areas of the companies.

As limitations of the study, we can mention the convenience sampling, which restricts the generalization of the results. In this study, it should be considered that the sample is mainly consisted of consumers with college degree and from the state of São Paulo.

For future studies, we suggest studying this subject using the factor attitude towards remanufactured products as a moderating variable, since it has a strong correlation with the dependent variable (i.e. intention to purchase remanufactured products). Thus, we believe that it would be possible to explore what factors make up the attitude and create a more complete model to predict the relationship between the variables that affect the consumption of remanufactured products. For future studies, we also recommend investigating the factors not addressed in this research that influence the intention to purchase sustainable products, such as: skepticism and altruism (Mostafa, 2008), in order to increase knowledge of the intention to purchase remanufactured products in the Brazilian market.

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1. Definition of research problem	✓	✓	✓	✓	✓
2. Development of hypotheses or research questions (empirical studies)	✓	✓	✓		
3. Development of theoretical propositions (theoretical work)	✓				
4. Theoretical foundation / Literature Review	✓	✓	✓	✓	
5. Definition of methodological procedures	✓		✓	✓	✓
6. Data collection	✓	✓	✓	✓	
7. Statistical analysis	✓	✓		✓	
8. Analysis and interpretation of data	✓	✓		✓	
9. Critical revision of the manuscript	✓	✓	✓		✓
10. Manuscript writing	✓	✓	✓	✓	✓
11. Other (please specify)					

