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# The Intention to Use Reusable Packaging

Investigating the Effect of the Consumer's  
Perceived Ease of Use, Perceived Usefulness  
and Pro-Environmental Attitude

Joana Sofia de Oliveira Ferreira Pedro Dias

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Prof. Paulo Romeiro

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## **ABSTRACT**

**Title:** “The Intention to Use Reusable Packaging: Investigating the Effect of the Consumer’s Perceived Ease of Use, Perceived Usefulness and Pro-Environmental Attitude”

**Author:** Joana Sofia de Oliveira Ferreira Pedro Dias

With consumers becoming more concerned with the environment and increasing the demand for sustainable products, companies have been adapting their products to match consumers’ expectations. One of the most efficient ways of increasing a product’s sustainability is through sustainable packaging. This study focuses on reusable packaging with concentrated refills.

This research aims at identifying what determines the intention to use a reusable packaging and how the consumers’ environmental attitude will impact this relationship. More precisely, this study will consider the Technology Acceptance Model as the starting point and analyze how perceived ease of use and perceived usefulness will predict the intention to use when moderated by the consumer’s environmental attitude.

An online questionnaire was conducted where respondents were exposed to a product picture of a spray surface cleaner either in a single-use or reusable packaging. The results obtained indicate that the consumers’ intention to use a reusable packaging is significantly lower than the single-use packaging mostly due to the its perceived inconvenience and difficulty to use. Additionally, a consumer with a high environmental attitude is more willing to use a reusable packaging and finds it easier to use. Findings also show that the brand effect is diminished in a reusable packaging when consumers have higher levels of environmental attitude when compared to a single-use packaging.

### **Keywords**

Reusable, Packaging, Intention to Use, Refills, Technology Acceptance Model

## SUMÁRIO

**Título:** “A Intenção de Usar Embalagens Reutilizáveis: Investigação do Efeito da Facilidade de Utilização Percebida, Utilidade Percebida e da Atitude Pró-ambiental do Consumidor”

**Autor:** Joana Sofia de Oliveira Ferreira Pedro Dias

Os consumidores estão mais preocupados com o meio ambiente e a procura por produtos sustentáveis tem vindo a aumentar. Esta tendência tem levado as organizações a adaptar os seus produtos de forma a irem de encontro com expectativas dos consumidores. Um dos métodos mais eficientes para aumentar a sustentabilidade de um produto é através de embalagens sustentáveis. Este estudo foca-se em embalagens reutilizáveis com recargas concentradas.

Esta investigação tem como objetivo identificar o que explica a intenção de usar uma embalagem reutilizável e como é que a atitude ambiental dos consumidores vai impactar esta relação. Mais precisamente, o estudo vai considerar o *Technology Acceptance Model* como ponto de partida e analisar como *Facilidade de Utilização Percebida* e a *Utilidade Percebida* preveem a intenção do uso, quando moderados pela atitude ambiental do consumidor.

Foi realizado um questionário em que os inquiridos foram expostos a uma imagem de um limpa-superfícies em spray ou numa embalagem descartável ou numa embalagem reutilizável. Os resultados obtidos indicam que a intenção dos consumidores usarem uma embalagem reutilizável é mais baixa dado uma pré-concebida inconveniência e dificuldade de uso acrescida.

Além disso, um consumidor com uma atitude ambiental elevada está mais disposto a usar uma embalagem reutilizável e considera-a mais fácil de usar. Os resultados também mostram que o efeito da marca é perdido com consumidores com nível elevados de atitude ambiental em embalagens reutilizáveis.

### **Palavras-chave**

Reutilizável, Embalagem, Intenção de Uso, Recargas, Technology Acceptance Model

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## **GLOSSARY**

<b>TAM</b>	Technology Acceptance Model
<b>TRA</b>	Theory of Reasoned Action
<b>PEOU</b>	Perceived Ease of Use
<b>PU</b>	Perceived Usefulness
<b>ATU</b>	Attitude Towards Use
<b>ITU</b>	Intention to Use
<b>ASU</b>	Actual System Use
<b>VIEW</b>	Visible, Informative, Emotional, Workable
<b>FMCG</b>	Fast Moving Consumer Goods
<b>NGO</b>	Non-Governmental Organization
<b>SPA</b>	Sustainable Packaging Alliance
<b>TPB</b>	Theory of Planned Behavior
<b>UK</b>	United Kingdom
<b>PP</b>	Packaging Preference
<b>PEA</b>	Pro-Environmental Attitude

## **CHAPTER 1: INTRODUCTION**

### **1.1 Background and Problem Statement**

With the growing concern of the well-being of the environment, companies have been desperate to find their spot in the sustainable market (Kooijman, 1993). Whether through packaging alterations or through changes in formulas, organizations have been relying on the launch of green products (Dangelico, 2010) to convince consumers they are up to their sustainable standards. Although to some these products are simply image-boosters, the conscious segment is quickly becoming one of the biggest targets for most companies. A study by Unilever shows how a third of the consumers does now prefer sustainable products and how this represents an untapped market of €966 billion (Unilever, 2017). One of the most efficient ways of transforming non-sustainable products into sustainable ones is through packaging modifications. Sustainable packaging is considered an important attribute in consumers' choices and for at least one third of the consumers is the most important attribute.

With most of the current packaged goods market resourcing to plastic, one of the biggest polluters, most countries have now been introducing legislation that bans the use of certain materials and penalizes those who do not consider environmental issues (Rundh, 2009). Green packaging is now becoming more available in the market and competing against traditional products for the consumers' attention. This comes in all shapes and forms, but the focus of this dissertation will be reusable and concentrated packaging technologies. Creating refillable packaging, increases the number of times containers are used, yielding the environmental benefits (Numata & Managi, 2012). Concentrated products have a simple concept, reducing the amount of packaging in a packaged good. Companies like Unilever have been experimenting with having consumers investing in traditional reusable packaging and then selling ultraconcentrated versions of the product in small bottles that the consumers can later dilute at home.

Although consumers appreciate reusable products, there is evidence of a perceived inconvenience. Consumers believe that reusable packaging requires more time and effort to clean, refill and store than a single-use packaging and have even expressed safety concerns due to their higher involvement. Additionally, they believe that these technologies must offer further benefits relative to traditional packaging, specially cost benefits (Lofthouse & Bhamra, 2006).

Even though the number of consumers with a high pro-environmental attitude is rising, the market share of green products has remained stable throughout the years. This means that the desire to have sustainable products does not always represent the actual in-store experience, as a large percentage of consumers identifies as being conscious yet still buy non-conscious products (Rokka & Uusitalo, 2008).

Taking into account the conflicting ideas presented, the aim of this research is to identify what determines the intention to use a reusable packaging and how the consumers' environmental attitude impacts this relationship.

## **1.2 Problem Statement**

The main scope of this research is to understand how consumers' intention to use a reusable packaging differs from the traditional packaging. Additionally, it also intends to comprehend how a consumer's pro-environmental attitude impacts their intention to use a packaging technology. The problem statement can be summarized as:

*How does the consumers' pro-environmental attitude and packaging usability perceptions (reusable vs single-use) impact consumer's intention to use reusable packaging?*

This problem statement is explained by the following research questions:

**RQ1:** Overall, how willing are consumers to use reusable packaging?

**RQ2:** What explains intention to use reusable packaging?

## **1.3 Relevance**

The trend of sustainability has been on the consumers' minds for the past few decades. As a response, consumers have become significantly more aware of the impact of their choices (Stolz, Molina, Ramírez, & Mohr, 2013) and started to demand products that meet their changing needs (Scott & Vigar-Ellis, 2014). With the amount of waste generated by the population drastically increasing, one of the main focuses has been the excessive packaging used by most businesses. Therefore, organizations are trying to find solutions to intensify their corporate social responsibility and become more sustainable. Reusable packaging may be one solution for companies to adapt their current products and attract the conscious segment.

Nevertheless, due to the inconvenience that is typically associated with reusable packaging, it is vital to understand how consumers react to this change and investigate whether this would be implemented as a viable option for the majority of consumers. Exploring the adoption of

reusable packaging can help marketers with their efforts of becoming more sustainable and analyzing whether concentrated refills and reusable packaging can revolutionize the way a category is dealt with.

In addition, by identifying the level of pro-environmental attitude it is possible to analyze how this variable will impact the choice of packaging the consumer intends to use. This could provide marketers with more in depth information about a possible consumer profile so that the ideal strategies are applied.

Overall, the main goal of this study is to understand what explains the intention to use a reusable packaging and to provide marketers with the necessary tools to improve the acceptance of these products.

#### **1.4 Research Methods**

In order to gather the necessary data to answer the proposed research questions, both secondary and primary data was collected. The first step was to analyze the existing literature, particularly from relevant academic papers, regarding the most important components of this study (Technology Acceptance Model, sustainability, packaging and pro-environmental attitude). This careful review assisted in defining the problem clearer as well as designing the primary data collection process.

As for the primary data, quantitative research was collected through a questionnaire that tested which type of packaging (reusable or single-use) was more attractive to the consumer. In order to do so, four different groups of respondents were exposed to different versions of a spray surface cleaner. Either a non-branded reusable cleaner, branded reusable cleaner, non-branded single-use cleaner and branded single-use cleaner. This questionnaire also sought information regarding the level of pro-environmental attitude of each respondent.

#### **1.5 Dissertation Outline**

This dissertation has a total of five chapters, starting with this introductory chapter where the problem statement and research questions are presented. The second chapter includes the literature review where the main findings of previous research can be identified. This compilation focuses on the Technology Acceptance Model, the pro-environmental attitude of consumers, research regarding packaging and its environmental impact, as these are the most important variables to consider when studying the intention to use a reusable packaging technology in the market. Methodology is presented in chapter three and will comprise the

detailed techniques used to gather data in order to answer the research questions and how the statistical analysis will be conducted. Chapter four covers the obtained results and tests the validity of the proposed hypothesis. Finally, chapter five concludes the dissertation with the main findings and limitations of the study, as well as suggestions for further research to be conducted.

## **CHAPTER 2: LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK**

The following chapter aims to summarize previous research and literature regarding topics that are relevant for a better understanding of the research purpose of this thesis. The literature review begins with an overview of the Technology Acceptance Model (TAM), followed by an explanation of packaging and its sustainable alternatives. Moreover, the concept of sustainability and consumer's pro-environmental attitude is also presented. Taking into consideration the literature, the hypotheses were defined. Finally, the conceptual framework presented summarizes the relationships between each variable and provides an overview of the study.

### **2.1 Technology Acceptance Model (TAM)**

In a time where technology was quickly becoming part of the daily life, there was the growing need to create a model that forecasted how users would react to a new technology. The Technology Acceptance Model (TAM) was introduced by Fred D. Davis in 1985 with the main goal of refining the understanding of a user acceptance processes and to provide insights regarding the design and implementation of a system (Davis, 1985). This model would allow designers and creators to test how a technology or system would be perceived before proceeding with its implementation. As a starting point for the model, F. D. Davis used the Theory of Reasoned Action (TRA) (Ajzen & Fishbein, 1975) which presented a more psychological and human-centric approach that intended to discover which were the motives behind an individual's behavior. The TRA defends that an individual's conscious behavior is explained by their attitudes, subjective norms and beliefs and behavioral intention. In order to adapt the model, Davis eliminated the subjective norm in predicting a behavior and considered simply the attitude towards the technology. In addition, two main concepts were identified – perceived usefulness (PU) and perceived ease of use (PEOU) – which would be adequate to evaluate the attitude of a user towards a system. The Technology Acceptance Model narrows the previous application to information systems with the adoption and behavior of computer technologies (Rodrigues Pinho & Soares, 2011). The TAM has become such an important resource that it has been cited in the majority of the research regarding the acceptance of technology (Lee, Kozar, & Larsen, 2003).

TAM's framework assumes that the adoption of a new technology will depend primarily on the Perceived Usefulness (PU) and on the Perceived Ease of Use (PEOU). Both factors will influence the Attitude Towards Use (ATU) and therefore, the Intention to Use (ITU). The final variable in the model is the Actual System Use (ASU).

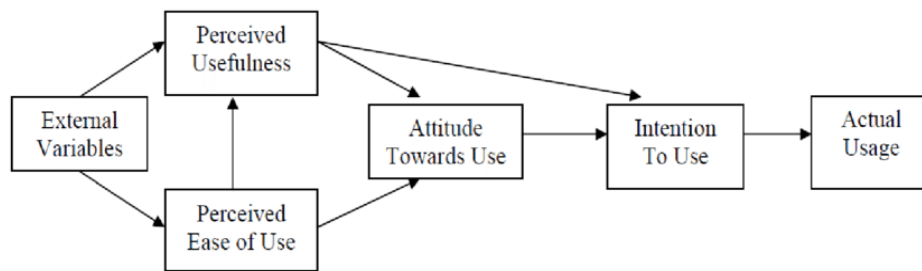


Figure 1: Technology Acceptance Model (Davis, 1985)

### 2.1.1 Perceived Usefulness

Perceived Usefulness has been defined as “the degree to which an individual believes that using a particular system would enhance his or her job performance” (Davis, 1989). Meaning, perceived usefulness will depend on the consumers’ perception of the result of a certain system. If the system was “capable of being used advantageously”(Davis, 1989) than there is a positive perceived usefulness. Perceived usefulness derives from what extent users believe that the system or technology will increase their job performance (Davis, 1989).

Based on research concerning this variable, the following hypothesis was formulated:

*H<sub>1</sub>: Perceived Usefulness and Perceived Ease of Use mediate the relationship between packaging and intention to use.*

*H<sub>1a</sub>: Perceived Ease of Use mediates the relationship between packaging and Intention to Use.*

*H<sub>1b</sub>: Perceived Usefulness mediates the relationship between packaging and Intention to Use.*

In addition, perceived usefulness has been shown to have a stronger effect on intention to use than perceived ease of use. This effect is explained by the fact that no matter how easy a technology is to use, a user will not adopt it if considered useless. This has led to the following hypothesis:

*H<sub>2</sub>: Perceived Usefulness has a stronger effect on Intention to Use than Perceived Ease of Use.*

### **2.1.2 Perceived Ease of Use**

Perceived Ease of Use is defined as “the degree to which an individual believes that using a particular system would be free of physical and mental effort” (Davis, 1989). If a technology is perceived as useful but requires a more complicated use, the positive benefits are overshadowed by the difficulty associated with the use. Ease of use is defined by Davis as “freedom from difficulty or great effort”. Due to the fact that a part of a user’s job is to use the system, perceived ease of use is also described as the perception an individual has on how easy and simple is to use the technology (Venkatesh, 2000).

Additionally, perceived ease of use is described as having a direct effect on perceived usefulness. According to Davis (1993), a system that is easier to use is perceived as being more useful. However, the reverse relationship does not seem to have an effect. Davis states that “making a system easier to use, all else held constant, should make the system more useful. The converse does not hold however” (Davis, 1993).

Due to the mentioned interaction between perceived ease of use and perceived usefulness, the following hypothesis was assembled:

*H<sub>3</sub>: Perceived Ease of Use impacts positively Perceived Usefulness.*

### **2.1.3 Intention to Use**

According to Technology Acceptance Model literature, Intention to Use reflects a user’s desire to use a technology in the future (Teo & Zhou, 2014). It is commonly used as an outcome variable since it is the single best predictor of actual system usage (Davis & Venkatesh, 1996).

### **2.1.4 TAM Limitation and Extensions**

Being one of the most influential and used models in studying the acceptance of technologies, there are many extensions and applications of the model. One of the greatest advantages but also limitations of the model is its adaptability to variations. Some of the most relevant extensions take into consideration behavioral and social variables (Venkatesh, & Davis, 2010) and test online technologies like e-services (Featherman & Pavlou, 2003; Pavlou, 2014).

Although the Technology Acceptance Model has been used in research for the past decades, there are still unexplored areas of potential application that could continue to validate the model (Marangunić & Granić, 2015) in addition to gaps that make it incomplete in certain areas.

The first limitation of the model is the self-reported use. The model fails to measure system in use and focus solely on the variance in the self-reported use (Legris, Ingham, & Collette, 2003) which is not a precise measure. This type of study often leads to biases that may alter the relationship between variables (Agarwal & Karahanna, 2000; Podsakoff, P. M., & Organ, 2015). The second most reported limitation is the fact that the model looks simply at one task at a single point, falling then in the generalization problem in any sort of study ((Lee et al., 2003). Finally, most of the research conducted with the TAM resourced to the use of students. While this is an easy form of achieving the data, it can also deteriorate the generalization of the findings (Lee et al., 2003). Furthermore, other mentioned limitations include the use of single measurement scales, short exposure to the technology before testing and self-selection biases of the subjects (Lee et al., 2003).

## **2.2 Packaging**

Due to the effects of globalization and the internationalization of packaged goods, companies have been forced to analyze where their competitive advantage originates. Packaging has quickly become the differentiating factor and a source of both revenue and concern for businesses (Rundh, 2009). Originally, the main functions of packaging were deeply connected with practicality. Other than containing the product and ensuring its safety, packaging was also thought of as a mechanism to ease distribution and successfully present the product to consumers (Dharmadhikari, 2012; Silayoi & Speece, 2007). This concept, defined as a form of art by some researchers, has specific key words for its function in the existing literature such as protection, preservation, display and description (Dharmadhikari, 2012; Kotler & Keller, 2016).

However, the role of packaging has changed through time and now it can be seen as both protective, communicative and as one of the elements of a brand (Keller, 2013). Research by Vilnai-Yavetz and Koren (Vilnai-Yavetz & Koren, 2013) believes that packaging should be thought of as having four main characteristics. It should be effective, instrumental since it protects its content, aesthetic in order to attract more consumers and symbolic by communicating the brand values properly. In addition to this, Twedt also defines four main aspects of packaging that form the acronym VIEW. This stands for visible, informative, emotional appealing (should show the product's personality) and workable in the sense that it should still preserve its primary function (Twedt, 1968).

Products should be easily found on shelves and convey information that may be of interest to a potential customer (Maja Arslanagic, 2012). Research mentions both imagery elements

(graphics, color, shape, size) and informative elements (information regarding producer, country of origin, brand) (Silayoi & Speece, 2007). Kotler (Kotler & Keller, 2016), divides packaging features in two blocks as well, but focuses on structural elements such as form, size and material and graphic elements which are equivalent to the imagery elements in Silayoi & Speece framework.

Packaging has become an extension of the brand and of the product in the market (Ahmed, Parmar, & Amin, 2015) which is why most organizations now focus on it as a promotion tool.

### **2.2.1 The Relevance of Packaging**

The importance of packaging and its effect in the decision-making process has been subject of research for many years. With competition continuously increasing in the world of packaged consumer goods and the proliferation of brands due to globalization, obtaining differentiation is necessary and often done with packaging (Ampuero & Vila, 2006; Underwood, 2001, 2003). With more than 70% of purchase decisions being made at the shelf, packaging is frequently the last impression on the consumer before this decision is made (Nawaz, Billoo, & Asad, 2012) as well as the first product attribute that a consumer is exposed to (Argo & White, 2012). It takes on a significant part in differentiating the brand among competitors and is one of the reasons for this phenomena is that consumers may not invest a lot of time thinking about brands before going to a physical shop to buy (Silayoi & Speece, 2007).

Packaging has shifted from a protector to a persuader (Agariya, Johari, Sharma, Chandraul, & Singh, 2012) and represents an essential part of any product today since it provides the consumer information regarding its attributes and benefits as well as a guarantee that it will satisfy wants and needs and attract customer attention (Maja Arslanagic, 2012). As proven in previous research (Silayoi & Speece, 2007), the most important attribute for a consumer's likelihood to buy is the packaging technology. The latter conveys a message of convenience and ease of use.

In terms of the communication impact of packaging, research by Behaeghel (1991) and Peters (1994) shows that it might be the most important communication method. This is explained by the fact that it is wide spread and reaches most of the potential buyers, it is the main source to gather the information the consumer might need and it is at the most crucial moment in the decision making process (Ampuero & Vila, 2006). In order to properly take advantage of this, manufacturers should work on understanding the consumer response to their packaging and merge the consumer's perception with the product design (Nancarrow et al., 1998).

In addition, packaging development may also provide several business benefits such as an enhancement of the product experience, new distribution channels and opportunities as well as the already mentioned increased impact at the point of sale (Nawaz et al., 2012). Moreover, packaging becomes a tangible representation of the brand values (Nawaz et al., 2012) and creates a product identity in which its characteristics may display the distinctiveness and originality of the product (Maja Arslanagic, 2012; Silayoi & Speece, 2007). For a number of authors, packaging should be thought of as an extension of the brand (Agariya et al., 2012; Ahmed et al., 2015; Ampuero & Vila, 2006; Keller, 2013) and a focal point due to its great reach when compared with advertising (Agariya et al., 2012).

Research also shows that the effect of packaging is more relevant in low involvement categories where most FMCG tend to fall into. The effect of packaging is stronger in this type of product which may be due to the lack of research in the decision making process (Grossman & Wisenbilit, 1999).

The importance and strategic relevance of packaging is expected to continue a source of criticism from consumers and support the developing formats that take into consideration new options regarding ethical considerations as long as packaging plays such an important role in the decision-making process (Bone & Corey, 2000).

### **2.2.2 The Environmental Impact of Packaging**

The rising concern with the environment has been leading both companies and consumers to change their production and consumption habits. With each inhabitant of the European Union generating on average 170 kilograms of waste in one year (Elgaaied-gambier, 2019; *Eurostat - Packaging Waste Statistics*, n.d.), manufactures have been working on ways of reducing their impact on the world. Whether by a reduction of packaging materials, the creation of returnable packaging or by increasing recycling (Kooijman, 1993), efforts have been increasing to meet consumers' expectations.

In addition, consumers have also become more conscious of the impact of their choices and life styles in the environment (Stolz et al., 2013) and have made efforts to educate themselves and change their purchasing behaviors (Scott & Vigar-Ellis, 2014). This creates demand for more conscious products (Ampuero & Vila, 2006).

Like mentioned before, the need for sustainable living is no longer arguable. According to the Living Planet Report, the population is using 50% more resources than the earth can provide

(WWF, 2018) which has called the interest of governments, institutions and NGO's around the world. Most countries have now introduced legislation that bans the use of certain materials and penalizes companies who do not comply with environmentally-friendly behaviors (Rundh, 2009).

One of the aspects that has received great attention is packaging sustainability (Elisa, Balta-Ozkan, & Reefke, 2017). The increase in research regarding the environmental costs of packaging (Bone & Corey, 2000; John Thogersen, 1999; Roper & Parker, 2006) suggests that this conscious feature should be a relevant attribute for any product (Pirsch, Grau, & Gupta, 2007). Therefore, the introduction of green or sustainable packaging has been one of the alternative ways of convincing the new green niche market (Magnier & Schoormans, 2015). Evidence shows that ethical product characteristics have a indistinct impact on choices made by consumers (Bech-Larsen, 1996). The increase in the number of green products available to the consumer sustains previous research and shows how traditional products are now facing a green competitor (Lin & Chang, 2012).

Besides the benefits for the environment, research shows that a sustainable business also has its own advantages. Enduring in social responsibly practices increases the consumer perception of the brand and eventually leads to higher profits (White, Lin, Dahl, & Ritchie, 2016).

### **2.2.3 Green Packaging**

Sustainable or green packaging is often defined resourcing to the criteria specified by the Sustainable Packaging Alliance (SPA) where packaging should be safe and beneficial to individuals and communities across all phases of its life cycle; is sourced, manufactured, transported, and recycled using renewable energy; takes advantage of the use of recycled materials; manufactured using clean techniques; recovered and utilized in closed loop cycles (Jerzyk, 2016). These green products tend to be biodegradable and carry natural and nontoxic formulas. As for its packaging, green products focus on reusable, recyclable materials whose disposable or incineration does not produce a negative effect for the environment (Lin & Chang, 2012).

### **2.2.4 Reusable Packaging**

One of the most discussed solutions for this problem has been using reusable or refillable packaging (Lofthouse & Bhamra, 2006). Reusable packaging can be defined as having the capacity of being used more than once opposed to one-way or single-use packaging (Mollenkopf, Closs, Twede, Lee, & Burgess, 2005). This reusable solution goes against the

trend of disposable products that has entered the market in the past couple of decades and that is responsible for the high number of single-use packaged goods (Mccollough, 2007).

In the study by Lofthouse and Bhamra, the main reasons that are associated with the consumer using reusable packaging are concerns with reduced waste, convenience to use and easier transportation. However, the factor that is more correlated with lack of interest to use this packaging is the inconvenience associated with reusable packaging. Consumers mention increased storage as one of the most troublesome factors since it requires keeping empty containers as well as the frustration of taking the extra time to clean and refill the package (Lofthouse, 2007). In addition to this, they associate refillable packaging with lack of flexibility since only one type of refill typically fits the dispenser (Lofthouse, Bhamra, & Trimmingham, 2009).

In order to promote the use of reusable packaging, these need to be convenient as well as providing an additional incentive such as cost benefits. In terms of manufacturing, there are several issues that deserve more attention such as durability and chosen material. Research also argues that using reusable packaging actually yields in a higher cost for the producer (Kooijman, 1993). Kooijman believes that one should not take into consideration the environmental effects of single-use packaging without taking into consideration the effects in the production chain (Kooijman, 1993).

Innovative packaging is a source of competitive advantage and companies are rushing to be one of the first movers in green packaging (Dangelico, 2010). These types of products are also particularly interesting to most manufactures since study shows that there is willingness to pay a price premium for sustainability (Chaudhary, 2014).

### **2.2.5 Concentrated Formula to Reduce Packaging Waste**

One of the alternative ways of reducing the amount of packaging in goods is through a change in its core formula however, existing literature on this topic is still rare. Packaged consumer goods are often sold in its ready to use formula which either includes a large percentage of water that could be added later by the consumer or that it could be sold more concentrated by small adjustments the formula (Dharmadhikari, 2012). FMCG companies have been looking into this as a solution for products like laundry detergents and softeners where the traditional bulky package are replaced by small and concentrated formulas that offer the same dosages (Dharmadhikari, 2012; Wever, Schermer, Smit, & Vos, 2015). In addition to this alternative, Lofthouse also approaches the use of concentrated products mixed in the original reusable

packaging. In this case, the consumer buys a concentrated refill pod and dilutes it with water in the already purchased bottle (Lilley, Lofthouse, & Bhamra, 2005). In addition to reducing the amount of packaging, smaller products can be responsible for reduced transportation costs and more shelf space (Dharmadhikari, 2012; Lofthouse et al., 2009).

In a study by Loughborough University, most respondents have enjoyed previous experiences with these concentrated products. However, consumers voiced their concerns regarding availability in the retailer, since it would become necessary to stock both the original packaging as well as the concentrated refills and health and safety concerns due to their higher involvement mixing the products. An important aspect to mention is that refills are perceived as needed to be cost effective and easy to use. The study also reinforces the need of an effective communication for these innovative products in order to teach consumers how to properly take advantage of them (Lilley et al., 2005; Lofthouse et al., 2009).

Creating new environmentally-friendly options, can be an effective way of encouraging the consumer to take a more sustainable approach to their day-to-day choices (East, Samarakoon, Pranamornkith, & Bronlund, 2015).

### **2.3 Sustainability and Pro-Environmental Attitude**

The past decades have been extremely important for consumers to realize their individual impact on the environment and on the future of the next generations (Elgaaied-gambier, 2019; Gershoff & Frels, 2015). Therefore, consumers' concern with purchasing goods that are substantially less harmful to the environment and that take into consideration the nature of the resources has been significantly increasing over time (Gershoff & Frels, 2015).

Even though pioneer research on sustainability dates back to 1948 (Adams, Jeanrenaud, Bessant, Denyer, & Overy, 2016), the concept remains difficult to clarify. It can be defined as an attitude that reflects the extent to which a consumer is worried about threats to the environment, consequences for the harmony of nature and future generations and the lack of human action to protect the environment for future generations (Abdul-Muhmin, 2007). Therefore, sustainable consumer consciousness is explained by behaviors that lead to a decrease in the environmental impact throughout the lifecycle of a good (Joshi & Rahman, 2015; Moisander, 2007; White, Habib, & Hardisty, 2019). However, some definitions refer to the egoistic self rather than to the social definition.

This trend is motivated by a common characteristic among today's consumers: the desire to feel good about their chosen products and companies (Banerjee & Wathieu, 2017; Kitzmueller & Shimshack, 2012). Consequently, research shows that these consumers are willing to pay a price premium for a product that falls in these characteristics (Banerjee & Wathieu, 2017).

Even though it is clear the rise in the number of sustainable consumers, there is little evidence that the market share of green products has increased as well. Research shows that the market share of green products remains in the 1-3% of the entire market (Johns, Kilburn, & Bray, 2011; Joshi & Rahman, 2015). This can be explained by the inconsistency between consumers' attitudes and behaviors (Ferguson, Silva, & Oliveira-brochado, n.d.; Tanner & Kast, 2003). The problem is no longer availability of products and some believe that this effect is caused by the additional effort and research that green products require (Young, 2010). This gap between attitudes and behaviors is defined as the "Green Purchasing Inconsistency" or "Green Attitude-behavior Gap" (Joshi & Rahman, 2015). Even consumers that score high in the level of consciousness still experience this gap as their decision often focuses on several product attributes and not just on the environmental aspect (Rokka & Uusitalo, 2008).

While in the past, decisions were made with the main goal of increasing the benefits for the individual, sustainable choices are characterized by a long-term effect and a selfless attitude by the consumers (White et al., 2019). Furthermore, there are aspects that companies can take into consideration to promote the propagation of sustainable behaviors. White et al. define five main routes that include through social influence, habit formation, the individual self, feelings and cognition and tangibility (White et al., 2019).

One thing is for certain: sustainability is not an ephemeral trend but an important problem that affects everyone (Albino, Balice, Maria, & Iacobone, 2012).

### **2.3.1 Consumers' Pro-Environmental Attitude**

With today's consumers becoming more well-informed, environmental matters escalated to the top of their social concerns (Cleveland, Kalamas, & Laroche, 2002). This has attracted many researchers to attempt and quantify this level of environmental attitude and its potential consequences. A pro-environmental attitude has been explained as attitudes that attempt to reduce the negative impact of one's actions on the environment (Kollmuss & Agyeman, 2002).

However, there is evidence that a pro-environmental attitude will not necessarily result in an environmental behavior (Cleveland et al., 2002; Pickett-Baker & Ozaki, 2008). Like mentioned

before, this attitude-behavior gap has been studied for many decades but there is still compelling evidence (Ajzen & Fishbein, 1974, 1977) that beliefs form attitudes towards behaviors that can be summarized as intention of behaviors (Theory of Planned Behavior). Consequently, pro-environmental attitudes do not guarantee pro-environmental behaviors but it is highly expected that those who have a pro-environmental attitude behave in such way (Mainieri et al., 2010; Pickett-Baker & Ozaki, 2008). Therefore, attitudes are still considered the most reliable explanatory factor in predicting green behaviors (Chen & Chai, 2010).

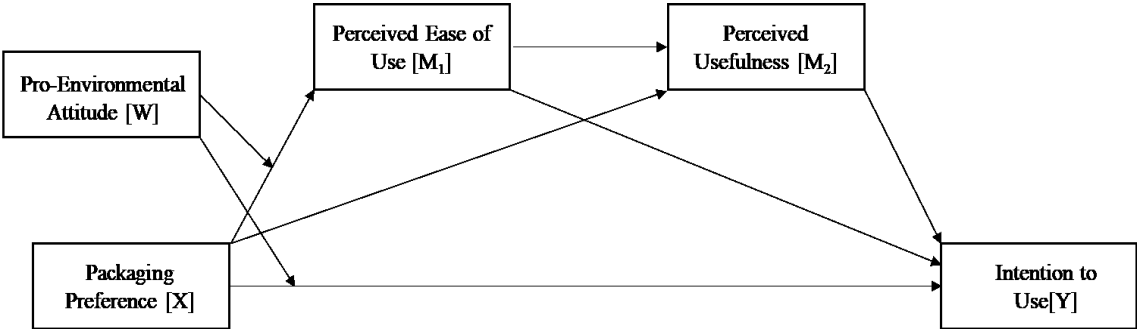
Additionally, research has also found that environmental attitudes may vary throughout cultures. Countries who are more collectivist and less long-term orientated showed more environmental concern than those who are individualistic and long-term orientated (Sarigöllü, 2009).

Although this attitude-behavior gap, pro-environmental attitude has been proven to be a good moderator for sustainable behaviors (Dunlap, Liere, Mertig, & Jones, 2000; Tanner & Kast, 2003). Therefore, the following hypothesis were drawn:

*H<sub>4a</sub>: Pro-Environmental Attitude moderates the relationship between packaging preference and Perceived Ease of Use.*

*H<sub>4b</sub>: Pro-Environmental Attitude moderates the relationship between packaging preference and Intention to Use.*

**2.4 Modified TAM: Reusable Packaging Technology Acceptance Model**



*Figure 2: Modified TAM - Reusable Packing Technology Acceptance Model*

## **CHAPTER 3: METHODOLOGY**

The following chapter presents and explains in detail the methodology used to answer both the research questions and the proposed hypotheses. It starts with an explanation of the research approach followed by information regarding the primary and secondary data collection. Due to the complexity of the primary data, details on data measurement and analysis are also included.

### **3.1 Research Approach**

The objective of this dissertation is to gain insights on the drivers of the intention of consumers to use reusable packaging. This was achieved by conducting a literature review on topics such as sustainability, pro-environmental attitude, packaging and its effects on the environment, which later allowed for the conceptual framework to be developed.

In order to answer the research questions and test the validity of the proposed hypotheses, different research methods were employed. In this dissertation, two methods were favored, namely the exploratory and the explanatory methods. In the initial stage, the exploratory method was used by searching in the existing literature for information that could help determine the appropriate variables and hypothesize its connections. Regarding the explanatory method, the main goal was to test the proposed hypotheses and explain their interactions. Furthermore, this study focuses solely on quantitative data to validate the hypotheses and reach the desired conclusions.

### **3.2 Secondary Data**

To gather information for the literature review, secondary data was collected mainly from online databases which provided academic articles from prestigious journals. The collected data was essential to provide a better understanding of the problem statement and of the variables used in the conceptual framework. Additionally, secondary research was also needed to define which constructs to use in this study.

### **3.3 Primary Data**

The primary data was obtained through an online survey. Resourcing to this research approach may lead to great advantages but also some issues for the overall research. While low in costs, high in speed of response and convenient to analyze, there is little control over the respondent, no opportunity to clarify questions and it may not be representative of the population (Malhotra, Nunan, & Birks, 2017)

To ensure the effectiveness and comprehension of the survey, a pilot test was conducted. This took into consideration 11 responses, which led to adjustments being made, taking the feedback into consideration.

### **3.3.1 Online Survey**

#### **3.3.1.1 Data Collection**

The main goal of this study was to obtain data regarding consumers' willingness to use a reusable packaging technology and the chosen category to investigate this was the home care category. As seen in the literature review, plastic is one of the most polluting materials and companies have been actively trying to reduce its used amount. This category typically uses large packaging and there is little effort being put into reusable options. Most of the options that reduce the packaging amount focus on concentrated formulas, but this is mostly true for other products in the category such as laundry detergents and softeners. Therefore, the product chosen to serve as stimuli was a surface cleaner in a spray bottle. This was inspired by Unilever's recent launch in the UK that uses the packaging technology tested in this study: reusable bottle and concentrated refills. Since this type of technology is only available in the UK (with Unilever's CIF) and in North America (with SC Johnson's brands like Windex), european respondents are typically not used to seeing this type of product in a reusable and refillable form, making results unbiased, which should provide a clear idea of the intention to use.

Data collection took place between the 23<sup>rd</sup> November 2019 and the 29<sup>th</sup> November 2019 through an online questionnaire that was distributed mainly through social media platforms (Facebook, LinkedIn, Instagram). Additionally, to increase respondents' motivation to fill out the survey, a monetary giftcard from a large retailer was raffled.

As for the target population, the focus was on consumers who are regularly involved with home care products. Thus, to guarantee compliance with this premise, the control questions automatically excluded those who had not purchased any type of cleaning products in the last year nor used a surface cleaner in the last trimester. There was only one restriction in terms of nationality which was to exclude people from the UK and North America who could have already been in contact with the product. The questionnaire was available both in english and portuguese.

Overall, data was collected through a non-probability sampling technique, meaning that the sample was not randomly chosen throughout the population. This technique is reasonable due

to time and financial constraints and the difficulty in determining the correct sample. Additionally, a convenience technique (Malhotra et al., 2017) was also used, leading to less variations in the population which may be responsible for limitations in this research.

The survey was closed with a total of 479 responses of which only 402 were considered valid. This is mainly due to unrealistic response time, not complying with the prerequisites and the presence of outliers. The randomly assigned stimuli were evenly distributed, resulting in 101 being exposed to stimulus 1, 101 to stimulus 2, 100 to stimulus 3 and 100 to stimulus 4.

**3.3.1.2 Research Design**

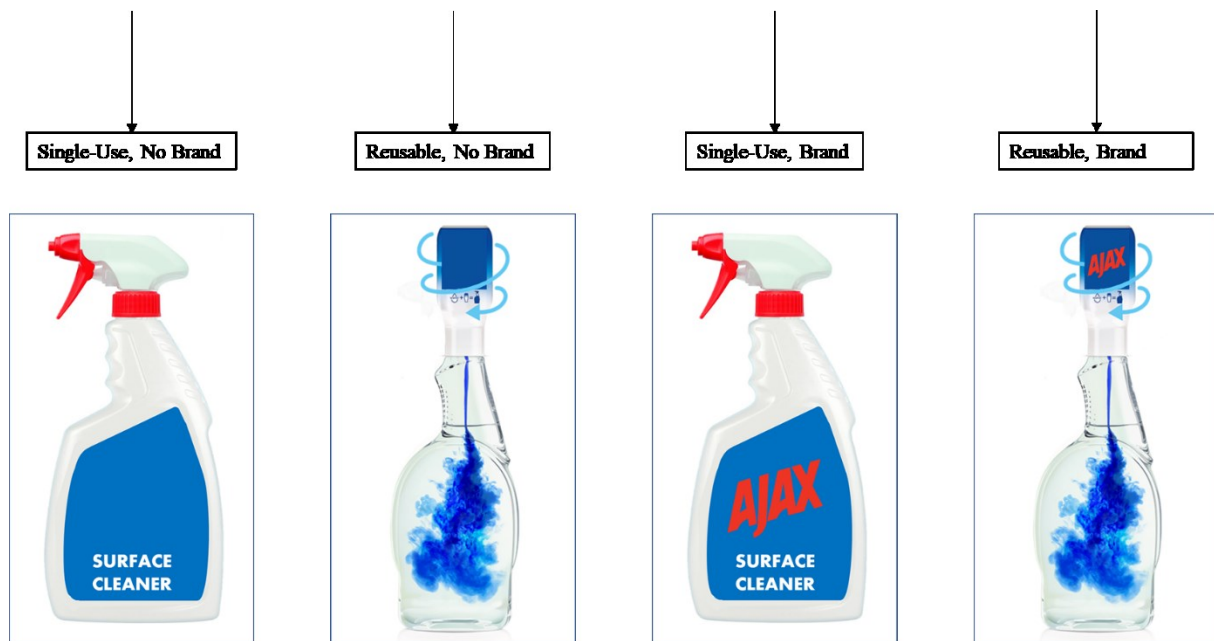
The questionnaire had a cross-sectional design as data was only collected once from the given population. This model had a 2 (reusable, single-use) by 2 (brand, no brand) design.

	<b>REUSABLE</b>	<b>SINGLE-USE</b>
<b>BRANDED</b>		
<b>NON-BRANDED</b>		

*Figure 3: Cross-Sectional Design Matrix*

The survey (Appendix 1) is composed by four sections, starting with the control questions. As mentioned above, the latter focused on refining the sample for this analysis by excluding those who had not purchased or used a cleaning product in the last year and trimester, respectively.

In the second section of the survey, respondents were asked about their pro-environmental attitude and to define how this might impact the intention to use a reusable packaging product. In the third section, they were shown one of four stimuli (Figure 4) and then inquired about its perceived usefulness, perceived ease of use as well as intention to use. To provide further detail and information, each stimulus showed a written description in addition to the visual element. The fourth and final block focused on demographic questions concerning age, gender, nationality, marital status, occupation, education and income.



*Figure 4: Stimuli Shown to Different Groups of Respondents*

### **3.3.2 Measurement / Indicators**

Taking into consideration what was mentioned in the previous section, the beginning of the questionnaire analyzed the fit of the respondent to the study. The following sections – pro-environmental attitude and the chosen stimulus - were randomized to ensure the variables were not compromising the study. All items in the survey were presented in a 7-point Likert scale, ranging from “Strongly Disagree” to “Strongly Agree”.

Since this conceptual framework is a modified and adapted model of the Technology Acceptance Model, two of the variables use constructs developed by F.D. Davis (1989) himself. This is the case of perceived usefulness and perceived ease of use which have six questions each and use a 7-point Likert scale in the original model. As for intention to use, the chosen construct was by T. Teo, M. Zhou (2014) whose starting point was the TAM. In this case, the scale had to be adapted from a 5-point Likert scale to a 7-point Likert scale.

To test the consumers’ pro-environmental attitude, the construct used was the New Environmental Paradigm (Dunlap et al., 2000). This model uses a 7-point Likert scale to determine where a consumer stands in terms of his/her attitudes towards the environment. This model was designed to tap on different aspects of a pro-environmental attitude such as the fragility of nature’s balance and the reality of the limits to growth. The construct is composed by 15 questions that are phrased both negatively and positively, providing more accurate responses.

<b>OPERATIONAL MODEL</b>			
<b>Construct</b>	<b>Scale</b>	<b>Items</b>	<b>Literature</b>
<b>Perceived Usefulness</b>	7-point Likert Scale	6	(Davis, 1989)
<b>Perceived Ease of Use</b>	7-point Likert Scale	6	(Davis, 1989)
<b>Intention to Use</b>	5-point Likert Scale	2	(Teo & Zhou, 2014)
<b>Pro-Environmental Attitude</b>	7-point Likert Scale	15	(Dunlap et al., 2000)

*Table 1: Operational Model*

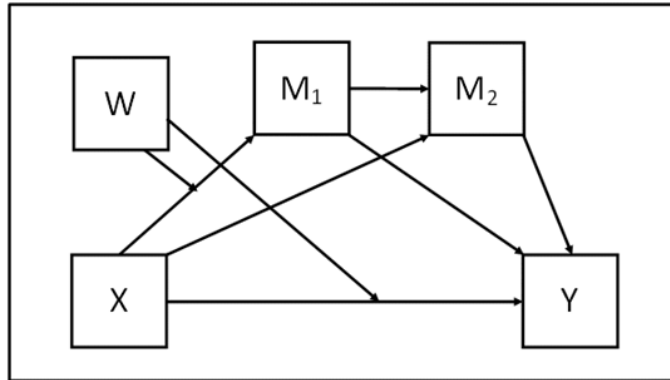
Additionally, besides testing reusable packaging, the stimuli also allows to test the impact of a brand on intention to use. In order to test this, research was conducted to determine which brand is popularly used across Europe and maintains its brand elements (e.g. name, logo) in the majority of the countries. Due to the lack of available data concerning market share, AJAX was the chosen brand due to its name and brand elements' consistency across european countries.

### **3.2.3 Data Analysis**

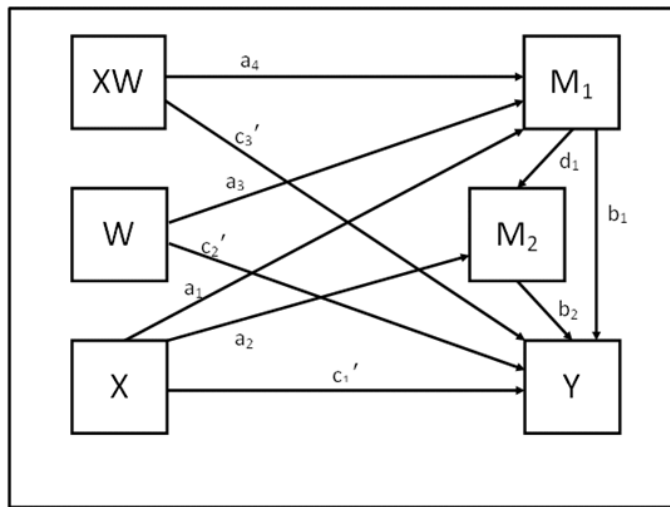
All quantitative data collected was analyzed using IBM's software, SPSS. The main objective of this analysis is to confirm the suggested hypotheses and test the statistical significance of the variables' interactions. Firstly, the degree of reliability of each construct was checked by calculating the Cronbach's Alpha. After generating descriptive statistics and frequencies to get an overview of the sample, the collected data was split into two sections. The first part of the analysis only considers data from stimuli that did not include the brand. During this stage, the Process Macro by Hayes (Hayes, 2013) will be the main tool as all the hypotheses are based on mediations and moderations. The used models vary according to the hypotheses but in the final stage of the analysis, model 86 was used to demonstrate the complete effect of the conceptual framework.

Additionally, the further results section analyzes the brand effect on intention to use in the reusable packaging stimuli. Finally, a k-means cluster analysis was also performed to identify any possible pattern in the level of usage, pro-environmental attitude and demographic features of consumers.

**Model Diagram:**



**Statistical Diagram:**



*Figure 5: Hayes' Process Macro Model 86 (Conditional Process)*

## CHAPTER 4: RESULTS AND DISCUSSION

The following chapter will present the analysis of the quantitative data. It will begin with a characterization of the overall sample and a reliability test, followed by testing each hypothesis and presenting its statistical result.

### 4.1 Sample Characterization

From a total of 479 answers, 77 respondents were excluded from the sample for not complying with the control questions, for having unrealistic response time or for being identified as outliers. The remaining 402 responses are presented in the table below according to their exposed stimulus. The total number of respondents was evenly divided across groups with Qualtrics randomization tool.

Due to the distribution and sampling technique used, it is possible to observe that the large majority of respondents were Portuguese with ages between 18-24. The nationalities included in *other* were all from European countries, mainly Italy and Germany. There is also a larger percentage of valid female answers, resulting in 61% of the sample being women.

		Single-Use, No Brand	Single-Use, Brand	Reusable, No Brand	Reusable, Brand	Total
Respondents	<i>Total</i>	101	100	101	100	<b>402</b>
	<i>Male</i>	45,5%	33,0%	41,6%	35,0%	<b>38,8%</b>
	<i>Female</i>	54,5%	67,0%	58,4%	65,0%	<b>61,2%</b>
<hr/>						
Age	<i>Less than 18</i>	0,0%	0,0%	0,0%	1,1%	<b>0,2%</b>
	<i>18-24</i>	27,5%	26,7%	31,9%	28,9%	<b>35,8%</b>
	<i>25-34</i>	24,2%	16,7%	15,4%	22,2%	<b>17,7%</b>
	<i>35-44</i>	17,6%	10,0%	14,3%	16,7%	<b>13,2%</b>
	<i>45-54</i>	16,5%	35,6%	24,2%	16,7%	<b>20,9%</b>
	<i>55-64</i>	13,2%	11,1%	14,3%	13,3%	<b>11,7%</b>
	<i>65-74</i>	1,1%	0,0%	0,0%	0,0%	<b>0,2%</b>
	<i>Over 75</i>	0,0%	0,0%	0,0%	1,1%	<b>0,2%</b>
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Nationality	<i>Portuguese</i>	85,1%	88,0%	90,1%	94,0%	<b>89,3%</b>
	<i>Other</i>	14,9%	12,0%	9,9%	6,0%	<b>10,7%</b>
<hr/>						

		Single-Use, No Brand	Single-Use, Brand	Reusable, No Brand	Reusable, Brand	Total
Marital Status	<i>Single</i>	57,4%	56,0%	56,4%	60,0%	<b>57,5%</b>
	<i>Married</i>	37,6%	33,0%	37,6%	30,0%	<b>34,6%</b>
	<i>Widowed</i>	2,0%	1,0%	1,0%	1,0%	<b>1,2%</b>
	<i>Divorced</i>	3,0%	10,0%	5,0%	9,0%	<b>6,7%</b>
<hr/>						
Occupation	<i>Student</i>	27,7%	28,0%	27,7%	37,0%	<b>30,1%</b>
	<i>Employed</i>	64,4%	62,0%	65,3%	50,0%	<b>60,4%</b>
	<i>Unemployed</i>	2,0%	3,0%	3,0%	8,0%	<b>4,0%</b>
	<i>Retired</i>	5,0%	0,0%	1,0%	1,0%	<b>1,7%</b>
	<i>Other</i>	1,0%	7,0%	3,0%	4,0%	<b>3,7%</b>
<hr/>						
Education	<i>9th Grade</i>	2,0%	3,0%	3,0%	1,0%	<b>2,2%</b>
	<i>High School</i>	11,9%	12,0%	13,9%	13,0%	<b>12,7%</b>
	<i>Bachelor</i>	49,5%	57,0%	50,5%	43,0%	<b>50,0%</b>
	<i>Master</i>	29,7%	27,0%	29,7%	38,0%	<b>31,1%</b>
	<i>Doctorate</i>	5,0%	0,0%	2,0%	2,0%	<b>2,2%</b>
	<i>Other</i>	2,0%	1,0%	1,0%	3,0%	<b>1,7%</b>
<hr/>						
Income	<i>Low</i>	42,6%	35,0%	32,7%	38,0%	<b>37,1%</b>
	<i>Medium</i>	46,5%	55,0%	59,4%	52,0%	<b>53,2%</b>
	<i>High</i>	10,9%	10,0%	7,9%	10,0%	<b>9,7%</b>

Table 2: Sample Characterization

#### 4.2 Measure Reliability

Furthermore, to check the reliability and consistency of the variables used for this study, a Cronbach's alpha test was conducted. Even though all constructs were extracted from previously tested literature, it is still important to guarantee viability of the data. The test was run for pro-environmental attitude, perceived ease of use, perceived usefulness and intention to use, per stimulus.

Due to the existence of both negative and positive variables in the pro-environmental attitude constructs, the negative variables were recoded to ensure the results are comparable. Out of the 15 items that make up the construct, the eight odd-numbered were framed positively, meaning agreement indicates a pro-environmental attitude and the seven even-numbered were framed negatively, where disagreement indicated a pro-environmental attitude. The seven even-numbered were recoded.

All the constructs had Cronbach's alpha's above 0.8, meaning that they are reliable enough to predict the variables and proceed with the data analysis.

<b>CRONBACH'S ALPHA</b>		
<b>Construct</b>	<b># of Items</b>	<b>Total</b>
<b>Pro-Environmental Attitude</b>	15	0.804
<b>Stimulus 1: Single-Use, No brand</b>		
Perceived Ease of Use	6	0.907
Perceived Usefulness	6	0.933
Intention to Use	2	0.894
<b>Stimulus 2: Single-Use, Brand</b>		
Perceived Ease of Use	6	0.832
Perceived Usefulness	6	0.932
Intention to Use	2	0.858
<b>Stimulus 3: Reusable, No brand</b>		
Perceived Ease of Use	6	0.809
Perceived Usefulness	6	0.936
Intention to Use	2	0.925
<b>Stimulus 4: Reusable, Brand</b>		
Perceived Ease of Use	6	0.853
Perceived Usefulness	6	0.938
Intention to Use	2	0.886

*Table 3: Cronbach's Alpha of Constructs*

### **4.3 Results from the Hypotheses Testing**

In order to get a better understanding of the relationships between the predictor variables and the outcome variable, several statistical tests were performed to test the validity of the hypotheses. Due to the nature of the conceptual framework, the conducted tests were simple and multiple linear regressions. As the hypotheses aim to test the moderation and mediation effects, this analysis uses the Process Macro.

A preliminary analysis was conducted to ensure that none of the regression assumptions was violated and could eventually compromise the validity of the data. Regarding the independence assumption, it is possible to assume that the variables are independent since information was collected only once and was distributed across groups, making it impossible for information about one, to provide data about another. As for multicollinearity, two tests were conducted to rule out this assumption violation.

Starting with the correlation matrix, all independent variables were included, and the Pearson's bivariate correlations were all less than 0.80. As for the Variance Inflation Factor (VIF), all values were below 2 which indicates that multicollinearity is not an issue. Regarding the remaining assumptions, it is possible to see that the residuals are normally distributed and linear. Additionally, error terms are independent from each other.

Before proceeding with the analysis, it is important to mention that the level of significance used is 5% and that packaging preference has been coded as a dummy variable where 0 corresponds to single-use packaging and 1 corresponds to reusable packaging. Only non-branded stimuli were used in the first stage of the analysis as the main goal of this dissertation is to test intention to use a reusable versus a non-reusable packaging.

### **4.3.1 Hypothesis 1**

*H<sub>1a</sub>: Perceived Ease of Use mediates the relationship between packaging preference and Intention to Use*

With the purpose of studying the mediation effect of Perceived Ease of Use on the relationship between the package preference and the intention to use, Process' model 4 was used. The latter accounts for a simple single mediator analysis and the results can be found on Appendix 2.

Overall this model is significant and with an R-Square of 21%. Starting with the effect of the packaging preference on the perceived ease of use (path a) , it is significant and shows a negative effect of -0.2475 ( $p < .05$ ). The bootstrapping confidence interval for the latter does not include zero, implying that the analysis is significant.

Regarding intention to use, the model is also significant, and it is possible to see that perceived ease of use (path b) has a significant ( $p < .001$ ) positive impact of 0.5682 but that packaging preference continues to be significant with  $p < .01$  and a direct effect of -0.3445. Due to this, the model suggests that perceived ease of use is a partial mediator since X is still explaining Y.

In order to prove that there is mediation, especially partial, it is necessary to compare path c and c'. Path c' is the direct effect of packaging type on intention to use while c is the total effect. The indirect effect represents how the dependent variable is influenced by packaging preference through a sequence where packaging preference influences perceived usefulness and how this influences intention to use. Therefore,  $c' = -0.3445$  and  $c = -0.3445 + (-0.1406) = -0.4851$ .

Therefore, despite being only a partial mediation, the proposed hypothesis is validated.

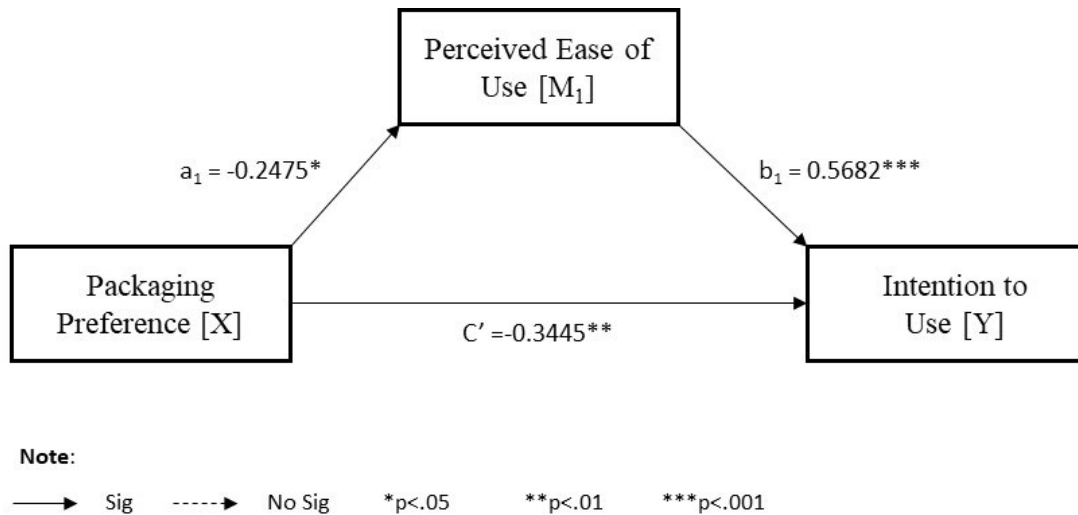


Figure 6: Statistical Model with Coefficients ( $H_{1a}$ )

$H_{1b}$ : Perceived Usefulness mediates the relationship between packaging and intention to use

Once again, in order to determine the mediation effect of perceived usefulness on the relationship between the packaging preference and intention to use, model 4 was used and results can be found on Appendix 3.

Overall, this model is significant and with an R-Square of 22%. Starting with the effect of the packaging preference on the perceived usefulness (path a), it is significant and shows a negative effect of -0.5 with  $p < .01$ . The bootstrapping confidence interval for the latter does not include zero, implying that the analysis is significant.

Regarding intention to use, it is possible to see that perceived usefulness (path b) has a significant ( $p < .001$ ) positive impact of +0.3299 but that packaging preference continues to be significant with  $p < .05$  and an effect of -0.3202. Due to this, the model suggests that perceived usefulness is a partial mediator since X is still explaining Y. In the total effect model, it is possible to see that packaging preference has an effect of -0.4851 in intention to use.

In order to prove that there is mediation, especially partial, it is necessary to compare path c and c'. Path c' is the direct effect of packaging type on intention to use while c is the total effect. The indirect effect represents how the dependent variable is influenced by packaging preference through a sequence where packaging preference influences perceived usefulness and how this influences intention to use. Therefore,  $c' = -0.3202$  and  $c = -0.3202 + (-0.1649) = -0.4851$ .

Therefore, despite being only a partial mediation, the proposed hypothesis is validated.

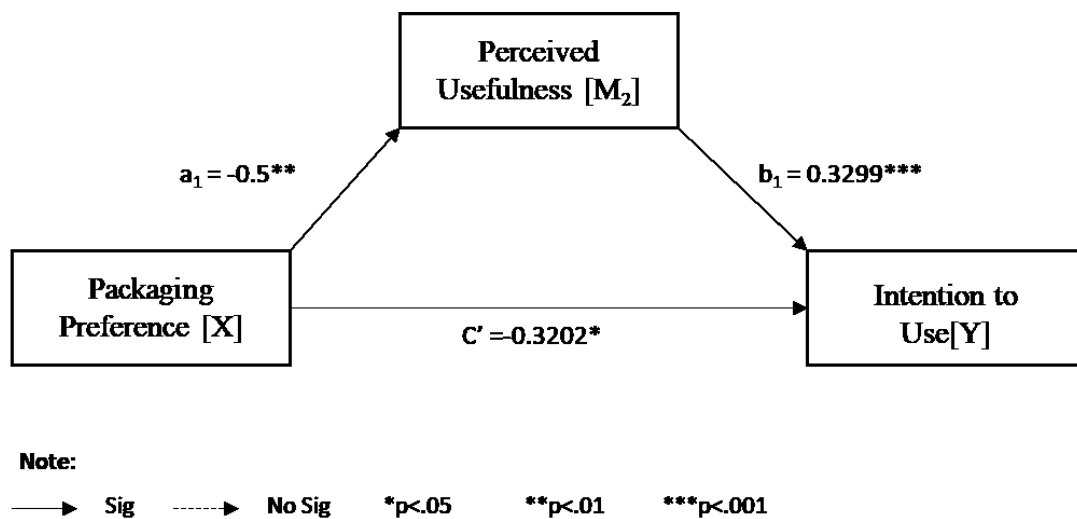


Figure 7: Statistical Model with Coefficients (H<sub>1b</sub>)

### 4.3.2 Hypothesis 2

*H<sub>2</sub>: Perceived Usefulness has a stronger effect on Intention to Use than Perceived Ease of Use.*

With the purpose of testing how the mediators work together, model 6 was run (Appendix 4). In order to test which mediator has the strongest effect, it is necessary to see their interactions working in serial model.

Overall the model is significant and explains 30% of the variance. Starting with the effect of packaging preference on perceived ease of use, it is possible to see that there is a significant ( $p < .05$ ) negative effect of -0.2475. The bootstrapping confidence interval for the latter does not include zero, implying that the analysis is significant. As for the effects on perceived usefulness, packaging preference also plays a significant part ( $p < .05$ ) with a negative effect of -0.3669. Additionally, the model provides more information about the relationship between perceived ease of use and perceived usefulness. This effect is significant and perceived ease of use has a positive effect on perceived usefulness of 0.5379.

Regarding the effects on intention to use, all p-values are significant and packaging preference is the only one that has a negative effect (-0.2492). This suggests that a reusable packaging has lower intention to use than a single-use packaging. Perceived ease of use and perceived usefulness have positive effects of 0.4285 and 0.2598, respectively. Therefore, it is possible to

understand which of the mediators has a stronger effect on the variable, and in this case, perceived ease of use has a stronger effect.

When looking at the direct effect, it is possible to conclude that X (packaging preference) still predicts Y (intention to use) significantly ( $p < .05$ ) and has an effect of  $-0.2492$ . As for the indirect effects, all are significant as none of the bootstrapping confidence intervals includes zero. With the indirect effects, it is possible to understand that the model had two individual mediators that also cause a double mediation. This double mediation is proven by the indirect effect 3 (Packaging preference  $\rightarrow$  PEOU  $\rightarrow$  PU  $\rightarrow$  Intention to use) that has an overall effect of  $-0.0346$ . The effects are stronger with each of the individual mediators though (PEOU has an effect of  $-0.1061$  and PU has an effect of  $-0.0953$ ).

Since the overall effect of X on Y (path c) is lessened by the inclusion of the mediators but there is still a significant relation, one can say that there is partial multiple mediation.

It is possible to conclude that perceived usefulness and perceived ease of use are partial mediators. Additionally, the proposed hypothesis is not validated since perceived ease of use has a stronger effect than perceived usefulness.

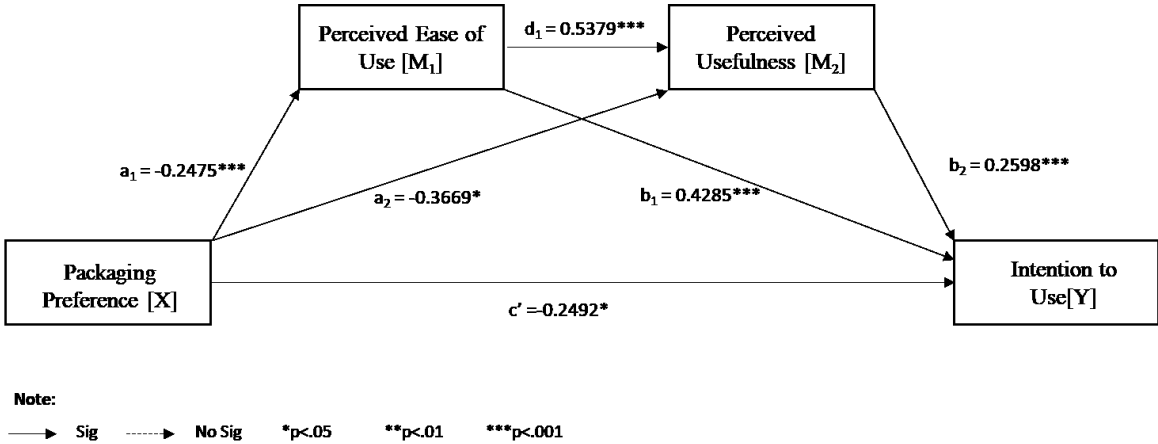


Figure 8: Statistical Model with Coefficients (H<sub>2</sub>)

### 4.3.3 Hypothesis 3

*H<sub>3</sub>: Perceived Ease of Use impacts positively Perceived Usefulness.*

This hypothesis has been validated during the interpretation of model 6. It is possible to conclude that perceived ease of use influences perceived usefulness, which means that not only do the mediators work in series but also in parallel. Perceived ease of use causes a significant ( $p < .001$ ) effect of 0.5379 on perceived usefulness. For every 1 unit increase in perceived ease of use, perceived usefulness will increase by 0.5379.

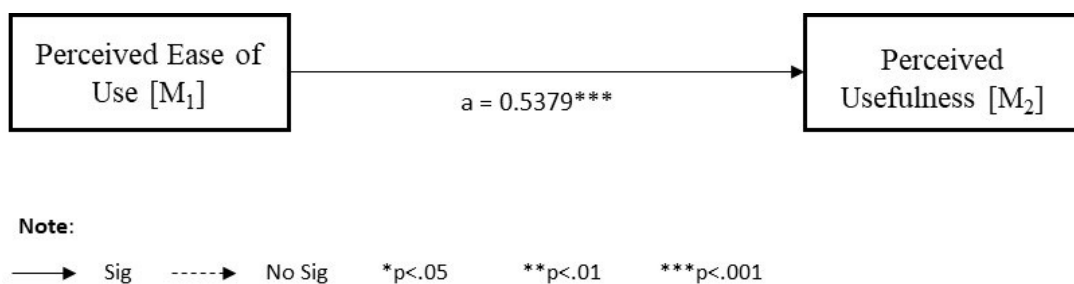


Figure 9: Statistical Model with Coefficients (*H<sub>3</sub>*)

### 4.3.4 Hypothesis 4

*H<sub>4a</sub>: Pro-Environmental Attitude moderates the relationship between packaging preference and Perceived Ease of Use*

In order to study the moderating effect of the pro-environmental variable between packaging preference and intention to use, a Process Macro was conducted. The latter took into consideration model 1 which accounts for a simple single moderation analysis and results can be found on Appendix 5. The main objective of this analysis is to understand how pro-environmental attitude explains how packaging preference affects intention to use on different specifications of the moderator.

Overall, the model is significant ( $p < .001$ ), but only around 11% of the variance is explained by this model. Regarding the effects on perceived ease of use, it is possible to see that packaging preference has a negative effect of -1.17579 with a significant p-value ( $p < .001$ ). This suggests that a reusable packaging will decrease perceived ease of use when compared to a single-use packaging. On the one hand, pro-environmental attitude does not have a significant effect on perceived ease of use ( $p\text{-value} = 0.1867$ ) but the interaction between pro-environmental attitude and the packaging preference is significant ( $p < .05$ ), which suggests a moderation. According

to this, when a pro-environmental attitude interacts with a reusable packaging, there is a positive effect of 0.2819 when compared to a single-use packaging.

In addition, when looking at the conditional effects, it is possible to go further in the analysis and state the level of pro-environmental attitude and its impact on intention to use. The analysis includes the mean value of pro-environmental attitude (5.2667), a low level (this is equivalent to the mean minus one standard deviation = 4.44667) and a high level (mean plus one standard deviation = 5.9333). Only the mean and lower value can be considered, since the high level includes zero in the bootstrapping interval. However, it is possible to see that a lower value of pro-environmental attitude in a reusable packaging will result in a negative effect in perceived ease of use of -0.4989 when compared to a single-use packaging and that the average value of pro-environmental attitude interacting with a reusable packaging will account for a lower negative impact of -0.2734. The high pro-environmental attitude suggests a less negative impact when interacting with reusable packaging of -0.0855 but this analysis is not significant.

The *Johnson-Neyman* test was conducted to provide further detail about the level in which pro-environmental attitude becomes significant. The cut-off point occurs when the  $p$ -value=0.05 which is at a 5.5223 level of pro-environmental attitude. Until this point, the relationship between packaging preference and pro-environmental attitude is significant. As the level of pro-environmental attitude decreases, the relationship becomes stronger and the effect becomes more negative. It is also possible to conclude that 63% of the data is significant and below 0.05 and that 37% is not significant.

The graph below clearly shows how the different levels of pro-environmental attitude will affect intention to use.

Since the interaction is significant, it is possible to state that pro-environmental attitude moderates the relationship between packaging preference and intention to use, thus validating the proposed hypothesis.

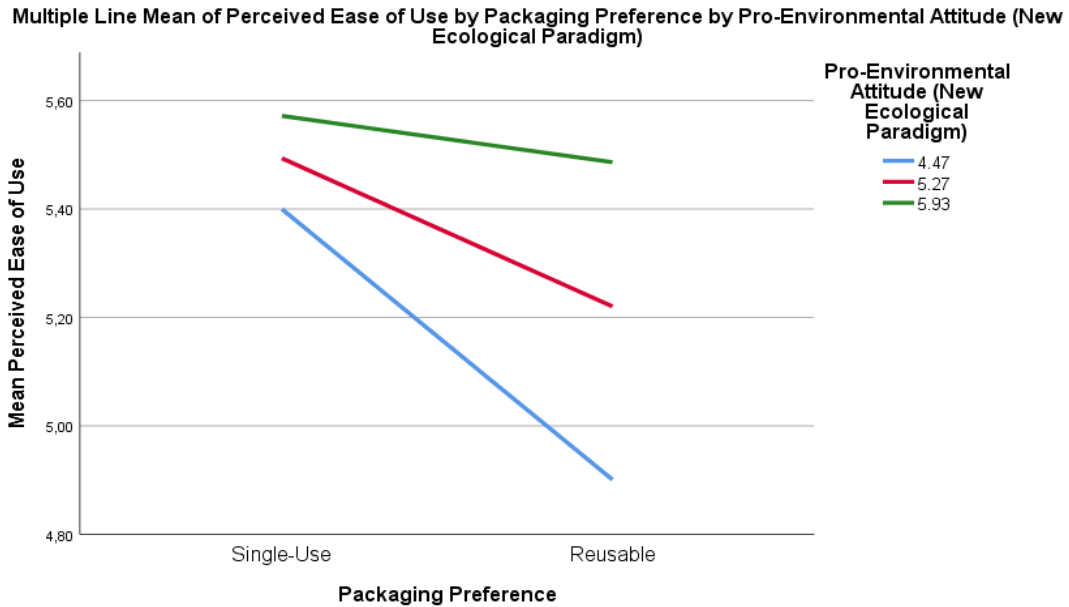


Figure 10: Interaction Effect of PEA \* PP on PEOU

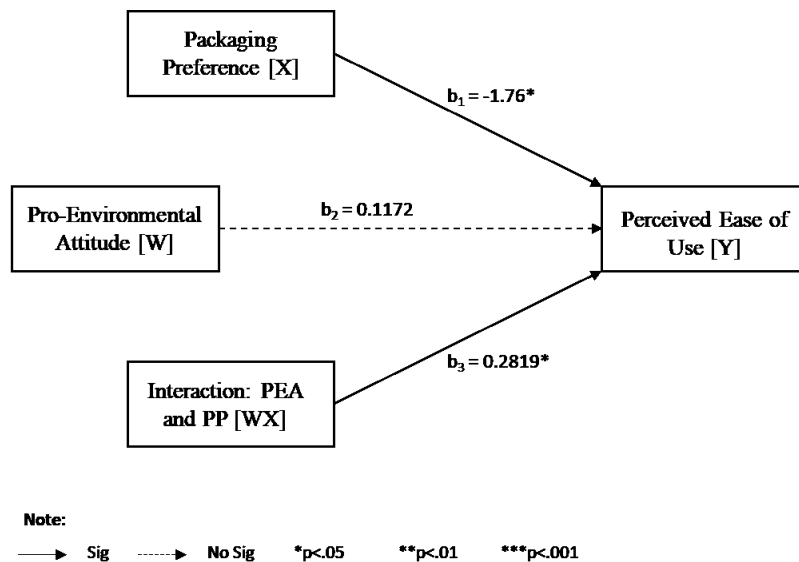


Figure 11: Statistical Model with Coefficients ( $H_{4a}$ )

$H_{4b}$ : Pro-environmental attitude moderates the relationship between packaging preference and Intention to Use

Once again, to study the moderating impact of pro-environmental attitude on packaging preference and intention to use, process' model 1 was used and results can be found on Appendix 6. The main objective of this analysis is to understand the conditions under which packaging preference may influence more strongly or weakly intention to use.

Overall, the model is significant ( $p < .001$ ), but only around 14% of the variance is explained. Starting with the effect of packaging preference, it is possible to see that there is a negative effect of -4.3840 on intention to use when the packaging is reusable when compared to single-use packaging ( $p < .001$ ). Even though pro-environmental attitude has no direct effect on intention to use ( $p\text{-value} = 0.2285$ ), the interaction between the packaging and pro-environmental attitude is significant with a  $p < .001$ . This suggests that when a reusable packaging interacts with pro-environmental attitude, there is a positive effect on intention to use of 0.7418 when compared to single-use packaging. When looking at the conditional effects, it is possible to go further in the analysis and state the level of pro-environmental attitude and its impact on intention to use. The analysis includes the mean value of pro-environmental attitude (5.2667), a low level (this is equivalent to the mean minus one standard deviation – 4.44667) and a high level (mean plus one standard deviation – 5.9333). Only the mean and lower value can be considered as the high includes zero in the bootstrapping interval. This suggests that there is no relationship between a high pro-environmental attitude and the type of packaging.

However, it is possible to see that a lower value of pro-environmental attitude in a reusable packaging will result in a negative effect of -1.0707 when compared to a single-use packaging and that the average value of pro-environmental attitude interacting with a reusable packaging will account for a lower negative impact of -0.4773. The high pro-environmental attitude suggests a positive impact when interacting with reusable packaging of 0.0173 but this analysis is not significant. Additionally, the *Johnson-Neyman* test provides information regarding the level of pro-environmental attitude in which the relationship becomes insignificant. In this case, the cut-off point occurs when  $p\text{-value} = 0.05$  which is at a 5.5245 level of pro-environmental attitude. Until this point, there is a significant relationship between packaging preference and intention to use. As the level of pro-environmental attitude decreases, the relationship becomes stronger and the effect more negative. It is also observable the percentage of the data that is above and below this cut-off. For this analysis, 63% of the data is significant and 37% is not significant.

The graph below clearly shows how the different levels of pro-environmental attitude will affect intention to use in the different types of packaging. Therefore, it is possible to state that pro-environmental attitude moderates the relationship between packaging preference and intention to use, thus validating the proposed hypothesis.

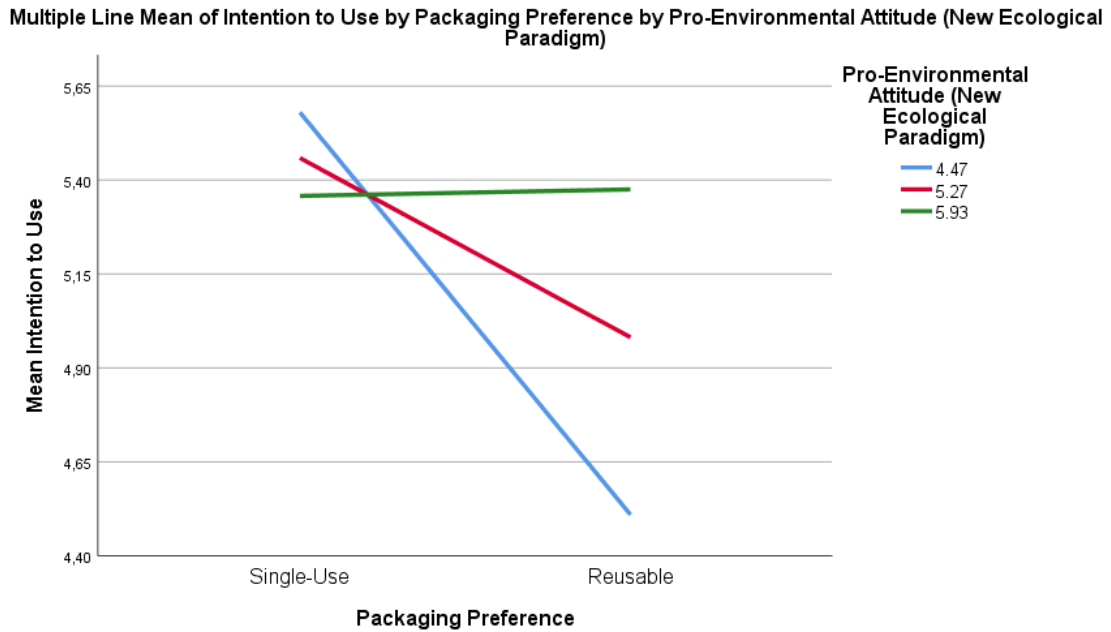


Figure 12: Interaction Effect of PEA \* PP on ITU

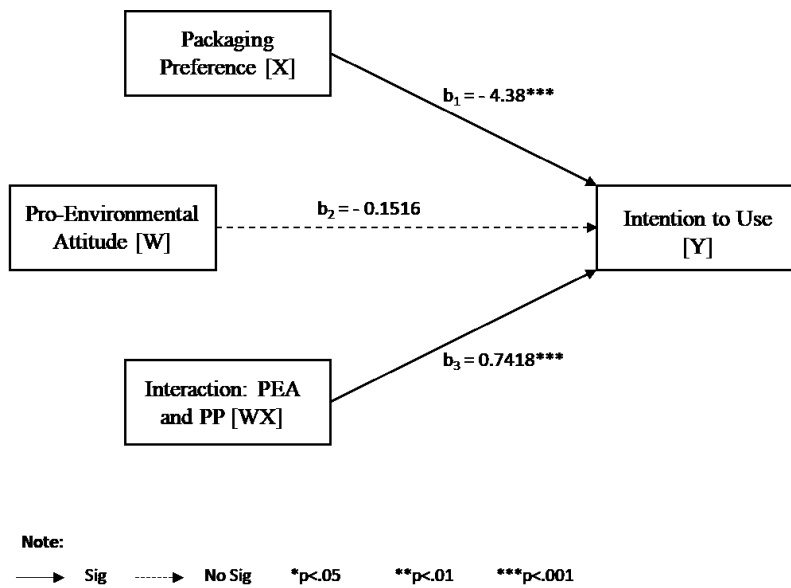


Figure 13: Statistical Model with Coefficients ( $H_{4b}$ )

#### 4.3.5. Conditional Process Modeling – Moderated Mediation (Model 86)

In order to test the model in its whole, a final Process Macro was conducted. The selected model was model 86 since it combined all the models that were previously used in this analysis (Appendix 7).

The first variable outcome is perceived ease of use and the result is similar to what had been tested before for the moderation. Since this variable is only influenced by packaging preference,

by pro-environmental attitude and by their interaction, the added variables do not represent a change for the significance nor the coefficients. This is also valid for the conditional effects of the moderator, cut-off point and for the graphical analysis. Regarding perceived usefulness, the same result is found on the analysis of model 6, which includes the effects of packaging preference and perceived ease of use on perceived usefulness. All the effects and p-values are the same which validates the chosen model.

As for the outcome variable, intention to use, due to the effect of several variables interacting with each other and the possible moderated mediation, the situation changes slightly. The overall model is significant and explains around 35% of the variance which is the highest R-Square so far due to the inclusion of more variables. Calculating the adjusted R-Square, the model decreases slightly, explaining 34% of the variance. Packaging preference influences significantly ( $p < .001$ ) intention to use by -3.6068. This means that a reusable packaging will result in a lower intention to use when compared to a single-use packaging. Perceived ease of use and perceived usefulness are both significant with  $p < .001$ . It is still observable that perceived ease of use has a stronger effect on intention to use (PEOU has an effect of 0.3617 and PU has an effect of 0.2681). Pro-environmental attitude also influences the dependent variable ( $p < .05$ ), with an effect of -0.2321 and there is a significant interaction between packaging preference and pro-environmental attitude. When looking more in depth at this analysis, it suggests that having a low (mean-1 standard deviation) pro-environmental attitude will result in a negative effect of -0.7498 in the intention to use a reusable packaging, when compared to a single-use. The same happens for the mean pro-environmental attitude but the effect is smaller, causing intention to use to go down by 0.2381. Even though the high pro-environmental attitude (mean+1 standard deviation) suggests a positive effect on the intention to use a reusable packaging, this cannot be verified as the p-value is not significant and zero crosses the bootstrapping confidence interval. In this case, the moderator cut-off point occurs at a level of 5.2679 of pro-environmental attitude and 53% of the model is significant (lower than the cut-off point). Below is the visual effect of the moderator on the complete model.

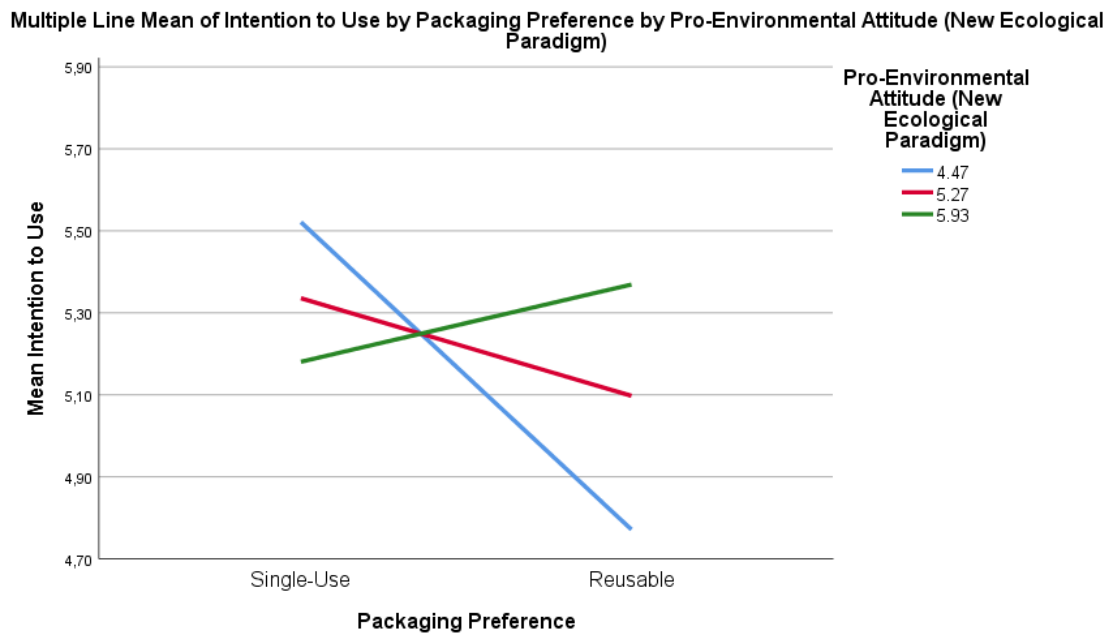


Figure 14: Interaction Effect of PEA \* PP on ITU [Total Model]

Due to the existence of both mediation and moderation, the term used by Hayes to describe this model is conditional process modeling. Additionally, this model will reflect on the conditional direct and indirect effects. Due to the multiple mediator, there is more than one indirect effect of X which are known as specific indirect effects (Hayes & Rockwood, 2019). Since, in this case, the effect of X on  $M_1$  is moderated by W, there no longer is a quantity that can be used to describe X's effect on M. Therefore, X's effect on Y is a function of W.

Starting with the conditional direct effect of X on Y, it is possible to see that the effect of the moderator is significant for low (mean-1 Standard Deviation) and average pro-environmental attitude ( $p < .05$  and bootstrapping interval does not include zero) and it appears that the effect is becoming less negative as pro-environmental attitude increases. The high (mean+1 Standard Deviation) pro-environmental attitude suggests that there is a positive effect of 0.1884 but the value is not significant. Moving to the conditional and unconditional indirect effects of X on Y, the macro presents three sections: one for  $M_1$  (Perceived ease of use), one for  $M_2$  (Perceived usefulness) and a final that includes both mediators working in parallel. Starting with the perceived usefulness, there is a significant effect of -0.0983 but no index of moderated mediation since the moderator does not directly impact this variable. As for perceived ease of use, the indirect effects are the strongest but only the low and average ones can be considered significant. This suggests that when  $X \rightarrow \text{PEOU} \rightarrow Y$ , the effect of the moderator causes an

effect of -0.1804 for a low pro-environmental attitude and -0.0980 for an average pro-environmental attitude, which suggest that intention to use is more negative as pro-environmental attitude decreases. Additionally, there is evidence of moderated mediation in this case as the bootstrapping confidence interval does not include zero. The index quantifies the effect of the moderator on the indirect effect of X on Y through M<sub>1</sub> which is 0.1019. Regarding the final analysis, it is possible to see the effect of the moderator on the parallel mediators (X → PEOU → PU → Y). The effects show the same relation (as pro-environmental attitude increases, the effect is less negative). There is also evidence of moderated mediation, but lower since the index is 0.0406.

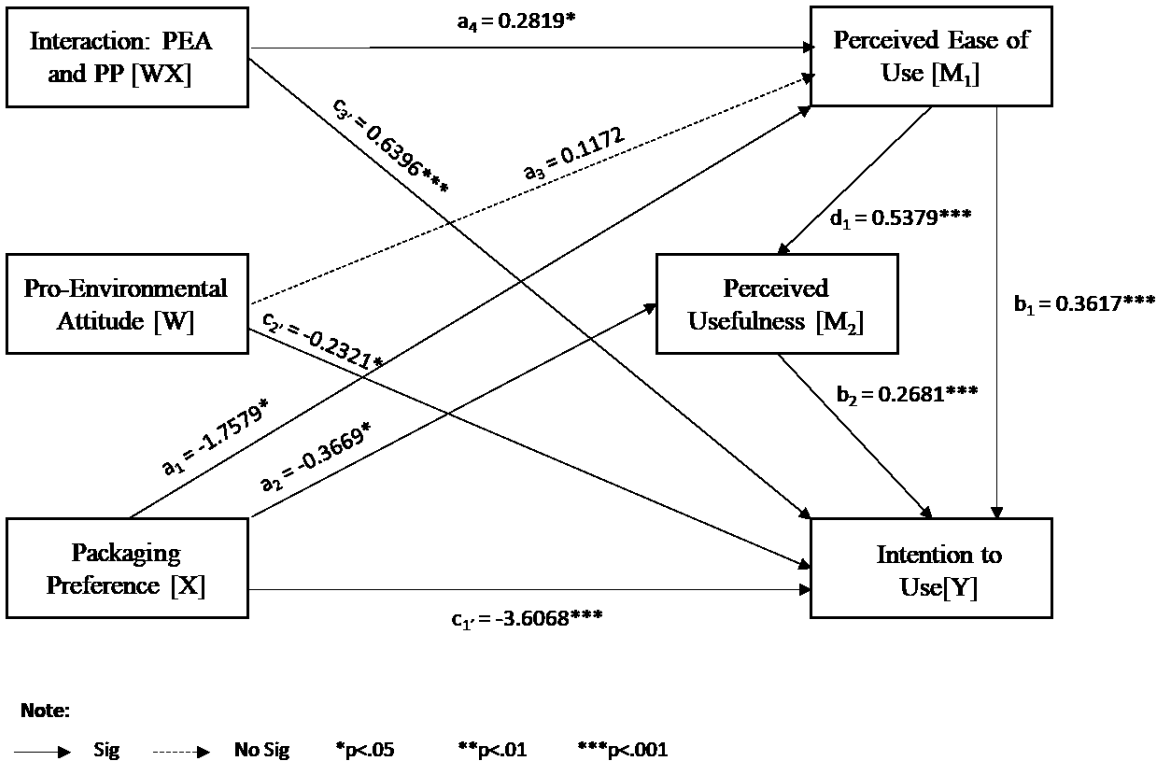


Figure 15: Statistical Model with Coefficients

## 4.4 Further Results

### 4.4.1 Brand Effect

In order to provide further detail for future managerial implications, the brand effect was also tested (Appendix 8). The aim of this analysis was to provide information regarding how the consumers' intention to use would change between the same type of product but with one being branded and the other non-branded. The independent variable was coded as 1 corresponding to *brand* and 0 corresponding to *no brand*.

It is possible to see that the model is significant and explains 25% of the variance (Adjusted  $R^2=24\%$ ). The first variable outcome is perceived ease of use and all the variables have significant p-values. Being a branded product will have an impact of 2.9452 on perceived ease of use when compared to a non-branded product. Pro-environmental attitude will also have a significant ( $p<.001$ ) positive impact of 0.3991 when compared to a non-branded version of the product. Surprisingly, the interaction of a branded product with pro-environmental attitude, causes an overall negative effect of -0.4687. Analysis suggests that as pro-environmental attitude increases, perceived ease of use decreases. The mean pro-environmental attitude leads to a significant (bootstrapping does not include zero) effect of 0.4766 and a low pro-environmental attitude to an effect of 0.8516, also significant. The high pro-environmental attitude suggests an effect of 0.1741 but the analysis is not significant. The *Johnson-Neyman* test shows that the significant region is 76%, which includes all pro-environmental attitude below 5.7773.

Moving to perceived usefulness, it is possible to observe that a branded product will increase perceived usefulness by 0.3460 when compared to a non-branded product, significantly ( $p<.05$ ). Perceived ease of use also impacts perceived usefulness significantly ( $p<.05$ ) by suggesting that an increase in one unit of perceived ease of use, will result in an increase of 0.2771 in perceived usefulness. As for intention to use, brand (condition) still has the strongest positive effect, followed by pro-environmental attitude and perceived ease of use. However, the interaction between a branded product and pro-environmental attitude shows that the negative effect increases as pro-environmental attitude increases. The latter is only significant for the average and high pro-environmental attitude but could show that the positive brand effect is lost when pro-environmental attitude is high. This is significant for 54% of the sample. There is evidence of moderated mediation on both paths (including just perceived ease of use and the full parallel path) with indexes not crossing zero in the bootstrapping interval. Concluding, in a reusable

packaging, the effect of having a brand causes a decrease in intention to use when there is a higher pro-environmental attitude.

#### **4.4.2 Cluster Analysis**

A cluster analysis was conducted to provide recommendations for possible consumer profiles (Appendix 9). The latter included the main demographic variables (age, education and income), surface cleaner usage and the level of pro-environmental attitude. All stimuli were included in this analysis. Gender was not included as the difference between clusters was not significant.

The cluster analysis returned a total of four clusters. In the first, it is possible to see the “Future Generation” cluster. This is formed by young people (25-34), who have a low income (less than €10,000) but have the highest pro-environmental attitude. However, this group rarely uses a surface cleaner. The second cluster, “The Mass”, represents those who have an average pro-environmental attitude, frequently use a surface cleaner, have ages between 45-54 and an average income between €10,001 - €19,999. The third cluster, “The Believers”, represent those who frequently use a surface cleaner, have a high pro-environmental attitude and ages that range from 35-44. This cluster is particularly interesting as they have a very high income but are the smallest group. Finally, “The Haters” who have the lowest pro-environmental attitude, rarely use such products, have ages ranging from 55-64 and medium income values.

## **CHAPTER 5: CONCLUSIONS AND LIMITATIONS**

The following and last chapter will summarize the main findings of the study and draw conclusions based on both the collected data and previous literature. Additionally, this chapter will also identify managerial and academic implications as well as the limitations and recommended further research.

### **5.1 Main Findings & Conclusions**

#### **RQ1: Overall, how willing are consumers to use reusable packaging?**

Overall, the willingness of consumers to use a reusable packaging is still lower than the traditional packaging offered for this type of category. Consumers still see this packaging as more difficult to interact with, resulting in a lower usefulness and therefore, lower intention to use. This is aligned with the literature findings, where consumers believe that reusable packaging is less flexible (Lofthouse et al., 2009) and requires additional incentives to be used.

#### **RQ2: What explains intention to use reusable packaging?**

Throughout this dissertation it has been proven that intention to use is explained both by perceived ease of use and perceived usefulness. Starting with perceived ease of use, it is possible to understand that if the packaging technology is easy to interact with and to learn how to use, consumers are more likely to use it. The same relation is true for perceived usefulness since consumers will be more willing to use a packaging technology if they believe it to be useful for their day-to-day life.

Contrary to what is seen in the original Technology Acceptance Model, where perceived usefulness has a stronger effect than perceived ease of use, in this case, consumers' intention to use is more influenced by how easy the packaging is to deal with than by how useful the consumer believes it to be. In addition, one can also state that a consumer will find the packaging more useful if it is easy to work with in the first place, meaning that perceived ease of use influences perceived usefulness.

Additionally, this study investigated the impact of consumers' pro-environmental attitude on intention to use. Literature has previously shown that this variable can be a good moderator for a relationship as such, which was indeed the case. The model suggests that a higher pro-environmental attitude leads to a higher intention to use a reusable packaging and that a lower pro-environmental attitude leads to a lower intention to use a reusable packaging. The impact of pro-environmental attitude on perceived ease of use was also tested, yielding similar results. The model proposes that a consumer with a low pro-environmental attitude also believes that

the reusable packaging is harder to use than the single-use packaging. However, as the level of pro-environmental attitude rises, this effect is diminished.

To conclude, the intention to use a packaging technology is explained by how easy the consumer can learn how to use the packaging and by how useful it believes the packaging to be. Moreover, a higher pro-environmental attitude will lead to a higher intention to use reusable packaging technology.

## **5.2 Managerial Implications**

Regarding managerial implications, this study may be relevant to any marketers who work in the home-care category and are working with reusable packaging technologies. Even though the intention to use a reusable packaging is lower, the insights gathered are still relevant as most businesses are attempting to reduce their ecological footprint.

Firstly, since the strongest driver of intention to use is perceived ease of use, it is advised that businesses take time to educate the consumer on how to use the packaging and emphasize that the level of effort between the two types of packaging is similar. In addition, the presence of a brand element causes a decrease in intention to use of those with higher levels of pro-environmental attitude. This may be an indicator that pro-environmental consumers perceive a sustainable line extension to be similar to the parent brand and therefore, not up to their sustainable standards (Hill & Lee, 2015).

Moreover, this study provides information on the target segment that businesses should invest in when launching a reusable packaging technology. Since consumers with a high pro-environmental attitude have a higher intention to use, marketers should care for this segment. The results from the cluster analysis indicate that the most interesting target may be “*The Believers*” who regularly use the product, have purchasing power and a high pro-environmental attitude. However, this group still represents a niche. Furthermore, “*The Future Generation*” may become an interesting segment in the upcoming years as this group has the highest pro-environmental attitude, but still no purchasing power.

## **5.3 Academic Implications**

While a lot of research has been conducted on sustainability, there is still little information regarding the potential intention to use reusable packaging, especially in the home care category. This investigation offers information on a particular type of reusable packaging which, so far, has rarely been used as an object of study, filling this research gap.

Furthermore, the Technology Acceptance Model is typically used for software and digital technologies and is yet to be adapted to technologies such as the one studied in this research. This contributes to the proliferation of the model for all types of technologies whether digital or not.

#### **5.4 Limitations and Further Research**

Although this study has been able to provide insights regarding the intention to use a reusable packaging technology, there are several limitations which must be considered. Firstly, due to the nature of this study as part of a master's dissertation, there were time and money constraints.

Secondly, the data collection method was an online survey. Even though this method is the less invasive available option, it is known that respondents may answer according to their ideal intention and not necessarily their actual behaviors. This is increasingly relevant since part of this study analyzes the consumers' pro-environmental attitude, which may lead a respondent to feel obligated to answer according to society standards (Fisher, 1993). The questionnaire was designed to decrease this social desirability bias, but it should still be considered as a limitation of the study.

Regarding the sample, due to the use of the non-probability sampling technique, it is not representative of the population. Moreover, the existence of the randomized scenarios, has made the sample extremely small for each group. It is advised to reconduct the study with a representative and random sample of the population in order to have more reliable results.

The main limitation of the study is focusing only on one product category which limits the extent to which one can argue about the overall intention of using reusable packaging. In addition, the chosen product category is typically a low involvement category (Laurent & Kapferer, 1985) which may lead to a less accurate generalization due to faster and less-thought-out decisions. Further research should be conducted on more product categories and with different involvement levels to confirm whether intention to use is indeed impacted. Furthermore, the brand effect was tested with the brand Ajax simply due to its consistency in brand elements. It would be recommended to use the market leader of the product category to understand if results differ.

One interesting path for further research would be to understand any possible bias that consumers may have when dealing with sustainable products. The pre-defined bias that

sustainable products tend to have a higher price may have influenced the intention to use in the subconscious of the consumer.

Additionally, the Portuguese tend to score extremely high on cultural dimensions that would reduce willingness to try new products. Uncertainty avoidance for example, would lead to a lower intention to test a new product due to a lower tolerance for unpredictable situations (Hofstede, 2011). Further research would be advised by conducting this study in countries whose cultural dimensions have more innovation-friendly scores such as Denmark or Sweden.

Further research should also explore the remaining drivers that explain intention to use since only perceived ease of use and perceived usefulness were taken into consideration. Likewise, this study should also be conducted taking into consideration purchase intention in addition to intention to use.

Finally, further research is recommended to test the effect of educating a consumer on how to use the packaging technology. Since this study shows that the consumers' perceived ease of use decreases with the reusable packaging technology, further research should investigate how intention to use differs between a consumer who has been taught how to use the product versus one who has not.

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## **APPENDICES**

### **Appendix 1: Survey**

#### **Block 1: Introduction**

#### **Block 2: Control Questions**

**Q1:** Have you purchased any cleaning products for your household in the last year?

(1) Yes (2) No

**Q2:** How often have you used a surface cleaner, in the last trimester?

(1) Every day (4) Every month  
(2) Every week (5) Every 2 – 3 months  
(3) Every 2 – 3 months (6) Never

#### **Block 3: Pro-Environmental Attitude**

Please indicate your level of agreement with the following statements [ (1) Strongly Disagree – (7) Strongly Agree]

- We are approaching the limit of the number of people the earth can support.
- Humans have the right to modify the natural environment to suit their needs.
- When humans interfere with nature it often produces disastrous consequences.
- Human ingenuity will insure that we do NOT make the earth unlivable.
- Humans are severely abusing the environment.
- The earth has plenty of natural resources if we just learn how to develop them.
- Plants and animals have as much right as humans to exist.
- The balance of nature is strong enough to cope with the impacts of modern industrial nations.
- Despite our special abilities, humans are still subject to the laws of nature.
- The so-called “ecological crisis” faced by humankind has been greatly exaggerated.
- The earth is like a spaceship with very limited room and resources.
- Humans were meant to rule over the rest of nature.
- The balance of nature is very delicate and easily upset.
- Humans will eventually learn enough about how nature works to be able to control it.
- If things continue on their present course, we will soon experience a major ecological catastrophe.

#### **Block 4: Stimuli (Each respondent will see one and then proceed to answer Block 5 + Block 6 + Block 7 + Block 8)**

##### **Stimuli 1: Single-Use, No Brand [Text below + Visual]**

Imagine that you are in your local supermarket looking for a spray surface cleaner. While browsing the shelves, you come across the product below and take a closer look at it. The

product is a traditional spray surface cleaner in a regularly used packaging that is thrown away once it's finished.

Please answer the questions below with this product in mind.

**Stimuli 2: Single-Use, Brand [Text below + Visual]**

Imagine that you are in your local supermarket looking for a spray surface cleaner. While browsing the shelves, you come across the product below and take a closer look at it. The product is a traditional spray surface cleaner in a regularly used packaging that is thrown away once it's finished.

Please answer the questions below with this product in mind.

**Stimuli 3: Reusable, No Brand [Text below + Visual]**

Imagine that you are in your local supermarket looking for a spray surface cleaner. While browsing the shelves, you come across the product below and take a closer look at it. The product uses a packaging that is reusable, meaning that a consumer can use the same original spray bottle for multiples uses. The refills are small bottles that contain the product concentrated (as seen on the top of the image below). Refills are diluted with water in the original packaging and the product is ready to use.

Please answer the questions below with this product in mind

**Stimuli 4: Reusable, Brand [Text below + Visual]**

Imagine that you are in your local supermarket looking for a spray surface cleaner. While browsing the shelves, you come across the product below and take a closer look at it. The product uses a packaging that is reusable, meaning a consumer can use the same original spray bottle for multiple uses. The refills are small bottles that contain the product concentrated (as seen on the top of the image below). Refills are diluted with water in the original packaging and the product is ready to use.

Please answer the questions below with this product in mind.

**Block 5: Perceived Usefulness**

Please indicate your level of agreement with the following statements [ (1) Strongly Disagree) – (7) Strongly Agree]

- Using this packaging would enable me to accomplish my cleaning tasks more quickly.
- Using this packaging would improve my job performance.
- Using this packaging would increase my productivity.
- Using this packaging would enhance my effectiveness on my cleaning tasks.
- Using this packaging would make it easier to clean.
- I would find this packaging useful in my cleaning tasks.

### **Block 6: Perceived Ease of Use**

Please indicate your level of agreement with the following statements [ (1) Strongly Disagree) – (7) Strongly Agree]

- Learning how to use this packaging would be easy for me.
- I would find it easy to get this packaging to do what I want it to do.
- My interaction with this packaging would be clear and understandable.
- I would find this packaging flexible to interact with.
- It would be easy for me to become skillful at using this packaging.
- I would find this packaging easy to use. (6)

### **Block 7: Intention to Use**

Please indicate your level of agreement with the following statements [ (1) Strongly Disagree) – (7) Strongly Agree]

- I would use this packaging on a regular basis in the future
- I would use this packaging frequently in the future

### **Block 8: Demographics**

**Q1:** What is your gender?

- (1) Male (2) Female

**Q2:** What is your age?

- |                  |           |                 |
|------------------|-----------|-----------------|
| (1) Less than 18 | (4) 35-44 | (7) 65-74       |
| (2) 18-24        | (5) 45-54 | (8) 75 or older |
| (3) 25-34        | (6) 55-64 |                 |

**Q3:** What is your nationality?

- (1) Drop-down list from Qualtrics

**Q4:** What is your marital status?

- |             |              |
|-------------|--------------|
| (1) Single  | (3) Widowed  |
| (2) Married | (4) Divorced |

**Q5:** What is your occupation?

- |                |             |
|----------------|-------------|
| (1) Student    | (4) Retired |
| (2) Employed   | (5) Other   |
| (3) Unemployed |             |

**Q6:** What was the last level of education that you concluded?

- |                           |               |
|---------------------------|---------------|
| (1) 9 <sup>th</sup> grade | (4) Master    |
| (2) High school           | (5) Doctorate |
| (3) Bachelor              | (6) Other     |

**Q7:** Only for statistical purposes, what is your approximate net yearly income, in euros?

- |                       |                          |
|-----------------------|--------------------------|
| (1) Less than €10,000 | (7) €60,000 - €69,999    |
| (2) €10,000 - €19,999 | (8) €70,000 - €79,999    |
| (3) €20,000 - €29,999 | (9) €80,000 - €89,999    |
| (4) €30,000 - €39,999 | (10) €90,000 - €99,999   |
| (5) €40,000 - €49,999 | (11) €100,000 - €149,999 |
| (6) €50,000 - €59,999 | (12) More than €150,000  |

## Appendix 2: Hypothesis 1a

Mediator effect of perceived ease of use between packaging preference and intention to use (Model 4)

Run MATRIX procedure:

```
***** PROCESS Procedure for SPSS Version 3.4 *****
          Written by Andrew F. Hayes, Ph.D.      www.afhayes.com
          Documentation available in Hayes (2018). www.guilford.com/p/hayes3
*****
Model    : 4
  Y      : ITU_Mean
  X      : Conditio
  M      : PEOU_Mea

Sample
Size:   202

*****
OUTCOME VARIABLE:
  PEOU_Mea

Model Summary
      R      R-sq      MSE      F      df1      df2      p
,1779    ,0316    ,4736    6,5334    1,0000    200,0000    ,0113

Model
      coeff      se      t      p      LLCI      ULCI
constant    5,4769    ,0685    79,9833    ,0000    5,3419    5,6119
Conditio    -,2475    ,0968    -2,5560    ,0113    -,4385    -,0566

Standardized coefficients
      coeff
Conditio    -,3548

*****
OUTCOME VARIABLE:
  ITU_Mean

Model Summary
      R      R-sq      MSE      F      df1      df2      p
```

,4567 ,2086 ,8097 26,2240 2,0000 199,0000 ,0000

Model

	coeff	se	t	p	LLCI	ULCI
constant	2,3682	,5142	4,6052	,0000	1,3541	3,3822
Conditio	-,3445	,1287	-2,6773	,0080	-,5982	-,0908
PEOU_Mea	,5682	,0925	6,1456	,0000	,3859	,7505

Standardized coefficients

	coeff
Conditio	-,3423
PEOU_Mea	,3938

\*\*\*\*\* TOTAL EFFECT MODEL \*\*\*\*\*

OUTCOME VARIABLE:

ITU\_Mean

Model Summary

	R	R-sq	MSE	F	df1	df2	p
	,2416	,0584	,9585	12,4003	1,0000	200,0000	,0005

Model

	coeff	se	t	p	LLCI	ULCI
constant	5,4802	,0974	56,2538	,0000	5,2881	5,6723
Conditio	-,4851	,1378	-3,5214	,0005	-,7568	-,2135

Standardized coefficients

	coeff
Conditio	-,4820

\*\*\*\*\* TOTAL, DIRECT, AND INDIRECT EFFECTS OF X ON Y \*\*\*\*\*

Total effect of X on Y

Effect	se	t	p	LLCI	ULCI	c_ps
-,4851	,1378	-3,5214	,0005	-,7568	-,2135	-,4820

Direct effect of X on Y

Effect	se	t	p	LLCI	ULCI	c'_ps
-,3445	,1287	-2,6773	,0080	-,5982	-,0908	-,3423

Indirect effect(s) of X on Y:

	Effect	BootSE	BootLLCI	BootULCI
PEOU_Mea	-,1406	,0671	-,2862	-,0250

Partially standardized indirect effect(s) of X on Y:

	Effect	BootSE	BootLLCI	BootULCI
PEOU_Mea	-,1397	,0650	-,2798	-,0257

\*\*\*\*\* ANALYSIS NOTES AND ERRORS \*\*\*\*\*

Level of confidence for all confidence intervals in output:

95,0000

Number of bootstrap samples for percentile bootstrap confidence intervals:

5000

NOTE: Standardized coefficients for dichotomous or multicategorical X are in partially standardized form.

NOTE: Variables names longer than eight characters can produce incorrect output. Shorter variable names are recommended.

----- END MATRIX -----

### Appendix 3: Hypothesis 1b

#### Mediator effect of perceived usefulness between packaging preference and intention to use (Model 4)

Run MATRIX procedure:

```
***** PROCESS Procedure for SPSS Version 3.4 *****
      Written by Andrew F. Hayes, Ph.D.      www.afhayes.com
      Documentation available in Hayes (2018). www.guilford.com/p/hayes3
*****
Model   : 4
  Y     : ITU_Mean
  X     : Conditio
  M     : PU_Mean

Sample
Size: 202

*****
OUTCOME VARIABLE:
  PU_Mean

Model Summary
      R      R-sq      MSE      F      df1      df2      p
      ,1974      ,0390      1,5570      8,1085      1,0000      200,0000      ,0049

Model
      coeff      se      t      p      LLCI      ULCI
constant      4,8878      ,1242      39,3666      ,0000      4,6430      5,1326
Conditio      -,5000      ,1756      -2,8475      ,0049      -,8462      -,1538

Standardized coefficients
      coeff
Conditio      -,3938

*****
OUTCOME VARIABLE:
  ITU_Mean

Model Summary
      R      R-sq      MSE      F      df1      df2      p
      ,4741      ,2248      ,7931      28,8552      2,0000      199,0000      ,0000

Model
      coeff      se      t      p      LLCI      ULCI
constant      3,8679      ,2621      14,7572      ,0000      3,3510      4,3848
Conditio      -,3202      ,1278      -2,5050      ,0130      -,5723      -,0681
PU_Mean      ,3299      ,0505      6,5363      ,0000      ,2303      ,4294

Standardized coefficients
      coeff
Conditio      -,3182
PU_Mean      ,4161

***** TOTAL EFFECT MODEL *****
OUTCOME VARIABLE:
  ITU_Mean

Model Summary
      R      R-sq      MSE      F      df1      df2      p
      ,2416      ,0584      ,9585      12,4003      1,0000      200,0000      ,0005

Model
      coeff      se      t      p      LLCI      ULCI
constant      5,4802      ,0974      56,2538      ,0000      5,2881      5,6723
```

```

Conditio      -,4851      ,1378      -3,5214      ,0005      -,7568      -,2135

Standardized coefficients
  coeff
Conditio      -,4820

***** TOTAL, DIRECT, AND INDIRECT EFFECTS OF X ON Y *****

Total effect of X on Y
  Effect      se      t      p      LLCI      ULCI      c_ps
  -,4851      ,1378      -3,5214      ,0005      -,7568      -,2135      -,4820

Direct effect of X on Y
  Effect      se      t      p      LLCI      ULCI      c'_ps
  -,3202      ,1278      -2,5050      ,0130      -,5723      -,0681      -,3182

Indirect effect(s) of X on Y:
  Effect      BootSE      BootLLCI      BootULCI
PU_Mean      -,1649      ,0639      -,2985      -,0479

Partially standardized indirect effect(s) of X on Y:
  Effect      BootSE      BootLLCI      BootULCI
PU_Mean      -,1639      ,0613      -,2889      -,0484

***** ANALYSIS NOTES AND ERRORS *****

Level of confidence for all confidence intervals in output:
  95,0000

Number of bootstrap samples for percentile bootstrap confidence intervals:
  5000

NOTE: Standardized coefficients for dichotomous or multicategorical X are in
      partially standardized form.

NOTE: Variables names longer than eight characters can produce incorrect output.
      Shorter variable names are recommended.

----- END MATRIX -----

```

## Appendix 4: Hypotheses 2 and 3

Mediator effect of perceived usefulness and perceived ease of use between the packaging preference and intention to use (Model 6)

Run MATRIX procedure:

```

***** PROCESS Procedure for SPSS Version 3.4 *****

      Written by Andrew F. Hayes, Ph.D.      www.afhayes.com
      Documentation available in Hayes (2018). www.guilford.com/p/hayes3

*****

Model   : 6
  Y     : ITU_Mean
  X     : Conditio
  M1    : PEOU_Mea
  M2    : PU_Mean

Sample
Size: 202

*****
OUTCOME VARIABLE:
  PEOU_Mea

```

Model Summary

	R	R-sq	MSE	F	df1	df2	p
	,1779	,0316	,4736	6,5334	1,0000	200,0000	,0113

Model

	coeff	se	t	p	LLCI	ULCI
constant	5,4769	,0685	79,9833	,0000	5,3419	5,6119
Conditio	-,2475	,0968	-2,5560	,0113	-,4385	-,0566

Standardized coefficients

	coeff
Conditio	-,3548

\*\*\*\*\*

OUTCOME VARIABLE:

PU\_Mean

Model Summary

	R	R-sq	MSE	F	df1	df2	p
	,3515	,1235	1,4271	14,0252	2,0000	199,0000	,0000

Model

	coeff	se	t	p	LLCI	ULCI
constant	1,9417	,6827	2,8441	,0049	,5954	3,2880
Conditio	-,3669	,1708	-2,1475	,0330	-,7037	-,0300
PEOU_Mea	,5379	,1227	4,3822	,0000	,2959	,7800

Standardized coefficients

	coeff
Conditio	-,2889
PEOU_Mea	,2955

\*\*\*\*\*

OUTCOME VARIABLE:

ITU\_Mean

Model Summary

	R	R-sq	MSE	F	df1	df2	p
	,5502	,3027	,7170	28,6513	3,0000	198,0000	,0000

Model

	coeff	se	t	p	LLCI	ULCI
constant	1,8638	,4936	3,7755	,0002	,8903	2,8373
Conditio	-,2492	,1225	-2,0347	,0432	-,4907	-,0077
PEOU_Mea	,4285	,0911	4,7031	,0000	,2488	,6081
PU_Mean	,2598	,0502	5,1697	,0000	,1607	,3588

Standardized coefficients

	coeff
Conditio	-,2476
PEOU_Mea	,2970
PU_Mean	,3277

\*\*\*\*\* TOTAL EFFECT MODEL \*\*\*\*\*

OUTCOME VARIABLE:

ITU\_Mean

Model Summary

	R	R-sq	MSE	F	df1	df2	p
	,2416	,0584	,9585	12,4003	1,0000	200,0000	,0005

Model

	coeff	se	t	p	LLCI	ULCI
constant	5,4802	,0974	56,2538	,0000	5,2881	5,6723
Conditio	-,4851	,1378	-3,5214	,0005	-,7568	-,2135

Standardized coefficients

	coeff
--	-------

Conditio - ,4820

\*\*\*\*\* TOTAL, DIRECT, AND INDIRECT EFFECTS OF X ON Y \*\*\*\*\*

Total effect of X on Y

Effect	se	t	p	LLCI	ULCI	c_ps
-,4851	,1378	-3,5214	,0005	-,7568	-,2135	-,4820

Direct effect of X on Y

Effect	se	t	p	LLCI	ULCI	c'_ps
-,2492	,1225	-2,0347	,0432	-,4907	-,0077	-,2476

Indirect effect(s) of X on Y:

	Effect	BootSE	BootLLCI	BootULCI
TOTAL	-,2359	,0854	-,4242	-,0861
Ind1	-,1061	,0556	-,2358	-,0173
Ind2	-,0953	,0508	-,2078	-,0042
Ind3	-,0346	,0183	-,0775	-,0060

Partially standardized indirect effect(s) of X on Y:

	Effect	BootSE	BootLLCI	BootULCI
TOTAL	-,2344	,0816	-,4095	-,0877
Ind1	-,1054	,0546	-,2304	-,0174
Ind2	-,0947	,0497	-,2020	-,0041
Ind3	-,0344	,0172	-,0736	-,0064

Indirect effect key:

Ind1 Conditio -> PEOU\_Mea -> ITU\_Mean  
Ind2 Conditio -> PU\_Mean -> ITU\_Mean  
Ind3 Conditio -> PEOU\_Mea -> PU\_Mean -> ITU\_Mean

\*\*\*\*\* ANALYSIS NOTES AND ERRORS \*\*\*\*\*

Level of confidence for all confidence intervals in output:  
95,0000

Number of bootstrap samples for percentile bootstrap confidence intervals:  
5000

NOTE: Standardized coefficients for dichotomous or multicategorical X are in partially standardized form.

NOTE: Variables names longer than eight characters can produce incorrect output. Shorter variable names are recommended.

----- END MATRIX -----

## Appendix 5: Hypothesis 4a

### Moderator Effect of Pro-Environmental Attitude on Packaging Preference and Perceived Ease of Use (Model 1)

Run MATRIX procedure:

\*\*\*\*\* PROCESS Procedure for SPSS Version 3.4 \*\*\*\*\*

Written by Andrew F. Hayes, Ph.D. [www.afhayes.com](http://www.afhayes.com)  
Documentation available in Hayes (2018). [www.guilford.com/p/hayes3](http://www.guilford.com/p/hayes3)

\*\*\*\*\*

Model : 1  
Y : PEOU\_Mea  
X : Conditio  
W : PEA\_Mean

Sample  
Size: 202

\*\*\*\*\*

OUTCOME VARIABLE:

PEOU\_Mea

Model Summary

	R	R-sq	MSE	F	df1	df2	p
	,3374	,1138	,4378	8,4779	3,0000	198,0000	,0000

Model

	coeff	se	t	p	LLCI	ULCI
constant	4,8763	,4580	10,6457	,0000	3,9730	5,7795
Conditio	-1,7579	,6946	-2,5309	,0122	-3,1276	-,3882
PEA_Mean	,1172	,0885	1,3250	,1867	-,0572	,2916
Int_1	,2819	,1320	2,1361	,0339	,0217	,5421

Product terms key:

Int\_1 : Conditio x PEA\_Mean

Test(s) of highest order unconditional interaction(s):

	R2-chng	F	df1	df2	p
X*W	,0204	4,5630	1,0000	198,0000	,0339

-----

Focal predict: Conditio (X)

Mod var: PEA\_Mean (W)

Conditional effects of the focal predictor at values of the moderator(s):

PEA_Mean	Effect	se	t	p	LLCI	ULCI
4,4667	-,4989	,1362	-3,6626	,0003	-,7675	-,2303
5,2667	-,2734	,0940	-2,9091	,0040	-,4587	-,0881
5,9333	-,0855	,1332	-,6414	,5220	-,3482	,1773

Moderator value(s) defining Johnson-Neyman significance region(s):

Value	% below	% above
5,5223	62,8713	37,1287

Conditional effect of focal predictor at values of the moderator:

PEA_Mean	Effect	se	t	p	LLCI	ULCI
3,0000	-,9123	,3070	-2,9714	,0033	-1,5177	-,3068
3,1833	-,8606	,2841	-3,0295	,0028	-1,4208	-,3004
3,3667	-,8089	,2614	-3,0950	,0023	-1,3243	-,2935
3,5500	-,7572	,2389	-3,1692	,0018	-1,2284	-,2861
3,7333	-,7056	,2169	-3,2531	,0013	-1,1333	-,2779
3,9167	-,6539	,1954	-3,3472	,0010	-1,0391	-,2687
4,1000	-,6022	,1745	-3,4508	,0007	-,9464	-,2581
4,2833	-,5505	,1547	-3,5597	,0005	-,8555	-,2456
4,4667	-,4989	,1362	-3,6626	,0003	-,7675	-,2303
4,6500	-,4472	,1198	-3,7323	,0002	-,6835	-,2109
4,8333	-,3955	,1064	-3,7157	,0003	-,6054	-,1856
5,0167	-,3438	,0973	-3,5324	,0005	-,5358	-,1519
5,2000	-,2922	,0938	-3,1163	,0021	-,4771	-,1073
5,3833	-,2405	,0963	-2,4971	,0133	-,4304	-,0506
5,5223	-,2013	,1021	-1,9720	,0500	-,4027	,0000
5,5667	-,1888	,1046	-1,8059	,0724	-,3950	,0174
5,7500	-,1371	,1173	-1,1692	,2437	-,3684	,0942
5,9333	-,0855	,1332	-,6414	,5220	-,3482	,1773
6,1167	-,0338	,1514	-,2232	,8236	-,3324	,2648
6,3000	,0179	,1711	,1046	,9168	-,3194	,3552
6,4833	,0696	,1917	,3628	,7172	-,3086	,4477
6,6667	,1212	,2132	,5687	,5702	-,2992	,5416

Data for visualizing the conditional effect of the focal predictor:

Paste text below into a SPSS syntax window and execute to produce plot.

```

DATA LIST FREE/
  Conditio  PEA_Mean  PEOU_Mea  .
BEGIN DATA.
  ,0000      4,4667    5,3998
  1,0000    4,4667    4,9009
  ,0000      5,2667    5,4935
  1,0000    5,2667    5,2202
  ,0000      5,9333    5,5717
  1,0000    5,9333    5,4862
END DATA.
GRAPH/SCATTERPLOT=
  PEA_Mean WITH      PEOU_Mea BY      Conditio .

***** ANALYSIS NOTES AND ERRORS *****

Level of confidence for all confidence intervals in output:
  95,0000

W values in conditional tables are the 16th, 50th, and 84th percentiles.

NOTE: Variables names longer than eight characters can produce incorrect output.
      Shorter variable names are recommended.

----- END MATRIX -----

```

## Appendix 6: Hypothesis 4b

### Moderator Effect of Pro-Environmental Attitude on Packaging Preference and Intention to Use

Run MATRIX procedure:

```

***** PROCESS Procedure for SPSS Version 3.4 *****

      Written by Andrew F. Hayes, Ph.D.      www.afhayes.com
      Documentation available in Hayes (2018). www.guilford.com/p/hayes3

*****

Model   : 1
  Y     : ITU_Mean
  X     : Conditio
  W     : PEA_Mean

Sample
Size: 202

*****

OUTCOME VARIABLE:
  ITU_Mean

Model Summary

      R      R-sq      MSE      F      df1      df2      p
,3779    ,1428    ,8814    10,9953    3,0000    198,0000    ,0000

Model

      coeff      se      t      p      LLCI      ULCI
constant    6,2572    ,6500    9,6271    ,0000    4,9755    7,5390
Conditio   -4,3840    ,9856   -4,4481    ,0000   -6,3276   -2,4404
PEA_Mean   -1,1516    ,1255   -1,2081    ,2285   -1,3991    ,0959
Int_1      ,7418    ,1872    3,9617    ,0001    ,3725    1,1110

Product terms key:
  Int_1      :      Conditio x      PEA_Mean

Test(s) of highest order unconditional interaction(s):
      R2-chng      F      df1      df2      p

```

X\*W ,0679 15,6952 1,0000 198,0000 ,0001

Focal predict: Conditio (X)  
Mod var: PEA\_Mean (W)

Conditional effects of the focal predictor at values of the moderator(s):

PEA_Mean	Effect	se	t	p	LLCI	ULCI
4,4667	-1,0707	,1933	-5,5397	,0000	-1,4518	-,6895
5,2667	-,4773	,1333	-3,5791	,0004	-,7402	-,2143
5,9333	,0173	,1891	,0913	,9274	-,3556	,3901

Moderator value(s) defining Johnson-Neyman significance region(s):

Value	% below	% above
5,5245	62,8713	37,1287

Conditional effect of focal predictor at values of the moderator:

PEA_Mean	Effect	se	t	p	LLCI	ULCI
3,0000	-2,1586	,4356	-4,9550	,0000	-3,0177	-1,2995
3,1833	-2,0226	,4031	-5,0178	,0000	-2,8176	-1,2277
3,3667	-1,8866	,3709	-5,0872	,0000	-2,6180	-1,1553
3,5500	-1,7507	,3390	-5,1635	,0000	-2,4193	-1,0821
3,7333	-1,6147	,3078	-5,2464	,0000	-2,2216	-1,0077
3,9167	-1,4787	,2772	-5,3342	,0000	-2,0253	-,9320
4,1000	-1,3427	,2476	-5,4220	,0000	-1,8310	-,8543
4,2833	-1,2067	,2195	-5,4985	,0000	-1,6395	-,7739
4,4667	-1,0707	,1933	-5,5397	,0000	-1,4518	-,6895
4,6500	-,9347	,1700	-5,4977	,0000	-1,2700	-,5994
4,8333	-,7987	,1510	-5,2880	,0000	-1,0966	-,5008
5,0167	-,6627	,1381	-4,7980	,0000	-,9351	-,3903
5,2000	-,5267	,1330	-3,9592	,0001	-,7891	-,2644
5,3833	-,3907	,1367	-2,8591	,0047	-,6602	-,1212
5,5245	-,2860	,1450	-1,9720	,0500	-,5720	,0000
5,5667	-,2547	,1484	-1,7170	,0875	-,5473	,0378
5,7500	-,1187	,1664	-,7134	,4764	-,4470	,2095
5,9333	,0173	,1891	,0913	,9274	-,3556	,3901
6,1167	,1532	,2148	,7133	,4765	-,2704	,5769
6,3000	,2892	,2427	1,1917	,2348	-,1894	,7679
6,4833	,4252	,2721	1,5629	,1197	-,1113	,9618
6,6667	,5612	,3025	1,8553	,0650	-,0353	1,1578

Data for visualizing the conditional effect of the focal predictor:  
Paste text below into a SPSS syntax window and execute to produce plot.

```
DATA LIST FREE/
  Conditio PEA_Mean ITU_Mean .
BEGIN DATA.
  ,0000 4,4667 5,5800
  1,0000 4,4667 4,5093
  ,0000 5,2667 5,4587
  1,0000 5,2667 4,9814
  ,0000 5,9333 5,3576
  1,0000 5,9333 5,3749
END DATA.
GRAPH/SCATTERPLOT=
  PEA_Mean WITH ITU_Mean BY Conditio .
```

\*\*\*\*\* ANALYSIS NOTES AND ERRORS \*\*\*\*\*

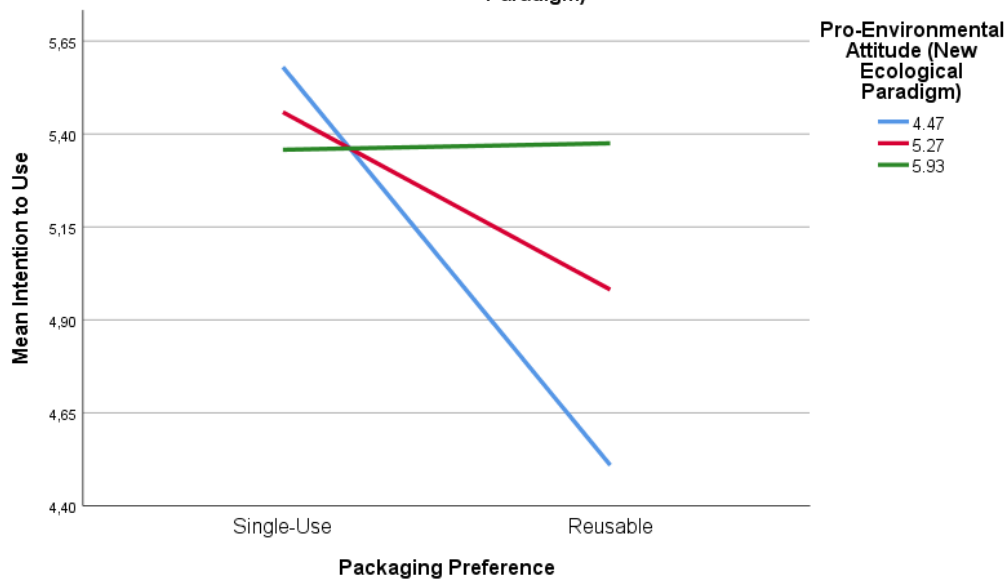
Level of confidence for all confidence intervals in output:  
95,0000

W values in conditional tables are the 16th, 50th, and 84th percentiles.

NOTE: Variables names longer than eight characters can produce incorrect output.  
Shorter variable names are recommended.

----- END MATRIX -----

Multiple Line Mean of Intention to Use by Packaging Preference by Pro-Environmental Attitude (New Ecological Paradigm)



## Appendix 7: Conditional Process Modeling - Moderated Mediation

Run MATRIX procedure:

\*\*\*\*\* PROCESS Procedure for SPSS Version 3.4 \*\*\*\*\*

Written by Andrew F. Hayes, Ph.D. [www.afhayes.com](http://www.afhayes.com)  
 Documentation available in Hayes (2018). [www.guilford.com/p/hayes3](http://www.guilford.com/p/hayes3)

\*\*\*\*\*

Model : 86  
 Y : ITU\_Mean  
 X : Conditio  
 M1 : PEOU\_Mea  
 M2 : PU\_Mean  
 W : PEA\_Mean

Sample  
 Size: 202

\*\*\*\*\*

OUTCOME VARIABLE:  
 PEOU\_Mea

Model Summary	R	R-sq	MSE	F	df1	df2	p
	,3374	,1138	,4378	8,4779	3,0000	198,0000	,0000

Model	coeff	se	t	p	LLCI	ULCI
constant	4,8763	,4580	10,6457	,0000	3,9730	5,7795
Conditio	-1,7579	,6946	-2,5309	,0122	-3,1276	-,3882
PEA_Mean	,1172	,0885	1,3250	,1867	-,0572	,2916
Int_1	,2819	,1320	2,1361	,0339	,0217	,5421

Product terms key:

Int\_1 : Conditio x PEA\_Mean

Test(s) of highest order unconditional interaction(s):

	R2-chng	F	df1	df2	p
X*W	,0204	4,5630	1,0000	198,0000	,0339

-----  
 Focal predict: Conditio (X)  
 Mod var: PEA\_Mean (W)

Conditional effects of the focal predictor at values of the moderator(s):

PEA_Mean	Effect	se	t	p	LLCI	ULCI
4,4667	-,4989	,1362	-3,6626	,0003	-,7675	-,2303
5,2667	-,2734	,0940	-2,9091	,0040	-,4587	-,0881
5,9333	-,0855	,1332	-,6414	,5220	-,3482	,1773

Moderator value(s) defining Johnson-Neyman significance region(s):

Value	% below	% above
5,5223	62,8713	37,1287

Conditional effect of focal predictor at values of the moderator:

PEA_Mean	Effect	se	t	p	LLCI	ULCI
3,0000	-,9123	,3070	-2,9714	,0033	-1,5177	-,3068
3,1833	-,8606	,2841	-3,0295	,0028	-1,4208	-,3004
3,3667	-,8089	,2614	-3,0950	,0023	-1,3243	-,2935
3,5500	-,7572	,2389	-3,1692	,0018	-1,2284	-,2861
3,7333	-,7056	,2169	-3,2531	,0013	-1,1333	-,2779
3,9167	-,6539	,1954	-3,3472	,0010	-1,0391	-,2687
4,1000	-,6022	,1745	-3,4508	,0007	-,9464	-,2581
4,2833	-,5505	,1547	-3,5597	,0005	-,8555	-,2456
4,4667	-,4989	,1362	-3,6626	,0003	-,7675	-,2303
4,6500	-,4472	,1198	-3,7323	,0002	-,6835	-,2109
4,8333	-,3955	,1064	-3,7157	,0003	-,6054	-,1856
5,0167	-,3438	,0973	-3,5324	,0005	-,5358	-,1519
5,2000	-,2922	,0938	-3,1163	,0021	-,4771	-,1073
5,3833	-,2405	,0963	-2,4971	,0133	-,4304	-,0506
5,5223	-,2013	,1021	-1,9720	,0500	-,4027	,0000
5,5667	-,1888	,1046	-1,8059	,0724	-,3950	,0174
5,7500	-,1371	,1173	-1,1692	,2437	-,3684	,0942
5,9333	-,0855	,1332	-,6414	,5220	-,3482	,1773
6,1167	-,0338	,1514	-,2232	,8236	-,3324	,2648
6,3000	,0179	,1711	,1046	,9168	-,3194	,3552
6,4833	,0696	,1917	,3628	,7172	-,3086	,4477
6,6667	,1212	,2132	,5687	,5702	-,2992	,5416

Data for visualizing the conditional effect of the focal predictor:  
 Paste text below into a SPSS syntax window and execute to produce plot.

```
DATA LIST FREE/
  Conditio PEA_Mean PEOU_Mea .
BEGIN DATA.
  ,0000 4,4667 5,3998
  1,0000 4,4667 4,9009
  ,0000 5,2667 5,4935
  1,0000 5,2667 5,2202
  ,0000 5,9333 5,5717
  1,0000 5,9333 5,4862
END DATA.
GRAPH/SCATTERPLOT=
  PEA_Mean WITH PEOU_Mea BY Conditio .
```

\*\*\*\*\*

OUTCOME VARIABLE:

PU\_Mean

Model Summary

R	R-sq	MSE	F	df1	df2	p
,3515	,1235	1,4271	14,0252	2,0000	199,0000	,0000

Model

coeff	se	t	p	LLCI	ULCI
-------	----	---	---	------	------

constant	1,9417	,6827	2,8441	,0049	,5954	3,2880
Conditio	-,3669	,1708	-2,1475	,0330	-,7037	-,0300
PEOU_Mea	,5379	,1227	4,3822	,0000	,2959	,7800

\*\*\*\*\*

OUTCOME VARIABLE:

ITU\_Mean

Model Summary

R	R-sq	MSE	F	df1	df2	p
,5940	,3528	,6722	21,3730	5,0000	196,0000	,0000

Model

	coeff	se	t	p	LLCI	ULCI
constant	3,3786	,7155	4,7223	,0000	1,9676	4,7896
Conditio	-3,6068	,8748	-4,1231	,0001	-5,3320	-1,8816
PEOU_Mea	,3617	,0920	3,9312	,0001	,1802	,5431
PU_Mean	,2681	,0487	5,5043	,0000	,1720	,3641
PEA_Mean	-,2321	,1102	-2,1074	,0364	-,4494	-,0149
Int_1	,6396	,1656	3,8635	,0002	,3131	,9661

Product terms key:

Int\_1 : Conditio x PEA\_Mean

Test(s) of highest order unconditional interaction(s):

	R2-chng	F	df1	df2	p
X*W	,0493	14,9264	1,0000	196,0000	,0002

-----

Focal predict: Conditio (X)  
Mod var: PEA\_Mean (W)

Conditional effects of the focal predictor at values of the moderator(s):

PEA_Mean	Effect	se	t	p	LLCI	ULCI
4,4667	-,7498	,1748	-4,2882	,0000	-1,0946	-,4049
5,2667	-,2381	,1203	-1,9788	,0492	-,4753	-,0008
5,9333	,1884	,1669	1,1286	,2605	-,1408	,5175

Moderator value(s) defining Johnson-Neyman significance region(s):

Value	% below	% above
5,2679	52,9703	47,0297
6,2953	95,5446	4,4554

Conditional effect of focal predictor at values of the moderator:

PEA_Mean	Effect	se	t	p	LLCI	ULCI
3,0000	-1,6879	,3888	-4,3407	,0000	-2,4547	-,9210
3,1833	-1,5706	,3601	-4,3616	,0000	-2,2808	-,8604
3,3667	-1,4533	,3316	-4,3822	,0000	-2,1074	-,7993
3,5500	-1,3361	,3036	-4,4014	,0000	-1,9347	-,7374
3,7333	-1,2188	,2759	-4,4169	,0000	-1,7630	-,6746
3,9167	-1,1016	,2490	-4,4244	,0000	-1,5926	-,6105
4,1000	-,9843	,2229	-4,4164	,0000	-1,4238	-,5447
4,2833	-,8670	,1980	-4,3791	,0000	-1,2575	-,4766
4,4667	-,7498	,1748	-4,2882	,0000	-1,0946	-,4049
4,6500	-,6325	,1542	-4,1014	,0001	-,9366	-,3284
4,8333	-,5152	,1372	-3,7540	,0002	-,7859	-,2446
5,0167	-,3980	,1254	-3,1726	,0018	-,6453	-,1506
5,2000	-,2807	,1203	-2,3331	,0207	-,5180	-,0434
5,2679	-,2373	,1203	-1,9721	,0500	-,4745	,0000
5,3833	-,1634	,1227	-1,3319	,1844	-,4054	,0786
5,5667	-,0462	,1322	-,3491	,7274	-,3069	,2146
5,7500	,0711	,1475	,4821	,6303	-,2197	,3619
5,9333	,1884	,1669	1,1286	,2605	-,1408	,5175
6,1167	,3056	,1892	1,6151	,1079	-,0676	,6788
6,2953	,4199	,2129	1,9721	,0500	,0000	,8398
6,3000	,4229	,2136	1,9803	,0491	,0017	,8441
6,4833	,5402	,2393	2,2577	,0251	,0683	1,0120
6,6667	,6574	,2659	2,4721	,0143	,1330	1,1819

Data for visualizing the conditional effect of the focal predictor:  
 Paste text below into a SPSS syntax window and execute to produce plot.

```

DATA LIST FREE/
  Conditio   PEA_Mean   ITU_Mean   .
BEGIN DATA.
  ,0000      4,4667     5,5212
  1,0000     4,4667     4,7714
  ,0000      5,2667     5,3355
  1,0000     5,2667     5,0974
  ,0000      5,9333     5,1807
  1,0000     5,9333     5,3691
END DATA.
GRAPH/SCATTERPLOT=
  PEA_Mean WITH      ITU_Mean BY      Conditio .

***** DIRECT AND INDIRECT EFFECTS OF X ON Y *****

Conditional direct effect(s) of X on Y:
  PEA_Mean   Effect      se      t      p      LLCI      ULCI
  4,4667     -,7498      ,1748   -4,2882  ,0000   -1,0946   -,4049
  5,2667     -,2381      ,1203   -1,9788  ,0492   -,4753   -,0008
  5,9333     ,1884      ,1669    1,1286  ,2605   -,1408   ,5175

Conditional and unconditional indirect effects of X on Y:

INDIRECT EFFECT:
  Conditio   ->   PEOU_Mea   ->   ITU_Mean

  PEA_Mean   Effect      BootSE   BootLLCI   BootULCI
  4,4667     -,1804      ,0776    -,3587     -,0533
  5,2667     -,0989      ,0449    -,2003     -,0254
  5,9333     -,0309      ,0445    -,1255     ,0542

      Index of moderated mediation:
      Index      BootSE   BootLLCI   BootULCI
PEA_Mean     ,1019      ,0581     ,0053     ,2350
---

INDIRECT EFFECT:
  Conditio   ->   PU_Mean   ->   ITU_Mean

  Effect      BootSE   BootLLCI   BootULCI
  -,0983      ,0507    -,2063     -,0062

INDIRECT EFFECT:
  Conditio   ->   PEOU_Mea   ->   PU_Mean   ->   ITU_Mean

  PEA_Mean   Effect      BootSE   BootLLCI   BootULCI
  4,4667     -,0719      ,0314    -,1436     -,0230
  5,2667     -,0394      ,0185    -,0830     -,0115
  5,9333     -,0123      ,0182    -,0530     ,0215

      Index of moderated mediation:
      Index      BootSE   BootLLCI   BootULCI
PEA_Mean     ,0406      ,0231     ,0020     ,0932
---

***** ANALYSIS NOTES AND ERRORS *****

Level of confidence for all confidence intervals in output:
  95,0000

Number of bootstrap samples for percentile bootstrap confidence intervals:
  5000

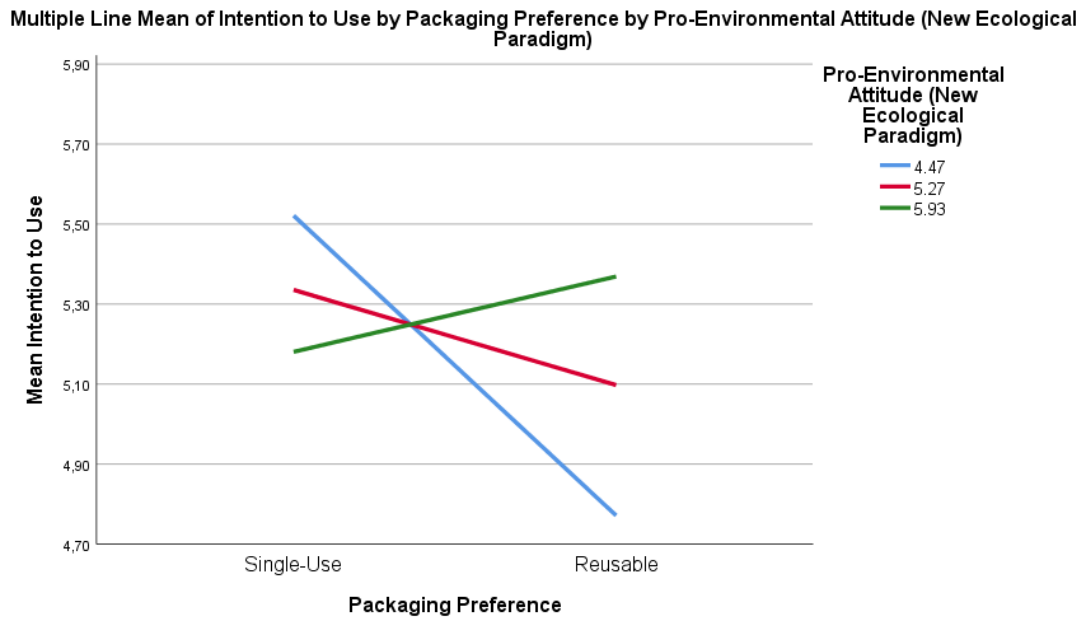
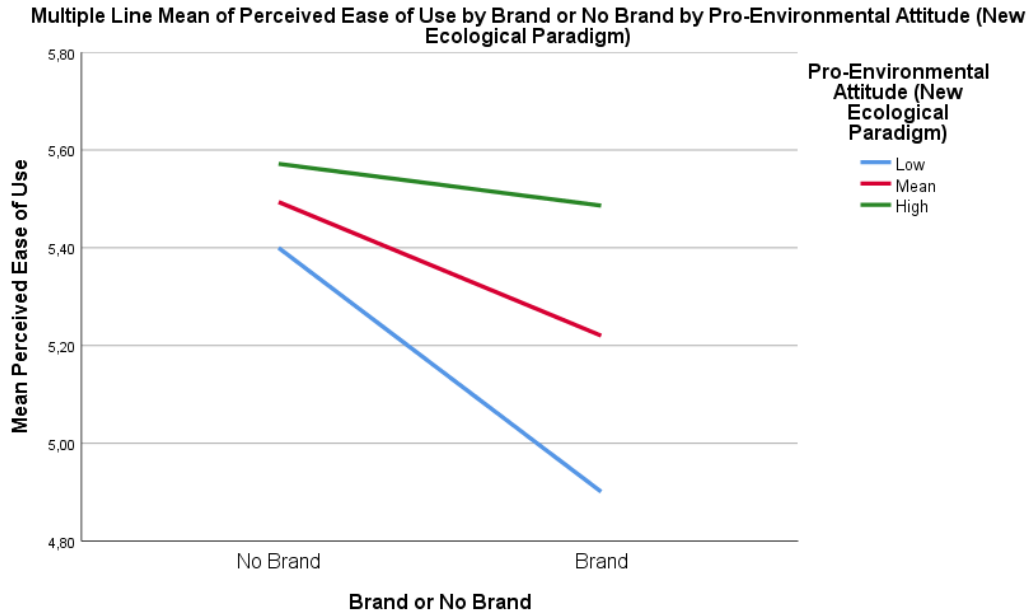
W values in conditional tables are the 16th, 50th, and 84th percentiles.

```

NOTE: Standardized coefficients not available for models with moderators.

NOTE: Variables names longer than eight characters can produce incorrect output. Shorter variable names are recommended.

----- END MATRIX -----



## Appendix 8: Conditional Process Modeling with Brand Effect

Run MATRIX procedure:

\*\*\*\*\* PROCESS Procedure for SPSS Version 3.4 \*\*\*\*\*

Written by Andrew F. Hayes, Ph.D. [www.afhayes.com](http://www.afhayes.com)  
 Documentation available in Hayes (2018). [www.guilford.com/p/hayes3](http://www.guilford.com/p/hayes3)

\*\*\*\*\*

Model : 86  
 Y : ITU\_Mean  
 X : Conditio  
 M1 : PEOU\_Mea  
 M2 : PU\_Mean  
 W : PEA\_Mean

Sample  
 Size: 201

\*\*\*\*\*

OUTCOME VARIABLE:  
 PEOU\_Mea

Model Summary	R	R-sq	MSE	F	df1	df2	p
	,4249	,1806	,4347	14,4700	3,0000	197,0000	,0000

Model	coeff	se	t	p	LLCI	ULCI
constant	3,1184	,5203	5,9931	,0000	2,0923	4,1445
Conditio	2,9452	,7170	4,1077	,0001	1,5313	4,3592
PEA_Mean	,3991	,0976	4,0896	,0001	,2066	,5915
Int_1	-,4687	,1362	-3,4426	,0007	-,7372	-,2002

Product terms key:  
 Int\_1 : Conditio x PEA\_Mean

Test(s) of highest order unconditional interaction(s):	R2-chng	F	df1	df2	p
X*W	,0493	11,8515	1,0000	197,0000	,0007

-----

Focal predict: Conditio (X)  
 Mod var: PEA\_Mean (W)

Conditional effects of the focal predictor at values of the moderator(s):

PEA_Mean	Effect	se	t	p	LLCI	ULCI
4,4667	,8516	,1389	6,1306	,0000	,5777	1,1256
5,2667	,4766	,0937	5,0859	,0000	,2918	,6614
5,9120	,1741	,1326	1,3130	,1907	-,0874	,4357

Moderator value(s) defining Johnson-Neyman significance region(s):

Value	% below	% above
5,7773	76,1194	23,8806

Conditional effect of focal predictor at values of the moderator:

PEA_Mean	Effect	se	t	p	LLCI	ULCI
3,0667	1,5078	,3079	4,8974	,0000	,9006	2,1150
3,2533	1,4203	,2838	5,0051	,0000	,8607	1,9799
3,4400	1,3328	,2599	5,1280	,0000	,8203	1,8454
3,6267	1,2453	,2364	5,2684	,0000	,7792	1,7115
3,8133	1,1578	,2133	5,4289	,0000	,7372	1,5784
4,0000	1,0703	,1908	5,6111	,0000	,6942	1,4465
4,1867	,9828	,1691	5,8135	,0000	,6494	1,3163
4,3733	,8954	,1486	6,0271	,0000	,6024	1,1883
4,5600	,8079	,1298	6,2240	,0000	,5519	1,0638
4,7467	,7204	,1137	6,3381	,0000	,4962	,9445

4,9333	,6329	,1014	6,2420	,0000	,4329	,8328
5,1200	,5454	,0945	5,7700	,0000	,3590	,7318
5,3067	,4579	,0942	4,8590	,0000	,2720	,6437
5,4933	,3704	,1006	3,6823	,0003	,1720	,5687
5,6800	,2829	,1125	2,5155	,0127	,0611	,5047
5,7773	,2373	,1203	1,9721	,0500	,0000	,4746
5,8667	,1954	,1283	1,5226	,1295	-,0577	,4485
6,0533	,1079	,1469	,7345	,4635	-,1818	,3976
6,2400	,0204	,1673	,1220	,9031	-,3095	,3503
6,4267	-,0671	,1889	-,3552	,7229	-,4396	,3054
6,6133	-,1546	,2114	-,7314	,4654	-,5714	,2622
6,8000	-,2421	,2344	-1,0327	,3030	-,7044	,2202

Data for visualizing the conditional effect of the focal predictor:  
Paste text below into a SPSS syntax window and execute to produce plot.

```

DATA LIST FREE/
  Conditio  PEA_Mean  PEOU_Mea  .
BEGIN DATA.
  ,0000      4,4667    4,9009
  1,0000      4,4667    5,7525
  ,0000      5,2667    5,2202
  1,0000      5,2667    5,6968
  ,0000      5,9120    5,4777
  1,0000      5,9120    5,6518
END DATA.
GRAPH/SCATTERPLOT=
  PEA_Mean WITH      PEOU_Mea BY      Conditio .

*****
OUTCOME VARIABLE:
  PU_Mean

Model Summary
      R      R-sq      MSE      F      df1      df2      p
,2785  ,0775  1,1190  8,3222  2,0000  198,0000  ,0003

Model
      coeff      se      t      p      LLCI      ULCI
constant  2,8349  ,5827  4,8647  ,0000  1,6857  3,9840
Conditio  ,3460  ,1581  2,1892  ,0298  ,0343  ,6578
PEOU_Mea  ,2771  ,1096  2,5281  ,0122  ,0609  ,4932

*****
OUTCOME VARIABLE:
  ITU_Mean

Model Summary
      R      R-sq      MSE      F      df1      df2      p
,5086  ,2587  ,3843  13,6091  5,0000  195,0000  ,0000

Model
      coeff      se      t      p      LLCI      ULCI
constant  ,7393  ,5434  1,3604  ,1753  -,3324  1,8111
Conditio  1,6097  ,7028  2,2902  ,0231  ,2235  2,9958
PEOU_Mea  ,2157  ,0679  3,1754  ,0017  ,0817  ,3496
PU_Mean   ,1317  ,0417  3,1606  ,0018  ,0495  ,2138
PEA_Mean  ,4847  ,0956  5,0711  ,0000  ,2962  ,6732
Int_1     -,3470  ,1318  -2,6326  ,0092  -,6070  -,0871

Product terms key:
  Int_1      :      Conditio x      PEA_Mean

Test(s) of highest order unconditional interaction(s):
      R2-chng      F      df1      df2      p
X*W      ,0263      6,9308      1,0000      195,0000      ,0092
-----
      Focal predict: Conditio (X)

```

Mod var: PEA\_Mean (W)

Conditional effects of the focal predictor at values of the moderator(s):

PEA_Mean	Effect	se	t	p	LLCI	ULCI
4,4667	,0595	,1434	,4151	,6785	-,2233	,3424
5,2667	-,2181	,0948	-2,2995	,0225	-,4052	-,0310
5,9120	-,4421	,1260	-3,5094	,0006	-,6905	-,1936

Moderator value(s) defining Johnson-Neyman significance region(s):

Value	% below	% above
5,1823	46,2687	53,7313

Conditional effect of focal predictor at values of the moderator:

PEA_Mean	Effect	se	t	p	LLCI	ULCI
3,0667	,5454	,3072	1,7756	,0774	-,0604	1,1512
3,2533	,4806	,2839	1,6931	,0920	-,0792	1,0404
3,4400	,4158	,2608	1,5945	,1125	-,0985	,9302
3,6267	,3511	,2380	1,4747	,1419	-,1184	,8205
3,8133	,2863	,2157	1,3272	,1860	-,1391	,7117
4,0000	,2215	,1939	1,1423	,2547	-,1609	,6039
4,1867	,1567	,1729	,9066	,3657	-,1842	,4976
4,3733	,0919	,1529	,6013	,5483	-,2096	,3934
4,5600	,0271	,1344	,2019	,8402	-,2380	,2923
4,7467	-,0376	,1183	-,3182	,7507	-,2709	,1956
4,9333	-,1024	,1054	-,9714	,3325	-,3104	,1055
5,1200	-,1672	,0972	-1,7197	,0871	-,3590	,0246
5,1823	-,1888	,0957	-1,9722	,0500	-,3777	,0000
5,3067	-,2320	,0949	-2,4451	,0154	-,4191	-,0449
5,4933	-,2968	,0988	-3,0038	,0030	-,4916	-,1019
5,6800	-,3615	,1083	-3,3381	,0010	-,5752	-,1479
5,8667	-,4263	,1221	-3,4912	,0006	-,6672	-,1855
6,0533	-,4911	,1389	-3,5347	,0005	-,7651	-,2171
6,2400	-,5559	,1578	-3,5223	,0005	-,8671	-,2446
6,4267	-,6207	,1781	-3,4849	,0006	-,9719	-,2694
6,6133	-,6855	,1994	-3,4382	,0007	-1,0786	-,2923
6,8000	-,7502	,2213	-3,3898	,0008	-1,1867	-,3137

Data for visualizing the conditional effect of the focal predictor:  
Paste text below into a SPSS syntax window and execute to produce plot.

DATA LIST FREE/

```
Conditio PEA_Mean ITU_Mean .
BEGIN DATA.
,0000 4,4667 4,6784
1,0000 4,4667 4,7380
,0000 5,2667 5,0662
1,0000 5,2667 4,8481
,0000 5,9120 5,3790
1,0000 5,9120 4,9369
```

END DATA.

GRAPH/SCATTERPLOT=

PEA\_Mean WITH ITU\_Mean BY Conditio .

\*\*\*\*\* DIRECT AND INDIRECT EFFECTS OF X ON Y \*\*\*\*\*

Conditional direct effect(s) of X on Y:

PEA_Mean	Effect	se	t	p	LLCI	ULCI
4,4667	,0595	,1434	,4151	,6785	-,2233	,3424
5,2667	-,2181	,0948	-2,2995	,0225	-,4052	-,0310
5,9120	-,4421	,1260	-3,5094	,0006	-,6905	-,1936

Conditional and unconditional indirect effects of X on Y:

INDIRECT EFFECT:

Conditio -> PEOU\_Mea -> ITU\_Mean

PEA_Mean	Effect	BootSE	BootLLCI	BootULCI
----------	--------	--------	----------	----------

4,4667	,1837	,0684	,0566	,3264
5,2667	,1028	,0430	,0283	,2006
5,9120	,0376	,0372	-,0201	,1277

Index of moderated mediation:

	Index	BootSE	BootLLCI	BootULCI
PEA_Mean	-,1011	,0442	-,1970	-,0269

---

INDIRECT EFFECT:

Conditio	->	PU_Mean	->	ITU_Mean
Effect		BootSE	BootLLCI	BootULCI
		,0456	,0284	,0002
				,1092

INDIRECT EFFECT:

Conditio	->	PEOU_Mea	->	PU_Mean	->	ITU_Mean
PEA_Mean	Effect	BootSE	BootLLCI	BootULCI		
4,4667	,0311	,0200	,0024	,0774		
5,2667	,0174	,0120	,0013	,0463		
5,9120	,0064	,0078	-,0028	,0264		

Index of moderated mediation:

	Index	BootSE	BootLLCI	BootULCI
PEA_Mean	-,0171	,0115	-,0446	-,0011

---

\*\*\*\*\* ANALYSIS NOTES AND ERRORS \*\*\*\*\*

Level of confidence for all confidence intervals in output:  
95,0000

Number of bootstrap samples for percentile bootstrap confidence intervals:  
5000

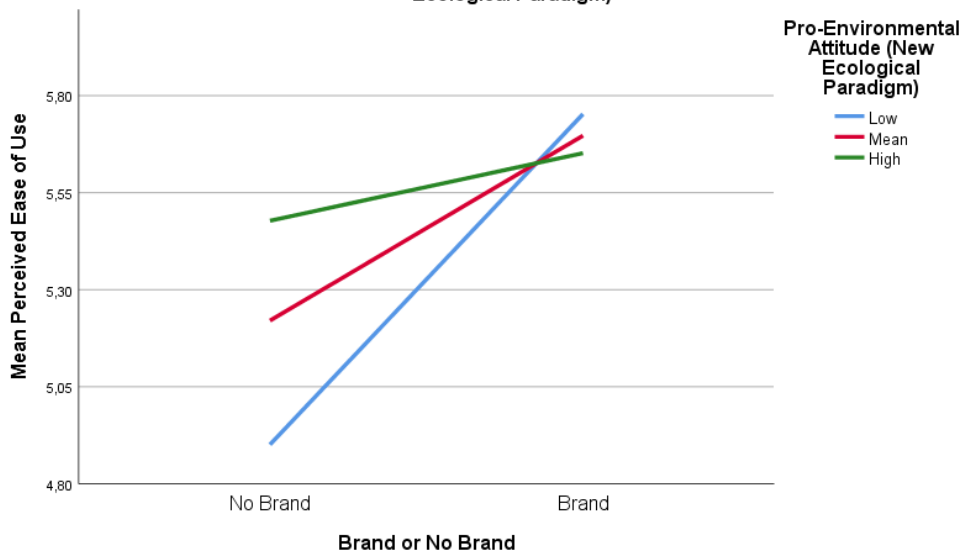
W values in conditional tables are the 16th, 50th, and 84th percentiles.

NOTE: Standardized coefficients not available for models with moderators.

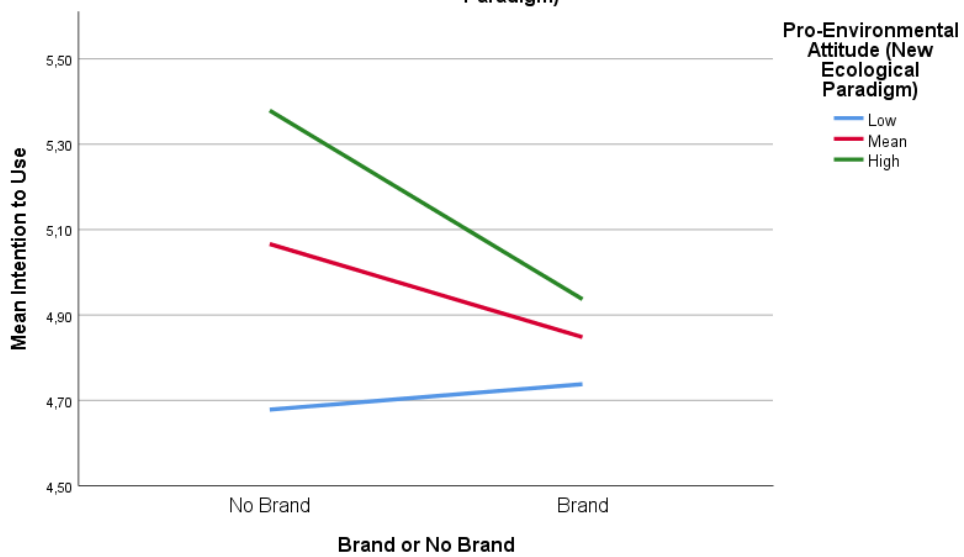
NOTE: Variables names longer than eight characters can produce incorrect output.  
Shorter variable names are recommended.

----- END MATRIX -----

Multiple Line Mean of Perceived Ease of Use by Brand or No Brand by Pro-Environmental Attitude (New Ecological Paradigm)



Multiple Line Mean of Intention to Use by Brand or No Brand by Pro-Environmental Attitude (New Ecological Paradigm)



## Appendix 9: Cluster Analysis

	Cluster			
	1	2	3	4
PEA_Mean	5,49	5,13	5,43	4,80
How often have you used a surface cleaner, in the last trimester?	5	2	3	6
Age	2,00	5,00	4,00	6,00
Income	1,00	2,00	6,00	4,00

## ANOVA

	Cluster		Error		F	Sig.
	Mean Square	df	Mean Square	df		
PEA_Mean	9,819	3	,452	364	21,734	,000
How often have you used a surface cleaner, in the last trimester?	23,689	3	1,714	364	13,817	,000
Age	193,410	3	,670	364	288,833	,000
Income	459,978	3	,763	364	602,885	,000

